

REPORT

A monthly report on transportation research, education, and information/outreach activities at the University of Minnesota

April 2000

Matthew J. Huber: 1922–2000

Professor Emeritus **Matthew J. Huber**, who taught transportation engineering in the Department of Civil Engineering for more than 20 years, died February 22.

With his passing the transportation community loses one of its most respected contributors, particularly in the field of traffic engineering. He was an educator who spent his career teaching students how to ask the right questions, gather the necessary data, and use traffic engineering tools to find solutions for safe and efficient design of highways.

Huber's career included teaching positions at Michigan State, Yale (where he taught **Doug Differt** and **Pete Fausch** of the CTS Executive Committee), and Minnesota. While at Yale Dr. Huber and Dr. **Fred Heard** contributed to the first highway capacity manual. "This was the bible of operational analysis of highways and for design of traffic projections to be used for geometric instructional designs," says Differt. Fruits of Huber's efforts can be enjoyed by millions of motorists who drive major U.S. highway systems as well as many motorists in foreign countries whose engineers had the privilege of studying with Huber, Differt adds.

Fausch also emphasizes



Matt Huber was an inspiration to the many students who learned from and admired him.

Huber's inspirational role. "As I look back on all the instructors I encountered as a student, he was at the top of the list. He was probably the closest thing to a 'teacher,' rather than a 'lecturer,' of anyone I've ever taken courses with. In fact, I kept notes from his classes for many years and used them in my work. I believe he was a part of the basis for the success I've achieved in my career."

The Matthew J. Huber Award for Excellence in Transportation Research and Education, which CTS presents each year to transportation students, is named in honor of Huber's many contributions to transportation education.

"Matt was instrumental in the creation of CTS," says **Richard P. Braun**, founding director of CTS. "He helped me define the role of the Center, select initial staff, and provide a link between faculty and practitioners. I always marveled at his excellent rapport with students—and that rapport provided a real tie for CTS to both the students and faculty. His presence in the transportation community will be sorely missed." [ITS](#)

"Matt was instrumental in the creation of CTS."

—Richard P. Braun

Reminder: Register Now for CTS Annual Research Conference

The preliminary program (with registration form) for the CTS Eleventh Annual Transportation Research Conference was mailed early this month. The conference will be held at Touchstone Energy@Place at RiverCentre in St. Paul. Highlights include:

- Opening remarks by Commissioner **Elwyn Tinklenberg** of the Minnesota Department of Transportation (Mn/DOT).
- An opening plenary session discussion on "The Sprawl Debate," with **Don Chen** from the Surface Transportation Policy Project (invited) and Dr. **Harry Richardson** from the School of Policy, Planning and Development at the University of California.
- A luncheon presentation on May 24 by **Barbara M. Fraumeni**, chief economist of the Bureau of Economic Analysis, on "Productive Highway Capital Stock: Who Cares?"
- A "Meet the Authors" poster session on May 24 sponsored by the Transportation Safety and Traffic Flow Council.
- A breakfast plenary session on May 25 titled "Transportation Funding: Is Minnesota Headed in the Right Direction?" Panel members include Senator **Carol Flynn**, chair of the Senate Transportation Policy Committee (invited); Representative **Carol Molnau**, chair of the House Transportation Finance Division (invited); **Fred Corrigan**, executive vice president of the Minnesota Transportation Alliance; and **Mark Hoisser**, president of the Minnesota Public Transit Association.
- Two half-day workshops on May 25: one on bridge infrastructure and the other on transportation and regional growth. For further information or extra programs call **Catherine Ploetz**, 612-625-4257. [ITS](#)

Intelligent Vehicles Are Focus of ITS Minnesota Annual Forum

Intelligent vehicle technology was the focus of ITS Minnesota's Sixth Annual Meeting & Information Exchange Forum, held on March 8 in Minneapolis. CTS is a founding member of ITS Minnesota and cosponsored the event.

Jeff Benson, former president of ITS Minnesota, opened the forum and introduced Deputy Commissioner **Doug Weiszhaar** of

Forum continued on next page

Forum from page 1

Mn/DOT for opening remarks.

Weiszhaar credited the many partnerships, such as that between the Center's ITS Institute and Mn/DOT, for the success of intelligent transportation systems (ITS) in Minnesota. He also declared that the key for future success is not just to deploy technology in vehicles, but to use it to improve driving safety.

Ray Resendes, program coordinator of the Federal Highway Administration's Intelligent Vehicles Initiative (IVI), gave the federal perspective in a speech on "The Federal IVI and the Role of Cooperative Infrastructure." Resendes described the IVI chiefly as a safety program to help decrease the number of U.S. traffic deaths, which have plateaued in recent years. The program is a three-pronged strategy involving vehicle-based solutions, such as on-board warning systems; infrastructure solutions, such as sensor-friendly roadways; and enhanced digital maps.

Unlike other ITS areas, which are now in the deployment stage, the IVI is a research program in which deployment will evolve over several generations. For example, rear-end collisions represent the second largest number of crashes and are one of the easiest problems to solve. Systems can be purchased today for heavy trucks, and the FHWA entered into an agreement last year with GM and Delco to field test systems on real roads with real passengers. Similarly, Cadillac now offers a vision enhancement system due in part to federally sponsored research. For other problem areas, however, such as intersections, IVI systems are planned for next generation deployment because of the complexity of the research issues involved, cost, or other factors, Resendes said.

System integration and driver workload are other research issues on the IVI agenda. "I can't emphasize enough how important human factors [research] is to the IVI," he said. In closing, Resendes predicted that in about five years we may be able to buy rear-end collision avoidance systems on a few models of cars, and advanced cruise control will be more common. [For more about the IVI visit www.its.dot.gov/ivi/ivi.htm.]

Professor **Max Donath**, director of the ITS Institute, presented "IVI Technology and Research Results" as part of a session on Mn/DOT's IVI special vehicle projects. He reviewed some of the technologies being studied as part of the Institute's SAFEFLOW research program, including digital global positioning systems (DGPS), radar obstacle detection, and data acquisition systems. "The key technology issues are to optimize these systems for driver acceptance and ensure that the systems are reliable and fault-tolerant and offer exceptional performance," Donath said.

A field operational test of technologies first developed for the SAFEFLOW is being funded in part under the federal IVI, through which the University will receive \$2.65 million over three years. Mn/DOT and private industry are also providing funding for



Doug Weiszhaar, Ray Resendes, and Max Donath spoke at ITS Minnesota's Sixth Annual Forum.

the project, which begins field installation and detail design this year on Highway 7 between Hutchinson and the Twin Cities. Additional partners include McLeod County and the city of Hutchinson. [See the December CTS Report for details.]

Other forum speakers described IVI evaluation efforts and gave updates on major ITS programs in Minnesota. The event closed with remarks from **Marthand Nookala**, incoming president of ITS Minnesota. **ITS**

CURA Updates Trade Center Report for Mn/DOT

At the request of Mn/DOT, the University's Center for Urban and Regional Affairs (CURA) has updated a 1990 report on regional trade centers. *Trade Centers of the Upper Midwest: Changes from 1960 to 1989*, was published in 1990 by a research team including Professor **John Adams** of Geography and then-graduate student **William Casey**.

Casey updated the 1990 report last year, using computerized data sets for demographic information as well as detailed information on types of business establishments. The economic model used in the study classified the Upper Midwest's trade center structure into a hierarchy of eight distinct levels based on population and number and mix of businesses. Some of the findings in the update include:

- The number of major metropolitan areas has doubled, and Minnesota experienced more change than the other six states in the area.
- Growth in cities of modest size and larger appears to be at the expense of smaller places.
- The vast majority of the change in Minnesota was from cities moving up the hierarchy of trade centers.

Since 1990, data about regional trade centers have played an important role in Mn/DOT's identification of interregional corridors. These corridors are designed to provide essential access to regional trade centers and selected other places and to promote safe and efficient movement of people and goods. Proposals connected with these corridors will be part of Mn/DOT's legislative initiatives over the next two years. The CURA trade centers update is a major component of the 2000 Statewide Transportation Plan. [Additional information can be found on the Statewide Interregional Corridors Web site: www.oim.dot.state.mn.us/irc/]

Casey's update appeared in CURA's January 2000 Reporter newsletter. For a copy of the newsletter, call CURA at 612-625-1551, or e-mail cura@tc.umn.edu. **ITS**

Local News Covers U Technology that Detects Driver Fatigue

A driver fatigue detection system under development by Professor **Nikolaos Papanikolopoulos** of the Department of Computer Science and Engineering was featured twice in March on Twin Cities local TV station KMSB's nightly news.

Designed by Papanikolopoulos and students **Rahul Singh** and **Rotherick Tan**, the system was fea-



Nikolaos Papanikolopoulos

TRANSPORTATION & REGIONAL GROWTH STUDY

Workshop Explores Cost Incidence

CTS research associate **David Anderson** presented the Transportation and Regional Growth Study's March workshop, titled "The Incidence of Transportation Costs in the Twin Cities Region," on March 15 in Minneapolis. Anderson, along with **Gerard McCullough**, CTS director and professor of applied economics, are calculating cost incidence by geographic regions and by income/vehicle ownership groups. Their goal for this stage of the study is to determine how costs vary for these groups in order to aid in policy analysis.

The broad tasks addressed in their study are calculating the full social costs of regional travel for the years 1998 and 2020, and determining who bears and who imposes these costs. Specific objectives include identifying costs that are growing rapidly or are distributed unfairly, and identifying activities with large gaps between social and private costs.

Costs are divided into three categories in the study: governmental costs (those borne by governments for roads, highways, and highway patrol, for instance); internal costs such as fuel or depreciation, borne by the person who causes them; and external costs, which are those not borne by the person who causes them, such as noise and pollution. The work on cost incidence focuses on the latter two categories.

Anderson and McCullough are examining these costs for 78 locations within the 19-county study area and for nine income/vehicle ownership categories.

Government Cost Findings

Governmental transportation costs are paid for in part with general revenue and in part with user fees. User fees also vary greatly across households. For example:

- The amount collected through fuel taxes is determined by vehicle type and by how much and how fast people drive.
- Vehicle registration fees are based on the age of the vehicle owned, and hence tend to rise with income.
- Special assessments for transportation are an important source of revenue for local governments.
- Fees paid by commercial vehicles are

tured in news segments focusing on sleep deprivation and drowsy drivers.

The objective of Papanikolopoulos's Mn/DOT-sponsored research is to build a system that tracks the eyes (in other words, the iris) or other facial characteristics of a driver in order to detect fatigue. Fatigue can be detected by visually monitoring a driver's eyes and head position. Standard monochrome cameras can detect an iris at distances of 30–45 centimeters. Since the shape of the iris does not change significantly from person to person, deformable models can be used to detect and track the iris, Papanikolopoulos explains. In addition, the eyes and the head move according to several well-

assumed to be costs passed on to consumers.

Heavy vehicles damage roads and bridges, imposing some maintenance costs for government. Passenger cars also impose governmental costs for services such as police and fire.

External Cost Findings

External costs depend on how, when, and where travel takes place. The same person may both impose and bear the same type of external cost, and these costs will not generally be equal. Location primarily determines who bears the external costs of air pollution and noise. Generally, the people who impose congestion bear its cost. Some

external crash costs are borne by drivers and some by pedestrians and bicyclists, although it's difficult to get good data on pedestrian and bicycle crashes in small areas, Anderson said.

People outside the region also bear certain some external costs. Examples include externalities from energy use, global warming, and crop damage.

Many external costs imposed by groups of people are closely related to some combination of vehicle miles traveled (VMT) and vehicle hours traveled (VHT). VHT and VMT increase somewhat with distance from the central business districts. People who are further from these districts generally travel in areas with lower densities, however, which may reduce the costs of some types of external impacts.

Future Work

Anderson and McCullough will finish calculating and assembling cost incidence data. Further work includes investigating transportation financing alternatives and determining the costs of two alternative transportation systems.

Upcoming Workshops

The next workshop, scheduled for Wednesday, April 12, will feature CTS research associate **Gary Barnes** presenting "Density and Travel Behavior in U.S. Cities." A third workshop is scheduled for Wednesday, May 3; the presenter will be announced shortly. Both workshops will be held from 3:30–5:00 p.m. in 1-126 Carlson

School of Management. **ITS**



David Anderson's presentation of cost incidence in transportation generated discussion among the many attendees at the first spring workshop.

**Details for events
are posted on the study's Web site:
www.umn.edu/cts/trg.**

known patterns that can be captured by the deformable model.

When the system detects that a driver is getting sleepy, a fatigue warning system would set off an alarm or make the seat vibrate to wake up the driver. Driver warning systems are part of the research under way at the ITS Institute's Intelligent Vehicles laboratory, which includes the SAFEFLOW and SAFETRUCK testbeds.

"Driver fatigue is becoming an important factor in accidents. Early detection of driver fatigue can prevent a large number of them," says Papanikolopoulos.

The state of Illinois hopes to field test a similar system soon. **ITS**

ITS Institute Board Approves Research Funding, FY01 Plan

The ITS Institute Board met on March 13. The meeting began with a presentation by **David Levinson**, assistant professor in the Department of Civil Engineering. **Max Donath**, director of the ITS Institute, presented the proposed research program for the Institute and provided information concerning the new peer-reviewed research selection process undertaken by the Institute this year. The board unanimously approved the Institute's FY01 research program.

The board also approved the Strategic Activities Plan for FY01—the first full year of Institute activities under the new TEA-21 grant—and the corresponding preliminary budget. The final budget will be approved when the board meets again in August in conjunction with the Institute's Annual Meeting and Peer Review.

In November, the board will meet to discuss opportunities for the Institute to become more involved in transit-related research. **Tim Johnson** from the Federal Transit Administration (FTA) attended the board meeting and will help the Institute coordinate an FTA presentation on transit research to the board. **CTS**

Researchers Speak to Legislature, Executive Committee

University researchers made the following presentations in recent months:

- **Nikolaos Papanikolopoulos**, Computer Science, testified before the Minnesota Senate Higher Education Budget Division about a federally funded robotics project. He demonstrated the "Scout" robot and described the partnership of University researchers and local companies who are working together on this "totally Minnesota operation." He also noted to the senators how the University involves both undergraduate and graduate students in such projects.
- **Barry Ryan**, Applied Economics and a researcher for the Transportation and Regional Growth Study, testified before the Minnesota Senate Transportation Policy Committee on the financing of the transportation system.
- **David Kittelson**, Mechanical Engineering, presented information on emissions research to the CTS Executive Committee on January 4. Kittelson, codirector of the Center for Diesel Research, is leading a project to measure nanoparticles in emissions from mobile sources. [See the August 1999 CTS Report for more about this research.] **CTS**

See a Pothole on Campus?

If you do, call the University's Parking and Transportation Services "Pothole Hotline." Advertised in the *Minnesota Daily* and elsewhere, the hotline allows motorists who see a campus pothole to notify the department, which then determines if it is a campus, city, or county street and has it repaired. The phone number is 612-626-7578; e-mail parking@tc.umn.edu. **CTS**

Upcoming Transportation and Related Events

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

- Apr. 4–May 2 League of Minnesota Cities 2000 Safety and Loss Control Workshops, various cities and dates. Call **Ellen Longfellow**, 651-281-1269, 800-925-1122, or visit www.lmnc.org.
- Apr. 18–20 "Airports R Us," Minnesota Airport Symposium 2000, Duluth Entertainment & Convention Center. Call Minnesota Council of Airports, 218-828-5049.
- Apr. 26 "The Untold Story: Secrets from the 'Collar Counties.'" Sponsor: Sensible Land Use Coalition. Call 612-474-3302.
- May 1–4 ITS America Tenth Annual Meeting and Exposition, Boston. Call **Katrina Mayo**, 202-484-4549, or visit www.itsa.org.
- May 10–12 2000 Minnesota Safety & Health Conference, Minneapolis Convention Center. Sponsor: Minnesota Safety Council. Call **Carol Wicks**, 651-228-7319.
- May 10–12 Minnesota Public Works Association Spring Conference, Rutgers Bay Lake. Call **Bev Ringsak**, 612-624-3720.
- May 18–20 Fifth National Aviation System Planning Symposium, Duluth. Call **Catherine Ploetz**, 612-625-4257; e-mail cploetz@cce.umn.edu.
- May 24–25 CTS Eleventh Annual Transportation Research Conference, RiverCentre, St. Paul. Call **Catherine Ploetz**, 612-625-4257; e-mail cploetz@cce.umn.edu.
- July 9–11 2000 Midwest Regional & Shortline Railroad Annual Conference, Arrowwood Resort, Alexandria, Minn. Sponsor: Minnesota Regional Railroads Association. Call **Amber Larsen Backhaus**, 651-228-9757. **CTS**

CTS Publishes Degree Program & Course Handbook

CTS has published an updated version of *Transportation-Related Degree Programs and Courses*. Intended for students and potential students, the handbook describes transportation education opportunities at the University of Minnesota, Twin Cities campus. The 47-page document includes three major sections: graduate degree programs; undergraduate degree programs; and a listing by department of transportation-related courses and research topics.

For a copy call **Mindy Jones** of CTS at 612-625-1813, or visit the CTS Web site at www.umn.edu/education/courseguide. **CTS**