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Policy and Planning

CTS to host new online academic journal

Several academic journals touch on the interaction of transport and land use—but only peripherally. A new venue developed by David Levinson and Kevin J. Krizek and hosted by CTS puts transport and land use front and center.

The goal for the Web-based Journal of Transport and Land Use (JTLU) is to be the leading outlet for research at the interdisciplinary intersection of these two domains, including work from the fields of engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science, and complex systems.

Levinson and Krizek are the editors of the journal. Levinson holds the Richard P. Braun/CTS Chair in Transportation Engineering and directs the Networks, Economics, and Urban Systems (Nexus) Research Group. Krizek is associate professor of planning, design, and civil engineering and director of the Active Communities / Transportation (ACT) Research Group at the University of Colorado. He was formerly an associate professor in the Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota, where he still serves as a CTS Faculty Scholar.

The peer-reviewed Journal of Transport and Land Use will follow an open-content, subscription-free process; contributions are also free of charge. All of this is enabled by support from CTS, where the journal will be housed. The new journal and new process offer several advantages:

- With a rigorous peer-review process, the journal will publish only high-quality papers that meet scientific standards.
- By being Web-based (and Web-only), costs are much lower and turnaround time faster than paper publication. A Web-based format also allows the inclusion of full-color graphics, multimedia content, and datasets.
- By being open-content, papers published in JTLU can be freely distributed (with attribution), increasing the value of the papers and their likelihood of being used in course readers and read by the public.
- By being subscription-free, the journal avoids the fundamental problem of today’s expensive journals published by for-profit publishers, which many libraries can no longer afford.
- By being free-to-contribute, JTLU overcomes the burden of the open-content journals that charge authors to publish their papers.

Levinson and Krizek are now soliciting papers. Details about the journal, its editorial process, and paper submission are on the Journal’s Web site. If you are interested in organizing a special issue, please e-mail Levinson at dlevinson@umn.edu.

Intelligent Transportation Systems

Minnesota Traffic Observatory opens its eyes on complex transportation issues
Astronomers call it "first light"—the moment when a new telescope captures its first images of the cosmos. A different kind of first light was celebrated in May, when the Minnesota Traffic Observatory (MTO) opened its eyes on the Twin Cities’ traffic network and gave researchers a powerful new set of tools for studying complex traffic systems.

Standing in front of a wall-sized projection screen displaying live video from several traffic cameras overlooking the I-94/35W Commons freeway interchange area, MTO director John Hourdos talked about how he hopes the Observatory will help researchers studying complex traffic systems.

"Instead of looking at just one or two locations, the Observatory offers the ability to look at large systems where many different parts interact," he explained.

A joint effort of the Intelligent Transportation Systems Institute and the Department of Civil Engineering, the Observatory boasts the ability to integrate real-time traffic data with state-of-the-art simulation systems, making it possible to analyze existing conditions and compare real-world observations with the results of simulated conditions.

Hourdos gained considerable experience in both traffic monitoring and simulation during his doctoral research, carried out largely in the MTO’s predecessor facility, the ITS Laboratory. He worked with civil engineering professor Panos Michalopoulos, ITS Lab manager Ted Morris, and educational systems engineer Chen-Fu Liao on video-based data gathering for monitoring vehicle movements.

Much of the work carried out in the ITS Laboratory laid the foundations for establishing the Minnesota Traffic Observatory, according to ITS Institute director Max Donath. With Morris and Liao joining Hourdos in the new facility, the MTO builds on its predecessor’s successes and adds new capabilities to work with researchers from a wide range of fields.

Windows on the world
In addition to data from the thousands of pavement-embedded loop detectors throughout the Twin Cities traffic system, the Observatory exploits the advantages of video-based traffic monitoring.

- The Observatory is connected by fiber-optic lines to the Minnesota Department of Transportation’s traffic operations center, allowing it to capture live feed from up to 16 of the more than 300 cameras the agency uses to monitor the metropolitan freeway system.
- The MTO also relies on a dedicated video-based traffic monitoring system covering the I-94/35W Commons freeway interchange area in Minneapolis, one of the state’s most accident-prone freeway areas.

For Chen-Fu Liao, these data-gathering capabilities provide the ideal foundation for traffic modeling and simulation. Working with members of the University faculty, Liao has developed simulation modules that let students in transportation planning courses investigate the effects of travel demand levels and signal timing schemes. He counts this work among his most important contributions, because it advances the education of new generations of transportation researchers and managers. In the future, Liao plans to develop similar simulation "games" for high-school students as a way of teaching about how the traffic network is managed.

Given the complexity of the traffic issues that the Observatory is designed to study, robust visualization tools are of critical importance. In addition to a large projection wall, two innovative pieces of equipment provide researchers with powerful interactive visualization capabilities.

- The GIS/MAP table, built by Hourdos and the Observatory staff, combines the large horizontal working surface of a traditional drafting table with the interactive capabilities of Geographic Information Systems technology.
- The Digital Environment, or DEN, takes a different approach—putting viewers in the center of the action via 3D immersive graphics. Three sides of the cubical structure are made up of large rear-projection screens made of a polarized material that actually transmits two slightly different images; a user wearing specially polarized glasses sees a different image with each eye, producing a realistic sense of three-dimensional space.

For the Observatory’s director, the MTO represents the logical evolution of the ITS Institute’s traffic research capabilities.

"There’s so many different kinds of traffic-related research going on today, and the demand for the kind of capabilities the Observatory brings to the table is increasing,” said Hourdos.

[Note: an expanded version of this article appears in the Summer 2007 ITS Institute Sensor.]

Papers win awards
A paper coauthored by Rajesh Rajamani on tire-road friction estimation was selected for the 2007 O. Hugo Schuck Award. This prestigious award in the controls systems community is given to the best paper presented at the American Control Conference. The award was presented during the 2007 conference awards luncheon in New York City. Rajamani, an associate professor in mechanical engineering, is a CTS Faculty Scholar and has conducted many projects funded by the ITS Institute.

Xinkai Wu, a student advised by civil engineering assistant professor Henry Liu, won the 2007 Institute of Transportation Engineers (ITE) Midwestern District’s Student Paper Award. His paper previously won the North Central ITE student paper award and now is being submitted to International ITE for consideration. The paper is titled “Improving Queue Size Estimation for Minnesota’s Stratified Zone Metering Strategy,” and the work is based on a recently completed research project supported by Mn/DOT. Liu and Professor Panos Michalopoulos are co-investigators of the project and coauthors of the paper.

Transit, Bicycling, and Walking
Researchers improve the calculation of travel times for transit, cycling, and walking
No matter how researchers choose to measure accessibility, calculating travel times between various origin and destination zones is an essential step. Many transportation planning efforts focus on travel times for drivers and public transit passengers, because these modes account for the bulk of daily trips. But in order to create a complete picture of accessibility, researchers need to understand travel
2. Determine the resilient modulus of fine grained sub grade soils taking into account the influence of matric suction.

With support from the Minnesota Department of Transportation and Hennepin County, Access to Destinations Study co-leader Kevin Krizek worked with a research team including Ahmed El-Geneidy, Michael Iacono, and Jessica Horning to examine this important issue. A final report on the research is now available—the second in the Access to Destinations report series.

Calculating travel times by mode requires two inputs: routes or networks for each mode, and estimates of travel speeds along those networks. Networks include not only streets and sidewalks but special facilities such as bicycle paths that create links used by certain modes but not by others. In order to determine speeds, different methods are required for different modes; while walking speeds exhibit little variation, bicyclists move at different speeds on roads and dedicated trails. Similarly, calculating transit speeds is complicated by the fact that vehicles move at different speeds on different streets, and riders often transfer between routes.

The researchers used information on networks and speeds to construct a series of maps that graphically depict various non-auto travel networks at different points in time between 1995 and 2005. Encompassing parts of the cities of Minneapolis, St. Paul, and Bloomington, the maps break down origins and destinations into several zones (similar to watersheds). This technique makes it possible to see changes in travel time between different "travel-sheds" over time.

In addition to establishing the validity of the methods used in the study for calculating non-automobile travel times, the research showed the effects of adding new links to the transportation network. The addition of an off-street bicycle trail along Hiawatha Avenue in Minneapolis, for example, produced a measurable reduction in travel times between several neighborhoods and the downtown area; similar reductions were observed in other neighborhoods following the completion of the Hiawatha light-rail line.

Tracking changes in accessibility over time is among the Access to Destinations Study’s main goals. By correlating these findings with data on changes in land use, researchers are building a detailed picture of the relationship between transportation accessibility and land use that will inform future planning efforts.

Access to Destinations: Refining Methods for Calculating Non-Auto Travel Times (Mn/DOT 2007-24) (9 MB PDF) is available from the Access to Destinations Web site.

National Transit News

TCRP research publications available online

The federal Transit Cooperative Research Program (TCRP), administered by the Transportation Research Board, provides practical transit research to address technical and operational issues. TCRP emphasizes putting research results into the hands of organizations and individuals that can use them to solve problems.

Recent TCRP publications include:

- Design, Operation, and Safety of At-Grade Crossings of Exclusive Busways (TCRP Report 117)
- Audible Signals for Pedestrian Safety in LRT Environments (TCRP Research Results Digest 84)

Journal of Public Transportation

The Journal of Public Transportation, Vol. 10, No. 2, 2007, published by the National Center for Transit Research at the University of South Florida, includes these articles, available at www.nctr.usf.edu:

- Comparing the Efficiency of Public Transportation Subunits Using Data Envelopment Analysis
- Investment in Mobility by Car as an Explanatory Variable for Market Segmentation
- Are Printed Transit Information Materials a Significant Barrier to Transit Use?
- Decision and Control Model for Promoting Public Transit via Lottery Incentives
- Parcel-Level Modeling to Analyze Transit Stop Location Changes
- Metro Station Operating Costs: An Econometric Analysis
- Design of Feeder Route Network Using Combined Genetic Algorithm and Specialized Repair Heuristic

Transportation Infrastructure

Soil properties research to improve mechanistic pavement design

The process commonly used for designing and constructing paved roads relies on empirical data to predict the behavior of the soils under the road surface. In an effort to improve engineers' ability to understand the properties of various kinds of soils, researchers in the University of Minnesota's Department of Soil, Water, and Climate led by professor Satish Gupta analyzed the mechanical properties of a variety of different Minnesota soils with an eye toward integrating mechanistic models of their behavior into the MnPAVE mechanistic-empirical design system.

The study was sponsored by the Minnesota Department of Transportation.

According to the researchers, this study had four goals:

1. Develop methods for predicting unsaturated shear strength of soils based on saturated shear strength and water retention characteristics curve.
2. Determine the resilient modulus of fine grained sub grade soils taking into account the influence of matric suction.
3. Determine the relationships between the resilient modulus and shear strength measurements.
4. Extend the results of the above studies and propose a framework towards predicting seasonal pore suction resistance factors for use in the mechanistic pavement design.

The researchers selected four soils representing four major geographic regions of Minnesota, containing between 4.8% and 75% clay; measurements of shear strength and resilient modulus were performed at several levels of suction and density for each soil type.

In their final research report, the researchers outline a framework for incorporating the results of this research into MnPAVE. "Pavement Design Using Unsaturated Soil Technology" (Mn/DOT 2007-11) is available from the CTS Web site.

**Upcoming Events**

Here are selected events related to transportation research. Visit the CTS Web site, [www.cts.umn.edu/events](http://www.cts.umn.edu/events), for more comprehensive event information. You may also subscribe to e-mail event announcements using our [subscription form](mailto:subscription-form@cts.umn.edu).

**August 23–24, 2007**
2007 Access to Destinations Conference, University of Minnesota. Contact Stephanie Malinoff, malinoff@umn.edu, 612-624-8398. [More](mailto:malinoff@umn.edu).

**September 17–18, 2007**
2007 Toward Zero Deaths Conference, Duluth Entertainment Convention Center, Duluth, Minnesota. Contact Shirley Mueffelman at 612-624-4754 or cceconf2@umn.edu. [More](mailto:cceconf2@umn.edu).

**October 8, 2007**
2007 James M. Oberstar Forum on Transportation Policy and Technology, Minneapolis. [More](mailto:more).

**October 16, 2007**
Intelligent Transportation Society of Minnesota Fall Industry Forum, St. Paul. Contact Julie Graizer, 612-624-3708, cceconf5@umn.edu.

**October 23, 2007**
CTS 20th Anniversary, Minneapolis. Contact Julie Graizer, 612-624-3708, cceconf5@umn.edu.