

CTS Catalyst

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Accelerating the pace of transportation innovation

SPEED ENFORCEMENT

page 2

TRANSIT CLASS, BOOK

page 3

START-UP COMPANY

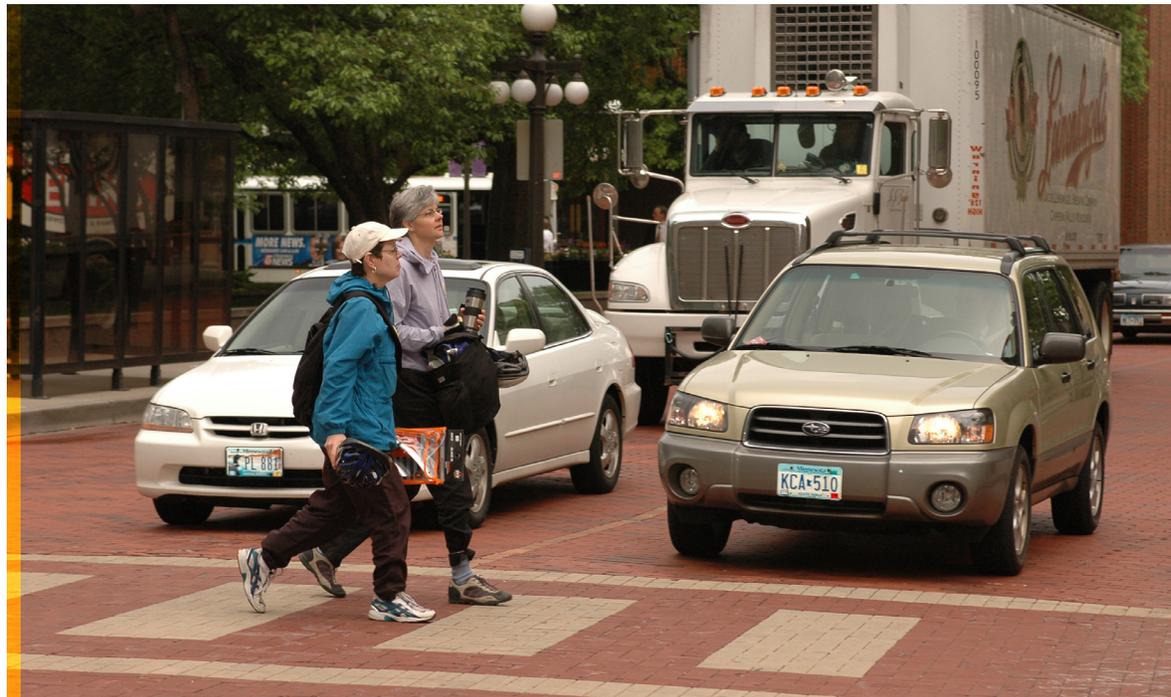
page 4

FREIGHT CONFERENCE

page 4

SUMMER CAMPS

page 5



Understanding the differences between biking and walking could improve transportation plans

U of M researchers have an important message for transportation planners: pedestrians and bicyclists are different. In a recent study, Greg Lindsey and Jessica Schoner explored the key differences between these two groups in order to help planners better track progress toward nonmotorized transportation goals and more effectively address the different needs of pedestrians and bicyclists.

“Transportation policies and plans are increasingly setting goals to encourage and increase

Differences continued on page 6

How do park-and-ride commuters decide where to park?

For many suburban commuters, driving to a transit stop or station and then taking transit to a destination is an attractive option. However, while there is a great deal of research about why commuters choose to park and ride, little is known about how they choose where to park and transfer to transit. According to Alireza Khani, the choice of a park-and-ride location is not as simple as it may first seem.

“An assumption might be that people choose the nearest park-and-ride lot to their origin location or choose the park-and-ride lot that minimizes their total travel time, but the problem is

Park-and-ride continued on page 7



In the gray area of speed laws, enforcement can spark controversy

Speed kills. It's a factor in approximately one-third of all U.S. fatal crashes and contributes to almost as many crashes as alcohol and distracted driving combined. To address this safety issue, states regulate speeds and give law enforcement agencies the authority to enforce these laws. However, there is often a lack of consensus and acceptance regarding the certainty and method of enforcement.

"We know that exceeding posted speed limits is a common practice and that it is a safety problem most people don't recognize," says Frank Douma, director of the State and Local Policy Program at the Humphrey School of Public Affairs. "One solution to this problem would be ramping up

deployed."

Despite these benefits, the idea of implementing ASE in Minnesota is highly controversial. In a seminar from the U of M's Roadway Safety Institute (RSI), Douma discussed the nature of the controversy around ASE, with a focus on why ASE has not been implemented in Minnesota.

Douma began with an overview of a 2012 public opinion survey, which showed that the overwhelming majority of Minnesotans support ASE in select locations such as places where many fatalities have occurred and in school zones and work zones.

"It would seem that if you just did a public opinion survey and that would carry the day in the legislature,

moving forward, progress was stopped after red-light camera deployment was overturned by Minnesota courts, which created the false perception that red-light and speed enforcement cameras are not constitutional."

Next, Douma discussed the results of an RSI project that builds upon the earlier public opinion survey through in-depth interviews with key stakeholder groups and online focus groups with members of the driving public.

"The answers with the stakeholder group were wide and varied; however, there was strong agreement that the safety impacts of ASE were desirable," Douma says. "We also discovered that the best way to talk about ASE with members of the public was to discuss the relationship between speeds and road safety. We found that many drivers still see speed as a good thing, regularly exceed the posted speed limit, and aren't aware that speed is a serious safety problem."

Finally, the presentation examined whether the certainty of punishment affects driving behavior and crashes. "Ultimately, we need to create an environment in which speeders are seen as endangering others and creating a public safety threat and in which enforcement of speed limits is a certain thing rather than one that depends on where you are and which officer is involved," Douma says.

"Despite all of this evidence to the contrary, people do not appear to believe speeding is a problem," he stressed. "This perception needs to be addressed before any new enforcement methods will be acceptable."



Minnesotans support automated speed enforcement in select locations, such as places where many fatalities have occurred.

enforcement using automated speed enforcement (ASE), which has been shown to reduce average speed, crash rates, injuries and fatalities, and speeds over the entire network when properly

you might see some kind of limited deployment of ASE in Minnesota. However, it has not gotten to that point," Douma said. "One challenge is that around the same time ASE was first

Global Transit Innovations: **student exchange, book development**



Visiting students toured a variety of Twin Cities facilities, including 3M.

This past summer, CTS hosted 24 students from two Chinese universities—Southeast University and Nanjing Tech University—for the inaugural offering of the Global Transit Innovations (GTI) Summer Training Program.

Focusing on transportation and urban planning, the program included academic courses, professional seminars, and site visits. It was developed by CTS, GTI, and the U of M China Center's Mindga Institute. Plans for future years include attracting students from additional countries and offering opportunities for U of M students to study in China.

GTI was established last year by CTS in partnership with Associate Professor Yingling Fan of the Humphrey School of Public Affairs, who serves as GTI director.

GTI has a growing research and education portfolio. For example, Fan is developing a new book that will share lessons learned from her study of transit development in 20 U.S. metropolitan regions. The book will be a resource for training students and professionals. Fan shares highlights of recent work below.

Tell us about your book.

There is momentum for rail and bus rapid transit (BRT) corridors across U.S. metropolitan regions, but little data on how they succeeded despite long-standing fiscal, political,

and sociocultural barriers for transit development in the car-centric U.S. The book will tell the story of how those infrastructure projects were built and offer original analyses on the societal impacts of existing and proposed corridors. Ultimately, the book will offer practical solutions on how to capitalize on emerging transit investments and maximize their positive impacts—i.e., get more bang for the buck.

Who is the intended audience?

The book is intended for planning practitioners and policymakers interested in creating more transportation options for metropolitan residents. Transit corridor development has a strong potential to make metropolitan regions more sustainable, livable, and equitable. Further, by integrating storytelling with rigorous empirical work, the book will be an interesting read for college students to learn about the challenges and opportunities of transit development in the U.S.

What are some highlights from your site visits?

To gather information for the book, I'm visiting cities and meeting with transit development leaders throughout the country. The field work and expert interviews have been extremely

enlightening. I have learned about the large unmet demand for cross-town transit in the San Francisco Bay Area and how transit fragmentation in the region hurts ridership. I have learned how Dallas pioneered the use of abandoned railways for transit development and urban regeneration. I have also learned how Detroit and New York City initiated transit corridor projects largely on the promise of land development and without transit agencies playing a primary role—in essence, "development-oriented transit." These unique case studies merit national and international attention.

What's needed for a transit revival?

The future of transit will largely be shaped by our ability to create a regional collection of places connected by transit. These places must have quality public spaces with various economic, leisure, and socializing activity opportunities. Of course, public transit needs to provide mobility—but it also desperately needs a regional collection of transit-connected places to bump up demand. A transit revival requires regional and systematic integration of transit planning and place-making initiatives.

The GTI website—gti.umn.edu—includes ongoing and completed research, publications, and profiles of current GTI researchers

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WITH YINGLING FAN ON
THE CTS BLOG:**



blog.cts.umn.edu

U of M startup named among best of 2016

Innotronics
startup discovery
invention commercialization company
agriculture
industry construction sensors
technology research safety

Innotronics LLC, a company launched by the U of M's Venture Center based on scientific discoveries made by CTS Scholar Rajesh Rajamani, was named among the "Best University Startups 2016" in August by the National Council of Entrepreneurial Tech Transfer (NCET2).

Innotronics, based in Stillwater, MN, develops non-contacting position sensors for use in construction and agriculture vehicles, as well as in industrial material handling systems.

Rajamani conducted the original research behind this technology in a project funded by the U's Intelligent Transportation Systems (ITS) Institute, a federally funded University Transportation Center (UTC) at the U of M from 1991 to 2013. In that project, Rajamani led the development of magnetic sensing technology that could be used to predict imminent collisions in passenger vehicles. The ITS Institute was succeeded in 2013 by the U of M-led

Roadway Safety Institute, the Region 5 UTC, where Rajamani continues to conduct safety-related research.

"Later, we realized that the same magnetic position-sensing technology could be used for the nonintrusive estimation of the position of a piston inside a cylinder," Rajamani says. "This has applications in hydraulic actuators, pneumatic actuators, internal combustion engines, and many other mechanical device applications."

The magnetic sensors offered by Innotronics can be easily installed at a significantly lower cost than many other existing sensors. Rajamani serves as the company's chief scientific officer.

Innotronics was one of 35 startups selected by NCET2 from 200 submissions from universities across the U.S. The startups were chosen by representatives from leading industry companies based on the technology's potential, the experience of the business team, and the commercial feasibility of the invention or service. The startups represent early-stage companies with high potential to create jobs, advance technology, and meet societal challenges in health, the environment, and other fields.

Freight and Logistics Symposium scheduled for Dec. 2

The annual Freight and Logistics Symposium will be held Friday, December 2, at the Ramada Plaza Minneapolis.

Charles W. Clowdis, managing director of transportation at IHS Economics & Country Risk, will give the keynote presentation on using reliable data to support transportation projects that result in new job creation.

This annual symposium is designed to bring together members of the private sector and government to discuss current issues in the freight and logistics industry and to share public and private initiatives intended to strengthen the freight transportation system. More information is available at cts.umn.edu/events/freight.



Summer camps introduce **the next generation to transportation**

In August, CTS and the Roadway Safety Institute (RSI) participated in several summer programs to help introduce the next generation to transportation topics and careers.

On August 15–19, CTS helped coordinate and host the Minnesota Department of Transportation (MnDOT) Career Exploration Program, a day camp designed to introduce underrepresented youth to potential careers at MnDOT. Sixteen campers ages 14–25 attended the program, where they learned about various trade-related job fields—such as carpentry, ironwork, and cement masonry—as well as civil engineering.

Campers also went on field trips to several MnDOT work sites and union training centers, where attendees learned about a variety of job possibilities. After these firsthand experiences, campers attended classes on how to apply and interview for jobs, heard about training programs, and took tours of the U of M and St. Paul College.

Engaging a much younger audience, RSI staff presented a lesson on pedestrian safety at the Minneapolis Safety Camp on August 1. The program, offered by the Minneapolis Parks and Recreation Board, aims to teach children entering second through fifth grade about personal and social safety skills. During the RSI lesson, 200 kids participated in interactive



MnDOT Workforce Development Program participants helped create a sidewalk.

activities emphasizing the importance of reflective apparel and nighttime visibility.

On August 3, CTS and RSI hosted a half-day session for high school students participating in Discover STEM, a week-long summer camp offered by the U of M's College of Science and Engineering. During the session, students learned about bicycle traffic counting and how accurate counts can inform efforts focused on improving safety. After a brief classroom session, students ventured into the field, where they performed

their own bicycle counts at several locations and learned about different counting technologies.

**Don't forget to register!
27th Annual CTS
Transportation Research
Conference**

**November 3
The Commons Hotel,
Minneapolis, MN**

Join us for a day of discovery and innovation on the U of M campus! Registration and full program information is available at cts.umn.edu/events/conference/2016.

**READ
CATALYST
ONLINE**

for links to research reports and other resources.



Discover STEM campers learned about bike counting from Greg Lindsey.



walking and bicycling, but the challenges are significant,” says Lindsey, a professor in the Humphrey School of Public Affairs. “Two major obstacles are the lack of data to construct comprehensive measures of walking and bicycling, and a nuanced understanding of the important differences between these modes—this is the void our latest research helps fill.”

The study analyzed the Metropolitan Council’s Travel Behavior Inventory for the Minneapolis–St. Paul metropolitan area for 2001 and 2010 to illuminate the differences between walking and bicycling over time and to illustrate the implications for performance measurements.

“Essentially, we focused on the who, what, where, when, and why of nonmotorized transportation—who pedestrians and bicyclists were, where they went and why, when they traveled,

and what factors were associated with the trips they made,” says Schoner, a Ph.D. candidate in civil engineering and lead analyst and project manager at Urban Design 4 Health. “We paid careful attention to areas in which pedestrians and bicyclists differed and how these differences affected planning and evaluation.”

Using a combination of statistics, modeling, and hypothesis testing, the researchers concluded that walking and bicycling trips were likely to be taken by different types of people for different reasons and at different times for different distances, and that each mode had different trends over the past decade. Among the differences: walking trips accounted for a higher mode share and they were shorter, more likely to be taken by women, less likely to be taken to commute, and more likely to be taken

through the winter. In addition, the frequency of bicycling increased more than walking did, especially among men who biked to commute.

Study results show that a number of sociodemographic factors, such as age, play an important role in the choice to walk or bike, and they influence each mode in different ways. Older age reduced the likelihood of biking more than it did walking. In addition, the bicycling mode share was much higher for men than it was for women, and the disparity did not decline over the decade, despite significant increases in bicycling overall.

“These differences between walking and bicycling have important implications for performance management, including the choice of performance measures to assess progress toward multimodal goals,” Lindsey says. “Our results could also be used to develop more nuanced performance measures and targeted strategies. For example, a gender gap between men and women exists for bicycling but not walking, so planners could consider educational programs and performance measures for women with respect to bicycling.”

Study results were published in *Transportation Research Record*, the journal of the Transportation Research Board. The authors acknowledge and thank the Minnesota Department of Transportation, the Metropolitan Council, and CTS for financial and technical support for their work.

Reminder: Submit a Research Partnership Award nomination

There’s still time to submit a nomination for the 2017 Research Partnership Award. The submission deadline is November 23. Criteria and submission instructions are available at cts.umn.edu/about/awards/rpa.



more complex than that," says Khani, an assistant professor in the Department of Civil, Environmental and Geo-Engineering. "For example, better transit service may be available if you are willing to drive further, or the number of parking spots in a given location may be limited. Plus, there are different costs associated with driving versus riding transit, parking fees, and amenities at the park-and-ride lot."

In a recent study, Khani and co-author Hao Pang of the University of Texas investigated the question of how park-and-ride commuters choose their parking locations. The study consisted of three major parts. First, a number of transit data sets from the Austin, Texas, metropolitan area—including data from a 2010 onboard transit passenger survey—were combined to build a multimodal transportation network containing a complete set of park-and-ride locations in the region. Next, auto and transit travel times through each park-and-ride location were estimated

using network models. Finally, several different choice models were developed and evaluated to identify the best way to model park-and-ride location choice.

The study produced a number of insights. In general, all travelers preferred park-and-ride lots with higher transit service frequencies, less than 10 minutes' driving time, fewer transfers during the transit portion of their trip, shorter walking times, and park-and-ride lots designated by the transit agency.

In addition, the study's authors were able to determine varying preferences among different park-and-ride passenger groups. "We found that park-and-ride passengers older than 35 did not seem to mind longer times on the transit vehicle, while younger riders tried to minimize the time spent on a transit vehicle," Khani says. "We believe that professionals might make better use of time spent on transit, while younger travelers are more motivated by short transit travel times."

In addition, the researchers found that non-whites preferred driving on freeways to reach a park-and-ride location while whites' preference is not significantly affected by driving on local streets or freeways. Also, the work found that travelers with higher incomes were less motivated by high-frequency transit service.

According to Khani, the models developed in this study can have application in travel forecasting—specifically for intermodal trip assignment—as well as in setting policy for park-and-ride service design.

The research was partially supported by the U.S. Department of Transportation through the Data-Supported Transportation Operations and Planning (D-STOP) Tier 1 University Transportation Center.

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How do
**PARK-AND-RIDE
COMMUTERS**

decide
WHERE TO PARK?
page 1

In the gray area of
**SPEED LAWS,
ENFORCEMENT**
can spark controversy.

page 2

**GLOBAL TRANSIT
INNOVATIONS:**

summer training and
BOOK DEVELOPMENT.

page 3



**Understanding the differences
between bicycling and walking.**

page 1