

CTS Catalyst

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Accelerating the pace of transportation innovation

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Bicycle and pedestrian counting initiative monitors nonmotorized traffic in Minnesota

In a continuing effort to better understand nonmotorized traffic patterns in Minnesota, researchers from the Humphrey School of Public Affairs have partnered with the Minnesota Department of Transportation (MnDOT) to develop guidelines and analyze information collected in bicycle and pedestrian traffic counts throughout the state.

The research team, led by Professor Greg Lindsey, aims to develop consistent methods for monitoring and assessing bicycle and pedestrian traffic that can be used in both permanent, automated traffic counts and short-term manual counts. The goal is to provide evidence for

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Ridership and pedestrian impacts of transitways: a case study

The Hiawatha light-rail transit (LRT) line began operations in 2004. How has the line affected transit ridership and walking among nearby residents? To get an understanding, U of M researchers conducted a case study of one section of the line in south Minneapolis.

The study, led by Jason Cao, assistant professor in the Humphrey School of Public Affairs, focused on a four-station, 3.8-mile residential section in the middle of the 12-mile Hiawatha line. Cao and his research assistant, Jessica Schoner, compared the section with four control corridors

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Research Partnership Award: Collaborating for better asphalt pavements and a smoother ride

Weather in cold climates can exact a heavy toll on roads—and on us, the road users. The bumpy ride that comes with those all-too-common cracks and potholes costs us lost time, frayed nerves, more tax dollars for road maintenance, and additional vehicle repairs.

Thermal cracking is the number one distress in asphalt pavements, not only in Minnesota but in all northern U.S. states and in Canada. Extreme temperature variations that include severe lows, combined with frequent application of deicing salt and repeated freeze-thaw cycles, are the main contributors to distress in our asphalt pavements.

For most of the past decade, six state DOTs and four research universities—led by the Minnesota Department of Transportation and the University of Minnesota—joined forces to battle this problem. The resulting pooled-fund research partnership represents the most comprehensive effort to date investigating low-temperature cracking in asphalt materials and asphalt pavement.

The team's work was honored with the 2013 CTS Research Partnership Award. The award, presented at the CTS Annual Meeting and Awards Luncheon (see article on page 3), recognizes research teams that have drawn on the strengths of their diverse partnerships to achieve significant impacts on transportation.

U of M civil engineering associate professor Mihai Marasteanu served as principal investigator on the project, and MnDOT engineer Tim Clyne managed the work.

"We're going to greatly reduce thermal cracking and delay it from when it starts occurring," Clyne says.



"And then, ultimately, that results in less maintenance costs, [fewer] user delays, and longer life cycle for these pavements."

Since more than 90 percent of all U.S. road surfaces are made of asphalt, finding a way to extend the life of those surfaces by just a year could save billions.

Field performance tests at the MnROAD international road research facility and samples from roads in participating states played a key role in the research.

"We basically used the strengths of each team to finish this project and provide to our sponsors very good products that they could implement to build better roads," Marasteanu says.

The main outcome of this research has been the development of new testing methods, specifications, and models for selecting asphalt materials that are resistant to thermal cracking. Upgrades to a national design guide are under consideration and could be implemented within a few years.

**90
PERCENT**
OF ALL U.S. ROAD
SURFACES ARE MADE
OF ASPHALT.

The research has already been implemented informally in a number of projects around the state, and MnDOT is using the results in several pilot projects this year.

"It's not just Minnesota, but several states around the region and the broader northern region of the United States—they're all using the results of this research," Clyne says.

More about the annual award—including project team members and a short video, as well as information about three additional projects that received special recognition—is at cts.umn.edu/About/Awards.

Leaders honored at CTS Awards Luncheon

CTS presented the following awards at its Annual Meeting and Awards Luncheon on April 17 in Minneapolis. Further information is at cts.umn.edu/About/Awards.

Richard P. Braun Distinguished Service Award

(outstanding leadership in research and innovation)

Nikolaos Papanikolopoulos, Distinguished McKnight University Professor, Department of Computer Science and Engineering, and director, Security and Transportation Technology Research and Applications (SECTTRA) Program



Nikolaos Papanikolopoulos

Ray L. Lappegaard Distinguished Service Award

(outstanding leadership, mentorship, and support for the profession)

Julie Skallman, director, State Aid Division, Minnesota Department of Transportation, and steering committee chair, Minnesota Local Technical Assistance Program



Julie Skallman

William K. Smith Distinguished Service Award

(leadership, mentorship, and education of future leaders in private-sector freight transportation)

Mark Berndt, freight program leader, Olsson Associates; previously with MnDOT's Office of Motor Carrier Service and the Office of Freight Railroads and Waterways



Mark Berndt

Distinguished Public Leadership Award *(public leaders who have influenced innovative transportation policy directions)*

Margaret Donahoe, executive director, Minnesota Transportation Alliance, and member, CTS Executive Committee



Margaret Donahoe

Education Awards

Matthew J. Huber Award *(students in engineering, science, and technology fields)*

Xuan Di, doctoral candidate, civil engineering; advisor, Henry Liu
Panagiotis Stanitsas, master's candidate, civil engineering; advisor, John Hourdos

John S. Adams Award *(students in policy and planning fields)*

Jessica Schoner, master's candidate, civil engineering and urban and regional planning; advisors, Jason Cao and David Levinson

Videos debut at annual meeting

CTS debuted these videos at the meeting:

- **Research Highlights: Pedestrians, Roundabouts, Bikes, and Storm Water.** Research highlights at CTS during 2012-2013 include developing a smartphone app for visually impaired pedestrians, examining pedestrian and bicyclist safety in roundabouts, counting bike and pedestrian traffic on trails for better urban planning, and improving water quality by filtering phosphorous from storm water.
- **Improving Asphalt Pavements in Cold Climates.** An overview of the 2013 CTS Research Partnership Award winner, a pooled-fund project studying low-temperature cracking of asphalt pavement.
- **Students Gain Real-World Experience Through MnDOT Internship Program.** Overview of the 2012 MnDOT Internship Program featuring interviews with student interns and MnDOT's Sue Mulvihill.

They are available for viewing at cts.umn.edu/Publications/Videos.



Yusuf Abdi is one of the student interns featured in a new video from CTS.

Since 1993, CTS has honored

68

TRANSPORTATION PROFESSIONALS

with awards for distinguished service.

Since 1999, CTS has honored more than

35

TRANSPORTATION STUDENTS

with awards for outstanding academic achievement.

Searching for common ground in the ITS privacy debate

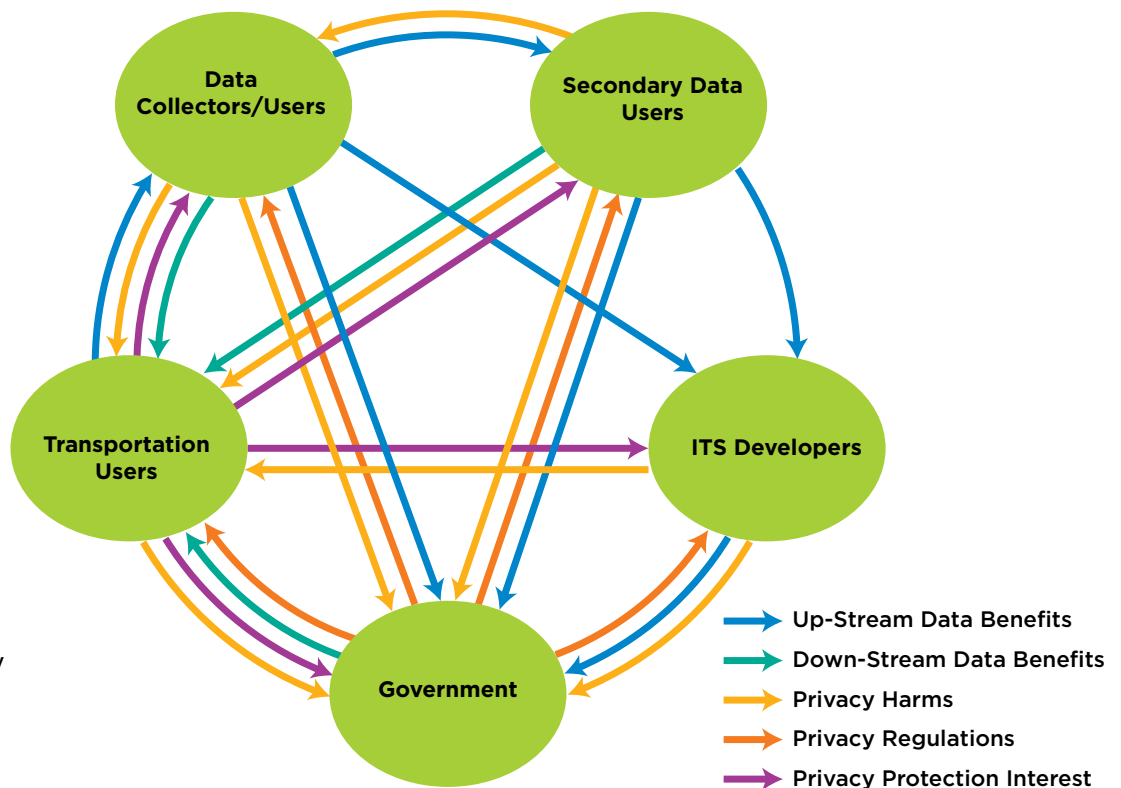
Should your vehicle be able to gather, store, or transmit information about where it's been—or where it's going? On the surface, it seems like a simple question. However, it inevitably gives rise to many others: Who will see the data? How will it be used? Can it be given or sold to a third party? Under what circumstances? Clearly, there are no straightforward solutions or answers in the debate surrounding privacy issues in intelligent transportation systems (ITS).

"The difficulty and complexity of these issues has resulted in an increasingly disconnected public discussion about privacy and ITS," says Frank Douma, a researcher in the Humphrey School of Public Affairs.

"In one camp are privacy advocates, and in the other camp are technologists and the ITS industry, who generally view privacy issues as secondary when compared with the tremendous benefits of these technologies. The disconnect often results in the two sides talking past each other, with too little energy spent finding potential common ground."

According to Douma, one cause of this disconnect is a lack of clarity on both sides about the needs, goals, and interests of those involved. To address this divide, a multidisciplinary team of U of M researchers has published a report that sheds new light on the ITS privacy debate by mapping and assessing the interests of all participants. The team was led by Douma and research assistant Tom Gary, and the project was sponsored by the ITS Institute.

Researchers began their analysis by pinpointing exactly who should be concerned about privacy as ITS technologies are developed and implemented and what their goals are with respect to privacy data. A number of diverse participant groups were



The ITS privacy debate involves an interlaced web of participants with multiple interests.

identified, including ITS developers, transportation users, the government, data collectors, data users, and secondary users such as marketers and litigants.

"We found few black-and-white divides among participants in the privacy debate," says Douma. "For example, transportation users are not simply pro-privacy, and data collectors are not inherently anti-privacy. Individuals are willing to share their locational data in exchange for real benefits in a variety of circumstances, such as GPS guidance or electronic tolling. However, there are also limits to this willingness."

Because of this nuanced landscape, researchers concluded that while there is no all-encompassing solution to the ITS privacy debate, there are a number of potential avenues and tools for finding common ground. Their recommendations include setting limits on the time data can be retained, prohibiting unrelated secondary use of data, designing ITS systems with privacy in mind, avoiding the collection

of personally identifiable locational information when possible, and implementing privacy policies such as the use of clear privacy notices.

"It's also important to remember that the positions of participants in this debate are not entrenched," says Douma. "As technology changes and the collection of personally identifiable data becomes more commonplace, it's likely that privacy norms will continue to shift and acceptance of the collection and use of this data in intelligent transportation systems will grow."



**READ
CATALYST
ONLINE**

for links to research reports and other resources.

Toxic PFC pollutants are migrating with wind and vehicles

During the past decade, concern about the once-common chemical manufacturing compounds known as PFCs—which have been used in everything from nonstick pans to stain-resistant carpet and fast-food containers—has grown rapidly. In previous studies, the chemicals have been linked to many negative health effects, including attention-deficit hyperactivity disorder (ADHD) and lowered immune response to vaccinations in children.

“Even though the use of these chemicals has been phased out by some manufacturers, PFCs remain a public health concern because they are still used in a wide range of industrial and commercial applications and because they tend to stick around—they are not easily degraded once they enter the environment,” says civil engineering professor John Gulliver.

Though PFCs are now common in the environment, little research has been done about their presence in the soil; most studies have focused on their presence in surface water and surface runoff. However, when U of M scientists noticed elevated levels of PFCs in the solid particles found in water runoff from PFC hot spots, they realized more work was needed to obtain this information.

A team of civil engineering and public health researchers funded by CTS decided to explore this potential problem by taking a unique, multidisciplinary research approach. Working together, they designed a project to determine if PFCs were in the soil and, if so, whether elevated levels of PFCs were traveling from known hot spots to other locations.

“Finding PFCs in soil particles would raise serious concerns,” says School

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decision making that Minnesota cities have historically lacked, Lindsey says. “We’ll have practical, useful information about bike and pedestrian traffic that can help local jurisdictions as they plan and invest in infrastructure,” he says.

As part of the 18-month project, the research team created a set of tools and methods for short-duration manual counts of nonmotorized traffic, held training workshops, and organized a statewide counting effort involving 43 Minnesota municipalities last fall. The overall response was positive, Lindsey says, and some communities are already using their collected data to submit grant proposals for projects related to nonmotorized traffic.

In addition, Lindsey and his team have examined traffic information from six permanent counters on Minneapolis trails. The continuous counts collected at these locations help the researchers understand traffic patterns and the factors that affect them, Lindsey says. For example, the team found that bike and pedestrian traffic vary by trail type, time of day, day of week, and season.

“Once we know the patterns at permanent sites, we can develop factors that help us expand short-term counts from other locations with similar conditions,” Lindsey says. The factors could be used to estimate anything from total daily traffic to annual traffic, as long as the short-term count location is similar to an existing model.

Based on the overall results of the study, the research

team developed recommendations for MnDOT. These include continuing to coordinate statewide short-term field counts, demonstrating the feasibility

of automated counting technologies, and beginning to integrate nonmotorized and vehicular traffic databases.

Based on these recommendations, MnDOT is moving forward with a new project that will collect more short- and long-duration counts throughout Minnesota, says Lisa Austin, ABC Ramps coordinator at MnDOT. The next phase of work aims to collect counts for pedestrians on sidewalks, bicyclists on shoulders and in bike lanes, and pedestrians and bicyclists on multiuse trails. MnDOT plans to install more permanent, automated counters in suburban and midsize cities and to conduct additional manual counts in smaller cities around the state, Austin says.

“We’re really excited that this bike and pedestrian counting project is moving into wider implementation,” Austin says. “This next phase will help us see which automated counting technologies work well and make recommendations for moving forward on a broader scale.”

According to Bike Walk Twin Cities,
**NONMOTORIZED
TRAFFIC INCREASED BY
37%**
in the Twin Cities from
2007 to 2012.

Despite employer skepticism, telework holds promise

For telework supporters, recent news has not been good. In early 2013, both Yahoo and Best Buy severely reined in their once-praised telework programs—and they are not alone. Market research conducted through the Urban Partnership Agreement, a U.S. Department of Transportation initiative aimed at reducing congestion using transit, tolling, technology, and telecommuting strategies, shows that employers need to be convinced of the economic benefits of telework before they will embrace telework policies.

“If telework is to gain widespread support in government and industry, employers need to be presented with strong evidence that telework is good for their bottom line and industry productivity,” says Humphrey School of Public Affairs research fellow Adeel Lari. “Up to this point, however, there’s been no clear research documenting the impacts of telework from an employer perspective.”

To begin filling in that knowledge gap, the Minnesota Department of Transportation (MnDOT) sponsored a University of Minnesota research team to conduct case studies of three organizations—an administrative department within a statewide public agency, a department within a local government agency, and a mid-size private manufacturing

firm—that offer a workplace flexibility program or policy to some or all of its employees. Researchers gathered data using surveys, in-depth interviews with managers, and data collected by the organizations on policy outcomes. Then, they created a profile for each organization to explore the impacts of flexible workplace policies.

The researchers faced some significant challenges. “Flexible workplace policies are defined and implemented differently by each organization, and there are numerous influences on an organization’s bottom line,” says Humphrey School research fellow Emily Saunoi-Sandgren. “This makes it nearly impossible to isolate the economic effects of flexible workplace policies.”

Despite these obstacles, the researchers did find evidence that points to the benefits of flexible workplace policies for employers. In all three organizations, both employees and managers expressed high levels of satisfaction with a flexible work environment, and high employee usage rates were noted. At two of the organizations, survey respondents reported that their work was of higher quality and performed more efficiently in a flexible work environment. Perhaps most significantly, managers at all three case sites reported that workplace flexibility had either a neutral or positive effect on an employee’s work.

“This research is informative because it explores the boundaries of efficiency through employee productivity and satisfaction,” says Ken Buckeye, a program manager with MnDOT and a member of the project’s technical advisory panel. “The bottom line is that employers want an economic reason to support telework. If that reason is enhanced efficiency and improved productivity, which comes from more satisfied employees, then the telework model will be more strongly embraced,” he says.

“While more work needs to be done to gather data regarding the benefits for employers of flexible workplace policies, based on our research we believe there is a net benefit to organizations implementing a flexible workplace that is ripe for further investigation,” Lari says.



NEW RESEARCH REPORTS

Recently published reports on transportation-related research at the University of Minnesota explore the following topics:

**DECISION-SUPPORT
SYSTEM FOR TRAFFIC
SAFETY**
(CTS 13-10)

**VIRTUAL
COLLABORATION FOR
TRAFFIC MANAGEMENT**
(CTS 13-15)

**DRIVER BEHAVIOR AT
LEFT-TURN INDICATIONS**
(CTS 13-18)

Research reports are available at cts.umn.edu/Publications/ResearchReports.

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of Public Health associate professor Matt Simcik. “Contaminated soil could be breathed in as dust, ingested with groundwater, transferred from soil to crops, and transmitted to children via hand-to-mouth contact.”

The study data came from surveying and sampling the soil at a known PFC hot spot in the Twin Cities area, where manufacturing operations for PFC-containing products had taken place until 2002. Researchers also collected

and tested the soil from several locations along U.S. Highway 10, which passes by the hot-spot location as it runs between the cities of Cottage Grove and Big Lake.

Careful analysis of the collected soil samples revealed relatively high concentrations of PFCs in the surface and subsurface soils at the hot-spot locations—levels high enough to pose a threat to both animals and humans. “We also found that this contamination is not

being contained at a few hot spots—it is being carried by wind and traffic to other locations and is migrating toward the groundwater table,” says CE postdoctoral research associate Frank (Feng) Xiao.

Based on their findings, the researchers have recommend testing groundwater in downwind areas from known PFC hotspots for possible contamination—a measure that could help protect public health in years to come.

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(two urban, two suburban) with similar demographics. The urban corridors resemble the Hiawatha Corridor in terms of built environment and transit access (via comparable bus service); the suburban corridors have curvier roadways and typically require park-and-ride for transit access.

The researchers mailed 6,000 surveys to a random sample of residences in the four control corridors and to residences within a half-mile of the four stations in the Hiawatha Corridor. From their analysis, the researchers drew conclusions in three areas:

Residential preferences of Hiawatha residents

- In choosing where to live, good transit service and job accessibility are important factors for residents of all areas—both urban and suburban—ranking behind only housing affordability and neighborhood safety and ahead of more than 20 other factors such as high-quality schools.
- Hiawatha Corridor residents have a stronger preference for transit access and quality than residents of the urban control corridors.

Impacts of the Hiawatha line on transit use

- Transit use among residents who already lived in the Hiawatha Corridor when the LRT line opened increased substantially for both work and non-work travel—a clear ridership bonus from the line.
- Transit use by residents who moved into the Hiawatha Corridor after the line opened is similar to that of residents in the urban control areas.
- Residents in the Hiawatha Corridor use transit three to four times more often than suburban residents do.



<https://www.flickr.com/photos/51035614490@N01/469207513>

The Hiawatha line, the built environment, and pedestrian travel

- Residents walk to stores more frequently if their homes are near commercial areas and their neighborhoods have adequate population density and a continuous street grid.
- Residents walk for recreation more frequently if there is a continuous street grid, but population density and proximity to stores are not significant factors.
- Residents along the Hiawatha line, which has a frequently interrupted street grid, walk for shopping or recreation at the same frequency as bus riders—LRT did not have a distinct measurable impact on walking.

“This study helps confirm the region’s transitway investment plan, which seeks to better align transit and land-use planning with the development of sustainable communities,” says Metro Transit General Manager Brian Lamb. “It also reinforces that people do make location choices based on transit-related characteristics.”

The research was funded by the Transitway Impacts Research Program (TIRP). More information about TIRP: cts.umn.edu/Research/Featured/Transitways.

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A case study of the
**HIAWATHA
 LRT LINE**

looked at changes in
RIDERSHIP AND WALKING.
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A research partnership investigating
LOW-TEMPERATURE CRACKING IN

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Researchers shed light on the ITS

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Bike and pedestrian counting initiative
 analyzes nonmotorized traffic patterns.

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