Southwest Minnesota has the highest average wind speeds in the state—bad news for MnDOT snowplow operators who often drive in low-visibility conditions to clear roads. “We have more days when the wind blows than when it doesn’t,” says Chase Fester, District 7 transportation operations supervisor. “We struggle with the wind.”

That’s why District 7 is piloting a snowplow driver-assist system (DAS) developed by U of M researchers to combat the blowing snow and fog that often cause zero visibility. The DAS helps snowplow operators see road alignments and features, such as turn lanes, guardrails, and road

Driver-assist system developed at U helps keep plows on the road

Getting drivers to switch to transit requires focus on travel time, urban form

Providing an attractive alternative to driving is often a key motive for transitway investment. In the popular imagination, agencies would select a high-demand corridor and build a dedicated transitway, and drivers would then directly substitute transit trips for driving. While transitways’ proven ability to attract “choice” riders (people who can drive and can afford cars, but choose to take transit instead) is compelling, the reality of their mode-shifting impacts can be complicated.

In a new study, a team of researchers from the Humphrey School of Public Affairs explored the
Mobile telecommunications altering travel behavior, mode choice

The rise of mobile technology (such as 6G phones and in-vehicle Wi-Fi) is changing the way people spend their travel time and even altering their travel choices, and these changes will continue as technologies become more advanced and autonomous vehicle technology matures. Experts predict that as the increasing use of telecommunications makes travel time more useful, it will increase people's willingness to travel.

In a recent report, Associate Professor Yingling Fan of the Humphrey School of Public Affairs explores the current understanding of how technology in motion will shape the future of travel and transportation.

Research has shown that rail and bus passengers use their travel time in a variety of ways, with roughly 55 percent of rail passengers and 40 percent of bus passengers engaging with technology. A number of factors affect how travel time is used, including journey purpose and direction of travel, age, gender and class, trip duration, and environmental factors such as seating availability.

Recent studies have also suggested that telecommunications could significantly influence mode choice.

“Broadband access on public transportation systems has been shown to increase ridership and encourage people to shift from cars to public transit,” Fan says. “However, it plays less of a role than more important factors such as total travel time and service reliability.”

Her research also used data and activity categories from the American Time Use Survey to identify new activities that could occur “in motion” as self-driving vehicle technology matures. These include a limited set of personal-care activities, a limited set of child-care activities, eating and drinking, tobacco and drug use, and participation in religious activities. Fan’s analysis shows that the average person spends about two hours on these activity types daily.

New technologies could have several important impacts on our transportation future, Fan says. The ability to use information and telecommunication devices may continue to help attract “choice” riders (those who are able to drive and afford a vehicle, but choose transit) to transit. Self-driving cars may get larger in size to meet a growing demand for more space for increased activity options and improved comfort levels.

“In addition, travel patterns may change as a result of new technologies,” Fan says. “People may start traveling more as the number and usefulness of activities that can be conducted while traveling increases—they may be more inclined to replace hub-and-spoke trips toward a central point with circular trips chained together. The saved travel time and increased utility of travel are likely to encourage visits to more distant but

Common activities during travel
Interactive workshops bring pedestrian safety solutions to practitioners

In November and December, the Roadway Safety Institute held three workshops designed to inform transportation practitioners about innovative treatment options for improving pedestrian safety. The workshops—held in Wisconsin, Indiana, and Ohio—convened nearly 90 attendees from nonprofit organizations, private firms, and state and local agencies.

Each workshop featured a presentation by Institute researcher Ron Van Houten of Western Michigan University (WMU), who provided a thorough overview of cutting-edge pedestrian safety treatments and their effectiveness. Van Houten is a professor in the Department of Psychology at WMU and a behavior analysis expert in the areas of traffic safety, pedestrian safety, intelligent transportation systems, traffic calming, bicycle safety, seat belt use, and reducing impaired driving.

Van Houten discussed both pedestrian-focused and driver-focused countermeasures, with an emphasis on innovative techniques supported by recent research. He also emphasized human factors, noting that changing the safety culture in a community is as important as installing countermeasures.

Following Van Houten’s presentation, workshop attendees participated in group discussions about their communities’ challenges and brainstormed possible solutions. Groups focused on topics such as design, research, public involvement, political will, funding, and jurisdiction.

While some participants’ challenges were specific to their communities, many common themes emerged. For example, participants at all three workshops identified the difficulty associated with pedestrians crossing mid-block rather than at intersections.

These themes have been shared with Institute staff and researchers in an effort to identify future research and outreach projects that could help practitioners meet the challenges they face in their communities.

A summary of the workshops, including the participant discussions at each event, is available at roadwaysafety.umn.edu.

CTS implements changes to events line-up

Since its inception, CTS has held hundreds of events: luncheons and forums, seminars and symposiums, and more than a quarter century of annual research conferences. These years have also seen the rise of new communications methods, such as podcasts and webinars, that are changing the ways people choose to network and learn.

To gauge the impacts of these changes, CTS conducted a comprehensive assessment over recent months. “Our goal was to understand how our current event and engagement activities are meeting the knowledge and information needs of our stakeholders, as well as the benefits stakeholders receive from being engaged with center activities,” says Laurie McGinnis, CTS director.

The assessment also looked at the impact of factors outside CTS, such as industry trends and events offered by other organizations. Only those events sponsored by CTS—not those of its subprograms—were included.

The biggest outcome of the assessment is a new time and location for the annual research conference. It will now be a one-day event held on campus in the fall. The 2016 research conference will be held November 3 at The Commons Hotel in Minneapolis.

Changes are also in store for the luncheon series. The CTS Fall Luncheon will now be held in conjunction with the research conference. One other luncheon will be held in the spring.

CTS events continued on page 4
Are you interested in learning more about how the sharing economy is affecting the transportation industry? Mark your calendar for this public forum, scheduled for May 17, 2016, at The Commons Hotel in Minneapolis.

Also known as collaborative consumption, the sharing economy is a growing trend away from the exclusive ownership and consumption of resources to one of shared use and consumption via peer-to-peer online platforms. The consequences of this trend for the transportation sector are many, potentially affecting everything from car ownership to road congestion to investments in infrastructure and public transit.

With a focus on shared mobility, this public forum will explore the promise—and potential perils—of the sharing economy. Practitioners, entrepreneurs, government representatives, and other leading thinkers will share their perspectives in presentations and panel discussions.

The forum, open to anyone interested in learning more about the sharing economy, is being held as part of the two-day International Symposium on the Sharing Economy. The symposium, which also includes a research workshop, aims to bring together leaders from academia, industry, nonprofits, and government to explore the emerging area of collaborative consumption and stimulate interdisciplinary research and collaboration.

More information is available at sharingeconomy.umn.edu/events.

CTS events from page 3

Other events will continue as usual. Research seminars will be offered in the fall and spring semesters. The Freight and Logistics Symposium will be held in early December.

“We worked with a variety of our stakeholders and reached out to event delivery experts as part of this process,” McGinnis says. General stakeholders were sent an online survey, focus groups were held with members of the CTS Councils, and more than a dozen individual interviews were conducted.

“We’re excited to offer this new line-up,” says McGinnis. “We hope it will meet our audience needs and help us better share the innovative ideas being developed at the U.”

Technology from page 2

Finally, mobile technology and self-driving cars are likely to have fundamental impacts—which may not be positive—on our society. These include transforming the urban form, making people more likely to choose housing location based on their preferences rather than spatial accessibility, and creating fewer but larger business centers.

The study was sponsored by the Minnesota Department of Transportation (MnDOT) and the Minnesota Local Road Research Board. “This research suggests that communications technologies will continue to impact our lives even more profoundly in the future,” says Ken Buckeye, program manager in MnDOT’s Office of Financial Management. “Where we live and work and our modal choices will be influenced strongly by our ability to stay connected in the manner we choose. This research has important implications for how we plan, develop, and operate our transportation networks and systems.”

Fan’s research is part of a multi-pronged study that analyzed the technological shifts altering surface transportation and the implications for Minnesota. Other contributors included principal investigator David Levinson, professor in the Department of Civil, Environmental, and Geo-Engineering (CEGE); Adam Boies, CEGE assistant professor; and Jason Cao, associate professor, Humphrey School of Public Affairs. Their high-level white papers are compiled in a final report: The Transportation Futures Project: Planning for Technology Change. Future issues of Catalyst will share findings from other chapters.
In February, participants from around the world attended the Winter Cycling Congress at The Commons Hotel on the U of M campus—the first time the international event has been held in the United States. This was the fourth year for the event, which unites a diverse and international group with a shared vision of increasing cycling and walking among people of all ages and abilities. This year, the event focused on the real and perceived barriers that prevent people from realizing the health, wealth, happiness, and equality benefits of year-round cycling.

Greg Lindsey, a professor at the U’s Humphrey School of Public Affairs and current MnDOT Scholar-in-Residence, participated in a session focused on data collection practices in the Twin Cities for measuring winter cycling traffic. The session explored how data collection can help make the case for winter cycling by demonstrating that the activity is significant and that changes in weather may deter but do not prohibit people from hitting the roads and trails on their bikes.

The conference also featured a five-mile public bike ride/parade beginning at the Commons Hotel and ending at the Weisman Art Museum.

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**Career Expo connects students with future employers**

Undergraduate and graduate students seeking transportation-related career opportunities gathered at the University of Minnesota in Minneapolis on February 16 for the 2016 Transportation Career Expo. Hosted annually by CTS, the expo offers students the chance to learn about transportation career alternatives, career preparation strategies, and future job opportunities. This year’s event featured roundtable discussions with transportation professionals on topics ranging from engineering to networking to public transit. Students also participated in mock interviews and mingled with the expo’s 22 exhibiting employers and professional associations.
effects of travel cost, travel time, and population density on mode choice. The research, sponsored by the Transitway Impacts Research Program, aims to help policymakers and transportation planners better understand and plan for these complicated impacts and maximize public investments in transitways.

Researchers began by using data from the Metropolitan Council’s Travel Behavior Inventory to examine mode choice in the Twin Cities region. In particular, they studied the competition between personal vehicles and transit. They found that in the seven-county Twin Cities metro area, the monetary value of in-vehicle travel time is about $17.50 an hour, with a “penalty” of $10 per transfer (equivalent to 35 minutes of in-vehicle travel time).

“Travel time seems to be the key for promoting the shift to transit,” says associate professor Jason Cao, the principal investigator. “Transit travel times compared with automotive travel times are an important predictor of the decision to drive or use transit.”

In addition, they discovered that density has a critical impact on the choice of transit, and that the density at destinations is more important than the density at origins, especially for people sharing a ride.

Next, researchers examined transitway ridership at the station level through a study of the Twin Cities and 15 peer regions to learn what role transit-supportive public policies play in boosting transitway ridership. Using a multiple regression analysis, they predicted boarding at the station level as a function of transit-supportive policies while controlling for the built environment, transit service, and socioeconomic characteristics.

“We found that specific station-area-focused policies promoting affordable housing, and explicit policies calling for sidewalks on all streets in station areas or entire cities, have a significant and positive impact on ridership if there are sufficient potential destinations in the station area,” says associate professor Yingling Fan. “The effects of transitways are bound up with, and dependent on, the places they serve.”

“This research reinforces that in addition to fully building out our regional transitway network, we also need to be intentional about investments and policies that support transit-oriented development,” says John Doan, Southwest LRT senior project manager at Hennepin County.

Based on their findings, the researchers recommend strengthening pro-affordable-housing policies and pro-sidewalk policies in the Twin Cities’ station areas, supporting and encouraging the neighborhood-scale commercial development required for these policies to succeed, and continuing the implementation of these policies as the regional transit system expands.

“Ultimately, the central thread of our research is that attracting the greatest number of travelers to transitways not only requires building excellent transitways, it also requires focusing on the broader transportation system and on the form of the region itself,” Cao says.

The final report was authored by Cao, Fan, and research fellow Andrew Guthrie.
Driver-assist system from page 1

markings. Even in less extreme winter weather, snowplow operators gain assurance of their lane location using the system.

The DAS was developed and refined over the past 20 years under multiple research projects funded by MnDOT and the USDOT’s University Transportation Center program. Professor Max Donath, director of the U’s Roadway Safety Institute, led the work. In addition to plows, the DAS technology has also been tested in other specialty vehicles such as patrol cars and ambulances. Vehicles using the system have been deployed in both Minnesota and Alaska.

The DAS uses GPS technology and a front-mounted radar to provide an image of the road and any obstacles in front of the operator. The image is displayed on a monitor inside the cab of the plow. The system also vibrates the operator’s seat as a warning if the plow veers too close to the roadway’s centerline or fog line.

“If the driver gets within one foot of the fog line on the right side, the right side of the seat vibrates. If the driver gets too close to the centerline on the left side, the left side vibrates,” says Fester.

The vibrations continue until the driver moves back into the center of the lane. The driver can also turn off the warning feature to clear snow from the shoulder.

The DAS is currently installed in one truck in District 7. The $75,000 cost makes it difficult to install in every truck in the district or state, although Fester says having at least one system in every district may be possible.

Fester says the system proved its worth one day in February when blizzard conditions caused zero visibility and forced many road closures in southwest Minnesota. He was called out at 2 a.m. February 8 to assist a stranded state trooper and several motorists on a 12-mile stretch of Highway 60 between Windom and Heron Lake. Fester drove a pickup behind the DAS-equipped snowplow, driven by Darryl Oeltjenbruns, to reach them.

As the DAS identified other stranded vehicles on the way to Heron Lake, Fester and Oeltjenbruns checked to make sure they weren’t occupied with people. Once they made it to Heron Lake, they stopped at the community center where they had earlier dropped off the stranded motorists.

On the way back to Windom, Fester and the state patrolman continued to check on stranded vehicles as the DAS-equipped snowplow led the way. If the vehicles weren’t in the ditch, motorists drove behind the two MnDOT vehicles.

If their vehicles were in the ditch, motorists rode in a Suburban that was also being escorted to Windom. After returning to Windom, the motorists were dropped off at motels or truck stops.

“When we first went out, there were about six stranded vehicles. Coming back from Heron Lake, there were about 15,” Fester says. “At one time, we had 12 vehicles in line as we drove back to Windom, driving about 10 to 15 miles per hour.”

Later that morning the DAS system was used again to locate other motorists.

“We continued to use it until about 10 a.m. or 11 a.m. that day,” Fester says. “The system worked great and kept everyone safe. It was an interesting morning.”

(Reprinted and adapted with permission from an article by Sue Roe in MnDOT’s Feb. 17, 2016, Newsline.)
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