With a new $1.75 million grant from the National Science Foundation (NSF), U of M researchers will focus on a critical challenge—how to leverage the emergence of automated vehicles (AVs) to rethink and redesign future transportation services and enable smart, connected communities where everyone benefits.

The three-year project, titled Leveraging Autonomous Shared Vehicles for Greater Community Health, Equity, Livability, and Prosperity (HELP), is one of 13 projects to receive an award as...
Annually updated research from the Accessibility Observatory at the University of Minnesota estimates the impact of traffic congestion on access to jobs for the 50 largest (by population) metropolitan areas in the United States.

The new rankings are part of the Access Across America study, which began in 2013. The rankings focus on accessibility, a measure that examines both land use and transportation systems. Accessibility measures how many destinations, such as jobs, can be reached in a given time.

“Rather than focusing on how congestion affects individual travelers,” explains Andrew Owen, director of the Observatory, “our approach quantifies the overall impact that congestion has on the potential for interaction within urban areas.”

The study, which is based on data from 2017, also ranks access to jobs by car for the 50 largest U.S. metro areas.

According to the latest data, the Minneapolis–Saint Paul metropolitan area ranks 7th nationally in access to jobs by auto. The study reports that the average worker traveling by auto in the Minneapolis–Saint Paul metro can reach 875,049 jobs within 30 minutes.

Total employment in the metro area is 1,794,806 (14th nationally). Minneapolis–Saint Paul ranks 28th in lost access to jobs because of traffic congestion. The average worker traveling by auto in the Minneapolis–Saint Paul metro can reach 26 percent fewer jobs within 30 minutes during congested periods.

Accessibility continued on page 4
This spring, graduate students at the Humphrey School of Public Affairs partnered with Metro Transit to explore the perceptions neighboring stakeholders have regarding nearby bus stops. The project—conducted as part of a capstone workshop focused on integrating land use, technology, and equity into transit planning—specifically aimed to generate solutions that maximize the role of bus stops as community assets.

In previous work, including research efforts led by U of M professor Yingling Fan, Metro Transit investigated what riders think of transit infrastructure, but less attention has been given to the feelings of the surrounding community. This project explored those missing perspectives by focusing on neighboring stakeholders, defined by the research team as nearby property owners, business managers and staff, residents, and other users of the space.

The student team consisted of Joseph Ayers-Johnson, Kurt Howard, Casey Lauderdale, Joseph Polacek, and Jake Schutt. The course instructor was Lyssa Leitner, who is a transportation planner with Washington County.

To complete the project, students conducted a literature review, interviewed subject matter experts in transit and community development, and surveyed more than 60 neighboring stakeholders. Through these efforts, the team sought to understand how Metro Transit can contribute to a more positive perception and experience of local bus stops and enhance their role as community assets for both riders and neighbors.

The team concentrated on three issues: how neighbors feel about nearby bus stops, what influences these feelings, and how neighbors can become more engaged in creating better bus stops.

Findings illuminate existing positive and negative perceptions of bus stops. Positive examples include the value transit accessibility brings for nearby residents and businesses, and the role bus stops play in contributing to a walkable environment. Negative factors are primarily related to maintenance needs and the perceived attraction of unwanted activity such as crime.

Based on these findings, the students developed 11 recommended actions to help Metro Transit strengthen the role of bus stops as community assets:

- Expand the role of community ownership models.
- Create an outreach strategy.
- Harness civic energy by partnering with community organizations.
- Share positive stories.
- Create an information hub where interested parties can learn how to customize their bus stop.
- Collaborate on municipal improvements.
- Contract with neighborhood groups for community outreach and engagement efforts.
- Replicate pilot surveys on a wider scale.
- Leverage existing community events.
- Run a pilot program of neighborhood-led bus stop customization and measure the response from riders and neighbors.
- Consider creating a position to act as a full-time liaison between Metro Transit agencies and community members.

The goal of these actions, according to the students, is to help Metro Transit create value that is recognized by transit riders, neighbors, and policymakers.
A summary report of the Strategic Visioning Workshop for Automated Vehicles in Minnesota, hosted by CTS earlier this year, is now available on our website. The event convened representatives from across the public, private, academic, and nonprofit sectors to define and advance an agenda related to automated vehicles (AVs) in Minnesota.

The report includes highlights from workshop presentations, panel discussions, and small-group visioning sessions. It also describes the following seven key themes that emerged from the event:

- Define the problems we are trying to solve and the challenges we want to avoid with AVs.
- Focus on people-centric planning.
- Create a comprehensive framework for AV demonstration and deployment.
- Foster collaboration and partnerships, including at the regional and national levels.
- Account for AV impacts on transportation funding and full costs of transportation.
- Increase public education and engagement.
- Develop the workforce of the future in Minnesota.

In addition, the report includes 18 strategic action plans drafted by workshop participants in the topic areas of people mobility; freight mobility; traffic operations and safety; and planning, economic development, and the environment.

The workshop was sponsored by CTS, the McKnight Foundation, the Minnesota Department of Transportation, Hennepin County, and the Metropolitan Council.

Read the full report at cts.umn.edu/events/2018/AVworkshop.
part of the NSF’s Smart & Connected Communities grant program this year.

Led by computer science professor Zhi-Li Zhang, the transdisciplinary project team includes five CTS scholars: Saif Benjaafar, industrial and systems engineering professor and director of the U’s Initiative on the Sharing Economy; Frank Douma, director of the State and Local Policy Program, Humphrey School of Public Affairs; Yingling Fan, Humphrey School professor; Tom Fisher, director of the Minnesota Design Center; and Alireza Khani, civil, environmental, and geo-engineering assistant professor.

The research envisions an ambitious “smart cloud commuting system” based on giant pools of shared AVs. “These smart cloud commuting systems have the potential to bring about far-reaching societal changes,” Zhang says.

“Using AVs in this way will provide inexpensive mobility services to all people, especially people with socioeconomic disadvantages,” Benjaafar says. “A system like this would help build stronger family and community ties, and boost economic productivity and equity by mitigating or removing mobility constraints.”

The researchers say the work will also include collaborators from across the state, with the aim of building stronger, smarter communities.

“The research will draw on innovative mobility field experiments under way in the Twin Cities region and will collaborate with several public, private, and civil society partners,” Fisher says. “These partners will include the cities of Minneapolis and Saint Paul, the Destination Medical Center in Rochester, the Minnesota Department of Transportation, the Metropolitan Council, and Metro Transit to design, plan, and analyze a shared AV system for greater community health, equity, livability, and prosperity.”

As part of the project, the research team will:

• Study the feasibility, economic viability, and architectural and operational designs of the envisioned smart cloud commuting system.
• Quantify system efficiency gains that can be attained from the intelligent control of AVs as well as from ride-sharing and smart trip scheduling of users.
• Develop optimization models and algorithms that account for essential tradeoffs, including cost, quality of service, and congestion in deciding how best to deploy AVs geographically and temporally.
• Investigate using economic models and likely scenarios of vehicle ownership and market structures to study the impact of each scenario on traffic measures including vehicle ownership and traffic volumes.
• Understand the social impacts of AVs on diverse populations and the effects they will have on land use and urban design as well as on economic opportunities in disadvantaged communities.

Ultimately, the project will result in policy recommendations, design guidelines, and quantitative analysis. “We’re hoping that our work can inform local and statewide decision making for our cities and communities,” Fan says.

Register for the Freight and Logistics Symposium

Registration and program information is now available for the annual Freight and Logistics Symposium, scheduled for Friday, December 7, at the Delta Hotels Minneapolis Northeast.

In the keynote presentation, Leo Janus, senior offering manager–Watson Supply Chain at IBM, will discuss cybersecurity and the use of blockchain in the movement of goods. The symposium will also include a panel discussion on cybersecurity and data privacy related to connected and automated vehicles in Minnesota.

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.

Register at cts.umn.edu/events/freight.
Protecting vulnerable road users such as bicyclists is a top priority for both transportation managers and the public. However, a lack of data on bike crash risk makes implementing effective safety measures difficult.

To address this information need, U of M researchers have developed new methodologies and tools for estimating bicyclist exposure to risk. Their work also illustrates, through case studies, how these new measures can be used to assess crash risk and be incorporated into planning-level studies to improve safety.

“In our community, we cannot rely on bicycle and pedestrian crash data to prioritize infrastructure investments, as our number of incidents is very small,” says Maren Webb, Safe Routes to School/SHIP coordinator in Grand Marais/Cook County. “However, anecdotal evidence and other data suggest that improvements are needed. This research will assist communities like ours to use locally collected bicycle and pedestrian count data to estimate and assess safety and crash risk, and to inform local Safe Routes to School planning and other infrastructure investments.”

The goal of the research was to provide tools and methodologies that support a data-driven approach, says Greg Lindsey, professor in the Humphrey School of Public Affairs and the principal investigator.

Researchers began by conducting a literature review summarizing recent advances in demand modeling, estimating exposure to risk (defined as bicyclist demand, or traffic volumes), and assessing crash risk. Next, they developed new bicycle demand models using a large database of afternoon peak-period bicycle counts in Minneapolis. Using this information, they then developed additional models to demonstrate how estimates of exposure correlate with the probability of crashes in Minneapolis.

“The demand models correlate the count data with different road and built-environment characteristics, enabling estimation of the number of bicyclists through any given segment in a network,” Lindsey explains. “By combining these demand models with crash data, it becomes possible to predict and understand the risk of bicyclist-car crashes at various locations and times. It also becomes easier to plan where to put countermeasures.”

Lindsey’s team used the exposure estimates to assess the need for countermeasures at 184 roadway-trail crossings in Minneapolis. “We discovered most locations that potentially warrant traffic signals or pedestrian hybrid beacons already have them,” he says. “However, as many as 17 crossings warrant site-specific analyses to determine whether additional safety countermeasures may be needed.”

“While MnDOT is a multimodal agency working to connect people and places, our roads and facilities are often barriers for people walking or biking to their destination,” says Michael Petesch, bicycle and pedestrian data coordinator with MnDOT’s Office of Transit & Active Transportation. “This study, along with several ongoing MnDOT efforts to characterize risk, will be useful in developing proactive approaches for planning and programming safety countermeasures on projects throughout Minnesota.”

The models will also be useful for developing performance indicators and measuring progress toward them, Lindsey notes.

The study was sponsored by the Roadway Safety Institute (RSI), a federally funded University Transportation Center. Moving forward, Lindsey has received RSI funding to conduct a follow-up study, this time focused on equity. “Do we provide equal service to all parts of the community, and do all parts of the community experience the same levels of risk? Is crash risk higher in poor neighborhoods than in wealthier neighborhoods? These are some relevant questions we aim to address,” Lindsey says.
“Most dockless providers are private, venture-capital-funded entities, representing a significant departure from current public and nonprofit approaches,” says Frank Douma, director of the State and Local Policy Program at the Humphrey School of Public Affairs. Several cities have encountered challenges in securing cooperation from these operators in areas such as data transparency.

“This raises a key question,” Douma says. “To what extent can cities use contracts and governance to exchange use of the public right-of-way for operating requirements that advance equity, accessibility, innovation, and other goals?”

A new U of M report presents recommendations for regulating dockless bike share in cities and ties these approaches to the implementation of Nice Ride Minnesota’s dockless pilot. It also examines prominent challenges in coordination and implementation and highlights novel approaches, with an eye toward the future of bike share in the Twin Cities.

“Access to and affordability of transportation services help make a city work,” says Eric Muschler, program officer with the McKnight Foundation, the project’s sponsor. “Shared mobility services and innovation in the transportation industry are disrupting the traditional ways we plan and build our infrastructure and how we will use transportation in the future. Ensuring it serves all citizens and has a net positive benefit to community and livability is crucial.”

As part of their study, Douma and research assistant Austin Hauf reviewed the wider literature on “smart mobility,” a catchall term that encompasses bike share, automated vehicles, ride-hailing services, congestion-pricing mechanisms, and other technology-driven transportation innovations. “The smart mobility literature indicates that cities may be missing a key opportunity to establish robust governance frameworks that guarantee public value in the face of a rapidly evolving transportation landscape,” Douma says.

For additional context, the researchers completed case studies of four U.S. cities that host dockless systems: Dallas, Seattle, San Diego, and Washington, DC.

“The case studies touch on a few consistent challenges,” Douma says. “Improperly parked bikes are a nearly universal problem in cities with dockless bike share, though the intensity of the problem is sometimes exaggerated.” Still, he notes, “It’s important to address this issue. Improperly parked bikes can block sidewalks and walkways and create barriers for people with disabilities or mobility challenges.”

Bike maintenance is another consistent challenge in dockless systems. “The bikes many providers use are made more cheaply, which minimizes loss if the bikes are vandalized or stolen but increases the likelihood of mechanical failure,” he says.

The final report includes general observations and recommendations for cities and service providers (see sidebar).

Recommendations for cities and service providers
  • Cities should proactively and transparently regulate smart mobility services that operate on their rights-of-way.
  • Service providers should expect to make concessions in exchange for use of right-of-way (such as data access to support transportation planning).
  • Cities should continue to place goals in the areas of transportation planning, health, safety, etc., above innovation.
  • Cities and operators should pursue flexibility in governance models and contracts.
  • Cities need to define what success looks like: Is it trips per day per bike, for example? Or geographic areas served?
  • Nice Ride should increase its efforts to collaborate within and beyond municipal boundaries.
Governing dockless bike share: early lessons from the Twin Cities.