Investments in biking routes improve access to jobs in US metros

First-of-its-kind research from the Accessibility Observatory at the University of Minnesota ranks the 50 largest (by population) metropolitan areas in the United States for connecting workers with jobs via bicycle.

The new rankings in *Access Across America: Biking 2017* are part of a national pooled-fund

Roadway safety and the new hands-free law

On August 1, the hands-free bill passed this spring became law in the state of Minnesota. According to the Department of Public Safety, the new law allows drivers to use their cell phones to make calls, text, listen to music or podcasts, and get directions, but only by voice commands or single-touch activation without holding the phone.

Inside, Nichole Morris, CTS Scholar and director of the HumanFIRST Laboratory at the U of M, shares her thoughts on what it means to go hands-free and how it can help reduce distracted driving.

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Roughly one quarter of bumble bee species are in decline, including the endangered rusty-patched bumble bee. Roadsides offer a unique opportunity to increase habitat for these declining species, which are important pollinators for both crops and natural systems. In a recent study, U of M researchers assessed the bumble bee community and habitat within Twin Cities roadsides and made recommendations for best management practices.

“Overall, we found that roadsides harbor many bumble bee species, including several of conservation concern,” says Dan Cariveau, professor of entomology and the study’s principal investigator. Others on the research team included co-investigator Elaine Evans (assistant Extension professor, entomology) and doctoral candidate Michelle Boone.

The rusty-patched bumble bee—named Minnesota’s state bee earlier this year—is no longer found in more than 95 percent of its original range and was listed as a federally endangered species in 2017. The Twin Cities metro area is one of the few in which this species persists, though in highly reduced numbers, Cariveau says.

In the MnDOT-funded study, researchers surveyed 94 sites along major roads and highways in seven metro counties. Each site was sampled 3 to 15 times (average of 6) throughout the 2018 season. The team recorded 12 species or species groups representing 52 percent of Minnesota bumble bee species. The abundance of blooming flowers at sites varied, with most sites having either low or moderate levels.

The team then used occupancy modeling to estimate the probability of detecting the rusty-patched bumble bee and other bumble bee species at the sites, and in turn, to estimate the “true occupancy” for a species. “This allowed us to determine how many surveys must be performed to be reasonably certain that the rusty-patched bumble bee is absent,” Cariveau says.

The modeling predicted that rusty-patched bumble bees occupy 4 percent of sites, with a 30 percent chance of detection. The researchers recommend performing nine surveys during the main bumble bee activity period to be 95 percent sure that bees are detected if they are there.

The team also examined the relationship of the bumble bee community to surrounding landscape factors. They found that sites with more wooded areas within two kilometers and with greater average floral area had increased bumble bee abundances (total number of all bumble bees recorded) and more bumble bee species. Developed areas also had higher abundances. “Crops, however—primarily corn and soybeans—had a negative impact on abundances and species, including uncommon species,” Cariveau says.

The researchers’ recommendations include adding bumble bee forage to roadsides. “Flowers support both the abundance and species richness of bumble bees,” he says. In addition, the team advises replacing noxious weeds such as Canada thistle and spotted knapweed with floral forage preferred by bumble bees. (Some roadside management plans require the removal of the flowering noxious weeds.) Plants preferred by the rusty-patched bumble bee can be added where its support is a priority.

The study’s findings can help inform decisions for habitat enhancements. “For example, if the goal is to expand the current rusty-patched bumble bee range into areas that the species historically occupied, then increasing floral availability near wooded areas where the surrounding landscape is dominated by crops could help,” Cariveau says.

“It was important to fund this research on Minnesota roadsides while we still have bees to study,” says Christopher Smith, wildlife ecologist and protected species program coordinator with MnDOT’s Office of Environmental Stewardship. “These results will help inform future surveys and provide baseline data needed to evaluate roadside vegetation management practices.”
In memoriam: Richard T. Murphy, Jr.

Richard T. Murphy, Jr., a former chair of the CTS Executive Committee, passed away July 4. Murphy was the president and CEO of Murphy Logistics Solutions—and a landscape architect, teacher, entrepreneur, environmental pioneer, and industry and community leader.

“CTS benefited from a long and meaningful relationship with Richard, including his 12 years on the CTS Executive Committee, four of those as our chair and two as past chair,” says CTS director Laurie McGinnis. “He was a strategic and innovative thinker, and he applied those abilities to help us advance as a center. True to Richard’s nature, he stayed connected to CTS even after that service was completed, always willing to provide counsel, give a presentation on a freight-related topic, or host a tour at Murphy Warehouse when asked. We will miss Richard as a friend, mentor, and colleague.”

CTS honored Murphy in 2006 with the William K. Smith Distinguished Service Award in recognition of his private sector leadership and mentorship within the freight and logistics industry. He was awarded the University of Minnesota’s Distinguished Alumni Award in 2015.

His legacy includes a career in landscape architecture, including 25 years of teaching; close to three decades as a successful entrepreneur and business leader of Murphy Logistics Solutions; and his role as an optimistic and dedicated environmental advocate and highly regarded logistics industry and community leader.

“We greatly appreciated Richard’s interest and contributions to our work on the role of freight in Minnesota’s economic competitiveness,” says Frank Douma, director of the Transportation Policy and Economic Competitiveness program and the Humphrey School’s State and Local Policy Program. “From providing us with site visits to helping arrange key interviews, his support was invaluable to the success of our work from its earliest days.”

Attend a CTS course on professional ethics

This fall, CTS is offering a course that will explore ethical dilemmas commonly encountered by engineers and planners—and their appropriate solutions. The two-hour course will be held November 19, 2019, from 8:00 a.m. to 10:00 a.m. at the St. Paul Student Center Theater on the U of M’s St. Paul campus.

The course meets the ethics-related requirements for engineers (2.0 PDHs) and planners (1.5 AICP Certification Maintenance credits) to renew their credentials in Minnesota.

For more information or to register, visit cts.umn.edu/events/ethics.
Many U of M faculty members are working on the leading edge of smart technology. One of them is Saif Benjaafar, a national authority on sharing economy business models and the smart technology that propels them. Benjaafar discussed his research and its implications in the summer 2019 issue of the College of Science and Engineering’s Inventing Tomorrow magazine.

In the article, Benjaafar points to ride-sharing companies like Lyft and Uber to explain the kind of analysis in which he specializes. “They do dynamic pricing, so they sense in real time what the supply of drivers is and what the demand of customers is, and then they price accordingly using sophisticated algorithms. A lot of the work I do is in that area—how should a platform set prices as supply and demand change in time and in space. That’s one notion of ‘smartness,’” said Benjaafar, Distinguished McKnight University Professor in the Department of Industrial and Systems Engineering.

“Another notion is matching. Which drivers do you match with which rider? Do you pull the trigger and match [the first available driver to the rider] or do you wait for a better match? If you wait too long you could lose the rider,” he said—and drivers don’t want to be idle for too long, either, because they’re not earning money then.

“These platforms have enabled micro-entrepreneurship, enabling micro-sellers to function as if they have the scale of a large company,” Benjaafar said. He’s keenly interested in environmental sustainability, and his work tends to focus on shared mobility because of its potential for reducing environmental impacts.

“One of the key ideas of the sharing economy is that there’s excess capacity in the world that goes untapped. So if you think of your car and all of the time it sits idle, it’s depreciating and occupying valuable real estate,” he said. “Before we had these online platforms, it was difficult to leverage that kind of excess capacity.”

It’s a balancing act, Benjaafar said. “There’s a possibility that everybody wins—that consumers benefit because now they can fulfill their needs without the hassle of ownership, and the service provider benefits by monetizing an expensive asset.”

But there’s also the potential for overconsumption, he explained, again using car-sharing as an example. Consumers who might otherwise walk, bike, or use public transit may choose to drive when that choice becomes accessible. “This is where public policy comes into play,” he said. Government can intervene by providing incentives for consumers to make the lowest-impact choice for any given situation.

Other challenges remain, Benjaafar said. And whether the on-demand economy ends up enhancing societal well-being overall depends partly on whether and how these challenges are addressed. Someone whose main source of income is driving for a ride-sharing company doesn’t have employer-sponsored vacation or health insurance, for example.

“If I’m driving for Uber, I’m not just supplying my time,” he explained. “I’m also supplying my car. And I’m responsible for maintenance and insurance. So there’s this fundamental shift in who bears a lot of the risk.”

The shift is already well underway, Benjaafar said, so it’s important to wrestle with its pitfalls now.

“I think the rules of the game should not be left in the hands of the platform operators and service providers,” he said. “Our research group is unique, because we’re stepping back and looking at the broader implications for society.”

Benjaafar is the director of the Initiative on the Sharing Economy, which he and CTS established in partnership with other faculty members across the U. It is administered by CTS. Visit sharingeconomy.umn.edu for the latest news and trends on smart services.

(Adapted with permission from CSE Inventing Tomorrow, summer 2019; written by Susan Maas; photo by Rebecca Slater.)
Students from the US and China gained insight into transportation and urban development through recent education activities offered by the U’s Global Transit Innovations (GTI) program.

For the third year, GTI coordinated a May term study-abroad course that included visits to major Chinese cities. The three-credit, graduate-level course—PA 5880: Planning for China’s Urban Billion—was offered by the Humphrey School of Public Affairs.

The intensive two-week course familiarized students with urban planning practices and emerging development issues in five unique Chinese cities: Beijing, Xiong’an, Shenzhen, Guangzhou, and Hong Kong. It was led by GTI director Yingling Fan, a professor in the Humphrey School.

The course integrated guest lectures, site visits, and cross-cultural classroom activities. For example, students examined Beijing through the lens of its oldest neighborhoods, which have faced destruction as the city and China relentlessly modernize. “We learned about the application of advanced urban sensing technologies to collect data on urban processes and transform how communities engage with neighborhood planning and development,” Fan says.

The students also made a one-day visit to Xiong’an, a new urban area located about 100 kilometers southwest of Beijing. Established in April 2017, Xiong’an was “hand-picked by Chinese president Xi Jinping as the dream city for his ‘thousand-year’ plan to transform the area into a high-technology hub of the region,” Fan says.

Seventeen students from eight departments across the University of Minnesota completed the course. One was Shannon Evans Engstrom, a Humphrey School graduate student in urban and regional planning. “The trip made a big impact on me and my career,” she says. “Studying transportation and land-use planning in China is particularly valuable because the government is able to do things we cannot do in the US, for better or worse. For example, a big takeaway for me was just how much they are able to do with technology and data.”

In a reverse commute, 31 students from five Chinese universities spent four weeks in the US this summer. Students from Southeast University, Northwest University, Southwest Jiaotong University, Beijing University of Technology, and Central South University participated in the program, which included courses on urban planning, transportation, and Geographic Information Systems. They also attended a variety of transportation-focused activities both on and off campus, including a tour of the I-35W reconstruction project in Minneapolis.

The program, first offered in 2016, was developed by CTS, GTI, and the U of M China Center’s Mingda Institute.

In addition, GTI hosted four visiting scholars this spring semester. The scholars—from four different universities—connected with the transportation community in the Twin Cities region to discuss their research and exchange knowledge.

GTI is an affiliated program of CTS. Its education component aims to attract bright minds to the transit-planning field and educate practitioners and agency staff.
study that began in 2013 and focuses on accessibility. Accessibility, which examines both land use and transportation systems, measures how many destinations, such as jobs, can be reached in a given time.

“This new study provides a baseline to evaluate how well a metro area is facilitating access to jobs by bicycle from year to year,” said Andrew Owen, director of the Observatory. “Bike commuting is a cost-effective, healthy, and environmentally sustainable alternative to being stuck in traffic.

State departments of transportation, metropolitan planning organizations, and local agencies can use our findings to better coordinate investments in bicycle facilities with the location of jobs and housing to improve job accessibility by bike.”

The study incorporates traffic stress and cycling comfort in its evaluation of access to destinations by bicycle. According to the study, low-stress routes are separated bike lanes and paths. Medium-stress routes include all bike infrastructure—low-stress facilities plus on-street unprotected bike lanes, certain shared lanes, and mixing with traffic on some non-arterial streets.

Many cities exhibit different rankings between their low-stress and medium-stress job accessibility metrics. For example, Philadelphia places 5th by low-stress access, but only 13th by medium-stress access. Minneapolis–Saint Paul places 12th by low-stress access and 7th by medium-stress access. Generally, this means residents in Philadelphia who are only willing to bike on low-stress facilities reach more jobs than those on low-stress routes in Minneapolis, but residents in Minneapolis willing to travel on all bicycle facilities reach more jobs than those in Philadelphia.

Minneapolis–Saint Paul performs the best nationally (followed by San Francisco and Portland) when comparing medium-stress bike access to the maximum-possible access—the access to jobs that would be experienced if every road felt as safe as an off-street path. Using medium-stress facilities, workers in the Twin Cities can reach nearly 78 percent of the jobs they could by biking on all streets.

“Our engagement with Minnesotans has taught us that people prioritize making local bicycle trips safer, more comfortable, and more convenient. This includes trips to and from places of employment,” says Jake Rueter, pedestrian and bicycle planner with the Minnesota Department of Transportation (MnDOT). “MnDOT will continue to implement its state and district bicycle plans to help improve our state’s health, environment, and economy through increased bicycling.”

Since 2010, the number of bicycle commuters nationwide has increased nearly 22 percent. “Though biking is used for less than one percent of commuting trips in the United States, biking infrastructure investments are much more cost-effective at providing access to jobs than infrastructure investments to support automobiles,” Owen said. “Ultimately, our findings give policymakers and planners more options to improve transportation performance goals related to congestion, reliability, and sustainability as well as increased access to jobs.”

The research is sponsored by the National Accessibility Evaluation Pooled-Fund Study, a multiyear effort led by MnDOT and supported by partners including the Federal Highway Administration and 12 additional state transportation departments.

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**Top 10 metro areas for job accessibility by bike (medium stress)**

1. New York
2. San Francisco
3. Chicago
4. Denver
5. Washington
6. Portland
7. Minneapolis–Saint Paul
8. Seattle
9. Boston
10. San Jose

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**Twin Cities workers can bike to**

61,532 JOBS

**WITHIN 30 MINUTES**

using medium-stress routes.
What does it mean to drive hands-free?
Hands-free is a general term to describe interacting with your phone while driving that does not involve holding or manually interacting with the phone for purposes of dialing, talking, or any other type of input or engagement.

Depending on the combination of the driver’s phone and vehicle, the hands-free phone use could be through the vehicle’s onboard features (e.g., microphones, speech recognition software, speakers, and steering wheel buttons) or through aftermarket products (e.g., headsets or Bluetooth adapters). All of these features may help to reduce, but not completely eliminate, the amount of physical and visual engagement drivers have with their phones while driving.

How does going hands-free help decrease distracted driving?
Drivers should always treat the primary task of driving as one that demands all of their mind, eyes, and hands. If you must use your phone while driving, hands-free driving is safer than manually interacting with your phone. This is because tasks that involve taking your eyes and hands away from driving increases crash risk and can have fatal consequences.

Studies have linked some of the largest crash risks to tasks like texting while driving or reaching in the vehicle while driving. In contrast, tasks like simply talking on the phone (not including dialing) or conversing with passengers are considered less risky tasks. Drivers can use one-button push, hands-free technology to limit the amount of time they may look away from the road at their phones and limit dangerous reaching to grab their phone in the vehicle.

Using voice-activated texting, which is allowed under the new hands-free law, frequently requires visual verification and corrections of what had been said to the phone—which is still a dangerous activity. I encourage drivers to go “old school” and talk to their friends and family through Bluetooth or onboard features while driving instead of voice-activated texting.

How can individuals further decrease their distracted habits while driving?
We tend to hear discussions about distracted driving and texting while driving as interchangeable terms, but distracted driving includes a wide variety of behaviors such as eating, grooming, and daydreaming.

Although reaching for an object that has fallen to the floor may seem innocuous, it can take your eyes and hands away from driving for long enough that you may wind up in a fatal collision or run-off-the-road crash. Pull over to retrieve any objects that you cannot reach without looking or moving your torso.

Passengers can also impose a distraction to drivers. Drivers should firmly let passengers know when they are feeling stressed or overwhelmed with their driving environment and that they need silence to focus. Due to the pronounced risks, I encourage parents to prohibit their teen drivers from having any teen passengers in their vehicle for the first year of independent driving, longer than what is required by Minnesota’s teen driver laws.

Daydreaming or getting lost in thought may be one of the hardest distracted behaviors to control. I encourage drivers to be more engaged in scanning their environment to help keep their mind busy and fully focused on driving. I like to count the number of pedestrians and bicyclists I see in my commute to help be sure I’m always looking for them and quiet the part of my brain that gets antsy for other things to do.
Investments in biking routes improve access to jobs in US metros.