

Transportation and Public Health
at the Crossroads: SMART
Infrastructure to Improve Health
Equity

Over Three Decades of
Leadership and Contribution:
TTI's University
Transportation Centers

Shaking Up the System: Safe-D
Looks at How Disruptive
Technologies Can Improve
Roadway Safety

TEXAS TRANSPORTATION

VOL. 57 | NO. 2 | 2021

Researcher

Inspiring Minds, Kindling Careers

TTI's University Transportation Centers

 **Texas A&M
Transportation
Institute**
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TEXAS TRANSPORTATION Researcher

VOL. 57 | NO. 2 | 2021

ON THE COVER: From shaping the initial vision for the U.S. Department of Transportation's University Transportation Center (UTC) Program to hosting some of its most significant centers, for more than 25 years the Texas A&M Transportation Institute has played — and continues to play — an integral role in fulfilling the UTC mission of inspiring thousands of young professionals to pursue careers in transportation.



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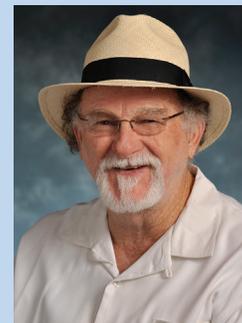
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TTI's Participation in the University Transportation Center (UTC) Program



“As director of the Southwest Region University Transportation Center [SWUTC] for 25 years, it was my privilege to help advance the mission of the UTC Program,” says Senior Research Scientist Dock Burke, now retired from the Texas A&M Transportation Institute (TTI). “We mentored more than 1,300 college students and reached some 14,000 K–12 students with our outreach programs, and that was just with SWUTC — only one of the eight UTCs TTI has been a part of. Without the UTC Program, the transportation profession’s bench of expertise would be far poorer in its depth and breadth.”



Dock Burke
SWUTC Director
Senior Research Scientist
(Retired)



1988

First year of UTC grants awarded, including to TTI for SWUTC



3

TTI-led UTCs



5

TTI-partnered UTCs (where another university led the center)



340

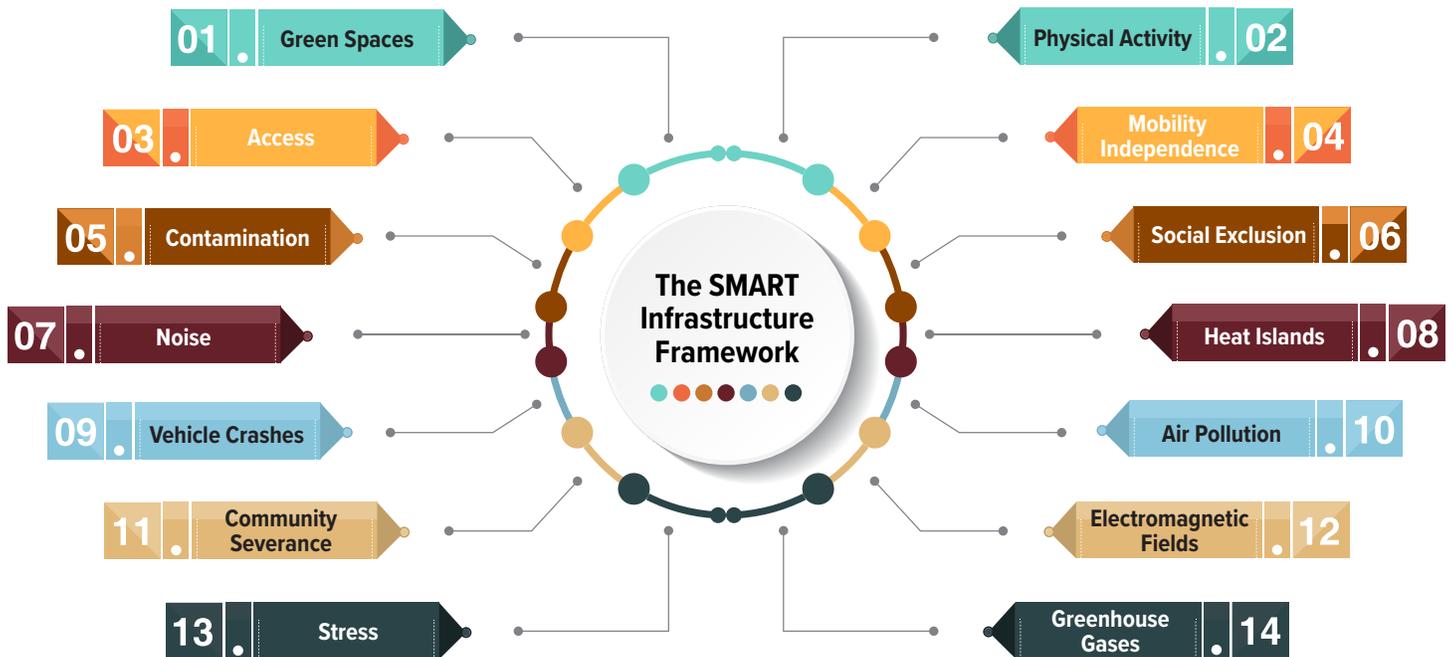
TTI-conducted UTC research projects



\$63.4M

research dollars awarded to TTI through the UTC Program

Transportation and Public Health at the Crossroads: SMART Infrastructure to Improve Health Equity



The COVID-19 pandemic has disrupted the world, including how we view our transportation system. But that interruption in “the way we’ve always done things” has also provided us an unprecedented opportunity to take a step back and reassess our habits, systems and interactions to achieve healthier outcomes. One strategy to do so demands that transportation planners and health professionals work together to develop future infrastructure aimed at reducing health disparities and advancing health equity.

The Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH) — a Tier-1 center funded by the U.S. Department of Transportation’s Office Research and Technology under the University Transportation Center Program — recently launched the SMART Infrastructure to Improve Health Equity initiative with the goal of improving overall public health. The initiative pulls together the strengths of CARTEEH’s consortium members — the Texas A&M Transportation Institute (TTI), Johns Hopkins University, the Georgia Institute of Technology, The University of Texas at El Paso, and the

University of California, Riverside — and leverages previous research efforts. Led by TTI Assistant Agency Director Joe Zietsman, CARTEEH is developing a framework designed to provide stakeholders with a range of tools to enhance the public health and equity outcomes related to infrastructure decisions.

“We’re excited about the opportunity to continue advancing research on the impact of infrastructure decisions on human health,” says Zietsman. “The more we’re able to bring together experts from two disciplines that have not traditionally worked together (engineers and health professionals),

the more progress we can make toward improving the nation’s health.”

The SMART Infrastructure Framework draws on CARTEEH’s work to identify the linkages between health and transportation. CARTEEH identified 14 such linkages, or pathways. They include green spaces, physical activity, access, mobility independence, contamination, social exclusion, noise, heat islands, vehicle crashes, air pollution, community severance, electromagnetic fields, stress and greenhouse gases. The framework also defines goals for the SMART component of the concept, namely:



- **Sustainable:** embracing the triple bottom line or three dimensions of sustainability (economic, social and environmental), now and into the future.
- **Multimodal:** diversifying transportation modes to allow for choices between modes.
- **Accessible:** facilitating access to destinations, activities and people.
- **Resilient:** emphasizing recoverability from a stressed situation.
- **Technological:** innovating the tools, methods and machines used to solve transportation problems.

As can be seen from the 14 pathways, transportation has both beneficial (e.g., physical activity) and detrimental (e.g., air pollution) impacts on health. Center researchers recently conceptualized and quantified the 14 pathways. This pathway model creates a critical framework for linking health outcomes to infrastructure decisions.

“We believe the SMART framework and associated tools will help advance the research efforts of the transportation-related objectives laid out by the federal government in the years to come,” says TTI Associate Research Scientist Ben Ettelman, who developed the framework.

Researchers are developing a Transportation Health Enhancement Toolkit as part of the SMART initiative. The toolkit is based on several pilot projects currently being undertaken by TTI and its CARTEEH partners. These projects cover all stages of the transportation infrastructure life cycle, including planning, project development, construction, operations, maintenance and end of life/disposal. The tools will include performance measures, methods and models, and case studies for transportation practitioners implementing transportation infrastructure improvements, so they’re both SMART and healthy.

“The pandemic has certainly advanced health to the forefront of the world’s agenda,” Zietsman notes. “We’re hopeful that CARTEEH’s SMART Infrastructure to Improve Health Equity initiative is an important step in the right direction for providing transportation infrastructure that supports and enhances healthy outcomes in an equitable way across the nation — and, eventually, our global community at large.” ■



For more information, contact **Joe Zietsman** at (979) 317-2796 or j-zietsman@tti.tamu.edu, or **Ben Ettelman** at (512) 407-1166 or b-ettelman@tti.tamu.edu.



Applying SMART Principles in Dallas, Texas

In collaboration with The Nature Conservancy (TNC) in Texas, TTI and CARTEEH recently completed a study assessing the performance and calibration of low-cost air-quality monitors continuously measuring four criteria air pollutants in Dallas, Tex. Produced as a part of the Breathe Easy Dallas project — a collaboration between TNC, TTI, CARTEEH, the City of Dallas, and other health and community organizations in the metroplex area — the study seeks to increase understanding about how local air monitoring can help improve public health in high-risk population areas.

“We’ve been so pleased to partner with TTI on this project,” states Kathy Jack, Dallas Healthy Cities program director at TNC. “CARTEEH’s researchers bring unique knowledge to studying the intersection of transportation, environmental exposures and public health, and that expertise is proving critical to the success of the Breathe Easy Dallas project.” ■

Ocean of Possibilities —

MarTREC EXPLORES BLOCKCHAINS FOR MARITIME INDUSTRY



Port Houston is abuzz with activity, from a tank barge (foreground), to a car carrier (right-hand side), to a general cargo ship (left-hand side). MarTREC's research applies to a variety of ships, helping streamline processes and share sustainable best practices.

MarTREC

Maritime Transportation Research & Education Center

Established under the Fixing America's Surface Transportation Act enacted in 2015, MarTREC works to preserve and support the nation's transportation system to facilitate efficient, resilient, and sustainable maritime and multimodal logistics and infrastructure.

Endless waves. Cloud-dotted skies. Foaming wakes left by ships.

Along the shore, ports bustle with activity, their efficiency in transporting international trade a key part of the U.S. economy. Intermodal carriers move freight inland from those ports, ultimately to stock store shelves and land on consumer doorsteps.

The Maritime Transportation Research and Education Center (MarTREC) is a U.S. Department of Transportation Tier 1 University Transportation Center funded through the Office of the Assistant Secretary for Research and Technology. Established under the Fixing America's Surface Transportation Act enacted in 2015, MarTREC works to preserve and support the nation's transportation system to facilitate efficient, resilient, and sustainable maritime and multimodal logistics and infrastructure. The center's vision is to be the nation's premier source of expertise on maritime and multimodal transportation research and education. Led by the University of Arkansas, MarTREC consortium members include the Texas A&M Transportation Institute (TTI), Jackson State University, Louisiana State University, the University of New Orleans and Vanderbilt University.

"For TTI, MarTREC has provided an opportunity to do groundbreaking research related to marine freight transportation," says TTI Research Scientist Jim Kruse,

“The survey shows that the majority of the industry [around 87 percent] is not in the process of implementing blockchain. But the industry is slowly evaluating blockchain as a tool used at ports to efficiently move goods through the U.S. Customs and Border Protection inspections and into the supply chain process.”

*Joan Mileski
Head of the Maritime Business Administration
Department, Texas A&M University at Galveston*

director of the Institute’s Center for Ports and Waterways. “MarTREC covers a wide variety of research topics related to the marine transportation system, and TTI’s knowledge of that system, combined with extensive capabilities in economics, emissions and big data, enables the Institute to produce analyses beyond the traditional research in this area.”

Last year, TTI researchers and Texas A&M University at Galveston professors completed the MarTREC report *Analysis of Blockchain’s Impacts on and Applicability to the Maritime Industry*. In maritime terms, the report defines blockchain as a ledger or shared database “that identifies and tracks transactions digitally and shares this information across a distributed network of computers.” Businesses, for example, store and share data in blocks linked together. All users can view and control the data, thereby encouraging transparency and efficiency. The research team reviewed literature; completed a case study of the Port of Veracruz, Mexico; and conducted a survey in the greater Port Houston area.

“The report offers a comprehensive look at the potential uses of blockchain technology in the maritime industry,” notes Juan Carlos Villa, who heads TTI’s Mexico City Office. “The report’s proof of concept at the Port of Veracruz and extensive survey of the Port Houston community provide a solid foundation for future research on this topic.”



Improving operations and lowering transport costs, both in MarTREC’s research wheelhouse, can make freighting goods more efficient and potentially lower costs for consumers via reduced manufacturing and shipping costs. Here, we see a barge moving down the Mississippi River in southeast Missouri.



General cargo ships, like this one in Port Houston, could benefit from MarTREC’s research on tools and strategies to enhance efficiency right when a ship docks at port and connects the cargo to the next step in the supply chain.

The literature review and survey responses indicated stakeholder concerns about how (and if) blockchains would meet maritime needs, providing an opportunity for development, education and research in that area.

“The survey shows that the majority of the industry [around 87 percent] is not in the process of implementing blockchain,” says Joan Mileski, head of the Maritime Business Administration Department at Texas A&M University at Galveston. “But the industry is slowly evaluating blockchain as a tool used at ports to efficiently move goods through the U.S. Customs and Border Protection inspections and into the supply chain process.”

The report was presented at Poster Session 1161 — Current Research Related to Ports and Channels at the 2021 Transportation Research Board Annual Meeting. Besides contributing to discussions on this emerging topic, the findings can also support policy-maker decision making related to ports and shipping. On the water or in the office, industry personnel can incorporate the best practices identified by Kruse and his team to optimize daily operations.

“The results of our study with TTI indicate that despite major investments by leaders in the industry, blockchain is still in its infancy related to maritime business,” notes Cassia Galvao, assistant professor in the Texas A&M University at Galveston’s Maritime Business Administration Department. “However, like the Internet in its early days, blockchain has the potential to transform the reality of how maritime business is done. It’ll be an evolving process for the next 5 to 10 years — but worth it.” ■



*For more information, contact
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j-kruse@tti.tamu.edu.*

NICR-Sponsored Study Evaluates Managed Lane Pricing Methods

Researchers Create New Measures for Comparing Pricing Strategies

Optimizing traffic flow is one goal of transportation agencies looking to improve mobility for transportation system users. Doing so reduces congestion, which not only optimizes roadway operations but also gets folks where they're going faster while often improving safety. Managed lanes represent one method for achieving this, and many states have implemented them. Managed lanes use pricing to regulate demand.

“There are two main ways of pricing managed lanes,” says Mark Burris. Burris holds the Herbert D. Kelleher Professorship in Texas A&M University's Zachry Department of Civil and Environmental Engineering. “With both methods, you want to keep traffic flowing smoothly. That's the goal of the lanes, and it's often a requirement from the Federal Highway Administration.”

Managed lanes offer travelers the option of avoiding congestion by

paying for the privilege of reduced via user fees or by riding with others as a high-occupancy vehicle at a reduced cost. The two most common pricing mechanisms are variable tolls (which change based on time of day) and dynamic pricing (which varies based on congestion levels on the roadway). In theory, dynamic tolls should be able to regulate demand on managed lanes more effectively than variable tolls since they can change every few minutes in response to current traffic conditions.

“If you charge one price over an entire day, there are going to be times when that price is too low, and you will get too many people in the lane,” Burris explains. “That promotes congestion, which is, of course, exactly the opposite of the goal. There will also be times during the day when the price is too

“We found that toll prices that change with traffic congestion in real time and toll prices that change with the time of day both work well to keep traffic flowing on managed lanes. Neither was clearly superior to the other. We also developed two new performance measures to determine the ability of the toll rate to regulate traffic flow on managed lanes.”

Mark Burris
TTI Research Engineer



high, and very few will want to pay it. So, you need a flexible pricing system.”

Burris was the principal investigator on a study, Comparing Pricing Mechanisms for Managed Lanes, sponsored by the National Institute for Congestion Reduction (NICR), a national University Transportation Center dedicated to congestion reduction through multimodal solutions for the surface transportation system. The center is a consortium led by the University of South Florida and including TTI/Texas A&M University, the University of California–Berkeley, and the University of Puerto Rico at Mayagüez (UPRM). TTI teamed with UPRM on this research.

The project analyzed extensive traffic data sets from both variably priced and dynamically priced managed lanes to compare the effectiveness of both pricing methods. Both were found to be effective, with dynamic pricing having a slight advantage given the performance measures used.

Burris and his team accomplished the following project objectives in determining their findings:

- Compared the effectiveness of dynamic pricing with variable pricing on managed lanes.
- Developed pricing (tolling) performance metrics from both the traveler’s and toll authority’s perspectives.
- Formulated two new performance metrics to compare the two pricing methods: a scoring index and a graphical display of performance for visualizing effectiveness.

“We found that toll prices that change with traffic congestion in real time and toll prices that change with the time of day



both work well to keep traffic flowing on managed lanes,” Burris reports. “Neither was clearly superior to the other. We also developed two new performance measures to determine the ability of the toll rate to regulate traffic flow on managed lanes.”

True to NICR’s national focus on congestion reduction, other research agencies can use these new performance measures to evaluate options for regulating managed lanes to better meet local needs. ■



For more information, contact **Mark Burris** at (979) 845-9875 or mburris@civil.tamu.edu or **Melissa Tooley** at (979) 317-2231 or m-tooley@tti.tamu.edu.

NICR Supports 2021 Urban Mobility Report

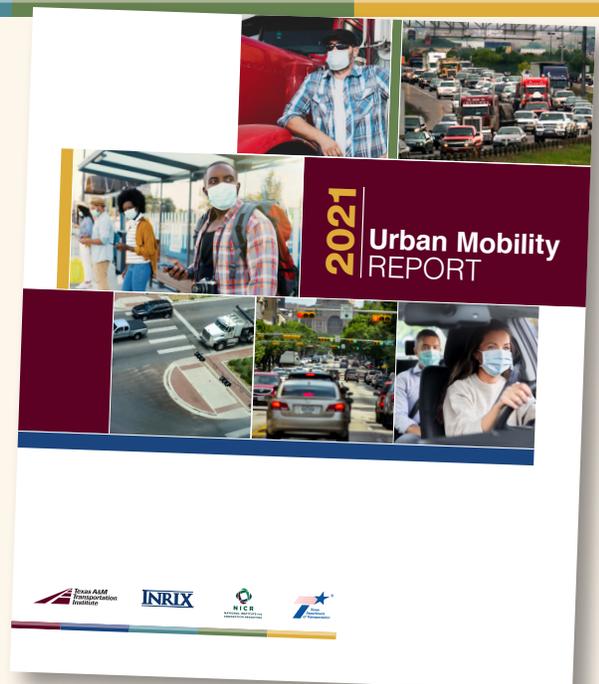
TTI published the 2021 Urban Mobility Report (UMR) on June 29. The definitive study of traffic congestion in the United States for more than 35 years, the report analyzes congestion levels in 494 U.S. urban areas.

The COVID-19 pandemic had a historic impact on traffic trends. In spring 2020, with 14 million people suddenly unemployed and more working from home, roadway congestion flattened to levels not seen in 30 years. Daily commuter traffic dropped by almost half compared to the year before, but the respite was short lived when the country began to reopen.

“The underlying elements of traffic problems — too many car trips, too much rush-hour roadwork, crashes, stalled vehicles and weather issues — have not receded,” says Tim Lomax, one of the report’s authors. “What’s different is that those elements have been eclipsed by plummeting traffic volume.”

This year’s study was funded by the Texas Department of Transportation and, for the first time, also received financial support from NICR.

“Given the center’s goal to find innovative solutions to traffic congestion, our financial support for this project was a natural fit,” says TTI Senior Research Engineer and NICR Tech Transfer Assistant Director Melissa Tooley. “We can’t find solutions until we clearly define the problems, and TTI’s UMR team has a proven record of doing just that after nearly four decades of research and analysis on this issue.” ■





Teens in the Driver Seat® Holds 12th Annual Summit:

Month-Long Gathering Honors Student Leaders Advocating Teen Driver Safety



The Texas A&M Transportation Institute's (TTI's) award-winning Teens in the Driver Seat® (TDS) program recognized teen advocates as champions of young driver safety at the 2021 TDS Safe Driving Summit held in May. Second only to teen suicide, car crashes kill more teens in the United States aged 15 to 18 than any other cause.

Founded in 2002 and recognized by the National Highway Traffic Safety Administration, TDS is a peer-to-peer safety program that educates

teens about the dangers of teen driving to help them develop

safer driving habits and avoid crashes. Thanks to funding from multiple sponsors, including the Texas Department of Transportation (TxDOT) and State Farm, program resources and technical support are available at no cost to schools.

The summit kicked off with the annual All-Star Awards, which reward schools excelling at TDS-approved activities aimed at raising safety awareness. Schools earn points for completing activities and can receive cash awards up to \$1,000. TDS recognized 27 different schools around the nation this year.

"The power of TDS has always been in its reliance on peers helping peers," notes Russell Henk, founder of TDS and manager of TTI's Youth Transportation Safety Program. "These young folks are not only leaders — they're lifesavers."

Restrictions on travel and social interaction imposed by COVID-19 required a virtual summit in 2021 — the first of its kind in TDS history. TDS personnel leveraged the format to offer a month-long series of activities and seminars; sessions covered topics like vaping, using cell phones while driving, and speeding.

"Each of you are inspiring others your age to drive safer and help save the lives of everyone out there on our roadways," State Farm Agent Jenny Weidner told award winners. "State Farm is proud to add our most sincere congratulations for your efforts."

Over 450 attendees from Texas, Georgia, Nebraska and Indiana registered for the summit. Participants represented a mix of students, teachers and traffic safety professionals.

"Your lives, your safety and your futures are important to us in all the work you and your peers have put in over the past year to be recognized here today," Terry Pence, director of TxDOT's Traffic Safety Section of the Traffic Safety Division, told attendees.

In 2022, TDS will celebrate 20 years of success in promoting teen driving safety. The program now extends from its birthplace in Texas to 14 other states, reaching more than 1.5 million students in 1,800 high schools nationwide. ■



Listen to our recent podcast on TDS's 20 years of success in reducing teen traffic injuries and fatalities.



For more information, contact **Russell Henk** at (210) 321-1205 or r-henk@tti.tamu.edu.

Over Three Decades of Leadership and Contribution:

TTI'S UNIVERSITY TRANSPORTATION CENTERS

EDUCATION



**TECHNOLOGY
TRANSFER**

RESEARCH



In 1987, the U.S. Congress authorized the U.S. Department of Transportation University Transportation Center (UTC) Program, establishing 10 federal regional UTCs across the country. The UTC Program was designed to improve transportation research in the United States by advancing technology and expertise across multiple modes of transportation while addressing vital workforce needs for the next generation of transportation leaders. The program is unique in that it is based on three tenets: research, education and technology transfer.

The Texas A&M Transportation Institute's (TTI's) then-Agency Director Charley Wootan played a key role in advancing this landmark legislation and competitive program. He established and actively led the Council of University Transportation Centers to advise the federal government on how to most effectively explore long-term, applied research in transportation. Since then, TTI has been the lead university for three UTCs and has partnered with other national consortia in five others.

"TTI has made extensive contributions to the body of knowledge and state of the practice in transportation through the UTC Program. Many of our most impactful programs were initiated or supported with UTC seed funding," states TTI Senior Research Engineer and Director of External Initiatives Melissa Tooley. "Many students and researchers have been introduced to transportation through TTI's UTCs and gone on to transportation careers, enriching the transportation workforce. And the program's continued emphasis on technology transfer ensures that research becomes best practice. We look forward to what the future holds with this program."

Southwest Region University Transportation Center

In 1988, Texas A&M University/TTI became home to the Southwest Region University Transportation

SWUTC Metrics of Success



605 published technical reports



>451 publications (including 171 refereed journal articles/books and 180 *Transportation Research Record* articles)



1,132 presentations



778 undergraduate and graduate students supported by SWUTC's research program



491 outstanding students awarded scholarships and fellowships



>14,000 young people (ages 6–18) who participated in SWUTC's K–12 programs



95 SWUTC graduates who entered the transportation-sector workforce upon graduation

Center (SWUTC) after the first competition. The other universities involved in SWUTC included The University of Texas at Austin, Texas Southern University, Louisiana State University and the University of New Orleans. Under the leadership of Dock Burke for its first 25 years and Melissa Tooley for its last three years, SWUTC stood as one of the most successful UTCs in the nation, providing a case study for how to leverage state and federal funding, as well as university partnerships, to advance cooperative research projects that benefit the region and the nation. SWUTC's research was implemented in new pavement materials and design methods, innovative transit service programs, dynamic travel-demand management, and more.

University Transportation Center for Mobility

With the passage of the 2005 U.S. transportation bill, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, TTI was awarded the University Transportation Center for Mobility (UTCM), one of 60 UTCs created nationwide. Over the center's six years of operation, Center Director Melissa Tooley managed \$6 million in federal funds and awarded 78 research projects, nearly half involving interdisciplinary collaborations with Texas A&M academic partners like the Bush School of Government and Public Service and the Departments of Agricultural Economics, Civil Engineering, and Landscape Architecture and Urban Planning. The center's legacy includes creating, in 2008, an interdisciplinary graduate certification program in transportation planning at Texas A&M in collaboration with its partners. To date, more than 70 students have graduated with this certificate. ■

TTI's UTC History

Southwest Region University Transportation Center (1988–2016)

Lead institution: The Texas A&M University System (including TTI)

Partners: The University of Texas at Austin and Texas Southern University, with Louisiana State University and the University of New Orleans added with the Moving Ahead for Progress in the 21st Century Act competition

Focus area: Economic growth and trade, enhancement of mobility, and development of the transportation workforce

TTI lead: Dock Burke and [Melissa Tooley](#)



The University Transportation Center for Mobility (2006–2012)

Lead institution: TTI

Partner: The Texas A&M University System

Focus area: Enhanced mobility contributing to improved quality of life

TTI lead: [Melissa Tooley](#)



Center for Advancing Research in Transportation Emissions, Energy, and Health (2016–present)

Lead institution: TTI

Partners: Johns Hopkins University, the Georgia Institute of Technology, The University of Texas at El Paso and the University of California, Riverside

Focus area: Transportation emissions' impact on the environment and public health

TTI lead: [Joe Zietsman](#)



Maritime Transportation Research and Education Center (2016–present)

Lead institution: University of Arkansas

Partners: Jackson State University, Louisiana State University, the University of New Orleans, Texas A&M University/TTI and Vanderbilt University

Focus area: Multidisciplinary maritime and multimodal research, education and technology transfer

TTI lead: [Jim Kruse](#)

UTCM Interdisciplinary Collaborative Partners

- Booz Allen
- Chevron
- INRIX
- Prairie View A&M University
- Texas Department of Transportation
- Texas Southern University
- The University of Texas at Austin
- The University of Texas at El Paso
- Walmart
- Wisconsin Department of Transportation
- World Bank



For more information, contact **Melissa Tooley** at (979) 317-2231 or m-tooley@tti.tamu.edu.

UTCM Metrics of Success



14 colloquia and **5 websites**
(including ones addressing active traffic management and bottlenecks)

100 conferences, workshops and presentations



250 scholarly literature contributions

101 undergraduate and graduate students



National Center for Transit Research (2013–2017)

Lead institution: The University of South Florida

Partners: TTI, the University of Illinois at Chicago, Florida International University and North Dakota State University

Focus area: Transit services in rural communities

TTI lead: [Linda Cherrington](#)



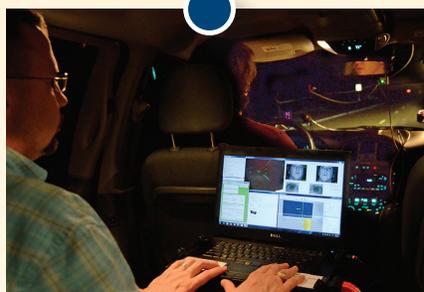
Center for Advancing Transportation Leadership and Safety (2014–2017)

Lead institution: The University of Michigan Transportation Research Institute

Partner: TTI

Focus area: Transportation safety

TTI lead: [Robert Wunderlich](#)



National Institute for Congestion Reduction (2019–present)

Lead institution: The University of South Florida

Partners: TTI, the University of California–Berkeley and the University of Puerto Rico at Mayagüez

Focus area: Reduce surface transportation congestion

TTI lead: [Melissa Tooley](#)



Safety through Disruption University Transportation Center (2016–present)

Lead institution: Virginia Tech Transportation Institute

Partners: TTI and San Diego State University

Focus area: Potential safety benefits of disruptive technologies

TTI lead: [Sue Chrysler](#)

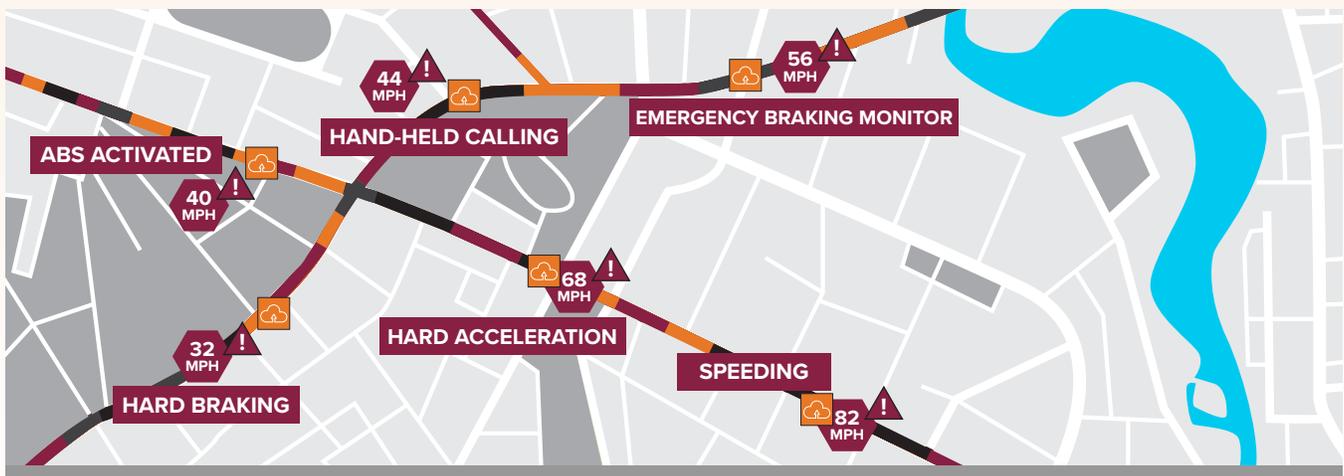


SHAKING UP THE SYSTEM:

Safe-D Looks at How Disruptive Technologies Can Improve Roadway Safety



Funded through the U.S. Department of Transportation’s University Transportation Center (UTC) Program, the Safety through Disruption (Safe-D) UTC is led by the Virginia Tech Transportation Institute (VTTI). In partnership with San Diego State University and the Texas A&M Transportation Institute (TTI), center researchers endeavor to maximize the potential safety benefits of disruptive technologies through targeted research that addresses the most pressing transportation safety issues.



Exploring How Connected Vehicle Data Enhance Crash Prediction Modeling

Knowing how many vehicles typically populate a road at peak travel periods is a key factor in many transportation planning and safety efforts, as is keeping track of how many crashes occur on a given roadway. Using data like these, traffic modeling can help predict the likelihood of crashes. Traffic modeling can also help identify locations with relatively higher risk for crashes as well as aid in selecting appropriate safety countermeasures to reduce and prevent them.

Funded by the Safe-D UTC, TTI researchers are currently working to enhance traditional crash prediction models, which rely heavily on physical road characteristics, the number of observed crashes in a location, and vehicle miles traveled. New data sets will allow crash models to include driving behaviors captured from sensors in newer-model connected vehicles (CVs) linked to the Internet.

“Our goal is to understand if these CV events, like hard braking, can serve as leading indicators of crashes so that we can

“Our goal is to understand if these CV events, like hard braking, can serve as leading indicators of crashes so that we can more accurately predict high-risk locations before any crashes occur.”

Michael Martin
TTI Assistant Research Scientist

more accurately predict high-risk locations before any crashes occur,” says TTI Assistant Research Scientist Michael Martin.

Purchased from Wejo (a data aggregation company), the data that cars routinely upload online provide researchers with information on travel speeds, seat belt usage, hard braking, and acceleration by date/time, location, and even the vehicles’ year, make, and model. Most of these types of information are closely related to the occurrence and severity of crashes but are not available from conventional safety data sets. Due to the detailed nature of these data, TTI researchers take extra precautions to ensure security and privacy.

“We are currently working with the TxDOT [Texas Department of Transportation] Odessa District in a number of test cases using these CV data in a real-world context,” Martin explains. “We’ve taken the Wejo data and aggregated the points, so we can easily see where people are driving and turning onto and off the highway — locations where we have a great deal of traffic conflicts caused by turning movements, slower speeds and vehicles stopping suddenly.”

“TTI’s connected vehicle and IVMS [in-vehicle monitoring system] research has been especially useful in the Permian Basin because of the rate at which oil well pads and proppant plants come online,” says Odessa District Engineer John Speed. “It allows us to quickly and accurately assess traffic behavior and update roadway construction plans to provide safe movements at driveways and intersections. And even during construction, TTI applied CV data to isolate hard-braking locations and turning movements for vehicles approaching a major project, providing our engineers with a new range of tools for improving traffic safety.”

Collaborative Study Examines Child-Seat Usage in Rideshare Services, Reveals Lack of Knowledge and Awareness

A 2019 Safe-D project conducted collaboratively by VTTI and TTI reveals a deeper understanding of how riders, drivers and the public view issues surrounding transporting children via rideshare services such as Uber and Lyft. Results highlight the importance of education and outreach on safety issues associated with the practice.

The research team first performed an in-depth review of the child passenger safety regulatory literature and laws across the United States. Regulations were often difficult to find; involved multiple statutes; and were sometimes confusingly worded, vague or unclear about the responsibilities of riders and drivers of rideshare vehicles.

“We discovered a wide variety of differences in child restraint requirements across the country,” says TTI Senior Research Scientist Katie Womack, the Institute’s project lead, “and very little that directly and specifically relates to requirements for car-seat use in rideshare vehicles.”

The team also conducted a series of focus groups with rideshare riders and drivers, as well as a nationwide Internet survey aimed at assessing riders’ and drivers’ knowledge and attitudes toward child passenger safety. In general, the focus groups revealed parents’ commitment to using car seats in their own vehicles. However, the impracticality of using their personally owned seats, along with other limiting factors and knowledge, generally resulted in failure to use car seats for rideshare trips.

“We discovered a wide variety of differences in child restraint requirements across the country, and very little that directly and specifically relates to requirements for car-seat use in rideshare vehicles.”

Katie Womack
TTI Senior Research Scientist



Photo Source: National Highway Traffic Safety Administration Image Library.

Rideshare drivers in the focus group shared a general lack of knowledge regarding their responsibility in the car-seat equation and indicated a preference for not advising parents on issues regarding whether, when or how to secure their children in the vehicle. Most of the drivers participating in the focus group were unaware of the requirements of the Texas law on child safety seat use or if/how it pertained to them when transporting children. There was wide consensus that the training rideshare drivers receive from their service companies was minimal, and the company policies were unclear.

“This research study is a first step in identifying major issues surrounding child-seat usage in rideshare services,” VTTI Research Scientist Justin Owens says. “As alternatives to traditional transportation grow in popularity, child passenger safety advocates, traffic safety professionals, researchers, lawmakers and industry partners must continue to educate, regulate, advocate and innovate for child safety in every vehicle.” ■



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Kong Publishes Paper on Phone Usage and Distracted Driving



Kong

TTI Graduate Research Assistant Xiaoqiang “Jack” Kong recently coauthored the research paper

“Characterizing Phone Usage While Driving: Safety Impact from Road and Operational Perspectives Using Factor Analysis” published in *Accident Analysis & Prevention*. Kong’s Institute coauthors include Assistant Research Scientist Subasish Das, Associate Transportation Researcher Hongmin “Tracy” Zhou, and Associate Research Scientist Yunglong Zhang, also a professor in Texas A&M University’s civil and environmental engineering department.

The researchers used factor analysis on a unique distracted-driving data set to understand phone usage while driving (PUWD) behavior from roadway and operational perspectives. Their findings indicate that the presence of a shoulder, median, higher speed limit and access control on the roadways with a higher functional class could encourage more PUWD events. The results also confirm the correlation between the frequency of PUWD events and the frequency of distracted crashes, especially on urban roadways. Transportation agencies can use the findings of this study to identify suitable countermeasures to reduce distraction-related crashes. The findings can also provide researchers with a new perspective to study PUWD behavior. ■

Villa Publishes Book on North American, European Trade and Transportation



Villa

TTI Research Scientist Juan Carlos Villa has co-authored *International Trade and Transportation Infrastructure Development: Experiences in North America and Europe* (first edition), published April 24, 2020, on Elsevier’s publisher platform. Villa manages TTI’s Mexico City Office, where he oversees research in freight transportation, logistics and trade.

The team of authors analyzes how trade agreements such as the North American Free Trade Agreement and the European Union Customs Union impact transportation systems and infrastructure in the member countries. The analysis takes a broad, historical perspective, categorizing trade by mode over time, examining modal shifts related to trade policy and disputes, and recognizing the modal shifts’ implications for all involved countries.

“This book starts with a clear description of the relationship between transportation infrastructure and trade, followed by a comprehensive narrative of the waterway, road and railway systems in North America and Europe,” says Villa. “[The book] offers readers a one-stop shop for insights on trade and transportation in North America and Europe.” ■

Khodadadi Publishes Safety Performance Functions Article

TTI Graduate Research Assistant Ali Khodadadi recently coauthored a paper, “Application of Different Negative Binomial Parameterizations to Develop Safety Performance Functions for Non-federal Aid System Roads,” published in the June 2021 edition of *Accident Analysis & Prevention*. The article focuses on safety performance functions (SPFs) for non-federal aid system (NFAS) roads (e.g., local roads in rural or urban areas).

“NFAS roads account for more than 75 percent of U.S. total roadway mileage,” says Khodadadi. “Our study aims to bridge the literature gap by developing advanced, customized SPFs that best suit NFAS roads. The results can significantly improve NFAS safety assessments, as well as benefit

any crash data set requiring more flexible, innovative model structures.”

Khodadadi works in TTI’s Traffic Operations and Roadway Safety Division and is pursuing his Ph.D. in transportation engineering at Texas A&M University.

“This Safe-D project demonstrates how new data sources for vehicle movement can supplement traditional traffic volume data collection efforts. Often, recent traffic counts on local roads are lacking or outdated,” says Safe-D Associate Director Sue Chrysler, senior research scientist in TTI’s Traffic Operations Group. “This leveraging of disruptive technology while improving safety is what the Safe-D UTC is all about.” ■

Wunderlich Briefs Texas House Committee on Pedestrian Safety



Wunderlich

TTI Senior Research Engineer Robert Wunderlich briefed the Texas House Committee on Transportation March 30, 2021, on pedestrian fatality statistics as background for House Bill 443. Wunderlich, director of TTI's Center for Transportation Safety, briefed lawmakers on the increase

in Texas pedestrian fatalities since 2011 and the characteristics associated with them.

Appearing as a resource witness before the committee, Wunderlich reported, "Pedestrian fatalities in Texas have risen steadily over the past 10 years," citing an overall increase of 69 percent in pedestrian fatalities in Texas between 2011 and 2020. More than 700 pedestrian fatalities occurred last year.

While stating TTI's neutral stance on the bill, Wunderlich also pointed out that pedestrian safety is one of seven emphasis areas embraced by the Texas Department of Transportation (TxDOT) in the state's Strategic Highway Safety Plan. Wunderlich and other experts in TTI's Center for Transportation Safety helped TxDOT formulate the current plan in 2017. ■

Das Publishes TRR Analysis in *TR News*



Das

TTI Assistant Research Scientist Subasish Das published the article "Data Dive into *Transportation Research Record* Articles: Authors, Coauthorships and Research Trends" in the January–February 2021 issue of *TR News*, the Transportation Research Board's (TRB's) bimonthly magazine.

The article examines TRB's *Transportation Research Record* (TRR), a peer-reviewed journal, including its history, aim and scope. In the study, Das developed an interactive, web-based tool, the TRR Coauthor Graphic (2001–2018), where TRR authors can see who is in their coauthorship network. Das found the network to be complex, which indicates a variety of coauthorships among TRR authors.

"The depth and breadth of the research published in TRR over the years are indicative of changing emphases in transportation research," says Das. "The rapid rise of new technologies and a commensurate growth in peer-reviewed publications — as well as a greater emphasis on interdisciplinary collaboration — have revolutionized transportation research." ■

TTI, Hillwood Announce Research Partnership

TTI entered into an agreement with Hillwood as AllianceTexas' official mobility innovation zone (MIZ) research partner. Hillwood's AllianceTexas development is located next to the world's first dedicated industrial airport, Fort Worth Alliance Airport. The partnership will leverage the experience and expertise of TTI's nationally recognized transportation researchers and forward thinkers with the MIZ's capacity and capabilities.

TTI will conduct research, manage strategic initiatives for the MIZ, and serve as a think tank for new opportunities in mobility at AllianceTexas. Unlike anywhere else in the nation, the MIZ provides partner organizations the scale, infrastructure and environment for the commercialization of emerging technologies in air and surface mobility.

"As budding surface and air mobility technologies take off, our research partnership with Hillwood reinforces TTI's ongoing commitment to testing and scaling innovations that impact the way we live," says TTI Agency Director Greg Winfree.

"The location and capabilities that the MIZ offers provide an unparalleled sandbox for research and development of the technologies that will move business, goods and people forward."

TTI experts involved in the partnership include Principal Investigator Juan Villa, along with Bob Brydia, Bill Eisele, Brittney Gick, Ginger Goodin, Mario Monsreal, Allan Rutter and Ed Seymour.

Expanding upon the Institute's experience, the MIZ provides a one-of-a-kind backdrop offering mobility visionaries full access to a unique testing ecosystem, resources and partnerships essential to comprehensively test, scale and commercialize the latest technologies.

"Our partnership with TTI is a natural pairing for the next phase of research and development at the MIZ," says Ian Kinne, director of logistics innovation for Hillwood. "With unmatched expertise in the field, TTI ensures we have the research-backed results needed to not only set the standard for — but also make significant advancements in — budding mobility technology." ■

Fitzpatrick Featured in *ITE Journal*



Fitzpatrick

TTI Senior Research Engineer Kay Fitzpatrick was featured in two articles in the March 2021 issue of the Institute of

Transportation Engineers' (ITE's) *ITE Journal*.

In "From Pen to Practice," the journal interviewed Fitzpatrick on

- the value of writing in advancing her transportation career,
- advice for young professionals in the transportation field, and
- her favorite memories and achievements as a longtime ITE member.

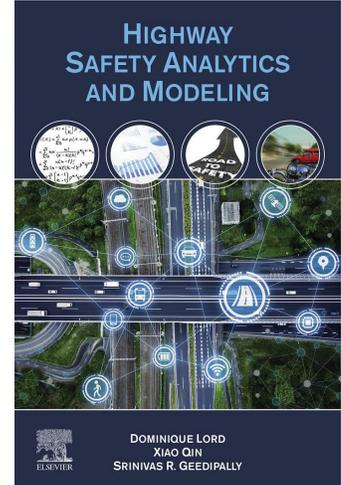
Also in the issue, Fitzpatrick and TTI Senior Research Scientist Eun Sug Park co-wrote the article "Evaluation of Pedestrian Hybrid Beacons, Including on High-Speed Streets" with Michael Cynecki of Lee Engineering in Phoenix, Ariz. A pedestrian hybrid beacon is a traffic control device placed at pedestrian crossings. Operational data collected at 10 high-speed crossing locations in Arizona showed high driver compliance, consistent with findings on lower-speed streets. The findings from the safety study indicate that crashes decreased after a pedestrian hybrid beacon was installed. ■

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TTI Crash Analytics Experts Publish *Highway Safety Analytics and Modeling*

Two crash analytics and modeling group members in TTI's Center for Transportation Safety published the first edition of *Highway Safety Analytics and Modeling* Feb. 25, 2021, on Elsevier's publisher platform. Dominique Lord, Texas A&M University Zachry Department of Civil and Environmental Engineering professor, and Srinivas Geedipally, TTI research engineer, are coauthors along with Xiao Qin, director of the University of Wisconsin–Milwaukee's Institute for Physical Infrastructure and Transportation.



The book is intended as a resource for transportation engineers and policy makers who work with highway safety data. The book helps engineers and policy makers walk through the decision-making process, from gathering and sorting data to building models and evaluating results. Readers can use the book to gain a better understanding of how to best use highway safety data to create countermeasures, policies and programs that decrease traffic crash frequency and severity. Examples and case studies offer real-world applications that make it easier to see how the models and methods might fit into the evaluative process. ■

Kuhn Elected International President of ITE



Kuhn

TTI Senior Research Engineer Beverly Kuhn was elected the 2022 international president of the Institute of Transportation Engineers (ITE) and will take office in January 2022.

Kuhn leads TTI's System Reliability Division and is a Texas A&M University System Regents Fellow. During her more than 30 years at TTI, she has developed diverse and extensive experience in the conduct and delivery of cutting-edge research for the transportation community. Kuhn has been active in ITE since she was a student at Texas A&M University and has held significant leadership roles in the organization over the past 30 years.

"I am honored to have been chosen to serve our professional organization as president and am excited to help ITE lead the way in these innovative times," says Kuhn. "I am committed to ensuring our transportation system serves and supports our communities — large and small — and all who hope for a healthy and prosperous future." ■

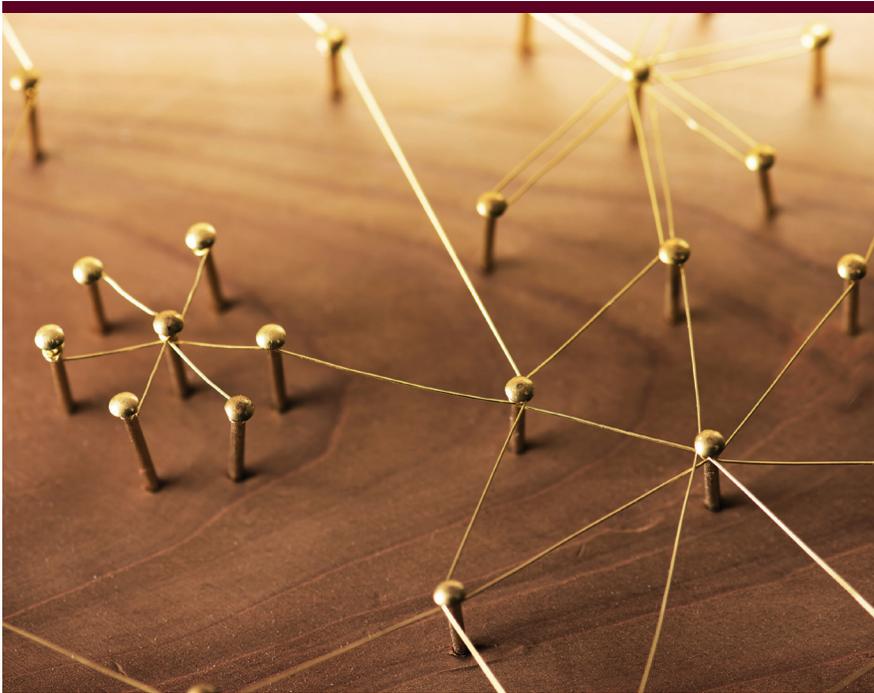


THE LAST STOP

with Greg Winfree, Agency Director

National Strategies, Local Expertise

THE EVOLUTION OF THE UTC PROGRAM BENEFITS EVERYONE



Begun in 1988, the UTC Program has evolved to complement the collective research agenda of USDOT's constituent agencies.

This encourages universities to partner in consortia, with each emphasizing its best talent as part of the larger team. This greater-than-the-sum-of-its-parts approach, further enhanced by diversity requirements (including allowing two-year and smaller colleges to compete), is exactly what's needed in an era when roadside safety is as much about behaviors as barriers. Now, engineers partner with epidemiologists, psychologists, data experts and many others to study today's complex transportation problems from multiple perspectives. We've learned that it takes more than a village ... it takes a network of villages, guided by a national strategy and working together, to better care for everyone.

When the Texas Highway Department formed in 1917, its engineers recognized the value of university-based facilities like those at the then-Agricultural and Mechanical College of Texas (later Texas A&M University) for conducting transportation research. Fast forward to 1950 and the birth of the Texas A&M Transportation Institute (TTI) and its charter to apply Texas A&M's broad, deep bench of academic talent to solve all manner of transportation problems.

That model of leveraging the best minds to meet the toughest transportation challenges is reflected in the U.S. Department of Transportation's (USDOT's) University Transportation Center (UTC) Program. Begun in 1988, the UTC Program has evolved to complement the collective research agenda of USDOT's constituent agencies. While individual agency priorities might naturally differ, USDOT's overall mission is the same: keep Americans safe, mobile and healthy on our nation's transportation network — whether by land, sea or air.

Before coming to TTI, I was assistant secretary of USDOT's Office of the Assistant Secretary for Research and Technology. I oversaw the Office of Research, Development and Technology, which operates the UTC Program. It was my honor to evaluate and select deserving universities to receive grant funding. When the program was first conceived, centers were largely awarded as congressional earmarks. In some cases, that resulted in outcomes more political than practical. Now, the program is truly competitive, with grant recipients evaluated solely on merit.

I'm proud of my role at USDOT in helping further the UTC Program's mission. And I'm proud of my current employer, TTI, and its long history of support for that program — from former TTI Agency Director Charley Wootan's key role in establishing the Council of University Transportation Centers, the granddaddy of the UTC Program, to the consistently excellent Institute proposals that won former and current UTCs dedicated to resolving our nation's most pressing transportation issues. There's never been a better time for the UTC Program's continued vision, leadership and support. Take my word for it. ■



THINKing TRANSPORTATION

Download, listen, and subscribe wherever you get your podcasts. Every other week, we interview a TTI expert or special guest on a wide range of transportation topics and discuss how those topics impact the average person.

<https://tti.tamu.edu/thinking-transportation/>



Shaking Up the System:

Using disruptive technologies to create safer roads.

Roadway safety today is about much more than traffic laws, warning signs and guardrails. TTI Senior Research Scientist Sue Chrysler illustrates how technologies — even disruptive technologies — are re-imagining how we can prevent crashes and mitigate their enormous personal and financial costs.

 **Stream Now**



Now You See It, Now You Don't:

COVID-19 made traffic congestion disappear, but not for long.

America's worst public health crisis in a century gave us a short-lived gridlock hiatus, as TTI Research Fellow Tim Lomax explains. The pandemic also amplified an important and timeless lesson in roadway traffic management at a time when U.S. infrastructure needs are once again top of mind.

 **Stream Now**

