TTI Helps Coordinate the CAV Task Force: Connected-Automated Vehicles Are Becoming a Reality

People First: Advanced Technology Improves Safety near Transit Stops

Looking to the Future with the Texas Connected Freight Corridors Project

TEXAS TRANSPORTATION
Researcher

VOL. 56 | NO. 1 | 2020

Research to Innovation

Smart Transportation = Smart Communities

Texas A&M Transportation Institute

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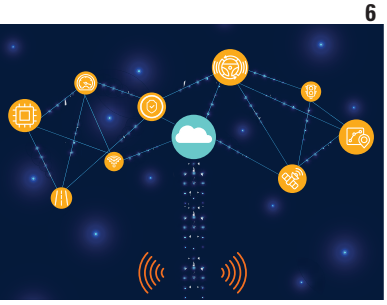
ON THE COVER: While news stories often cover the big technological breakthroughs — self-driving cars, deliveries by drone — it's iterative research advances at agencies like the Texas A&M Transportation Institute that make those innovative milestones possible.



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TTI.RESR2002/6813.0420.4000

A PUBLICATION OF
Texas A&M Transportation Institute

Texas Transportation Researcher is published by the Texas A&M Transportation Institute to inform readers about its research, professional and service activities. Opinions expressed in this publication by the editors/writers or the mention of brand names does not necessarily imply endorsement by the Texas A&M Transportation Institute or The Texas A&M University System Board of Regents.

Texas Transportation Researcher (ISSN 00404748) is a quarterly publication of TTI Communications, Texas A&M Transportation Institute, 3135 TAMU, College Station, Texas 77843-3135. Periodicals postage paid at College Station.

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TTI's Advanced Transportation Technology Research

AT A GLANCE

13 Connected-Automated Policy Briefs Provided to Lawmakers

$6M Awarded for Current Projects

12 Recent Pilot and Technology Demonstrations

3 Test Bed Facilities

11 Connected-Automated Vehicle Research Projects

TTI Earns Awards, Helps TRB Celebrate Its Centennial

100 YEARS TRB
MOVING IDEAS: ADVANCING SOCIETY

The Texas A&M Transportation Institute (TTI) was well represented at the 99th Annual Meeting of the Transportation Research Board (TRB). This year's meeting celebrated TRB's centennial and had a record attendance of more than 13,900 participants from around the world. The meeting program covered all transportation modes, with more than 5,000 presentations in nearly 800 sessions and workshops addressing topics of interest to policy makers, administrators, practitioners, researchers and representatives of government, industry and academia. A number of sessions and workshops focused on the spotlight theme for the 2020 meeting: A Century of Progress: Foundation for the Future.

Bill Eisele, head of TTI's Mobility Division, chairs the TRB Urban Freight Transportation Committee, which received the TRB Technical Activities Council Blue Ribbon Award for Identifying and Advancing Ideas for Research.

The Fred Burggraf Award, which recognizes excellence in transportation research by researchers 35 years of age or younger, was awarded to Alireza Talebpour, formerly of Texas A&M University's Zachary Department of Civil and Environmental Engineering and TTI.

The Blue Ribbon Award for the Urban Freight Transportation Committee presented to TTI Senior Research Engineer Bill Eisele. Left to right: Ann Brach, director of technical activities for TRB; Bill Eisele; Hyun-A Park, president of Spy Pond Partners and TRB Technical Activities Council chair.

The Traffic Control Devices (TCD) Committee's 2020 Young First Author Best Paper Award presented to TTI Senior Research Engineer Kay Fitzpatrick and TTI Associate Transportation Researcher Emira Rista for "How Do LED-Embedded Pedestrian Crossing Signs Compare to Rectangular Rapid-Flashing Beacons and Pedestrian Hybrid Beacons?" Left to right: David Hurwitz, chair of the TCD Committee's paper awards subcommittee; Kay Fitzpatrick; and Emira Rista.

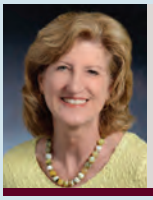
TTI Associate Transportation Researcher Emira Rista and TTI Senior Research Engineer Kay Fitzpatrick were awarded the Traffic Control Devices Committee's 2020 Young First Author Best Paper Award for their paper, "How Do LED-Embedded Pedestrian Crossing Signs Compare to Rectangular Rapid-Flashing Beacons (RRFBs) and Pedestrian Hybrid Beacons (PHBs)?"

"This paper addresses pedestrian safety issues as agencies have installed various treatments, including LED-embedded pedestrian crossing signs, which are rather novel and less expensive than previously utilized countermeasures," Rista explains. "However, because of their novelty, these devices have not been studied, and little is known about their effectiveness. Our paper examines their efficacy by studying driver yielding rates and how they vary based on several other road geometric and operational characteristics. This study will ultimately not only set the stage for further research on these devices but, from a practical standpoint, aid practitioners in understanding these devices and which roads (and road characteristics) these devices are best suited."

TTI Research Engineer Marcus Brewer and Graduate Assistant Jayson Stibbe were awarded the Geometric Design Committee's 2019 Best Paper Award for their paper, "Investigation of Design Speed Characteristics on Freeway Ramps Using Strategic Highway Research Program 2 (SHRP 2) Naturalistic Driving Data."

"This paper is based on a project sponsored by the SAFE-D University Transportation Center. The idea for that project came out of exploring new ways to use the incredible amount of data in the SHRP 2 naturalistic driving database," Brewer explains. "This type of data had not been previously used for a geometric design application, and we were able to explore how the data could be used to estimate how fast drivers travel on freeway ramps based on design characteristics. Results from this project can be used to evaluate the performance of existing ramps or estimate speeds that can be expected on future designs." ■

The Geometric Design Committee's 2019 Best Paper Award presented to TTI Research Engineer Marcus Brewer and Graduate Assistant Jayson Stibbe. Left to right: Hermanus Steyn, chair of the Geometric Design Committee; Marcus Brewer; and Brian Toombs, chair of the awards subcommittee for the Geometric Design Committee. Jayson Stibbe is not pictured.



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TTI Helps Coordinate the CAV Task Force

CONNECTED-AUTOMATED VEHICLES ARE BECOMING A REALITY

Connected-automated vehicles (CAVs) were once a figment of our imagination, something we only saw in science fiction movies; now, they're becoming a reality.

What exactly is CAV technology? CAVs leverage a combination of on- and off-vehicle sensors, cameras and other technologies to connect with other vehicles and infrastructure to help guide vehicles, improving public safety and traveler mobility. To ensure the Lone Star State continues its leadership role in developing transportation innovations, the Texas Department of Transportation (TxDOT), at the direction of Gov. Greg Abbott, has announced the formation of the CAV Task Force.

"This task force is a great opportunity to bring together leaders in transportation and industry in Texas to help chart a path forward," explains Texas A&M Transportation Institute (TTI) Senior Research Engineer Beverly Kuhn, head of the Institute's System Reliability Division. "That way, the state will be ready for CAVs long before they become commonplace on our roadways."

TxDOT asked TTI to help coordinate the CAV Task Force, the goal for which is to serve as an incubating hub for any policy recommendations made to the Texas Legislature and Gov. Abbott. The task force serves as a single point of information and coordination for all CAV activities in Texas. Members share their knowledge by hosting industry meetings, creating a knowledge base for best practices and collaboration, and reporting on lessons learned. Members plan to meet as often as six times per year across Texas. TTI is responsible for packaging meeting outcomes to share with various stakeholders.

TTI and TxDOT are confident that CAV technology will benefit both the everyday person and businesses in Texas. Texas has become a hub for technological advancement and start-up culture; it's important that as technology advances, Texas continues to foster a business-friendly environment. Toward that end, CAV technology will allow businesses to easily move goods across Texas while potentially cutting shipping costs over the long run.

"We are thrilled for what the CAV Task Force will bring to Texas. This task force will promote beneficial and safe advancements in mobility as we prepare for a rapidly approaching future. We are excited to have TTI supporting us on this effort."

Darran Anderson
Director of Strategy and Innovation for TxDOT

CAV technology will also enable greater mobility, significantly impacting the relationship between individual Texans and their chosen modes of transportation. For example, elderly and disabled travelers could enjoy greater access to health care via driverless vehicles taking them to and from appointments. CAV technology also promises to make travel times more reliable, improving trip estimates for travelers and shippers alike. On the safety front, CAVs hold the potential to reduce crashes through the seamless interaction of vehicles, transportation infrastructure and the driving environment. More accurate driver warnings and automated avoidance systems, for example, can help avoid crashes, creating safer roadways and improving quality of life for drivers.

"The task force provides a framework for TxDOT," notes TTI Executive Associate Director Ed Seymour. "Through the ongoing evolution of this task force, community partners have more opportunities to learn about the CAV marketplace, stay up to date on CAV industry insights, and be as prepared as possible for the transformation that's coming."

The group met for the first time in Austin, Texas, in October 2019. The kickoff meeting focused on establishing the task force's goals, discussing the status of CAV deployment in Texas, and determining the next steps for the group. TTI Agency Director Greg Winfree was appointed to serve on the task force. Over time, various public awareness strategies — including a website, white papers and an annual report — will make information about CAV technology and task force activities available to stakeholders.

"We are thrilled for what the CAV Task Force will bring to Texas," states Darran Anderson, director of strategy and innovation for TxDOT. "This task force will promote beneficial and safe advancements in mobility as we prepare for a rapidly approaching future. We are excited to have TTI supporting us on this effort." ■

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PEOPLE FIRST

Advanced Technology Improves Safety near Transit Stops

"The project enhances safety by alerting pedestrians and bicyclists to turning buses. Intersections are one of the busiest places where multiple modes interact — and, thus, potentially dangerous places for travelers."

Katie Turnbull
TTI Executive Associate Director and Principal Investigator

Ensuring connected-automated vehicle technology benefits pedestrians, bicyclists and other vulnerable road users is vital to transforming our transportation system in a way that meets the needs of all users.

Aiming for zero traffic deaths by the mid-century mark, the Texas Department of Transportation's (TxDOT's) Enhance Safety goal "promotes safe driving, bicycling and pedestrian activities." TxDOT is conducting projects aimed at meeting that goal, such as Automated Vehicle/Connected Vehicle (AV/CV) Test Bed to Improve Transit, Bicycle, and Pedestrian Safety. The project, conducted by the Texas A&M Transportation Institute (TTI), focuses on reducing crashes involving pedestrians and bicyclists at signalized intersections.

"The project enhances safety by alerting pedestrians and bicyclists to turning buses," explains TTI Executive Associate Director Katie Turnbull, principal investigator. "Intersections are one of the busiest places where multiple modes interact — and, thus, potentially dangerous places for travelers."

The multiyear project included three phases. In Phase 1, TTI researchers held meetings, workshops and roundtable forums with stakeholders to identify safety concerns. In

Enhancements to the signaling at the test intersection include visual and audio warnings for pedestrians and bicyclists that let them know a bus is turning.

Phase 2, the research team designed, developed and pilot-tested a Smart Intersection at The Texas A&M University System's RELLIS Campus. The system tracks buses as they approach an intersection and warns pedestrians and bicyclists that a bus is about to turn. Researchers also examined innovative approaches being tested throughout the United States and around the world to address these concerns.

Here's the way it works: a bus communicates with traffic signal equipment regulating an intersection via dedicated short-range communication (DSRC) frequencies. Cameras and sensors monitor the sidewalk at the point of crossing to determine if pedestrians or bicyclists are present. If they are, a supplemental bus sign with the image of a bus lights up above the standard crossing signal, and an audible warning "Caution, Bus Turning" indicates a bus is about to turn.

"We tested possible alternative methods and messages with transit users in Houston," Turnbull says, "including individuals with hearing and sight limitations. All groups favored multi-alert methods and simple messages. The redundancy also reinforces that tried-and-true strategy for staying safe — look *and* listen before you cross the street."

Phase 3 focuses on demonstrating the technology under real-world conditions at the George Bush Drive and Penberthy Boulevard intersection on the Texas A&M University campus. Buses operating along Route 8 — named the Howdy Route by Texas A&M — turn left from Penberthy onto George Bush.

"This final phase of the project provides the opportunity to demonstrate the system in daily operations. We've received strong support from the City of College Station, which owns and operates the traffic signals, as well as Texas A&M Transportation Services, which owns and operates the buses."

Srinivasa Sunkari
TTI Research Engineer

"This final phase of the project provides the opportunity to demonstrate the system in daily operations," says TTI Research Engineer Srinivasa Sunkari, who oversees the technical side of the project. "We've received strong support from the City of College Station, which owns and operates the traffic signals, as well as Texas A&M Transportation Services, which owns and operates the buses."

Texas A&M Transportation Services installed DSRC radios on 10 buses operating on the Howdy Route. The City of College Station installed the supplemental bus sign, DSRC receivers, sensors and other technologies on the traffic signal poles, and allowed placement of additional equipment in the traffic control cabinets. The system remains separate from normal signal operations.

"This three-phase innovative project highlights the importance of multiple agencies working together to improve safety for all road users," notes TxDOT Research Project Manager Wade Odell. "Diverse stakeholders have participated throughout all phases of the project, which is needed to help meet TxDOT's goal of zero traffic fatalities by 2050."

The eight-month demonstration of the system continues through October 2020. The project will conclude in early 2021 with a stakeholder workshop reviewing the demonstration and other activities.

"We will assess the technical operations of the system," says Turnbull, "as well as survey pedestrians, bicyclists and bus operators to gauge their perceptions and reactions. The results will help with potential ongoing operations and additional applications." ■

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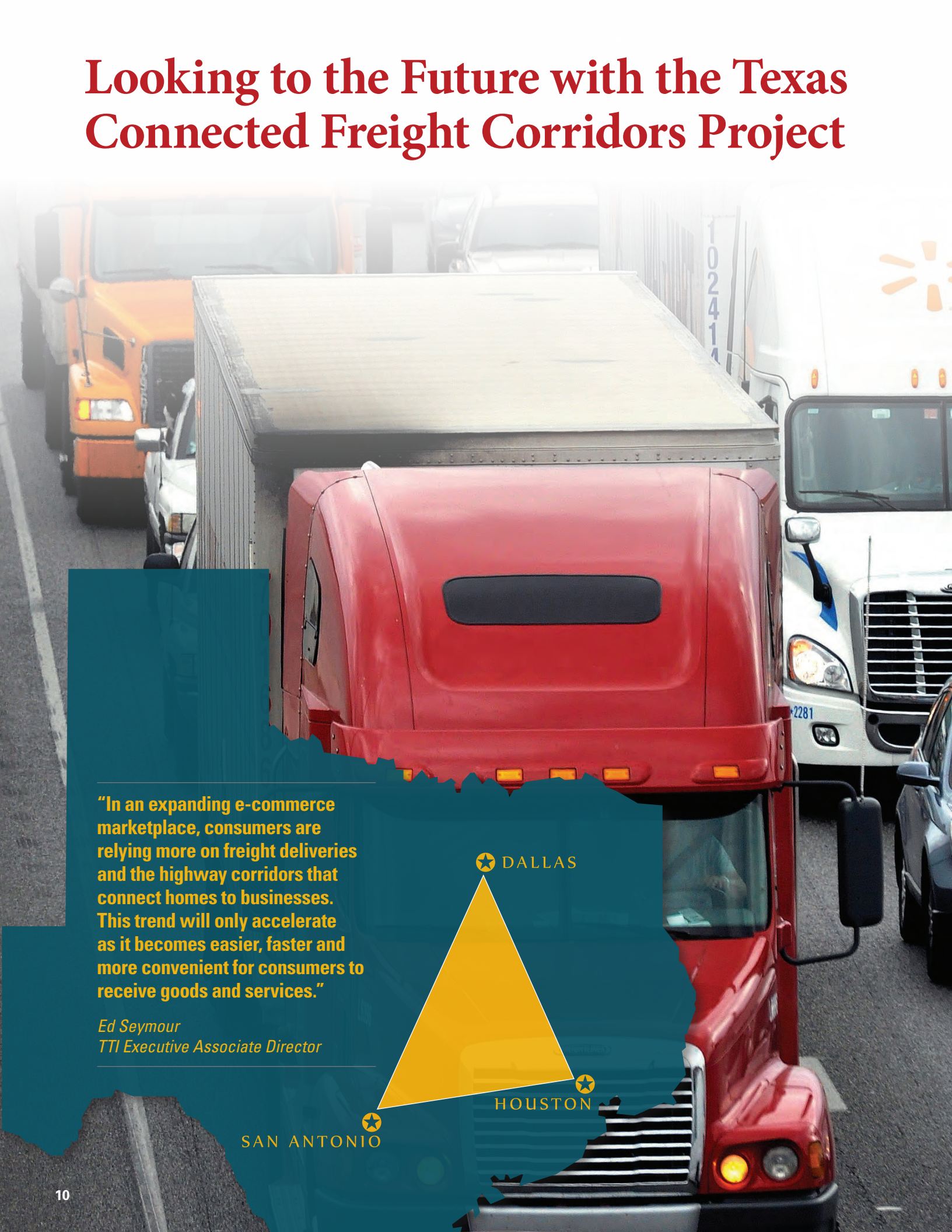
Looking to the Future with the Texas Connected Freight Corridors Project



"In an expanding e-commerce marketplace, consumers are relying more on freight deliveries and the highway corridors that connect homes to businesses. This trend will only accelerate as it becomes easier, faster and more convenient for consumers to receive goods and services."

Ed Seymour
TTI Executive Associate Director

Imagine yourself driving a truck along I-35 filled with perishable goods. You rely on your eyes to predict what you might encounter on the road ahead, though you can't always see every hazard. Advanced transportation technologies can make the difference, noticing (and reacting to) things the human eye can't. Mobility, safety, reliability, security — all improve when technology supplements human senses.

The Texas A&M Transportation Institute (TTI) is assisting the Texas Department of Transportation (TxDOT) in the development of the Texas Connected Freight Corridors (TCFC) project, funded with an Advanced Transportation Congestion Management Technology Demonstration grant from the Federal Highway Administration. Anticipating a Texas future populated by automated vehicles, the TCFC project evaluates what's needed to successfully usher in that future, while also improving freight mobility and safety on Texas roads today.

"More than half of all freight tonnage in the United States moves through Texas, which makes it the ideal environment in which to test and evaluate how a connected environment could transform a state's freight corridors," says TTI Assistant Research Engineer Nick Wood. "This project will establish a stronger relationship between fleet managers and highway operators for advancing connected vehicle technologies, which will only become more prevalent as Texas moves more goods to people and businesses across the nation."

The TCFC project involves the deployment of vehicle-to-infrastructure and vehicle-to-vehicle applications across the 865-mile Texas Triangle. The triangle connects Houston, Dallas and San Antonio via Interstates 10, 30, 35 and 45. The four-year project began April 1, 2019, and has several phases, including planning, design and development, and maintenance and operations.

In the planning phase, TTI researchers produced a concept of operations outlining how technologies would support truck drivers and managers. The document presents a scenario wherein a truck driver who travels from San Antonio to Dallas encounters a number of incidents throughout the day. Each incident triggers a warning to the driver through an onboard device that communicates information about closed lanes, stopped vehicles and debris on the highway. The TTI research team is assisting in the deployment of the first few applications, including queue warning, work zone warning, wrong-way driving alerts and truck signal priority.

"In an expanding e-commerce marketplace, consumers are relying more on freight deliveries and the highway corridors that connect homes to businesses," notes TTI Executive Associate Director Ed Seymour. "This trend will only accelerate as it becomes easier, faster and more convenient for consumers to receive goods and services. This project helps truck fleets and highway agencies learn how advancing technologies can improve safety and mobility."

"More than half of all freight tonnage in the United States moves through Texas, which makes it the ideal environment in which to test and evaluate how a connected environment could transform a state's freight corridors. This project will establish a stronger relationship between fleet managers and highway operators for advancing connected vehicle technologies, which will only become more prevalent as Texas moves more goods to people and businesses across the nation."

Nick Wood
TTI Assistant Research Engineer

Freight is already a significant player when it comes to implementing advanced connected and automated technologies. One example is truck platooning, where one truck operated by a driver is followed by others guided via technology. TTI's role in the TCFC project invites stakeholders to test new technology applications and strengthens relationships that will prove critical as public agencies and the connected-vehicle industry scale up to a larger connected infrastructure ecosystem. The TCFC project is also evaluating technologies that could improve safety for commercial vehicles, while also reducing passenger vehicle crashes on Texas roads.

"The TCFC project will lay a foundation for a scalable and sustainable connected-vehicle environment that promises to significantly improve safety for the traveling public," says TxDOT Senior Transportation Engineer Jianming Ma. "In Texas, the last day without a death on the state's roads was November 7, 2000, nearly two decades ago. Through this project, TTI and other team members are helping TxDOT achieve its Road to Zero goal to end all roadway fatalities on Texas roads by 2050. In the next several decades, connected and automated vehicles have the potential to make the public safer and reduce deaths on Texas roads." ■

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On a Typical Day, Texas Drivers Face Longest Delays on Houston, Austin Freeways

Access the 100 Most Congested Roadways in Texas 2019 Summary Report *at https://mobility.tamu.edu/texas-most-congested-roadways/.*

Fueled by the state's steady growth and healthy economy in 2018, Houston's West Loop this year is set to repeat its rank as the most gridlocked corridor in the state. Interstate 35 in central Austin comes in a close second, with the Southwest and Eastex Freeways in Houston and the Woodall Rodgers Freeway in Dallas rounding out the top five.

Supporting the Texas Department of Transportation (TxDOT), researchers from the Texas A&M Transportation Institute (TTI) use traffic volume and speed data to compile the annual listing of the most crowded roadways in Texas, comparing the time it takes to travel on a congested roadway against the time needed to travel the same corridor in uncongested conditions.

"One of the first things you do when a problem is identified is to measure the extent of the problem," explains TTI Senior Research Scientist David Schrank. "The *100 Most Congested Roadways in Texas 2019 Summary Report* does this for almost 10,000 miles of roadway in Texas."

Thirteen new road segments appear on the list this year, with 92 segments being concentrated in Texas' four biggest metro areas. However, roadway delay is becoming more common in urban areas of all sizes. This year's complete list of congested road rankings includes 1,854 segments spread across 66 counties.

The analysis continues to highlight the movement of freight throughout the state, as well as to and from other parts of the country. Road segments with high levels of truck traffic and congestion are found in Austin and Houston and on the U.S.-Mexico border near Laredo.

TxDOT — in an initiative known as Texas Clear Lanes — has increased efforts to address roadway gridlock, largely through two voter-approved funding initiatives directing more resources to the State Highway Fund for non-tolled projects.

"TxDOT's mission is Connecting You with Texas, and we are focused on getting people where they need to go efficiently and reliably by paying attention to where improvements are needed most," says Marc Williams, TxDOT's deputy executive director. "Congestion relief is a priority for our top chokepoints as we balance the many demands on our roadways across the state." ■

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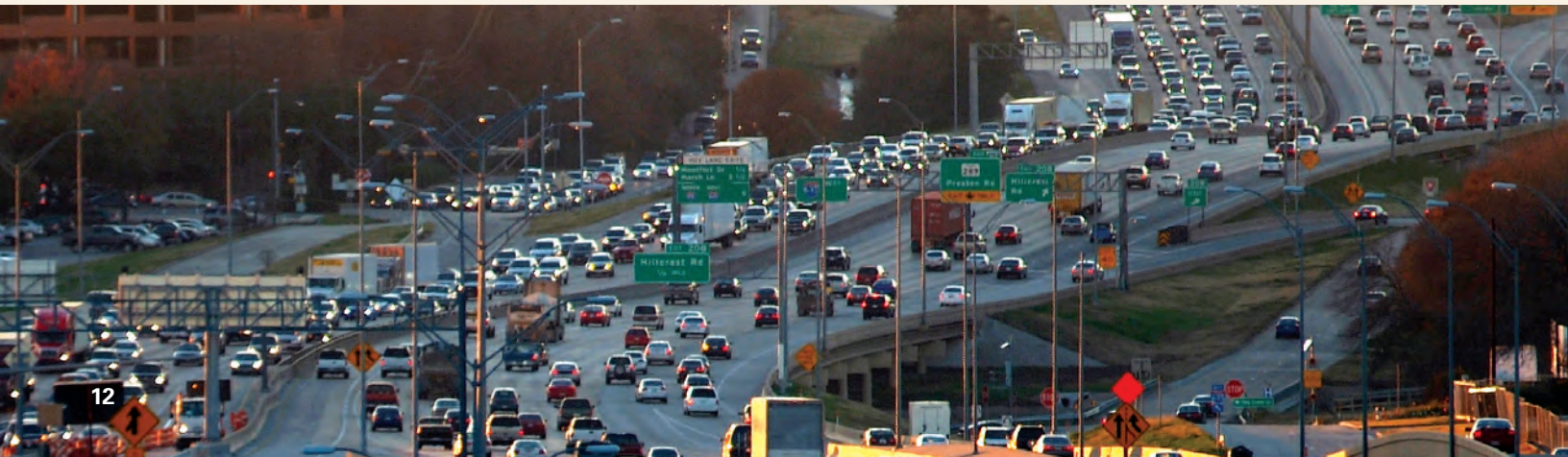


Manser Appointed to Motorcycle Safety Advisory Board


Manser

TTI Senior Research Scientist Michael Manser was recently appointed to the Texas Department of Licensing and Regulation's (TDLR's) Motorcycle Safety Advisory Board. The board provides technical knowledge and industry expertise to TDLR about motorcycle rider training and education.

With his more than 19 years of professional experience in the area of transportation human factors research, Manser's appointment to the board adds extensive practical knowledge and expertise on the subject of motorcycle safety. During his career, Manser has developed and managed a variety of Texas statewide education and outreach efforts for the Texas Department of Transportation, including the Texas Statewide Motorcyclist Safety Coalition and the Texas Statewide Pedestrian Safety Coalition.

"I am very honored to be appointed as a member of the TDLR Motorcycle Advisory Board," said Manser. "TDLR and the Motorcycle Advisory Board will play a significant role in improving rider safety by leading and guiding rider training efforts across Texas."

Manser's tenure as the board's TTI representative will end Sept. 1, 2021. ■

Winfree Urges Focus on Disease-Mitigating Innovations

Agency Director Greg Winfree's latest editorial opinion in *Traffic Technology International* is a call to action for transportation researchers to focus on hardening our shared global network's infrastructure to protect against the spread of infectious diseases like COVID-19. ■

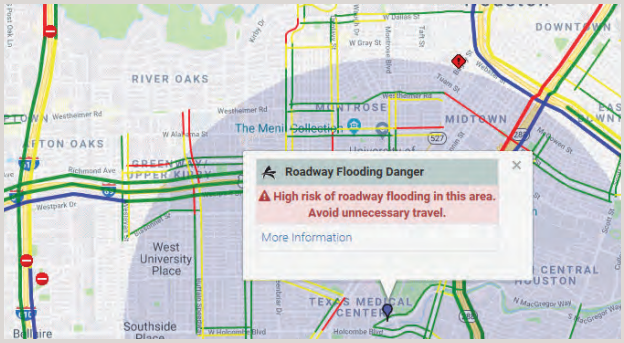
TTI, Houston TranStar Win TSMO Award for Roadway Flood-Warning System

TTI and Houston TranStar recently won multiple awards for their innovative real-time flood-warning system tool co-developed with the Harris County Flood Control District and the Texas Department of Transportation.

The tool educates motorists on high-risk flood areas during severe storms, combining rainfall and stream elevation data with real-time traffic information to show areas likely to flood, while enabling travelers to plan alternate routes, thereby avoiding dangerous roadways. Houston TranStar's website and traffic map were seen by more than 3 million unique visitors during Hurricane Harvey in 2017.

"Our project enhances traveler safety in the Greater Houston region by giving motorists reliable information to avoid roadways that are highly likely to be flooded," explains Dinah Massie, Houston TranStar executive director.

The flood-warning system had previously won an Intelligent Transportation Society of Texas Award, a Texas Public Works Association Technical



Innovation Award, and a Technology Award at the Emergency Management Association of Texas' Symposium. Additionally, the tool will be recognized with a National Operations Center of Excellence Transportation Systems Management and Operations (TSMO) Award for Best TSMO Project at the American Association of State Highway and Transportation Officials' 2020 spring meeting. The award recognizes TSMO projects that use innovative practices to save lives, time and money in response to a specific event.

"Hurricane Harvey remains fresh in Houston's memory," notes Mike Vickich, TTI senior systems analyst. "The flood-warning system has evolved into a critical resource for governments and other entities to put safety measures in place for the public." ■

Andrade Joins Texas Transportation Hall of Honor

Esperanza "Hope" Andrade, an influential and dedicated servant leader, innovator and advocate for the Texas transportation community, was inducted into the Texas Transportation Hall of Honor Jan. 7.

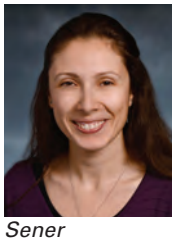
Andrade, a successful entrepreneur and businesswoman in San Antonio for more than three decades, was honored by a prestigious group of speakers representing the city and Texas. She was the second woman appointed to the Texas Transportation Commission and the first to serve as chair. Her contributions resulted in impactful, multimodal transportation solutions and record-breaking funding for roadways and safety initiatives. For example, while serving as Texas' first Latina secretary of state and as a member of the Texas Workforce Commission, Ms. Andrade championed transportation infrastructure and its importance to the state's economy.

"Perhaps what sets Ms. Andrade apart from so many other deserving individuals are her commitment to improving access to transportation throughout our state and her servant leadership exhibited in multiple positions throughout her lifetime," TTI Agency Director Greg Winfree told attendees at the ceremony. "These attributes, combined with her public policy experience and strong network, have given her a unique ability to inspire others to come together for the benefit of the state and the San Antonio community."

Speakers at the event included (left to right): Texas Sen. José Menéndez; San Antonio Mayor Ron Nirenberg; Bexar County Judge Nelson Wolff; Texas A&M University System Board of Regents Chair Elaine Mendoza; Bruce Bugg, Jr., chair of the Texas Transportation Commission; honoree Hope Andrade; Joe Krier, former president and CEO of the San Antonio Chamber of Commerce; former Texas Sen. and Bexar County Judge Cyndi Taylor Krier; President and CEO of VIA Metropolitan Transit Jeff Arndt; and TTI Agency Director Greg Winfree.

Andrade is the 45th member of the Hall of Honor, established in 2000 by TTI to recognize select individuals who played pivotal roles in the advancement of transportation in Texas and the nation. ■

TTI's Sener Appointed to IPATH Board of Directors



Sener

TTI Associate Research Scientist Ipek Sener was recently appointed to the International Professional Association for Transport and Health (IPATH) Board of Directors. According to the organization, "The aim of IPATH is to share information, exchange ideas, and foster collaboration to improve health, quality of life and well-being in communities by advocating for the integration of health in the urban and transport planning agendas."

With over 15 years of professional experience in transportation research at the intersection of social, behavioral and data sciences, Sener brings a wealth of knowledge to the IPATH Board of Directors. During her career, Sener published research in more than 100 publications, presented at national and international avenues, and conducted guest lectures. She currently serves as a faculty affiliate at the Texas A&M Center for Population Health and Aging and is on the editorial board of the Transportation Research Board's *Transportation Research Record* journal.

"I'm honored with this appointment to the IPATH Board of Directors," said Sener. "Over the last many years, we have made great progress in expanding the understanding and evaluation of health and transportation, and the IPATH Board of Directors will play a significant role as we move forward." ■

For more information about TTI News, contact **Rick Davenport** at (979) 317-2408 or r-davenport@tti.tamu.edu.

THE LAST STOP

with Greg Winfree, Agency Director

TRANSPORTATION AS A
DISEASE VECTOR

Our Research Must Focus on Mitigating the Spread of Infectious Diseases

In engineering, the term *vector* generally identifies a quantity that has magnitude and direction commonly represented by a directed line segment (i.e., an element of a vector space).

Traditionally in medicine, however, a vector is an organism that doesn't cause disease itself but spreads infection by conveying pathogens from one host to another. Inanimate objects such as foodstuffs and dust are also considered to be vector agents. As the coronavirus 2019 (COVID-19) and previous pandemics have demonstrated, we need to shift our focus and approach to the ways we deliver transportation to minimize the impact of these global scourges.

First, we must realize that although borders are closing and supply chains are disrupted, we'll continue moving toward a more interconnected world. Against that backdrop, we must acknowledge the major role transportation assets play in the global spread of contagia. The most obvious means of spreading disease involves the transport of exposed individuals from one place to another. There are multiple opportunities to expose others engaged in or tangential to a Point A to Point B trip — ticket agents, security personnel, food court employees and fellow travelers. Even more insidious is the potential for transportation assets to spread germs that continue to remain viable, left behind on surfaces touched by exposed individuals. A study recently published in *The New England Journal of Medicine* suggests the coronavirus can live on plastic and stainless steel for up to 72 hours. Moreover, our adoption of shared economy precepts exponentially increases opportunities for disease transmission as we carshare, bikeshare, scootershare, etc.

These facts demand that we, as transportation professionals, work across disciplines to reexamine how best to harden transportation assets to minimize their capacity to transport disease. It is our *responsibility* to do so. We'll need to work more closely with epidemiologists, infectious disease experts, biochemists, materials scientists and others to reimagine materials of construction and surface preparation. For example, copper and copper alloys were used as microbial agents before the advent of modern antibiotics in 1932 and have been registered at the US Environmental Protection Agency as the first reliable antimicrobial material. Let's investigate using this metal on surfaces that humans touch, like handrails and doorknobs. We can simultaneously work with materials scientists and biochemists on next-generation antimicrobial materials and coatings that can be deployed as well. This approach builds on the important work the Texas A&M Transportation (TTI) is already investigating at the intersection of transportation and health through TTI's Center for Advancing Research on Transportation Emissions, Energy and Health.

The reality is here, folks — and it's clearly established that transportation is a global disease vector. Perhaps we should look to the medical profession and its first, best mission to "do no harm" as we dedicate ourselves to the task of mitigating risk to human life. Human ingenuity can solve any problem. We're scientists and engineers — it's what we do. Moreover, our futures may depend on it. ■

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The Celebrating the TRB Centennial – Texas Style event and the Texas A&M Transportation Technology Conference have been rescheduled for October 26–28. Online registration is open.

CELEBRATING THE
TRB Centennial Texas Style
October 26, 2020 ★ College Station, Texas

TTI is hosting a celebration October 26 highlighting the participation and accomplishments of individuals and groups in Texas (universities, public agencies, consultants, industries and other organizations) to TRB over the past 100 years. The goals of the event are to:

- promote the value of transportation research;
- highlight 100 years of contributions to TRB products and services that make the transportation system better for all users;
- recognize, honor and celebrate the TRB community in Texas; and
- build support for continuing the successful Texas–TRB collaboration for the next 100 years.

FEATURING
Neil Pederson, *TRB Executive Director* and
Carlos Braceras, *Director, Utah Department of Transportation and Chair, TRB Executive Committee*

REGISTER: https://events.tti.tamu.edu/conference/ttc20-trb-centennial/.

5th Annual Texas A&M Transportation Technology Conference

Smart Transportation = Smart Communities

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