

For a Post-COVID America,
Questions Focused on Disease
Are Only the Start

Big Data Goes Country:
Integrating Speed and Weather
Measures to Study Rural
Roadway Safety

TTI Proving Grounds Crew
Nearly Beats Crash Test Record,
Despite COVID-19

TEXAS TRANSPORTATION Researcher

VOL. 56 | NO. 4 | 2020



HUMAN
Connections

Tech Transfer During a Pandemic



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ON THE COVER: While social distancing is one strategy for minimizing infection during a pandemic like COVID-19, human connection — facilitated by technology — is vital to effective technology transfer and information exchange.



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Texas DIR Recognizes TTI's Smart Intersection Project for Benefiting Texans

Texas DIR highlighted TTI's project aimed at reducing crashes involving pedestrians and bicyclists at intersections as a "great example of how using emerging technologies can positively impact the daily lives of Texans."

The Texas Department of Information Resources (DIR) highlighted the Texas A&M Transportation Institute (TTI) Smart Intersection project as an accomplishment in its Biennial Performance Report published Nov. 15. DIR's stated mission is to "serve Texas government by leading the state's technology strategy, protecting state technology infrastructure, and offering innovative and cost-effective solutions for all levels of government."

The project developed and pilot-tested a system in 2018 at The Texas A&M University System's RELLIS Campus that tracks buses approaching intersections. If the bus is turning at the intersection, pedestrians and bicyclists are given visual and audio warnings alerting them. The buses communicate with the intersection's traffic signal equipment using dedicated short-range communications radio, a wireless communication technology that provides secure, high-speed signals directly between vehicles and roadway infrastructure, without the need for cellular infrastructure.

"Intersections are busy places, with passenger vehicles, trucks, buses, pedestrians and bicyclists all sharing space," says TTI Executive Associate Director Katie Turnbull, TTI's principal investigator on the project. "Transit stops are typically located near intersections, with boarding and alighting bus passengers joining other pedestrians crossing the streets. Bicyclists may also be transit riders, getting their bikes on and off buses, or traveling through intersections."

TTI designed, developed, and pilot-tested the Smart Intersection concept for the Texas Department of Transportation (TxDOT). Contributions from Econolite, TxDOT, the Brazos Transit District and TTI made the pilot

test possible. Currently in Phase 3, the project continues in a real-world deployment location at the intersection of George Bush Drive and Penberthy Boulevard on the Texas A&M University campus. Partners assisting with Phase 3 include TxDOT, Texas A&M University Transportation Services and the City of College Station.

"TTI's Smart Intersection is a great example of how using emerging technologies can positively impact the daily lives of Texans," says John Hoffman, Texas DIR's deputy chief information officer. "We are including the project in DIR's 2020 Biennial Performance Report to show how transitioning to the next generation of innovative solutions is aligned with goals in the 2020–2024 State Strategic Plan for Information Resources Management."

The Texas Legislature requires DIR to submit a report every two years to document progress toward the goals of the 2020–2024 State Strategic Plan for Information Resources Management. The plan "identifies technology goals for state government over the next five years and guides agencies as they develop their agency strategic plans."

"It is an honor to be recognized by DIR for this project," notes Turnbull. "It highlights the importance of research partnerships involving TTI researchers, state and local agencies, and industry to improve safety for all road users." ■



For more information, contact Katie Turnbull at (979) 317-2473 or k-turnbull@tti.tamu.edu.



DESPITE CHALLENGES, 2020 Transportation Short Course Sees Record Attendance

"TxDOT and the state universities have laid a solid foundation of trust and teamwork over seven decades — marked this year. Seventy years gives new meaning to a long-term partnership.... Now we are entrusted to keep it vibrant and strong for the next 70 years."

*Greg Winfree
TTI Agency Director*

THE TEXAS A&M Transportation Institute (TTI) hosted the Ninety Fourth Annual Transportation Short Course Oct. 12–14, 2020. Traditionally held in person at Texas A&M University in College Station, Texas, travel restrictions and concerns for personal health in the era of COVID-19 forced planners to hold the event online for the first time in its near-century history.

"Not holding it was never an option," explains Director of Administration Mary Cearley, who organizes and oversees the event for TTI. "While we'd obviously prefer to hold it in person, Short Course is about sharing information to benefit everyone who uses our state transportation system. Going virtual gave us an opportunity to reach more people, which can only help further that mission."

A record 4,207 attendees registered for the event, up approximately 34 percent from last year's then-record attendance. Sponsored by the Texas Department of Transportation (TxDOT), Short Course gives transportation practitioners and researchers a common forum to discuss the latest innovations in transportation technology, methodology and application. Transportation system improvements — whether they be longer-lasting roads, improved urban mobility, or safer roadway designs aimed at saving lives — ultimately benefit everyone who uses the Texas transportation network every day. Sessions covered such topics as traffic operations, maintenance, construction, design, planning, structures and the environment, among others.

TTI Agency Director Greg Winfree welcomed attendees from the traditional site of Short Course's opening session, Rudder Auditorium on the Texas A&M campus. His address emphasized the historic relationship between TTI and TxDOT, a partnership forged in 1950 when the then-Texas Highway Department sought the expertise of Texas A&M civil engineering professors to improve the state's roadway network. That partnership soon expanded to include other universities and other travel modes and is now the envy of the nation.

"TxDOT and the state universities have laid a solid foundation of trust and teamwork over seven decades — marked this year," Winfree noted proudly. "Seventy years gives new meaning to a long-term partnership.... Now we are entrusted to keep it vibrant and strong for the next 70 years."

Though the auditorium was empty as Winfree streamed his speech, having him speak to attendees from Rudder Auditorium was a conscious decision that planners made. Keeping

"Not holding it was never an option. While we'd obviously prefer to hold it in person, Short Course is about sharing information to benefit everyone who uses our state transportation system. Going virtual gave us an opportunity to reach more people, which can only help further that mission."

*Mary Cearley
TTI Director of Administration*

Short Course traditions like that was a strategy for making the transition to an online venue just a little more comfortable. Other examples of familiar rituals included having the Texas A&M Corps of Cadets present the colors and provide the invocation, and showing a flyover of the A&M campus.

Another tradition and one of the proudest moments at Short Course is when TxDOT honors its best and bravest. Each year, two sets of awards are bestowed that uniquely recognize individual excellence in serving Texans. The Big Five Awards, named for giants in Texas transportation history, are presented to individuals showing outstanding leadership and dedication to TxDOT. The Extra Mile Awards recognize TxDOT employees who helped save a life or prevent a life-threatening situation from occurring, qualifications that gained extra significance during the 2020 pandemic.

"Congratulations to our award winners ... you do us all proud," said TxDOT Executive Director James Bass. "Not even the challenges of 2020 — and we've had a few — could stop our mission: connecting you with Texas."

That theme for this year's Short Course, "connecting you with Texas," could not have been timelier. Social distancing, quarantine and travel restrictions have made it more challenging for practitioners and researchers to communicate with one another, illustrating up the vital importance of

keeping events like Short Course alive. Taking the gathering virtual not only met a practical need but also facilitated information exchange and technology transfer by keeping the lines of communication open and encouraging even more folks to take part. Robust interactions between presenters and attendees through each session's virtual Q&A was a testament to the effectiveness of this year's event. In the end, it's Texans who travel and visitors to the Lone Star State who will benefit most from that investment.

Looking forward, Winfree noted how the world has changed this year. The transportation research agenda has changed as a result, and he emphasized the need to look beyond traditional focus areas and account for new, microscopic threats to system users.

"As we evolve our research agenda, our ingenuity must now also address the harder-to-see hazards on our steering wheels, bus handrails and airline seats," Winfree said. "We must redefine the concept of individual safety beyond safety belts and airbags to also include the public health impacts on our shared transportation environment."

Next year's Ninety Fifth Annual Transportation Short Course is planned for Oct. 11–13, 2021. ■



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Short Course Session Examines COVID-19's

IMPACTS ON TRANSPORTATION PLANNING

Sponsored by the Texas Department of Transportation (TxDOT) and hosted by the Texas A&M Transportation Institute (TTI), the Ninety Fourth Annual Transportation Short Course occurred Oct. 12–14, 2020. The event was held virtually for the first time and brought together a record number of transportation industry experts to share best practices and insights into how the Texas transportation system will evolve in a post-pandemic future.

The transportation planning breakout session looked at the short-term impact of the COVID-19 pandemic across various transportation modes, as well as the long-term implications for what the “new normal” might look like after it’s over.

“This year’s Short Course had new meaning attached to it, beyond our annual get-together to share lessons learned,” notes Unified Transportation Program Portfolio Performance Director Mildred Litchfield of TxDOT’s Transportation Planning and Programming Division. Litchfield co-chaired the session with TTI Executive Associate Director

Katie Turnbull and TTI Research Scientist Ed Hard. “Ensuring that the Texas transportation system works as efficiently, safely and resiliently as possible during and after COVID-19 is critical.”

Moderated by Transportation Planning and Program Director James Koch of TxDOT’s Houston District, the first half of the session examined the pandemic’s direct effects on various transportation modes, including vehicular, transit, bike, pedestrian and air travel.

Director of Transportation Michael Morris, North Central Texas Council of Governments (NCTCG), highlighted travel behavior changes in the Dallas–Fort Worth metroplex during the pandemic. He noted the reduction in roadway, toll road, transit and air transportation-related revenues during the shelter-in-place phase and the more recent increase in use. For example, there was a 57 percent reduction in toll road transactions and 92 percent drop in air travel in April 2020. He also emphasized the importance of funding during the recovery phase, stating that \$1 billion in

transportation investment could lead to 12,000–15,000 new jobs, providing vital relief to currently unemployed individuals.

Houston METRO’s President and CEO Tom Lambert described how transit in the Bayou City has changed, with declines in ridership in all services due to the pandemic. He noted that METRO continues to balance service, especially essential trips, with rider safety and the safety of METRO employees as key considerations. He described actions taken and those underway as METRO’s transit services group responds to changing conditions.

Bicycle and Pedestrian Planner Noah Heath of TxDOT’s Public Transportation Division and NCTCG’s Sustainable Development Program Manager Kevin Kokes shared the stage on the topics of bike and pedestrian traffic. They both stressed the increase in bicycle and pedestrian trips during the pandemic. Bike/ped counts were up by 36 percent through May at selected locations in the state, and the fitness app Strava reported a 99 percent uptick in bike trips in Texas. Both stats confirm

anecdotal evidence of increased bike and ped activity as folks explored their neighborhoods during the quarantine to get out of the house, which is also reflected in the shortage of bicycles for sale.

Director Jim Halley of TxDOT Airport Planning and Programming estimated that it will be at least 2023 before air travel will recover, saying the long-term effects of COVID-19 on the industry will last longer than 9/11's did. Carrier consolidation, operational efficiency optimization and fleet optimization are strategies the airline industry is using to save reserves.

The second part of the session, hosted by Director of Transportation Planning and Development Paula Sales-Evans of TxDOT's Corpus Christi District, explored the implications for future planning. Experts addressed the topics of funding and financing, environment and land use, automated and connected vehicles, and travel and tourism.

Texas Comptroller of Public Accounts and Chief Revenue Estimator Tom Currah briefed attendees on pandemic trends like gasoline supply and seated diner occupancy, both of which bottomed out in April. He discussed

trends in the sources of state highway fund revenues including motor fuel taxes, sales taxes, motor vehicle registration fees and severance taxes. While employment was hit hard in the spring, pre-pandemic employment peaks are expected to return within the next year. He reported that an updated budget forecast will be released before the 2021 Texas legislative session.

The Houston-Galveston Area Council's Director of Community and Environmental Planning Jeff Taebel discussed the possible impacts of three scenarios, focusing on if remote workers stay remote, if brick-and-mortar retail shopping doesn't rebound, and if lower-wage jobs continue to bear the brunt during the pandemic without any benefits. How this plays out will have definite impacts on future land use, development and travel patterns.

Director of the Federal Highway Administration's (FHWA's) Office of Safety Research and Development and Office of Operations Research and Development Brian Cronin looked at connected and automated vehicles and their potential to improve mobility and safety once widely deployed. He described different elements of FHWA's CARMA Platform, an open-source software for testing and

"All the speakers highlighted the importance of collaboration, communication, transparency, flexibility and commitment in responding to the pandemic."

*Katie Turnbull
TTI Executive Associate Director*

evaluating cooperative automation concepts aimed at improving system safety and increasing efficiency of the roadside infrastructure.

Director Joan Henderson of TxDOT's Travel Information Division addressed the pandemic's devastating impact on travel and tourism in the Lone Star State. Travel spending is down by \$519 billion, and the state has suffered an economic loss of approximately \$1.2 trillion, suggesting that COVID-19 will have nine times the impact on travel and tourism of 9/11. She described some of the approaches being taken to support safe travel and tourism, including staycations and outdoor activities. Henderson urged everyone to take the Texas Travel Pledge, which stresses safe travel and enjoying Texas responsibly for the welfare of others.

"All the speakers highlighted the importance of collaboration, communication, transparency, flexibility and commitment in responding to the pandemic," says Turnbull. "They stressed commitment for working together along with other public- and private-sector partners to address short-term issues and to ensure a robust long-term multimodal transportation system to support individual mobility and the movement of goods." ■



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College Students, Traffic Safety Professionals Attend Virtual 2020 U in the Driver Seat Symposium



The Texas A&M Transportation Institute's (TTI's) U in the Driver Seat (UDS) education and outreach program held its virtual 2020 UDS Symposium Oct. 7–9. Now in its eighth year, the symposium raises awareness about the leading cause of death for young adults ages 18–25 — traffic crashes. This year's theme was "recharge to save lives on our roads."

The UDS program was created to reduce the number of impaired driving injuries and deaths of college-aged students. This peer-to-peer initiative was inspired by the highly successful Teens in the Driver Seat® program, which began nearly 20 years ago and is aimed at reducing the large number of teen injuries and deaths due to car crashes. The UDS program is the first organization of its kind to host a virtual traffic safety event for both students and traffic safety professionals.

This year's UDS symposium had a record participation of nearly 300 people from across the country. Funded by Union Pacific, State Farm, General Motors, the Texas Department of Transportation, and TTI's Center for Transportation Safety, the event — with free admission — went virtual for the first time, which made it possible for more young adults and professionals to engage with life-saving traffic safety messages.

Attendees chose from two concurrent tracks: one for college students and the other for traffic safety professionals who work with college students. The symposium fostered an environment that encouraged students to listen and learn from each other, as well as from professionals who are experts on traffic safety topics.

Brigadier General Joe Ramirez, the commandant of Texas A&M University's Corps of Cadets, delivered the keynote address for the symposium. Ramirez said, "Probably one of the most powerful leadership adages out there is 'leading by example.' To your people, this is what 'right' looks like. It's the example that you want others to follow and that you want to follow yourself — both on the job and off the job. For your generation, it's very difficult because you have cell phones with cameras that take photos. People are watching you all the time. Leaders are watched all the time. Your people, your peers, your friends and your family members watch you every day, seeing how you respond and react to different situations."

Sessions emphasized the driving risks for young adults, such as distracted driving, impaired driving, speeding

"The games and the ability to present traffic safety content in a new and exciting way was one benefit of the virtual format."

*Russell Henk
TDS Director and Manager of
TTI's Youth Transportation
Safety Program*

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**Safety & Leadership
in a Dynamic Environment**

**Brigadier General Joe E. Ramirez Jr.
Commandant of Cadets
Texas A&M University**

and aggression, not wearing a seat belt, and drowsy driving. TTI Youth Transportation Safety Program Director Russell Henk opened the symposium with a Power Up! session. Subsequent sessions focused on impaired driving, the UDS program and traffic safety trivia.

On the second day, sessions reminded attendees of the consequences of driving distracted or impaired, while also inspiring them to "be the sober one." On both days, attendees visited virtual exhibit booths and networked after hours with other students and professionals. On the final day, sessions addressed trends in impaired driving during COVID-19 and highlighted social media insights for reaching college students. In between sessions, attendees networked with each other and participated in

virtual games. The event organizers announced awards for the games at the end of the symposium.

"The games and the ability to present traffic safety content in a new and exciting way was one benefit of the virtual format," Henk says. "As noted before, it increased event attendance to record levels, enabling us to share lessons learned with attendees from all over the country. And that's representative of how our program has responded during the pandemic — we've managed to adapt our outreach and messaging to respond to the times. That's a tribute to the professionalism of our staff and the passion our young advocates have for driver safety." ■



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what we're
THINKING

Ginger Goodin

FOR A POST-COVID AMERICA, Questions Focused on Disease Are Only the Start

Recent news that preventive COVID-19 vaccines may soon be available suggests that we're one step closer to answering one of the more dominant questions of our daily lives: How can we avoid falling victim to one of the most destructive diseases ever?

And while that's clearly the biggest question related to the pandemic, it's far from being the only one.

What's gotten less attention are the questions of how and where we are likely to work, live and shop once this global crisis is behind us. All three of those activities require a robust transportation system, and all three have changed dramatically in recent months. That much we know. What we don't yet know is how to ensure that our transportation system is prepared to support our existence in a post-pandemic nation.

That's the goal of research we're now doing at the Texas A&M Transportation Institute (TTI).

Many of us at TTI, like so many others, are doing that work largely if not exclusively from our homes or other non-office environments. Some organizations may elect to make work-from-home a permanent practice. Any lasting shift to telecommuting could in turn reduce traffic congestion, traffic crashes, vehicle emissions and other negative factors. It's also likely to cause long-term erosion in public transit

use, keenly important to many of the people whom we've come to regard as essential workers.

Choices of how and where we work naturally will influence where we choose to live. Pandemic-influenced changes in work culture may be a factor in Texas' sharp increase in home sales, a potential indicator of the long-term adoption of behaviors like

While the number of work-related trips has declined, the opposite has been true for the movement of goods, seen especially in the increasingly stronger consumer demand for deliveries that has made freight trips both shorter and more frequent.



Pandemic-influenced changes in work culture may be a factor in Texas' sharp increase in home sales, a potential indicator of the long-term adoption of behaviors like telecommuting or home relocation, which can lead to changing patterns of land use as people move to suburban communities or beyond.

both shorter and more frequent. Even as e-commerce deliveries have grown during our public health crisis, the pandemic has at the same time exposed a critical vulnerability in the supply chains that feed those deliveries. Certain industries are already exploring adjustments that would reduce Asian trade reliance and make supply chains more resilient, and therefore deliveries more reliable. Our research shows that if 25 percent of China's exports to the United States were sourced to Mexico, international truck and rail border crossings between the United States and Mexico would increase by more than 40 percent, exacerbating already serious border traffic gridlock.

Our greatest public health crisis in more than a century has already changed how and where we work, live and shop. And even after we emerge from our isolated and socially distanced reality, those changes are, to at least some degree, likely to persist and raise questions that require thoughtful and well-informed answers.

- To what extent will telecommuting become a norm, and what will the resulting impact be on our travel and our need for road construction and maintenance?

telecommuting or home relocation, which can lead to changing patterns of land use as people move to suburban communities or beyond. These dispersed land development patterns make transit service more challenging to provide, increase dependency on personal autos, and result in greater roadway infrastructure needs and greater burdens on low-income travelers in terms of the personal costs to own a vehicle.

While the number of work-related trips has declined, the opposite has been true for the movement of goods, seen especially in the increasingly stronger consumer demand for deliveries that has made freight trips

- Is the increase in home sales during the pandemic primarily happening in suburban and exurban areas, and if so, what would a shift in space demand mean for the ways in which our transportation systems are planned and developed in the future?
- Will e-commerce maintain its current growth trajectory, and if so, what does that mean for delivery demand and its impact on streets and highways?

These are only a few of the questions we need to be asking now. Issues related to equity and environmental justice, transportation funding, air quality, and other topics also merit our attention, so we're working on those, as well. The pursuit of answers requires us to choose science over speculation, just as those working to develop a preventive pharmaceutical have had to do.

The search for a vaccine has always been concerned with if we're going to live through the pandemic; the questions that remain will largely determine how we're going to live beyond it. ■



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A scenic aerial photograph of a rural landscape during sunset. In the center, a white church with a red roof and a steeple stands prominently. To its left is a small cluster of houses. To its right is a cemetery with many headstones. The surrounding area consists of vast, plowed fields. The sky is filled with warm, orange and pink hues from the setting sun.

BIG DATA GOES COUNTRY

Integrating Speed and Weather Measures to Study Rural Roadway Safety

"There is an urgent need for research to explore new data and better understand how to effectively quantify highway safety to overcome the limitations of current methods."

*Subasish Das
TTI Assistant Research Scientist*

The term "big data" is ubiquitous these days in the transportation research world, with usage in topics ranging from complex travel demand models to forecasting economic needs. Texas A&M Transportation Institute (TTI) researchers recently conducted a research project that examined the prevailing operating speeds on rural roadways on a large scale and determined how different measures of operating speed interact with roadway characteristics and weather condition to influence the likelihood of crashes. The project was sponsored by the U.S. Department of Transportation's Safety Data Initiative. Using alternatives to the originally planned and recommended pavement design in targeted areas avoids the time-honored practice of using a single pavement design or rehabilitation method for an entire corridor. That flexibility allows a targeted focus, tailoring construction solutions to unique problems along a discrete part of the roadway rather than applying a one-size-fits-all method.



"Our sponsor's vision is to integrate newer big data sources with traditional datasets to enhance the general understanding of crash risk and potential to prevent crashes and improve rural roadway safety," explains TTI Assistant Research Scientist and principal investigator Subasish Das. "There is an urgent need for research to explore new data and better understand how to effectively quantify highway safety to overcome the limitations of current methods."

This study developed databases for two states by incorporating several data sources. The databases used in this study included 2015 crash data from the Highway Safety Information



View the project website at <https://www.transportation.gov/office-policy/transportation-policy/rural-speed-safety-pilot-project>.

System, travel speed data from the National Performance Management Research Data Set, and roadway information from the Highway Performance Monitoring System.

The models combined traffic speed data with roadway geometrics, traffic operations and weather data to generate annual and daily crash predictions on roadway segments for different rural roadway facility types (e.g., rural two-lane roadways). One of the project's products is a decision support tool that shows heatmaps of rural roadways based on the model outcomes.

"Our prototype interactive decision support tool incorporated Washington and Ohio data containing the expected total crashes from the final models to show segment-level high-risk analysis," says Das. "The tool contains a dashboard with various dropdown lists to generate estimated annual crashes on Washington and Ohio roadway segments."

The research team found that certain speed measures were beneficial in quantifying safety risk. Annual-level crash prediction models show that increased variability in hourly operating speed within a day and increased monthly operating speeds within a year are both associated with a higher number of crashes. This model also shows that rural roadway segments experiencing significant differences between weekday and weekend operating speeds are associated with a high number of crashes.

One of the most important research findings was that daily-level crash prediction models show that a segment with high variation in daily average speeds is expected to experience a higher number of crashes than a segment with a lower variation in daily speeds. Examining time segments before and after crashes shows that speed variation increases significantly before a crash compared to a normal traffic-flow condition.

"Overall, this study shows the benefit of incorporating speed data in safety modeling to more effectively identify locations that would benefit from additional safety treatments and countermeasures," notes Das. "Having this information available to state department of transportation officials is vital to achieving an understanding of where the greatest crash risks may occur and where they need to focus their resources toward mitigating these risks."

In addition to this project, Das is also leading research projects to explore the development of short-term crash prediction models to predict the safety performance of rural roadways for specific geometric, operational and exposure characteristics, as well as to develop speed-related crash modification factors for the existing crash prediction models of the American Association of State Highway Transportation Officials' *Highway Safety Manual*. ■



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TTI'S TEENS IN THE DRIVER SEAT® Launches New App to Encourage Safety in Young Drivers

As a part of National Teen Driver Safety Week Oct. 18–24, teen advocates of the Texas A&M Transportation Institute's (TTI's) Teens in the Driver Seat® (TDS) program launched its You in the Driver Seat (YDS) smartphone app via TTI and TDS social channels. The app encourages safer driving behaviors in young drivers aged 16 to 25.

TDS is a peer-to-peer teen driver safety program and part of TTI's Youth Transportation Safety (YTS) Program in the Institute's Center for Transportation Safety. YTS develops and delivers the nation's most comprehensive suite of transportation safety programs and projects dedicated to saving lives and reducing injuries to America's youth. A second safe driving initiative, U in the Driver Seat — which extends TDS's strategies to encourage safer driving among college-aged drivers — is a secondary target market for the app.

The YDS app rewards teens for safe driving (defined as driving without

distractions — e.g., using their phones for texting, calls, social media, etc. — or speeding). Drivers earn points for safely driven miles, redeemable for gift cards to popular venues like Amazon, Starbucks and Chick-Fil-A. Drivers also earn safe driving badges and qualify for random reward drawings based on safe driving point benchmarks.

Distracted driving is one of the most common and preventable causes of teen driving crashes. For example, texting and driving causes reaction times to double. Distracted drivers have a harder time staying in their lane and maintaining a consistent speed, often leading to a lack of control and a fatal crash. The YDS app aims to make it cool, fun and rewarding to drive without distractions. A 2018 pilot test of the YDS app demonstrated a nearly 70 percent drop in distracted driving by users.

"We're excited about having this tool in our safety program's toolbox," says TDS Director and YTS Manager Russell Henk. "Our program has embraced the strategy of rewarding positive behavior for the nearly 20 years of its existence."

TDS seeks to raise awareness of the top five driving dangers for teens — driving distracted, speeding/street racing, driving at night, low seat belt use, and driving under the influence — and prevent crashes involving young drivers. The program empowers teens to encourage one another via positive peer pressure to make smarter choices, both behind the wheel and as passengers.

The YDS app is currently available in the Apple App Store and will soon be available for Android. ■



Car crashes account for nearly one-third of all teen deaths in America each year.



DRIVING SCORES

It's simple. Drive safe, without distractions, earn points. If you don't drive safe, we'll let you know how many points you missed out on.



SAFE STREAK BADGES

Earn Safe Streak Badges for every 3 consecutive safe trips you have! Safe Streak Badges qualify you for random prizes!



REWARDS

We'll send you a gift card for Chick-Fil-A, Starbucks or Amazon each time you reach a new level of points earned.

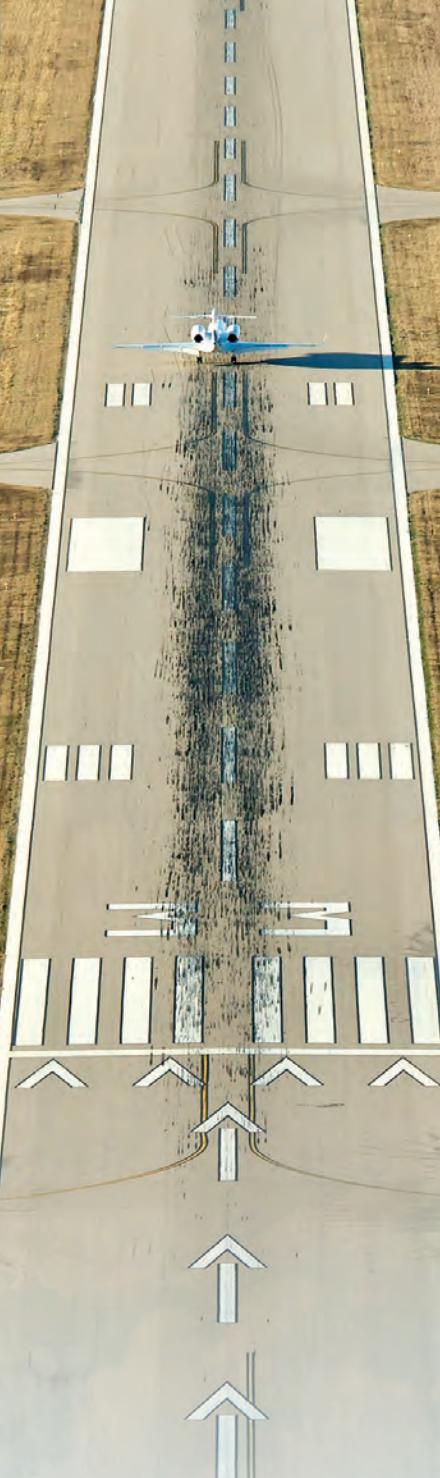
"Our program has embraced the strategy of rewarding positive behavior for the nearly 20 years of its existence."

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TDS Director and YTS Manager



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Researchers Develop Airport Economic Impact Estimator Tool



Small Airport Economic Impact Estimator

The Small Airport Economic Impact Estimator tool is a web-based application designed to help airport managers and planners calculate the economic impact of their airports. It features a user-friendly interface with several key components:

- Select Airport:** A dropdown menu allows users to choose "Abilene Regional Airport" or "Taylor West Texas".
- Select Input/Output:** Options include "Airport", "Visitor", and "Tenant".
- Map:** A map showing the location of Abilene, Texas, with the airport highlighted. It includes a legend for roads and landmarks.
- Airport Activity:** A table showing input data for employment, annual payroll, annual operating expenses, and 3 Yr Avg Capital Expenses. Employment: 24, Annual Payroll: 1,293,185, Annual Operating Expenses: 1,969,385, 3 Yr Avg Capital Expenses: 655,973. Jobs: 56, Labor Income: \$4,664,308, Output: \$18,102,907.
- Summary:** A table showing the estimated economic impact. Item: Airport Activity, Jobs: 11, Labor Income: \$890,065, Output: \$3,454,482. Item: Airport Capital Improvement, Jobs: 8, Labor Income: \$376,988, Output: \$10,699,447. Item: GA Visitor Activity, Jobs: 129, Labor Income: \$2,575,446, Output: \$72,028,696. Item: CS Visitor Activity, Jobs: 466, Labor Income: \$9,272,680, Output: \$25,947,131. Item: Tenant Activity, Jobs: 1,002, Labor Income: \$45,488,469, Output: \$145,635,606. Total: Jobs: 1,810, Labor Income: \$58,603,659, Output: \$183,343,363.
- Summary of Output:** A pie chart illustrating the breakdown of the total output. The chart shows four segments: Airport Capital Improvement (light blue), GA Visitor Activity (orange), CS Visitor Activity (red), and Tenant Activity (dark blue).

Whether providing justification for grants for airport upgrades or attempting to attract new development, having accurate and timely information about the economic impact of an airport is vital. The Small Airport Economic Estimator enables users to do just that by providing a set of vital economic data at the click of a mouse.

The web tool was developed by researchers at the Texas A&M Transportation Institute (TTI) under a research project that was sponsored by the Texas Department of Transportation (TxDOT).

"We have assisted TxDOT in preparing a statewide economic impact study in the past," says Senior Research Scientist Jeff Borowiec, who supervised the project. "But the ability to provide updated or more precise economic impact values to airport sponsors and other stakeholders was needed. For example, there could have been changes in an airport's activity levels since the last statewide study was performed."

The research team built the model by using various economic inputs including visitor spending data from the Texas Governor's Office, Terminal Area Forecast data from the Federal Aviation Administration, and the latest available data from the recently completed statewide economic impact study of Texas airports.

The web tool takes the model and provides an online interface for users to calculate the economic impact of the airport of their

choice. Users have the option to calculate using the default data or provide new inputs based on their knowledge of current conditions.

The web tool takes these inputs and generates summary outputs for three different types of activity:

- **Airport activity** — employment or expenses directly related to the functioning of the airport.
- **Visitor activity** — impact of visitor spending on the region.
- **Tenant/business activity** — employment or expenses related to any tenants or businesses that are located on the airport.

"Building an estimator tool that can be tailored to each airport provides more precise estimates of that airport's impact," notes Borowiec. "We also found that economic conditions vary widely across the state, which makes the use of local multipliers and input data key to providing accurate results."

"The Small Airport Economic Estimator tool provides an easy-to-use resource for airport managers, planners and local officials," says TxDOT Aviation Division Director of Planning Jim Halley. "As economic conditions change and the airport develops, it provides up-to-date economic impact numbers that can support grant applications and local funding matches, as well as attract new development. In addition, the Estimator can estimate economic impacts that may be realized if certain improvements are made that increase airport activity." ■



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The Small Airport Economic Impact Estimator tool can be viewed at <https://txeconomicapproach.org/>.

TTI Proving Grounds Crew Nearly Beats Crash Test Record, Despite COVID-19



Despite a worldwide pandemic that shut down businesses and kept most workers at home through the spring and much of the summer, 37 Texas A&M Transportation Institute (TTI) Roadside Safety and Physical Security Division employees have conducted a near-record number of crash tests.

"Typically, we complete 50 to 60 crash tests each fiscal year here at the RELLIS Campus," explains Senior Research Engineer Lance Bullard, division head. "Our fiscal year ends Aug. 31, and by that date we'd conducted 112 full-scale crash tests."

"The Manual for Assessing Safety Hardware, or MASH, was changed to, among other things, reflect the nation's changing vehicle fleet. Vehicles have gotten taller and heavier, so that means the safety equipment could react differently in a crash. We all need to make sure we're as safe as possible on our roadways."

*Lance Bullard
TTI Senior Research Engineer*

Why twice as much work? The Texas Department of Transportation (TxDOT) and other state DOTs across the country are working to ensure their roadway safety hardware (e.g., barriers, guardrails, crash cushions) meet new crash-performance standards adopted by the federal government in 2016.

"The *Manual for Assessing Safety Hardware*, or MASH, was changed to, among other things, reflect the nation's changing vehicle fleet," Bullard points out. "Vehicles have gotten taller and heavier, so that means the safety equipment could react differently in a crash. We all need to make sure we're as safe as possible on our roadways."

Bullard says a newly developed pooled-fund program is another reason for increased testing. Twenty-eight states and a Canadian province banded together and pooled their research dollars so TTI can help them design, develop and crash-test safety hardware that complies with the MASH standard.

Considering the division's testing volume since 1990, fiscal year 2020 will go into the history books as TTI's second busiest year for crash tests. The busiest (by four tests) was in 1995.

New and innovative roadside safety devices are also being developed and tested. For example, TxDOT is working with TTI engineers to design a fence system that attaches to the top of a concrete barrier so that motorcycle riders don't go over the barrier and suffer more severe injuries during a crash. Another example involve testing underway with manufacturers of storefront bollards to determine if their products can successfully keep vehicles from crashing through storefronts and restaurant windows.

"Yes, we have been busy, with no letup in sight," Bullard says. "We are booked solid through February 2021. But there is plenty of job satisfaction. Everything we do here is designed for just one thing: saving lives." ■

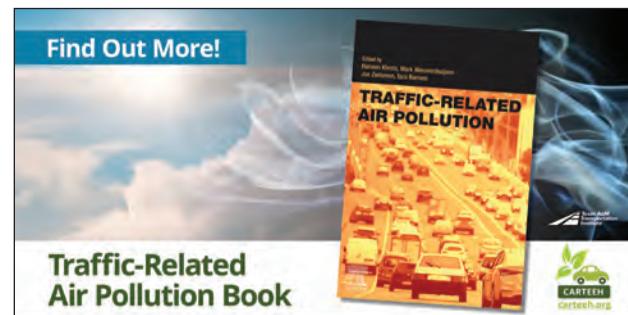


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CARTEEH Researchers Publish First Book on Traffic-Related Air Pollution and Human Health

Researchers from TTI's Center for Advancing Research in Transportation Emissions, Energy and Health (CARTEEH) recently published *Traffic-Related Air Pollution*, the first book to address traffic-related air pollution (TRAP) and its impacts on human health. TTI Associate Research Scientist Haneen Kkreis served as lead editor alongside contributing editors Assistant Agency Director Joe Zietsman and Associate Research Engineer Tara Ramani. Mark Nieuwenhuijsen, research professor at the Barcelona Institute of Global Health, also contributed.

The book consists of 25 chapters by global experts on a variety of topics related to TRAP and health, including mitigation standards and regulations regarding TRAP and public health. Included in this approach are methods and tools for assessing and quantifying road traffic, vehicle emissions, air



pollution, human exposure, biological reactions and population-based health impacts.

"*Traffic-Related Air Pollution* focuses on TRAP as one adverse, but modifiable, environmental exposure that significantly affects public health, especially in cities," Kkreis explains. "The book sets real-world implications alongside policy options, emerging technologies, and best practices and provides recommendations on ways to engage in discourse and policy to better address TRAP's health impacts and its real societal costs." ■

Curriculum in Development for Transportation Emissions and Health



Kkreis

Researchers in TTI's Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH) have developed a cross-disciplinary course titled *Traffic-Related Air Pollution: Emissions, Human Exposures, and Health*.

Transportation and health have historically been viewed as two distinct fields of education, research and practice, and there is a growing need for cross-disciplinary training at the intersection of transportation and health. TTI Associate Research Scientist Haneen Kkreis led development of the new curriculum, which provides the basis for a graduate-level course offered by CARTEEH consortium member institutions or other universities. Numerous models, measurement techniques and datasets underlie the content to demonstrate the relationship between traffic activity and human health through exposure to air pollution. The course also explores the impacts of environmental regulation and real-world policymaking and practice, with numerous case studies from around the world.

Developers separated the course into three high-level, separate tracks to help tailor the information to

participants' existing knowledge in their respective fields while focusing on potential application in the classroom and beyond.

The health track is targeted at urban planners, transportation planners and engineers unfamiliar with public health issues. The transportation track is aimed at environmental epidemiologists and public health students and practitioners with a limited knowledge of transportation concepts. The third track (planning and policy) targets practitioners and policymakers, providing a more holistic overview of health and transportation and focusing on the link between science and policy as seen in real-world case studies. This track is also applicable to health and transportation students and researchers since it equips them with the knowledge needed for policy option generation and policy assessment.

Thirty-five of the 60 lectures are completed and available online at carteeh.org. ■



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

TTI's Soheil Sohrabi Publishes AVs and Public Health Research Paper



Sohrabi

TTI Graduate Research Assistant Soheil Sohrabi recently published the research paper "Impacts of Autonomous Vehicles on Public Health: A Conceptual Model and Policy Recommendations" in the journal *Sustainable Cities and Society*. The paper's authors also include Haneen Kkreis, associate research scientist in TTI's Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH), and Dominique Lord, Professor and A.P. and Florence Wiley Faculty Fellow in TTI's Center for Transportation Safety.

The researchers developed a conceptual model to understand possible autonomous vehicle (AV) impacts on public health. The findings demonstrated that AVs can contribute to public health through 17 negative

pathways (e.g., losing transportation-related jobs) and eight positive pathways (e.g., providing access to needed services for more people). The impacts of seven pathways — such as the effect on physical activity after AV deployment — remain unclear. Policymakers can use the research to make better-informed decisions regarding AVs and public health. It can also help educate the public and health sectors about AVs' potential benefits and negative impacts.

Sohrabi worked on this research while he was a graduate research assistant at CARTEEH. He's currently working in TTI's Roadway Safety Division and is a Ph.D. student in Texas A&M University's Zachry Department of Civil and Environmental Engineering. Sohrabi continues to work on this topic through a project that's part of a Robert Wood Johnson Foundation grant to quantify safety and health concerns related to implementing AV technologies. ■

TTI's Bullard and Chrysler Named Regents Fellows



Bullard

The Texas A&M University System Board of Regents recently named TTI's Senior Research Engineer Lance Bullard and Senior Research Scientist Sue Chrysler as Regents Fellows.

Bullard designs, develops and tests highway safety devices and has led various research projects for the National Cooperative Highway Research Program, the Federal Highway Administration, many state departments of transportation and private manufacturers. He leads TTI's Roadside Safety and Physical Security Division and has served as principal investigator and engineer for the Texas Workforce Commission Automotive Equipment project that performs product reviews and inspections of vehicle modifications for physically disabled persons.

Bullard is grateful to his peers and colleagues at TTI regarding the nomination. "I'd like to thank all the people at TTI who have worked with me throughout the years," Bullard says. "TTI is a fantastic collection of folks who provide all the support and backup necessary to achieve such an honor."

For more than 30 years, Sue Chrysler has applied an interdisciplinary approach to research, serving as principal investigator or task leader on more than 50 projects on various research topics, from visibility

and distracted driving to traffic sign design and pavement marking effectiveness. She is the associate director of a National Safety University Transportation Center, Safe-D, which leverages disruptive technology to improve roadway safety. Throughout her career, Chrysler has been a thought leader in professional societies and standards committees, including several National Academy of Sciences Transportation Research Board committees.

"I am a cognitive psychologist by training, studying how people think, learn and react to the world," Chrysler notes. "Transportation is a perfect field to apply my skills and training because people are involved with so many different aspects of the transportation system as drivers, pedestrians, bicyclists, motorists and transit users."

The Regents Fellow Service Award Program began in 1998 and is the highest A&M System honor. ■



THE LAST STOP

with Greg Winfree, Agency Director

THE HUMAN FACTOR IN THE Tech Transfer Equation



I'm a people person. I draw energy from interacting with other folks. I'll take an in-person conversation over a phone call every time. But lately, traditional face-to-face contact has been supplanted by the virtual kind.

COVID-19 has transformed how we interact. Worldwide, nearly 1.5 million folks have perished as I write this. For mutual protection, we've had to disrupt some of our most beloved cultural traditions — from handshakes to hugging grandma — to slow the viral spread.

In transportation research, we use the term "human factors" to describe how humans interact with technology through the environment; but I'd like to redefine it here for a moment. The human factor (emphasis on human) encompasses everything we share when we communicate with one another — through tone, expression, body language, and simply sitting at the same table.

Since March, we've learned to rely heavily on the Internet to conduct business. Like many other organizations, the Texas A&M Transportation

Institute (TTI) has embraced web-based technology and migrated in-person conferences, symposia and business meetings to cyber-space. We've all had to become technical experts — or, at least, passably competent users of webcams and microphones — while redefining the protocols of professional meetings to accommodate wandering children and excitable pets. And we've done it with a patience and understanding toward one another, remarkable in part because of their regrettable rarity these days.

As transportation researchers, our victories come when human ingenuity applies technology to make transportation better: safer cars, longer-lasting roads, stronger bridges. What sometimes gets lost in all the physics and math is recognizing the importance of the human factor in the equation. Brainstorming with colleagues, briefing sponsors,

training practitioners in new concepts and methods — all are examples of interpersonal technology transfer and information exchange. When things get back to normal, it's worth remembering that the clear, effective communication of research takes more than language. It requires gestures, expressions and tone of voice. It requires a human connection.

The Internet is sometimes knocked for imposing distance and limiting personal interaction. That seems a bit ironic nowadays, doesn't it? Imagine trying to share research without your favorite virtual meeting program. And do me a favor the next time you're online with a colleague — do a little gut check. See if you don't feel just a little more connected when your colleague's face lights up the screen.

What will social norms look like post-COVID-19? We don't know yet. I suspect a lot of us will be working remotely on a semi-permanent basis. One thing's for sure, though: the need to socialize is as deep in our DNA as the need to survive. ■

Learn something new!

Attend one of our many transportation-related virtual conferences and events. Learn remotely without traveling and hotel expenses, and with reduced time constraints.

Visit <https://events.tti.tamu.edu/conferences-and-events/>

