



Evaluation of Real-Time Traffic Monitoring Devices for Texas Hurricane Evacuations	
<p>By: Kyle Bathgate, Connie Jiang, Shidong Pan, Jake Robbennolt, Dr. Lu Xu, Dr. Jingran Sun, Dr. Zhe Han, and Dr. Stephen Boyles.</p> <p>This project assesses the level of implementation of existing real-time traffic monitoring devices, such as cameras, sensors, and dynamic message signs, to aid with hurricane evacuations in Texas. This poster presents preliminary results from the ongoing study, including survey findings and traffic simulation results to provide TxDOT with recommendations for system upgrades and expansion</p> <p style="text-align: right;">PI: Dr. Stephen Boyles (sboyles@austin.utexas.edu)</p>	<p><b>Presenter: Kyle Bathgate</b></p> <p>Graduate Research Assistant Transportation bathgate@utexas.edu</p> 
A Simplified Earned Value Analysis Method for Highway Construction Projects	
<p>By: Dr. Junghye Son, Nabeel Khawaja, Duane S. Milligan, and Brenan D. Honey</p> <p>The study proposes a simplified method to measure a TxDOT project's construction progress using earned value (EV) concepts. The methodology relies on readily available contractor progress payment information, eliminating the need for additional data. The data-driven method enhances the project manager's ability to assess construction performance by providing a more realistic measure of project progress. The methodology can be used at the Area Office or the District Office level to augment the project management function of the Department.</p> <p style="text-align: right;">PI: Dr. Junghye Son (Junghye.son@austin.utexas.edu), and Nabeel Khawaja (khawaja@mail.utexas.edu)</p>	<p><b>Presenter: Junghye Son</b></p> <p>Research Associate Transportation junghye.son@austin.utexas.edu</p> 
Pedestrian Crash Frequency: Unpacking the Effects of Contributing Factors and Racial Disparities	
<p>By: Angela Haddad, Aupal Mondal, Dr. Chandra Bhat, Angie Zhang, Madison C. Liao, Lisa J. Macias, Dr. Min Kyung Lee, and Dr. S. Craig Watkins</p> <p>This study aims to explore the factors influencing pedestrian crashes and racial disparities in their involvement. A multivariate analysis approach is used to unpack the magnitude effects of the determinants of pedestrian crashes. Additionally, the study investigates the reasons for the racial disparities by identifying majority Black (MB) and majority non-Black (NMB) Census Block Groups (CBGs). The findings of this study can help policymakers and urban planners in developing effective strategies to mitigate pedestrian crashes and address the racial disparities in their occurrence.</p> <p style="text-align: right;">PI: Dr. Chandra Bhat (bhat@mail.utexas.edu)</p>	<p><b>Presenter: Angela Haddad</b></p> <p>Ph.D. Student Transportation Angela.haddad@utexas.edu</p> 
Evacuation Volume and Safety Assessment: A Case Study in Rural Texas Highways during Hurricane Laura on US 90 and US 287	
<p>By: Dr. Zhe Han, Kyle Bathgate, Connie Jiang, Dr. Michael Murphy, and Dr. Zhanmin Zhang.</p> <p>In this study, traffic volumes and crash rates during the mandatory evacuation for Hurricane Laura in 2020 were examined using time-series decomposition methods. A case study was performed on two rural Texas highways, and a significant increase in directional traffic volume and a higher number of crashes were observed during the evacuation and post-hurricane return.</p> <p style="text-align: right;">PI: Dr. Mike Murphy (murphymr@mail.utexas.edu)</p>	<p><b>Presenter: Zhe Han</b></p> <p>Research Associate Transportation hanzhe@austin.utexas.edu</p> 
Phantom Queuing in Mopac Express Lanes	
<p>By: Shing-Fu Kuo, Heidi W. Ross, Kenneth Perrine, and Dr. Natalia Ruiz-Juri</p> <p>This study aims to investigate the impact of Adaptive Cruise Control (ACC) on Managed Lane (ML) operation and explore the potential causes of the issue "phantom queuing" by studying the effects of Advanced Cruise Control (ACC) on traffic flow and identifying possible mitigations and further areas of study.</p> <p style="text-align: right;">PI: Dr. Randy Machemehl (rbm@mail.utexas.edu)</p>	<p><b>Presenter: Shing Fu Kuo</b></p> <p>Graduate Research Assistant Transportation jsnkuo@utexas.edu</p> 
Development of Austin District Driveway Permit Tool	
<p>By: Shidong Pan and Dr. Stephen Boyles</p> <p>TxDOT district engineers review and approve/deny driveway permit applications daily. Area office engineers, traffic, environment, and hydrology reviewers are involved in this process. A user-friendly Microsoft Access-based database tool has been developed to enhance efficiency and streamline this process.</p> <p style="text-align: right;">PI: Dr. Stephen Boyles (sboyles@austin.utexas.edu)</p>	<p><b>Presenter: Shidong Pan</b></p> <p>Ph.D. Student Transportation shidongpan@utexas.edu</p> 

Down-to-Earth WinterOps Sensing	
<p>By: Kenneth Perrine, Dr. Chandra Bhat, Dr. Christian Claudel, Lisa Macias, Angela Haddad, and Hassan Iqbal</p> <p>The Weather Responsive Management Strategies project evaluates the use of new kinds of low-cost sensors and data sources for responding to extreme weather events. Researchers have devised a method for tracking brine spraying, spreading, and snow plowing activities without operator intervention, allowing for activities to be tracked and treatment effectiveness to be analyzed.</p> <p style="text-align: right;">PI: Dr. Chandra Bhat (bhat@mail.utexas.edu)</p>	<p><b>Presenter: Kenneth Perrine</b></p> <p>Research Associate Transportation kperrine@utexas.edu</p> 
Exploring CAV-Based Traffic Control for Improving Traffic Conditions in the Face of Bottlenecks	
<p>By: Suyash Vishnoi, Dr. Christian Claudel, Junyi Ji, Dr. MirSaleh Bahavarnia, Yuhang Zhang, Dr. Ahmad Taha, and Dr. Daniel Work</p> <p>This work investigates traffic control via controlled connected and automated vehicles (CAVs) using novel controllers derived from the linear-quadratic regulator (LQR) theory. CAV-platoons are modeled as moving bottlenecks impacting the surrounding traffic with their speeds as control inputs. It is observed that the proposed controller works well in both settings to mitigate the impact of the jam caused by a fixed bottleneck.</p> <p style="text-align: right;">PI: Dr. Christian Claudel (christian.claudel@utexas.edu)</p>	<p><b>Presenter: Suyash Vishnoi</b></p> <p>Ph.D. Candidate Transportation scvishnoi@utexas.edu</p> 
Design of Stud Shear Connectors Considering Friction and Adhesion Effects	
<p>By: Alana Moraes and Dr. Matt Hebdon</p> <p>Research is being conducted at the Ferguson Structural Engineering Laboratory to investigate the effects of cohesion and friction on the shear transfer mechanism at the interface of the steel and concrete sections. The study consists of experimental tests ranging from component-level to full-scale, in-situ tests of bridges and finite element analysis.</p> <p style="text-align: right;">PI: Dr. Matt Hebdon (matt.hebdon@utexas.edu)</p>	<p><b>Presenter: Alana Moraes</b></p> <p>Ph.D. Candidate Structural Engineering alanamoraes@utexas.edu</p> 
Development of Crash Database Parsing Tools to Support the Highway Safety Improvement Program in Texas	
<p>By: Manar Hasan, Dr. Zhe Han, Dr. Randy Machemehl, and Dr. Michael Murphy</p> <p>This study presents a set of computerized tools that parse the crash database to identify crash hotspots, suggest potential treatments, and calculate safety benefits. These tools can be used by transportation agencies to support decision-making. A case study was conducted that returned 6,174 candidate projects and recommended the most effective treatments.</p> <p style="text-align: right;">PI: Dr. Randy Machemehl (rbm@mail.utexas.edu)</p>	<p><b>Presenter: Manar Hasan</b></p> <p>Ph.D. Student Transportation manar.hasan@utexas.edu</p> 
Balancing Solution Time and Quality in Disaster Recovery Sequencing	
<p>By: Abigail Crocker and Dr. Stephen Boyles</p> <p>Transportation system damage from extreme events may affect hundreds or thousands of links, and efficient sequencing is key to effective recovery. Several proposed methods exist, including greedy methods and a bidirectional beam search heuristic, but a rigorous comparison among methods is lacking in the current literature. This research seeks to quantify solution time and quality trade-offs, and recommend methods based on instance size and time availability. The "best" algorithm depends on instance size, and accuracy tolerance. We propose a simulated annealing heuristic which handles problems with up to 32 broken links at an average run time under an hour while consistently outperforming greedy methods.</p> <p style="text-align: right;">PI: Dr. Stephen Boyles (sboyles@austin.utexas.edu)</p>	<p><b>Presenter: Abigail Crocker</b></p> <p>ORIE Graduate Student Transportation ajcrocker14@utexas.edu</p> 

## Development of An Automated Methodological Procedure to Improve the Identification of Curve-Related Crashes in the Crash Records Information System (CRIS)

By: Dr. Zhe Han, Yang Xu, Dr. Mike Murphy, and Dr. Zhanmin Zhang

Horizontal curves can improve the safety and comfort of a ride for drivers and passengers by preventing a sharp turn from one direction to another. There is a need to improve the identification of curve-related crashes in CRIS. This project 1) conducted a thorough literature review to better understand the characteristics of horizontal curves and their impacts on traffic crashes; 2) examined curve-related parameters that can provide meaningful information for the identification of curve-related crashes in the CRIS database; and 3) developed a systematic methodological procedure and tested to be effective in improving the identification of curve-related crashes in CRIS. Finally, based on the Texas Peace Officer's Crash Report (CR-3), a thorough investigation was performed to improve our understanding of potential reasons for curve-related crash misclassifications in CRIS.

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## Texas Technology Task Force: Supporting the Future of Emerging Mobility Technology in Texas

By: Mark Werner, Andrea Gold, and Dr. Kristie Chin

Launched in 2013 as part of the 83rd Texas Legislative session, the Texas Technology Task Force guides TxDOT in developing actionable strategies to advance emerging transportation technologies to meet safety, mobility, and connectivity goals. The Task Force is comprised of dynamic experts representing public agencies, industry, and research institutions. Through quarterly meetings, the Task Force assesses emerging technology barriers and opportunities, develops a series of white papers, and publishes recommendations in an annual Technology Utilization Plan.

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## On Modeling Future Workplace Location (WPL) Preferences: An Analysis of Texas Employees

By: Katherine E. Asmussen, Aupal Mondal, Dr. Chandra R. Bhat, and Dr. Ram M. Pendyala

The COVID-19 pandemic has disrupted employee work patterns. In this poster, we examine employee workplace location (WPL) preferences in an unpredictable and evolving future by investigating how employees would prefer to allocate their monthly working days among the three WPL alternatives of working from home, from the work office, and from a variable third WPL.

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## Robotics Based Solution for Understanding Microplastics and their Fate in the Environment

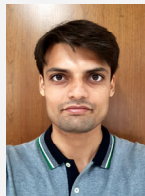
By: Hassan Iqbal and Dr. Christian Claudel

This work proposes mounting raman spectrometers, hyperspectral near IR cameras and macro cameras (visible) on autonomous robots that can navigate bays and shallow lakes to accelerate microplastics data acquisition. Ground robots are designed for detecting, counting and classifying microplastics along beaches in real-time. The measurement performance is evaluated when sensing the microplastics concentration in the top layer of sediments (classification accuracy, false and true positive rates).

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## Evaluation of Geosynthetic-reinforced Asphalt Milling Characteristics and Suitability as Pavement Base Course

By: Ashray Saxena, Natalia Correia, V. Vinay Kumar, and Dr. Jorge G. Zornberg

Due to the possibility of milling asphalt layers that contain geosynthetic interlayers, studies need to be carried out to understand the characteristic and behavior of RAP obtained from geosynthetic-reinforced asphalt, which is referred herein, as GRAP. The results from this investigation indicate that both RAP and GRAP blends with VA exhibited adequate workability and properties, indicating their potential use as pavement base course material.

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## Housing Choice in a New Remote Work Landscape

By: Dale Robbennolt, Angela Haddad, Aupal Mondal, and Dr. Chandra Bhat

The increasing prevalence of remote work during the COVID-19 pandemic has led individuals to reconsider their housing choices and reevaluate the various factors that influence their decisions. With remote work becoming more common, the physical proximity of residence to the in-person workplace may no longer be the primary determinant of residential choice, as it was before the pandemic. Instead, the attributes of the dwelling unit and the characteristics of the neighborhood are becoming increasingly important in determining housing choices. The current study adjusts residential choice models to account for the shifting factors that influence housing decisions, using a Generalized Heterogenous Data Model framework to simultaneously model a variety of attitudes, lifestyle preferences, and household sociodemographic characteristics as they affect housing choices.

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## Impact of Safety Countermeasures on Dockless E-Scooter Crashes

By: Jennifer Hall and Dr. Randy Machemehl

Although they're relatively new, e-scooters have already become deeply rooted into the transportation system as a solution to last-mile trips. Previous research has shown that majority of e-scooter related crashes occur along the street and sidewalk, and typically are caused by users falling off, or colliding with a vehicle. Solutions toward curbing accident rates including geofencing technologies, parking restrictions, and impoundment fees. This paper reveals that parking restrictions, paired with the impoundment fees is significant in reducing e-scooter related accidents in Austin, Tx.

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## Optimizing Geometric Configurations of Rumble Strip - Retroreflective Pavement Markers (RPM) Inset to Improve Visibility after Winter Weather Operations

By: Md Al Amin, Dr. Savitha Srunivasan, Dr. Raissa Ferron, and Michael Rung

Research Project 0-6995 found that RPMs placed in rumble strips are an effective way to protect RPMs from snowplows. The implementation project (5-6995-01) is examining the performance of RPM-Rumble Strip Inset by putting RPMs in six highway stretches in northern Texas. The study's findings include standardized geometric configurations to tradeoff RPM loss and nighttime visibility of the roadway centerline.

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## Analysis and Evaluation of Texas' Twin-Tub Girder Bridges for System Redundancy

By: Loveleen, Xiaoyi Chen, Sunghyun Park, and Jeonghwa Lee

Texas has around 500 steel twin-tub girder bridges. As per AASHTO guidelines, these bridges are considered non-redundant, and millions of dollars are spent on their hands-on inspections each year posing increased safety concerns. This research analyzes existing twin-tub girder bridges in Texas to demonstrate redundancy and identify a criterion that TxDOT can adopt to exempt these bridges from rigorous inspections.

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## A Dissonance Study of Employees' Current and Preferred Workplace Locations

By: Samantha Anderson, Katherine Asmussen, and Dr. Chandra Bhat

The purpose of this study is to investigate the COVID-19 effect on workplace location dissonance (i.e., the difference between how frequently an employee currently works remotely and how frequently the employee would like to work remotely if the choice were completely up to them). The findings from this study can provide important insights regarding how best to balance employee and employer preferences to improve overall workplace and life satisfaction. Additionally, this study can contribute to future transportation and land-use policy-making.

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## CRACKED PAVEMENTS! A Crackdown on Your Asphalt Binder Using Poker Chip Test

By: Kiran Mohanraj, Dheeraj Adwani, Satyavati Komaragiri, Dr. Angelo Filonzi, and Dr. Amit Bhasin

Cracking is one of the most prevalent forms of distress in asphalt pavements. Selection of asphalt binder suitable to the application is critical in improving cracking resistance of asphalt mixtures to both fatigue and transverse cracking. Asphalt binder relies on its stiffness, tensile strength, ductility and ability to relax to resist cracking due to repeated loading or changes in temperature. Current performance grade specifications of asphalt binders characterize cracking resistance primarily by asphalt rheology. This study focuses on poker chip test, a simple, direct, repeatable, low-cost test that evaluates the resistance to cracking of an asphalt binder by inducing failure in the specimen. Field performance data measured on several pavement sections across various districts in Texas was collected. The poker chip test results of asphalt binders recovered from field cores was able to identify sections where cracking was likely to occur.

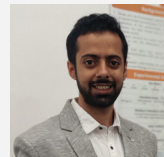
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## Texas Innovation Alliance: Deploying Emerging Technologies Across the State

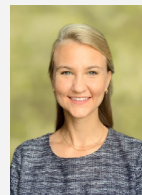
By: Anna McAuley, Dr. Kristie Chin, and Andrea Gold

The Texas Innovation Alliance is a peer-to-peer network that is collaborating on solutions to tackle Texas's biggest transportation challenges—safety, congestion, and accessibility. The Alliance is a TxDOT-sponsored initiative that brings together 10 regional teams to collaborate across the state in advancing deployments, developing best practices and policy guidelines, and supporting peer learning. Recent focus areas include electrification, connected and automated vehicles, unmanned aerial systems delivery, big data analytics, and grant readiness strategies.

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## Innovation Corridors: Opportunities for Next-Gen Roadways in Texas

By: Mollie Hinderaker, Dr. Kristie Chin, and Andrea Gold

Innovation corridors have the potential to improve numerous aspects of the Texas transportation system including traffic congestion, safety, emergency response, disaster resiliency, and construction management; all through a set of operating strategies and technologies that can dynamically manage traffic and respond to incidents in real time. Three case studies from across the US are highlighted to inform TxDOT's vision for future innovation corridor efforts. The research culminates in a set of key recommendations and strategies that can enable Texas to implement and scale technology projects into a larger network of innovation corridors.

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Presenter: **Mollie Hinderaker**

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## Investigating the Benefits, Challenges, and Potential Applications of Waze for Real-Time Traffic Management in PSAPs

By: Dr. Silvy Sirajum Munira, Dr. Kristie Chin, Dr. Michael Moore, Dr. Natalia Ruiz Juri, Brandy Savarese, and Hunter Maples

This study presents a framework for the risk assessment of port system infrastructure to extreme weather events. The framework is straightforward for easy implementation using existing GIS datasets. The methods inform port stakeholders of the susceptibility of their infrastructure assets and offer a tool to increase system resilience through project selection and allocation measures.

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## 4D Visualization to Coordinate Two Projects in North Texas

By: Cameron Schmeits, Juan Loayza, and Nabeel Khwaja

3D and 4D modeling are being utilized to coordinate spatial and temporal information between two projects that connect physically. 4D models give visual interactions of the construction process through video.

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## Exploring the Use of Artificial Intelligence to Leverage TxDOT Data for Enhanced Corridor

By: Kenneth Perrine, Dr. Natalia Ruiz-Juri, Dr. Stephen Boyles, Dr. Kristie Chin, Andrea Gold, and William Alexander

This project is developing machine learning models to predict expected travel times on freeway corridors in real-time. The models use as inputs travel time data provided by INRIX and traffic volume information where available. CTR has developed data pipelines, a database schema, and automated workflows to support model deployment. There are currently 4 trained models, two in Austin and two in El Paso, for which real-time results may be visualized and analyzed via a web-based application.

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## Transportation Infrastructure Maintenance and Rehabilitation Master Planning Tools

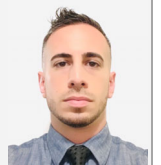
By: Stefanos S. Politis, Dr. Zhe Han, Dr. Liang Liang, Miguel Arellano, Dr. Michael Murphy, and Dr. Zhanmin Zhang

Performance-based tools have been developed for the efficient planning and allocation of budget to transportation infrastructure assets. Deterioration models are calibrated, drawing data from the Pavement Management Information System (PMIS) and the National Bridge Inventory (NBI). Markov chain simulation and genetic algorithms are employed to predict future needs and provide optimal solutions for different allocation scenarios.

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## Evaluate Nanomaterials in Concrete for Improved Durability

By: Hajilia Njenga, Hwan Lee, Dr. Savitha Srinivasan, Michael Rung, Dr. Berkin Dortdivanlioglu, and Dr. Raissa Ferron

The impact of nanomaterials on the durability properties of concrete mixtures is being evaluated in this research work. The goal of the project is to determine optimum dosage ranges for nanomaterials and establish guidelines for effective incorporation of nanomaterials in concrete.

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## Improving Roadway Flooding Estimates with Real-Time Data Assimilation

By: Jeil Oh, Dr. Matt Bartos, Dr. Paola Passalacqua, and Dr. David Maidment

Real-time assimilation of water depth data based on Kalman filter enables the estimation of discharge and associated levels of uncertainty at gauges and improves the flood estimates both downstream and throughout the network. Real-time data assimilation combined with National Water Model (NWM) results in improved flood forecasting, providing timely alerts for transportation systems during stormwater events.

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## Error Analysis of Streamflow Forecasts from the National Water Model and Validation of Data Assimilation Approach

By: Sujana Timilsina, and Dr. Paola Passalacqua

Error Analysis of the streamflow forecasts from the National Water Model (NWM) provides an insight to the performance of the National Water Model throughout Texas. The error analysis is used to explore the possible improvements in the streamflow predictions through error and uncertainty maps as well as the improvement in the NWM Data Assimilation technique.

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## Assess HERO Incident Management Programs in Austin, El Paso, and San Antonio Metropolitan Areas: Current Progress

By: Dr. Zhe Han, Yang Xu, Dr. Mike Murphy, and Dr. Zhanmin Zhang

The Highway Emergency Response Operator (HERO) program was established in TxDOT Austin District through a collaboration with other transportation agencies in 2010 to aid in clearance of minor crashes from roadways and to aid motorists in need of assistance. Following the public's positive response, more districts instituted HERO programs in recent years. The objective of this project is to conduct a systematic assessment of the overall effectiveness of HERO programs in Austin, El Paso, and San Antonio.

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