NCTSPM

2014 ANNUAL REPORT

NATIONAL CENTER FOR TRANSPORTATION
SYSTEMS PRODUCTIVITY AND MANAGEMENT

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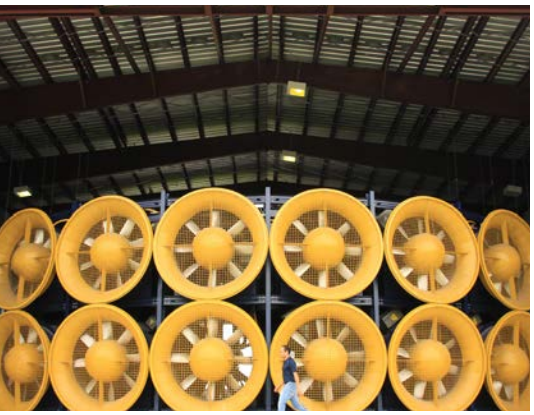
GEORGIA INSTITUTE OF TECHNOLOGY
FLORIDA INTERNATIONAL UNIVERSITY
UNIVERSITY OF ALABAMA AT BIRMINGHAM
UNIVERSITY OF CENTRAL FLORIDA

NCTSPM



The National Center for Transportation Systems Productivity and Management (NCTSPM) is a 2012 Tier 1 University Transportation Center (UTC) sponsored by the U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology (OST-R).

CONSORTIUM PARTNERS
Florida International University
Georgia Institute of Technology
Georgia Transportation Institute
University of Alabama at Birmingham
University of Central Florida

This publication is a report of NCTSPM's transportation research, education and technology transfer activities for January 1, 2014 – December 31, 2014.

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Faculty at Georgia Institute of Technology, Florida International University, the University of Central Florida, and University of Alabama at Birmingham contributed to the content of this report.

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Image at right courtesy of Flickr user Dmitry Kalinin.

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ABOUT NCTSPM

NCTSPM

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The scope of the Center program in research, education, and technology transfer is multi-modal, multi-disciplinary, multi-sector, and needs-driven. The theme of NCTSPM is transportation systems performance and management, and its focus is on addressing critical interactions between safety, state-of-good-repair, and economic competiveness. NCTSPM supports transportation-related research, education, workforce development, and technology transfer. It disseminates research results and other products of the Center to the transportation community and actively explores international cooperative activities with research entities in selected countries where similar research interests exist.

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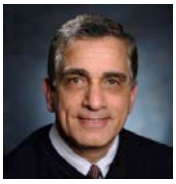

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MESSAGE FROM THE DIRECTOR

We have inherited a great legacy: a transportation system that underpins the largest economy on the globe and supports a standard of living unseen in human history by providing previously unimaginable mobility for both people and goods. Our collective goal must be to leave to future generations a sustainable transportation system even better than the one we inherited, including well-maintained infrastructure, safe roads, and effective support for strong national, regional, and local economies. In tackling this challenge, every agency finds itself doing more with less. And so, meeting these demands requires finding innovative and cost-effective solutions that continue to increase the efficiency and productivity of our transportation system.

NCTSPM is in a unique position to help accomplish this mission: we bring together researchers from a variety of disciplines – economists, planners, civil engineers, industrial systems engineers, and others – to focus their collective expertise on improving the productivity and management of our transportation system.

In these pages, you'll read about some of these boundary-crossing collaborations, including "Freight Movement and Economic Competitiveness from the Megaregion Perspective," which includes experts in transportation, regional planning, economics, and world trade, and "A Data-Driven Approach to State Transportation Investment Decisions: a Transportation Project Investment and Evaluation Resource (T-Pier)," featuring a team of transportation planners, public-policy experts, and systems analysis researchers. Other projects bring together engineers and scientists with the potential to change national standards in vital highway infrastructure, such as "Full-Scale Wall of Wind Testing of Variable Message Signs (VMS) Structures to Develop Drag Coefficients for AASHTO Supports Specifications" and "Bridge Rail Design Procedures." Through these and other projects, NCTSPM is innovating in ways that change how we view the transportation system, make critical investment decisions, design infrastructure, and safely and effectively interact with users. These changes can quite literally shift the way we do everything, from planning and designing to maintaining and regulating our transportation system.

We are also proud that our impact extends beyond research. NCTSPM hosted the 2014 University Transportation Center (UTC) Conference for the Southeastern Region. A venue for presenting research findings from a number of UTCs, this conference featured speakers from the state DOTs, the Metro Atlanta Chamber of Commerce, and the Federal Highway Administration. It was a major event that brought together researchers and stakeholders from across the country to focus on major transportation issues. We have also invested in the education of the next generation, from our undergraduate and graduate students to K-12 initiatives that expose younger students to the transportation field as well as broader science, technology, engineering, and math initiatives.

All of these efforts — groundbreaking research, transferring our findings into real-world use, and educational outreach — place NCTSPM at the forefront of the transportation issues that shape our future. We look forward to continuing this work and invite you to join us in these endeavors.

Dr. Michael P. Hunter
Director, NCTSPM

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George Overstreet Executive Board Member of the Alabama Trucking Association, Vice President of Operations

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MESSAGE FROM THE CHAIRMAN

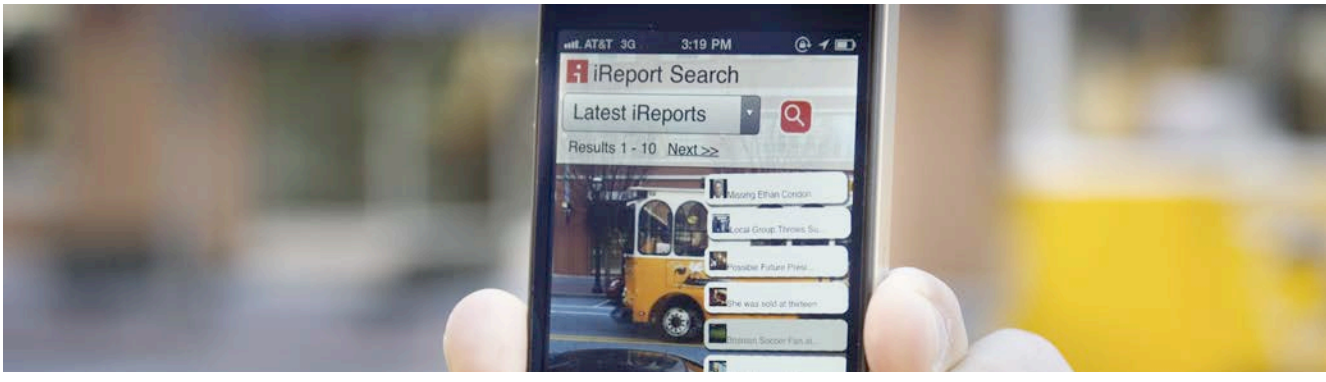
This has been a very productive and strong year for the Center, through the outstanding efforts of Dr. Hunter and all of the other leaders of the Center and its projects.

The thrust of almost all of our efforts has been to move sophisticated University-centered research out into the practical world of transportation. Our Center is multi-disciplinary and we are producing research with a focus on real-world applications. This is particularly important at a time when there are constraints on funding transportation projects at the federal, state, and local levels. Each dollar spent on transportation must be spent wisely, and in a way that shows the most bang for the buck. Internally, with a mix of federal, state and private funding and University resources, our Center is able to leverage funding and work.

In particular, our projects, discussed in this Report, focus on making transportation safer, more effective, and less expensive. The Center is developing methods and tools to allow departments of transportation at all levels to do more with less. NCTSPM is a particularly effective UTC in addressing this challenge, because our researchers bring together strengths from a wide variety of fields and a broad base of participating universities to meet the real-world challenges faced by every transportation system around the country today. Our Center is leading the way in helping to design the future of transportation.

Each member of our Board is proud to be associated with the Center and the outstanding work of our university partners.

F. T. Davis, Jr.
Chairman, Board of Advisors



PARTNER INSTITUTIONS

FLORIDA INTERNATIONAL UNIVERSITY (FIU) is a public research university in Miami, Florida. With a student body of nearly 50,000, FIU serves a large number of economically disadvantaged students. Nearly 50 percent of all undergraduate students at FIU receive financial aid, and nearly 60 percent of those recipients come from families with annual household incomes under $30,000. FIU is the largest producer of Hispanic engineers in the continental United States. It is also home to The Lehman Center for Transportation Research (LCTR) established in 1993 to meet the transportation research, education, and training needs of the South Florida region.

GEORGIA INSTITUTE OF TECHNOLOGY (Georgia Tech) is ranked seventh among U.S. News & World Report's top public universities and enrolls 21,000 students within its six colleges. Georgia Tech is the nation's leading producer of engineers as well as a leading producer of female and minority engineering Ph.D. graduates; it ranks among the nation's top ten universities (without a medical school) in research expenditures. Georgia Tech is home to the Center for Quality Growth and Regional Development, an applied research center created to help society achieve a sustainable, equitable, superior quality of life through effective planning, policy, and design.

GEORGIA TRANSPORTATION INSTITUTE (GTI), a partnership between the Georgia Department of Transportation and participating Georgia universities, seeks to address today's real-world transportation challenges, focusing on issues critical to the state of Georgia. GTI universities actively participating in the NCTSPM currently include Georgia Tech, The University of Georgia, Mercer University, Georgia Southern University, Georgia State University, Southern Polytechnic State University, and Spelman College—the latter being a historically African American institution.

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM (UAB) offers an academic experience to nearly 18,000 students, fueled by innovative curricula, strong mentoring, and groundbreaking research and scholarship in a highly interdisciplinary environment. UAB is a member of the University Transportation Center for Alabama and is also home to the UAB Sustainable Smart Cities Research Center, which seeks to foster cross-disciplinary research and training, and to develop innovative solutions for sustainable smart cities and communities.

UNIVERSITY OF CENTRAL FLORIDA (UCF), situated in the prime location of Orlando, offers opportunities in many fields that benefit students while they are in school, helping them land a career upon graduation. More than 56,000 students attend classes on UCF's main campus and its ten regional campuses, which are located throughout Central Florida. UCF houses the Center for Advanced Transportation Systems Simulation (CATSS). CATSS has a theme consisting of four core research focuses: Advanced Intelligent Transportation Technologies and Communications, Traffic Safety, Simulation and Advanced Training for Transportation Applications, and Congestion Pricing.

OTHER PARTNERS

Georgia Department of Transportation
Florida Department of Transportation
Alabama Department of Transportation

OTHER COLLABORATORS

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TECHNOLOGY TRANSFER
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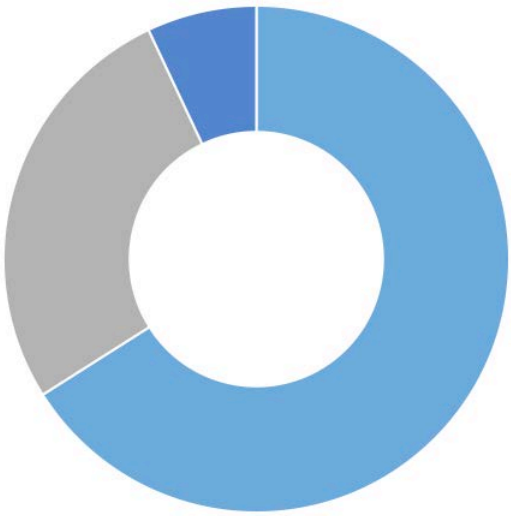
BUDGET

The budget of the NCTSPM is more than $14 million, with approximately $6.9 million from the USDOT and more than $7 million in matching funds from participating state DOTs, universities, local government agencies, and foundations. The following charts indicate the relative allocations to research, programmatic activities (e.g., technology transfer, education, workforce development), and administration.

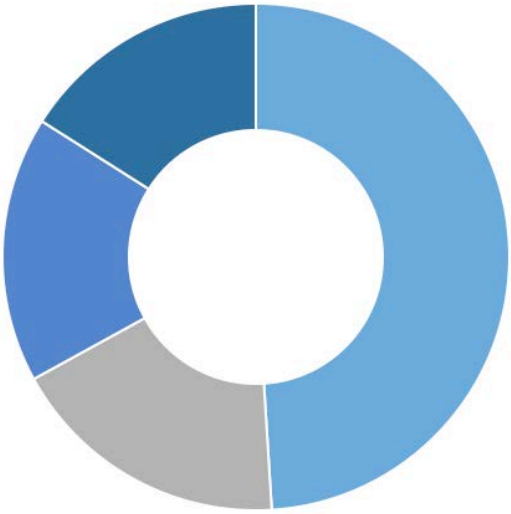
It is a primary goal of the NCTSPM, as a national university transportation center, to support high-quality, relevant research and critical national needs as well as serve as the training ground for the next generation of transportation professionals. As such, many of the research allocations indicated below represent financial support for graduate and undergraduate students at each of the participating institutions.



ALLOCATION ACROSS FUNCTIONS

- Research: 64%
- Programs: 28%
- Administration: 8%

Note: Center programs include technology transfer, outreach, education, and workforce development.



ALLOCATION ACROSS UNIVERSITIES

- Georgia Tech/GTI: 49%
- University of Alabama at Birmingham: 17%
- Florida International University: 17%
- University of Central Florida: 17%

FEATURED PROJECTS

BRIDGE RAIL DESIGN PROCEDURES

Anyone who's crashed into a concrete bridge rail and been stopped from going over the side might find this hard to believe: those railings might be too strong.

That idea is the basis of research that University of Alabama at Birmingham researchers Dean Sicking and Nasim Uddin are pursuing through the NCTSPM. And Sicking would know: he designed the energy-absorbing curved end of guardrails that dramatically reduced injuries and deaths from cars crashing into the guardrail. His safety systems are in use throughout the country.

He also helped develop the Steel and Foam Energy Reduction (SAFER) barrier in use at every NASCAR track in the country that absorbs energy when racers slam into the tracks' outer walls. No driver has died from such a crash since the barrier went into service.

Sicking and Uddin are working on a project to redefine procedures for safe, properly sized bridge rail design, capitalizing on Sicking's safety system expertise and Uddin's 20 years of bridge and infrastructure engineering experience.

The point of this research is to ensure public safety, while saving resources that are wasted when departments of transportation over-build bridges.

"The new procedures will help state DOT's avoid over-designing bridge rails and cantilever decks across the nation." – *John F. Black, P.E., State Bridge Engineer, Alabama DOT*

The project aims to develop better ways to estimate loading and weight capacities for bridge rails and deck systems. It will also identify the most appropriate design loads to be used in these new estimating systems, and it will incorporate crash-test conditions recommended in the Manual for Assessing Safety Hardware. The manual is a set of newer standards designed to include heavier modern-day vehicles and higher impact angles and speeds.

In researching how to best update the existing guidelines for bridge building, Uddin and Sicking will simulate historic bridge rail crash testing and conduct dynamic testing of bridge components, in order to better understand collisions involving vehicles, bridge rails, and bridge decking.

Ultimately, the research team will make recommendations for inclusion in the American Association of State Highway and Transportation Officials' (AASHTO) LRFD Bridge Design Specifications, a guide used by every engineer in the country and the standards required for all bridges built with federal funding.

THE ABCs OF ACCELERATED BRIDGE CONSTRUCTION

What began as a problem with rapidly-aging bridge decking in Florida has grown into research that holds the promise of extending bridge lifespans and increasing the amount of weight they can bear.

That's no small promise: more than a quarter of all bridges in the United States are considered structurally deficient or functionally obsolete. And most of them have decking issues.

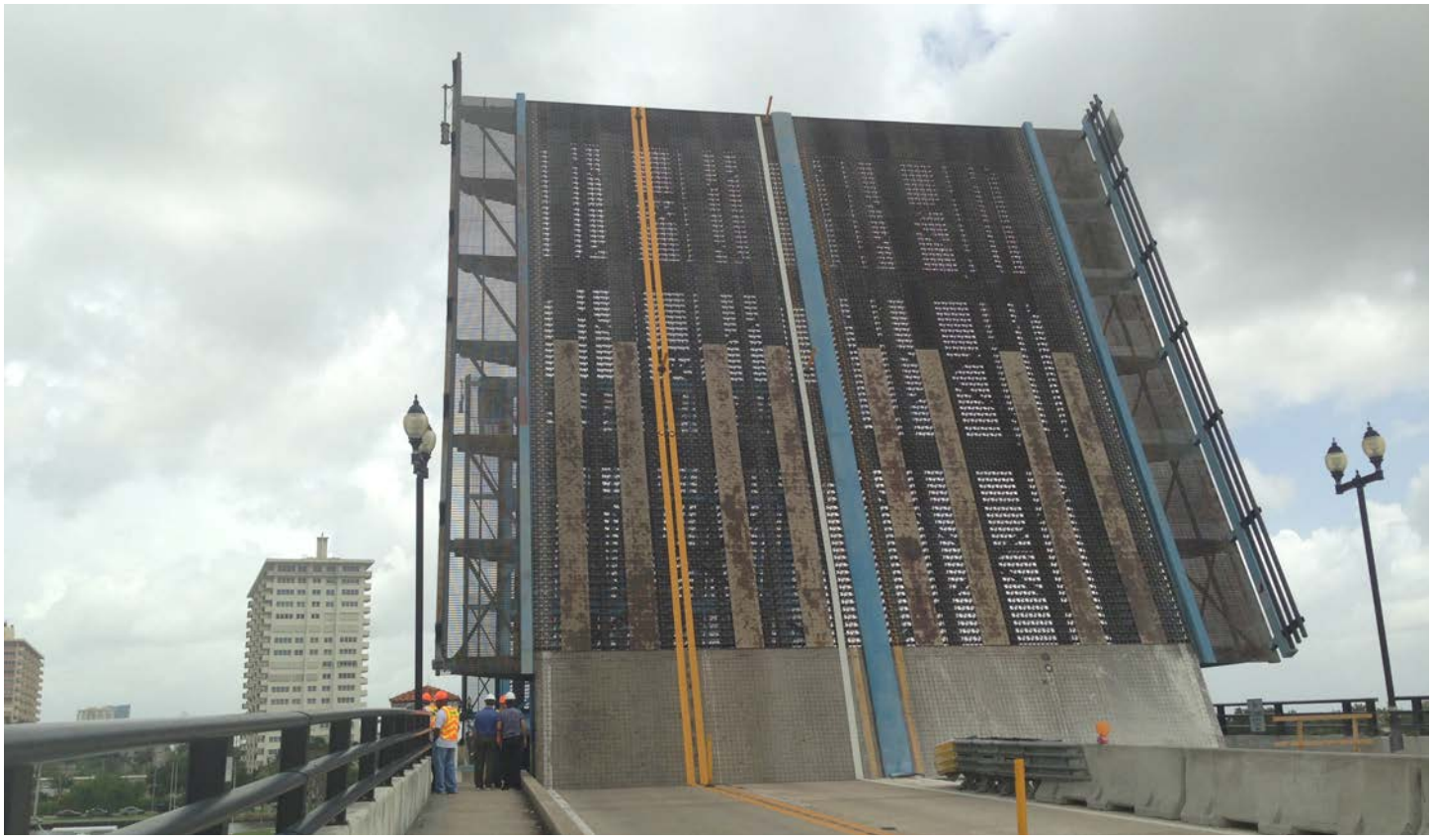
"Currently, the problem with bridge decking is its weight," said Dr. Amir Mirmiran, a researcher from Florida International University. "Most bridges have a weight limit, and the limiting factor for this weight limit is the weight of the deck itself. By replacing bridge decks with a lighter-weight decking system, it's possible to modify or enlarge a bridge."

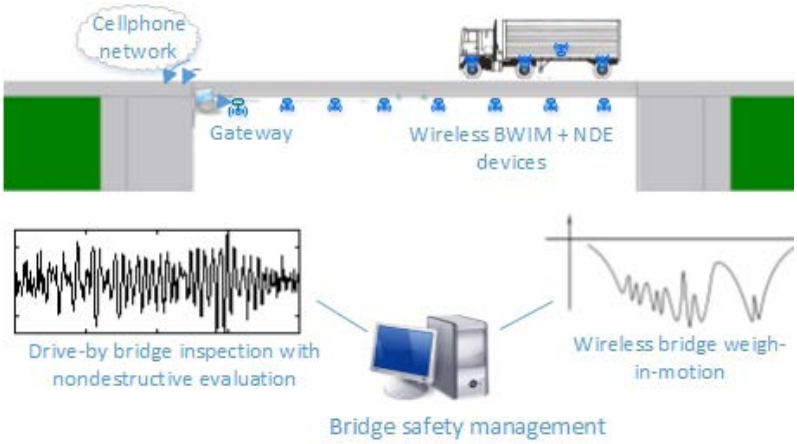
Mirmiran is leading a group of investigators at the University of Central Florida and the University of Alabama at Birmingham on a project that's developing new lightweight decking options that would allow for easier bridge construction and retrofitting. And because of the modular nature of their construction, this new kind of decking will allow existing bridges to be more readily modified to bear greater loads and to last longer.

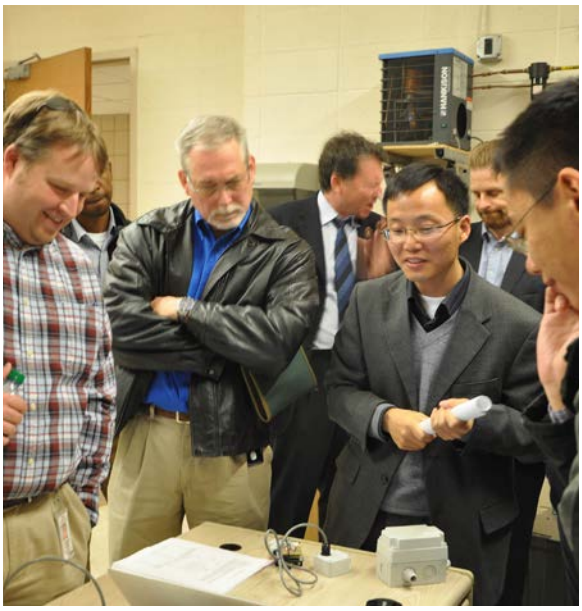
"By replacing bridge decks with a lighter-weight decking system, it's possible to modify or enlarge a bridge." – *Dr. Amir Mirmiran, Florida International University*

The project first arose when the Florida Department of Transportation (FDOT) asked Mirmiran's team to develop a lightweight, efficient way to replace bridge decking. The agency was struggling with bridge repairs because the open grid steel decks that were in use aged significantly faster in Florida than similar decking bridges in other areas. Once Mirmiran and his team solved the problem initially posed by FDOT, he approached NCTSPM in an effort to broaden the applications of their work.

Mirmiran's work has the potential to pay huge dividends for transportation agencies across the country, making roads safer with deck options that are more durable than what's in use today. The innovative decking also decreases maintenance costs for the bridges and makes it easier to widen or replace aging bridges.







GOING WIRELESS: HOW SMALL, CHEAP, SOLAR-POWERED SENSORS COULD CHANGE THE GAME FOR BRIDGE INSPECTIONS

It often takes a basket lift, hammers, chisels, and lots of safety equipment when a work crew inspects one of the nation's 600,000 bridges, an inspection which must be performed every two years.

Additionally, in a country with rapidly aging infrastructure such as the United States, only a fraction of the funds needed to repair deficient bridges are available, according to the American Society of Civil Engineers.

A group of NCTSPM researchers has developed a nondestructive evaluation system of sensing nodes to ease this time-consuming process and to help government agencies prioritize repair work. Led by Dr. Yang Wang, a Georgia Tech assistant professor, the team is preparing for field-tests in fall 2015.

"The idea is to have low-cost systems that can be instrumented on the bridge and monitor the bridge's condition so that we can use the limited resources [we have] on the most dangerous situations," Wang said in a November interview.

Wang's sensing nodes cost just a few hundred dollars each, and they eliminate the need for the expensive spider webs of cabling and data processing required for traditional sensor systems. Instead, the wireless nodes transmit data to a small local gateway nearby that sends the data directly to researchers or engineers via cellular networks.

The data collected from these sensing nodes is called Bridge Weigh-in-Motion (BWIM), and it allows authorities to track overweight vehicles and bridge conditions.

Wang has been working with Georgia Tech professors Drs. Laurence Jacobs and Jin-Yeon Kim, along with collaborator Dr. Nasim Uddin from the Department of Civil, Construction, and Environmental Engineering at the University of Alabama at Birmingham. "Dr. Uddin is applying his expertise in structural safety of bridges and bridge structures to conduct the dynamic analysis of the bridges… [and] through [Dr. Jacobs and Dr. Kim's] collaboration, the ultrasonic analysis part of the project can happen," Wang said.

Wang said this collaboration "was really the only way to get things done. Everyone has limited time and energy, and collaboration helps to get the job done."

Through this research, Wang's team will save money for local governments and address infrastructure health issues.

CHANGEABLE SPEEDS AND SAVABLE LIVES

Almost every driver has seen it before: s posted speed limit that doesn't come close to matching the conditions of the road.

Like that 55 mph zone in the middle of a severe thunderstorm. Or that super-slow zone on a near-empty interstate highway. While the "disconnect" between circumstances and speed can seem like just a minor inconvenience, the truth is, it can create dangerous situations for drivers.

Enter Dr. Mohamed Abdel-Aty, a researcher at the University of Central Florida. He and his team are working on a system to ensure that posted speed limits are actually the safest ones for current road conditions.

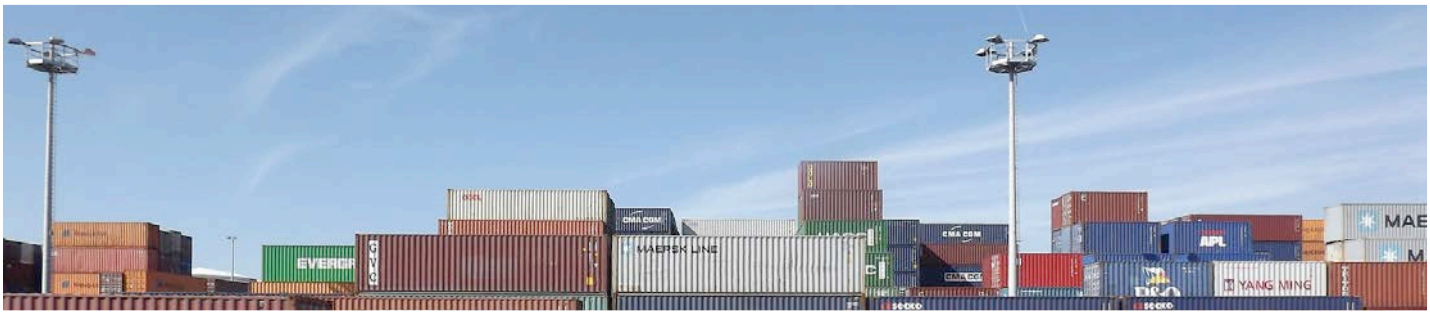
The project, "Integrating Safety in Developing a Variable Speed Limit System," is developing procedures and guidance to allow traffic managers to adjust speed limits in real time to reflect weather or traffic conditions and to make highways safer for all drivers.

Variable speed limit systems, or VSL, are far from a new idea with Daytime/Nighttime speed limit differences dating back to the early days of the interstate highway system and designated times for school zones dating back even further. Beginning in 2004, Abdel-Aty worked with the Florida Department of Transportation to use information gathered for travel time estimation to improve the safety of roadways. After a visit to the Netherlands some years later, where he saw a successful VSL system in action, Abdel-Aty realized he could use VSL to improve on his earlier idea. He also saw the enormous potential for VSL tools to prevent accidents.

Since VSL systems were still not completely developed — and researchers and engineers didn't know how to best monitor conditions and change speed limits — Abdel-Aty began gathering all the data on VSL systems he could find. For this project, his team has been conducting a safety analysis of changing speed limits, developing modeling tools to assess accident risk, and creating algorithms based on these crash models.

It's one of the first attempts to develop a VSL algorithm based on real-time safety risk estimation. The algorithm bridges the gap by combining the traffic-flow model with a real-time crash risk evaluation model.

And it works: testing has shown the algorithm can minimize crash risk while also mitigating the risk for human error and accounting for traffic conditions.



FREIGHT MOVEMENT AND ECONOMIC COMPETITIVENESS FROM THE MEGAREGION PERSPECTIVE

Come 2016, a newly expanded Panama Canal will offer a gateway between the Atlantic and Pacific oceans for incredibly large container ships.

It's also going to mean more congestion and wear and tear on roads across the southeast United States as trucks ferry the cargo from those enormous ships to their destinations.

Georgia Tech researcher Dr. Catherine Ross has been working to figure out just how much more, and she's using an innovative approach: she's examining the effects through the lens of the "megaregion".

Megaregions are areas of continuous development linking economically similar cities in a particular geographic region. They are useful in understanding the "big-picture" context of freight movement and the major events and influences that shape them.

"The dynamics that drive freight are not local," Ross said. "Larger-scale policies are needed to optimize investments and ensure a consistent approach to solving freight issues."

Ross' research used GPS data to compare ongoing changes in freight movement from terminals at the ports of Savannah, Norfolk, and New Orleans.

"GPS-related commodity flow is cutting-edge," said Ross, who is a deputy director of NCTSPM. "Before our study, we had the truck routes but did not know exactly where the trucks went. This research remedies that lack of data."

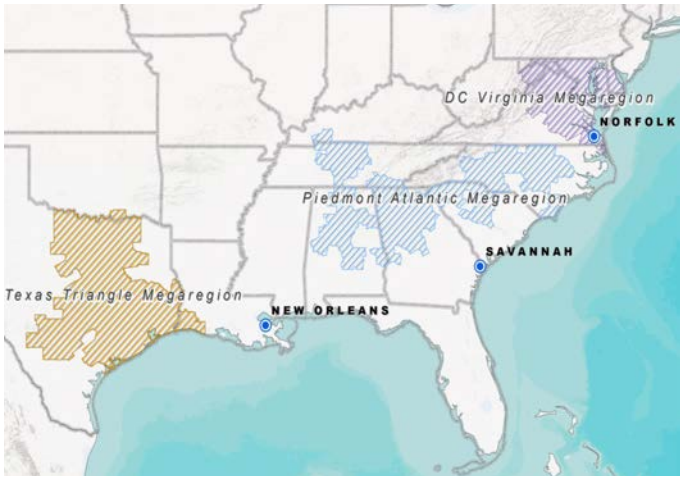
While the Panama canal expansion will have an overall positive economic impact, Ross found it will also result in a number of challenges: major bottlenecks, a lack of truck parking, and a potential need for additional freight corridors.

These challenges will reach far beyond the immediate area around ports.

Considering all of these problems on a megaregional scale, however, can highlight potential solutions, Ross said. For example, states in the Piedmont Atlantic Megaregion stretching from Alabama to North Carolina could partner to address bottlenecks on primary port-related corridors and to align freight corridors with import truck traffic.

Local governments can help freight flow smoothly by aligning land-use regulations with the state's designated freight corridors. And state Departments of Transportation can coordinate freight corridors with neighboring states to ensure continuity across the entire megaregion.

"Panama Canal expansion will have a significant impact on truck traffic – which has major implications for non-freight-related transportation as well," Ross said. "We already see major congestion in key places, and it is getting worse. This research is therefore critical for planning how to accommodate the expected increase."



ACTIVE RESEARCH PROJECTS

Image courtesy of Flickr user Karen Mardahl

ACTIVE RESEARCH PROJECTS

A Comprehensive Investigation of Visibility Problems on Highways: Developing Real Time Monitoring and Prediction System for Reduced Visibility and Understanding Traffic and Human Factors Implications (Georgia Tech, UCF)

Principal Investigator: Mohamed Abdel-Aty, UCF

Visibility, or the lack thereof, is one of the most important factors in determining a road's safety, and weather conditions, particularly fog, can have a negative impact on visibility. The southeastern United States is at the forefront of experiencing roadway visibility impairment as a result of foggy weather conditions, so this project will work to combat fog-related visibility impairment. It will do so using an alternative, low-cost approach, which, coupled with supplemental meteorological data, will attempt to pinpoint a "footprint" that can be used to identify areas and circumstances of probable fog formation. Computer algorithms will be used to allow for adaptation to local conditions.

FOG'S 'FINGERPRINT' – CLEARING THE WAY FOR SAFER ROADWAYS

Dr. Mohamed Abdel-Aty (UCF) is researching how drivers react to notifications of bad weather, and how to predict when foggy and low visibility weather, forms in certain areas. Their work will focus on keeping drivers safe regardless of the weather.

Image courtesy of Flickr user Jason Weaver

A Data Driven Approach to State Transportation Investment Decision: a Transportation Project Investment and Evaluation Resource (T-PIER) (Georgia Tech, University of Memphis)

Principal Investigator: Timothy F. Welch, Georgia Tech

The primary objective of this research is to provide a data-driven resource that planners and engineers, policymakers, service providers, and researchers can use to determine how investments should be made in the future by balancing available resources to maximize return on investment (ROI). T-PIER is equipped to examine the performance of improvements to small-and-medium-scale transportation networks with multiple interacting modes such as driving, biking, and walking. The tool will assist planners and engineers in determining the optimal allocation of projects for obtaining maximum benefits when resources are limited and scarce. The T-PIER framework combines both a travel demand and resource allocation model to interactively communicate and obtain an optimal set of projects to maximize ROI.

Assessment of High Early Strength Limestone Blended Cement for Next Generation Transportation Structures

Principal Investigator: Kimberly Kurtis, Georgia Tech

Because of the popularity of concrete as a building material and the emissions associated with its manufacture, there is an increasing interest in the viability of "green" concrete made with more environmentally-friendly ingredients. Specifically, the feasibility of the replacement of clinker with ground limestone is being investigated. Currently, AASHTO and ASTM specifications allow for up to 15% replacement, but the effects of this substitution on the strength and performance of concrete is not fully known. Some have documented accelerated cement hydration, particularly in concrete formed at higher temperatures. In this research early hydration kinetics are observed for the first time in these limestone cements at higher temperatures, of the type that would be used in precast structural concrete elements.

Automated Data Collection for Origin/Destination Studies of Freight Movement

Principal Investigator: Amr A. Oloufa, UCF

The collection of reliable origin/destination data for freight has profound consequences for a large range of applications in both planning and operations. In an exploratory project, the principal investigator and his research team developed a novel approach for tracking trucks using their license plate numbers, allowing for speed and travel time measurements for each truck. This information can then be used in an origin/destination model. That project demonstrated the feasibility of the approach; however, more work needs to be done before a system can be adopted for wide application. In the proposed project, limitations in the previous effort will be addressed, and the field test will be expanded to three gantries covering a total of nine lanes.

Bridge Rail Design Procedures

Principal Investigator: Dean Sicking, UAB

With the recent production of the revised Manual for Assessing Safety Hardware (MASH), the existing procedures for designing bridge rails have become out of date. Sicking and Uddin's research is in the process of developing better, more improved ways to design bridge rail and cantilever deck systems for variable impact loads. Currently, the design process results in over-engineered bridges with too-thick decks and oversized railings. Through the procedural update, bridges will be able to be better designed to meet their given design criteria while fulfilling the requirements of the new MASH.

Bringing Freight Components into Statewide and Regional Travel Demand Forecasting (Georgia Tech, UAB)

Principal Investigator: David Jung-Hwi Lee, Georgia Tech

A GPS-based database of truck travel may lower the hurdle of the lack of detail and disaggregation of existing data so that regional planning organizations can easily develop FDMs in conjunction with travel demand forecasting models. Incorporated with other existing data, a set of GPS data will provide detailed O-D information, critical routes for goods movement, operating speeds of a large sample of trucks along major highways, travel times, flows for intercity truck traffic, significant truck corridors, etc. This study will explore various possible ways that GPS-based truck movement data can contribute to freight demand forecasting at the state and regional levels.

GREENER CONCRETE – OR IS IT REALLY?

Dr. Kimberly Kurtis (Georgia Tech) is investigating a new class of concretes being touted in the construction world as being 'greener.' Her concern is whether this new type of concrete will have the same properties of durability as existing concrete formulations. If, however, this new concrete will not last as long as existing concrete, it can be argued that it isn't as sustainable as its manufacturers would have the public believe.

Image courtesy of Flickr user djprybyl

Consumer Response to Road Pricing: Macro and Micro Modeling Tools for Socioeconomic Evaluation and Pricing of Managed Lanes

Principal Investigator: Randall Guensler, Georgia Tech

Metropolitan Atlanta's I-85 express lanes were recently converted from High Occupancy Vehicle lanes to High Occupancy Toll (HOT) lanes. With this recent conversion, it's unknown what characteristics influence lane usage and what the optimal pricing for a HOT lane would be under the existing circumstances. Guensler's research will create a socioeconomic impact assessment tool that functions at both the big picture and localized levels. The tool will be able to be used by GDOT to quantify drivers' usage response in regards to given toll pricing levels and will be able to be used in decision making capacities.

Cooperative Vehicle-Highway Automation (CVHA) Technology – Simulation of Benefits and Operational Issues (FIU, Georgia Tech)

Principal Investigator: Michael Rodgers, Georgia Tech

Major automobile manufacturers including Ford, BMW, Audi, GM, and others are developing Cooperative Vehicle-Highway Automation (CVHA) systems that control steering and acceleration/deceleration to help manage driving in congested freeway environments. While these systems are being developed and deployed with the intent of reducing driver stress and potentially improving vehicle flow, it is not clear how they will be operated on existing transportation infrastructure, how they will be regulated by State DOTs, and how much, if any, congestion mitigation they will produce. This study focuses on developing the information necessary for State DOTs to make data-driven decisions regarding management of their current and next-generation infrastructure, given the imminent introduction of CVHA technology; it also provides transparent analysis for state transportation officials to carefully evaluate the impacts of CVHA to their highway systems.

Development of a Prototype Evidence-Based Database and Planning Tool: Applying Performance Management Principles in Asset Management Program Development

Principle Investigator: Adjo Amekudzi-Kennedy, Georgia Tech

In this study, Amekudzi-Kennedy addressed uncertainties regarding transportation asset management (TAM) and discussed difficulties regarding quantifying benefits of TAM systems. Since TAM is constantly evolving practice and is dynamic, rather than static in nature, its benefits must be viewed in context. This research is purposed to develop an evidence-based planning tool and database to aid agencies in planning the development of their asset management programs, and will do so by applying an evidence-based design (EBD) framework. EBD designs or retrofits facilities with evidentially proven features in order to capitalize on observed benefits of these features. In the context of TAM, this involves evaluating the impacts of adopted tools on system performance.

Development of Risk Management Strategies for State DOTs to Effectively Deal with Volatile Prices of Transportation Construction Materials

Principal Investigator: Baabak Ashuri, Georgia Tech

Transportation agencies across the nation are facing rising costs for construction of new highways, as well as maintenance and modernization of existing infrastructure systems. Therefore, the purchasing power of transportation agencies has been declining due to construction cost inflation. The objective of this project is to enhance transportation agencies' understanding of the opportunities, challenges, and best practices for utilizing risk management strategies for material price volatility in transportation projects. The final deliverable of this project is a comprehensive risk management guide that systematically addresses risk management for material price volatility in different types of highway projects at various phases of project development.

Development of a Web-based Decision Making Tool for the Highway Safety Manual Implementation

Principal Investigator: Priyanka Alluri, FIU

The objective of this project is to develop a web-based tool to assist agencies in deciding how to tailor the Highway Safety Manual (HSM) procedures to their needs. The tool will help agencies select the most suitable safety analysis methods among those discussed in the HSM. This research will first identify factors that influence the agency's selection of the existing methods. This information will, in turn, be used by the web-based tool to design and implement the selected procedures. Agencies will be able to use this tool to identify the most appropriate method to meet their particular needs, data, availability statistical expertise, available software tools, etc.

BANG FOR YOUR BUCK: GDOT EXPENDITURES AND WORKFORCE IMPACTS

Dr. Thomas "Danny" Boston (Georgia Tech) is looking at how spending by the Georgia Department of Transportation is affecting economic activities like average income, employment, and workforce development.

Image courtesy of Flickr user specmode

Digital Advertising Billboards and Driver Distractions (UAB, FIU)

Principal Investigator: Virginia Sisiopiku, UAB

In response to growing concern among the public regarding the potential distraction of digital billboards to motorists, Dr. Sisiopiku hopes to arrive at a firm conclusion as to whether these billboards do pose a distraction and safety risk to their viewers. There is significant data which suggests that distractions amounting to greater than two seconds cause the vast majority of traffic incidents; however, the controversy lies in whether digital billboards, which are lighted and feature bright colors and changing backgrounds, constitute a portion of this distraction interval. Building on the expertise of the project team, this study undertakes a comprehensive approach for establishing potential correlations between the presence of digital billboards and crash risk.

Economic Development and Workforce Impacts of State DOT Expenditures

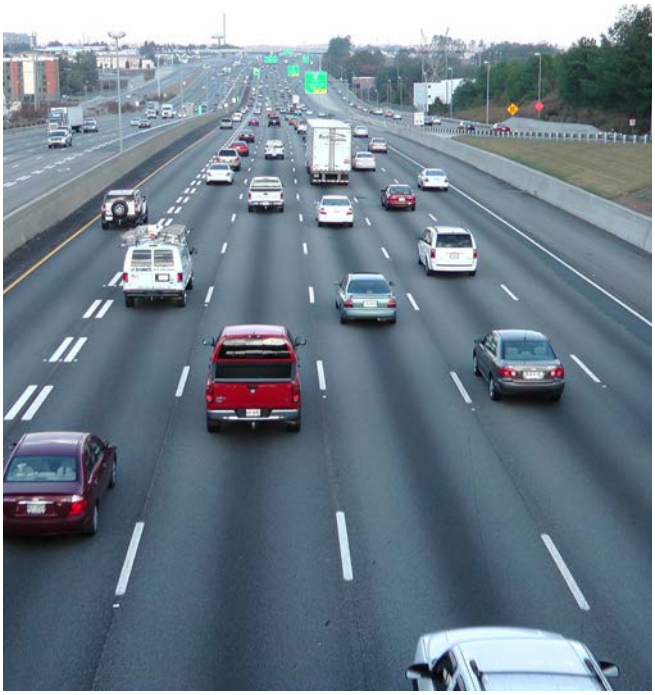
Principal Investigator: Thomas Boston, Georgia Tech

This research will measure the economic development impact of the Georgia DOT's highway expenditures on economic activity, income, employment, and workforce development and generalize these results to other state DOTs. The analysis will examine impacts in every prime contract and subcontract award made by the Georgia DOT over the past three years. A statewide input-output model will be used to estimate the multiplier effect of the award on economic activity, income, and employment throughout the state. Special attention will be given to economically disadvantaged communities and environmental justice areas.

Efficient Utilization of the Existing ITS System and the Viability of a Proactive Traffic Management System for the Orlando-Orange County Expressway Authority System

Principal Investigator: Mohamed Abdel-Aty, UCF

There is a wide range of vehicle detection devices in use than ever before on freeways and expressways, from the popular inductive loops and magnetometers to videos and radar-based detectors. The Central Florida Expressway System utilizes Automatic Vehicle Identification (AVI) system for Electronic Toll Collection (ETC) as well as for the provision of real-time information to motorists within the ATIS. Data are gathered using AVI tag readers that are installed for the purpose of toll collection and additional tag readers installed solely for the purpose of estimating travel times. The main objective of this research is to investigate the viability of using



the automatic vehicle identification (AVI) traffic data in the identification of freeway real-time "hot-spots" in a proactive traffic management framework. Guidelines will be provided to adapt the existing structure of the AVI system (e.g. locations, spacing, and archiving system) to provide more useful data.

Enhanced Role of Activity Center Transportation Organizations in Regional Mobility

Principal Investigator: Angshuman Guin, Georgia Tech

Major activity centers, with concentrations of employment, residential, and shopping activities, are an important part of the metropolitan form of today's urban areas. In many cases, these activity centers have formed transportation management associations (TMAs) to support the transportation needs of the employees working within the TMA boundary. In addition, many of these same areas have formed community improvement districts (CIDs), which allow for the commercial landowners in the districts to self-impose taxes to provide funds for transportation and other improvements. One of the areas that these organizations have not been actively involved in has been the real-time operations of the transportation system. This research will support the implementation of road operations strategies under the auspices of the Buckhead, Georgia CID, assess the feasibility and effectiveness of activity center management associations in such strategies, and generalize the results of the research to other activity center contexts.

Estimating the Monetary Benefits of Reducing Delays on Heavily Trafficked Truck Freight Corridors in Georgia

Principal Investigator: Frank Southworth, Georgia Tech

To improve the information supplied to state planners, this project is assessing the state-of-the-art in value of travel time savings for different classes of truck and automobile travel, and developing a practical method that can be applied at the statewide, corridor level for the purposes of deriving the monetary benefits of limiting within-corridor travel delays. The method will be demonstrated using data collected for the heavily trafficked I-85 corridor within the state of Georgia. To this end, a multi-class combined trip distribution-origin constrained traffic assignment model is being used to track the travel paths associated with a set of 43 commodity class specific origin-destination trip matrices. Prior to network assignment, these O-D flows are converted into trips by five different truck size classes. After experimenting with a number of truck freight flow disaggregation methods, a set of inter-county origin-destination-commodity truck flow matrices have been constructed within a six state region in the southeastern United States (including the states of AL, FL, GA, NC, SC, TN). The preferred approach uses a mix of techniques that includes the use of inter-industry input-output tables. Once an acceptable set of corridor-based commodity-cum-truck flows have been settled upon, and taking advantage of the specific path-based assignment approach employed, experiments will be carried out to develop a set of travel congestion-induced travel cost matrices that capture the implications of both commodity mix and vehicle type mix for the costs of corridor delay, including the costs of on-time unreliability on corridor performance.

Evaluating the Impact of Real-time Transit Passenger Information on Ridership and Mode Share

Principal Investigator: Kari Watkins, Georgia Tech

Transit provides many mobility and congestion reduction benefits. However, from a customer perspective, a mobility choice must be fast, comfortable, and reliable. One inexpensive way to combat unreliability is to provide real-time transit information via mobile devices. In this study, the research team has developed, implemented, and assessed an integrated transit information platform in Atlanta by combining regional real-time and schedule information sources from MARTA, Georgia Tech, CCT, and other transit providers into a proven platform known as OneBusAway. Using this platform, the research team has created a novel approach to measure individual ridership change and rider behavior utilizing smartcard data.

Evaluation of Anchor Bolt Clearance Discrepancies

Principal Investigator: Ian E. Hosch, UAB

The objective of this project is to investigate the effect of non-uniform stand-off distances on the stress distribution of the anchor bolts. Analysis will focus on the stress distribution within the anchor bolt group as well as the area above the base plate-to-shaft weld. The stand-off distance is defined as the distance between the bottom of the base plate and the top of the concrete foundation. This discrepancy has produced non-uniform stress distribution within the anchor bolt group due to service loading. The main outcome of the project is to create limit-state design equations for this condition.

Evaluation of Signage Alternatives for Express Lane Facilities

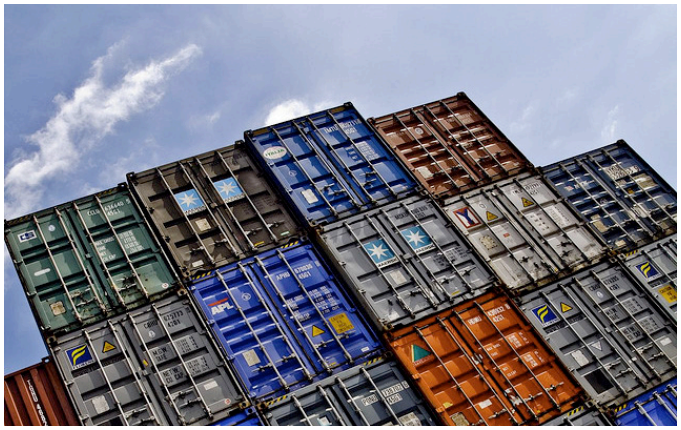
Principal Investigator: Albert Gan, FIU

This project aims to determine the amount of information to display and the manner in which the information is communicated to drivers to ensure a safe and effective operation of express lane facilities. The research will help prioritize the types of information to include and how best to display the information, including sign layout, sign placement, and, in the case of multiple sequential signs, spacing and order of sign display. This research will produce specific recommendations on the prioritization of contents to be displayed and the proper design and placement of signs for safe and effective express lane operations.

Evaluation of the Cost Effectiveness of Illumination as a Safety Treatment at Rural Intersections (Georgia Tech, Middle Georgia State College)

Principal Investigator: Angshuman Guin, Georgia Tech

Late-night/early-morning driving has significantly higher fatality rates than during during other periods of the day. A proven safety countermeasure that can be used to help drivers under such driving conditions is intersection illumination. While these safety benefits are well documented, intersection illumination represents one of the principal contributors to electrical power consumption in roadway maintenance and operations. The objective of this study is to provide a tool for State DOTs, which will give them better information in making decisions about when illumination, as well as what level of illumination, is justified in a rural setting from a safety and operations perspective. The tasks involved to attain this objective include identifying the relationship between illumination levels and observed crash rates and crash severities at rural intersections, analyzing the cost-effectiveness of different levels of illumination relative to current State DOT practices, and developing recommendations and guidelines that will inform decision makers as to the safety and cost implications of particular illumination policies and practices.



Examining the Value of Travel Time Reliability for Freight Transportation to Support Freight Planning and Decision-Making Principal Investigator: Xia Jin, FIU

The goal of this research is to advance the understanding on how the freight industry values transportation system performance in travel time reliability. As freight users constantly adapt to changes in the transportation system through mode shifts, temporal and route shifts, moving points of manufacture, shifting points of entry, etc., understanding of the pattern and sensitivity of the demand is critical to freight investment and policy decisions. This study will provide valuable insights on how the freight users value travel time reliability in their transportation choices. The project aims to contribute to a) better understanding of how the users (shippers and carriers) respond to system changes in productivity, reliability and capacity, and b) advanced methods and tools in evaluating the effectiveness of alternative freight management and operational strategies.

Extending HYRISK to Predict Scour Risk as a Function of Soil Erodibility Characteristics

Principal Investigator: Laurie Garrow, Georgia Tech

The majority of bridge failures in the U.S. are caused by foundation scour, but it is difficult to determine which bridges are most vulnerable. Because it is not financially feasible to inspect every single bridge in the state, a risk assessment tool called HYRISK was developed to calculate the probability of bridge failures because of scour. For the current project, HYRISK is being extended to include risk adjustment factors relating to probability of soil erosion. This will enable state agencies to use HYRISK to prioritize and identify a subset of at-risk bridges to perform scour screenings and evaluations on, saving time and money by identifying the most critical bridges in need of rehabilitation.

Factors Influencing Visual Search in Complex Driving Environments (Georgia Tech, UCF, Morehead State University)

Principal Investigator: Michael Hunter, Georgia Tech

Human factors engineering, which attempts to account for the capabilities and limitations of drivers, promises to provide ways to improve safety by designing more forgiving systems and environments. By understanding a driver's perception of the environment, engineers can make informed design changes to operational environments (such as temporary work zone areas and approaches) and reduce the potential for driver confusion, thus improving safety for both workers and drivers. The central focus of this research is to identify changes in the visual search patterns of drivers as environments become more complex. The overarching focus of the project is safety enhancement.

Field Validation of a Drive-By Bridge Inspection System with Wireless BWIM and NDE Devices (Georgia Tech, UAB)

Principal Investigator: Yang Wang, Georgia Tech

A proactive, automated drive-by inspection system is proposed to provide convenient evaluation of transportation infrastructure safety. The system incorporates a next-generation high-fidelity portable wireless BWIM+NDE (bridge weigh-in-motion and nondestructive evaluation) system, and compatible wireless sensing devices aboard a heavy drive-by inspection vehicle. As the inspection vehicle drives through a bridge, both wireless sensors aboard the vehicle and wireless BWIM+NDE devices on the bridge simultaneously trigger on. This wireless sensing system measures both truck excitation and the corresponding bridge vibration and ultrasonic characteristics, providing an unprecedented mix of heterogeneous data for bridge safety management and maintenance planning.

Freight Impacts on Small Urban and Rural Areas

Principal Investigator: Catherine L. Ross, Georgia Tech

Intercity and interstate freight movement occurs primarily along major trucking corridors that support 75 percent of total commodity flows by value in the U.S. Much of the freight movements traverse small and rural communities and roadways, and the impact of freight activity is significant. This study focuses on the impacts of freight activity on rural and small urban areas, using local data to analyze current and forecast future truck movements along rural corridors. The study improves upon existing research by integrating the use of real-time (GPS) truck activity data, growth in major economic sectors, detailed route information and growth in port activity to analyze the flow of freight and its likely impact on smaller geographic areas.

Image courtesy of Flickr user Evan Leeson

Freight Movement and Economic Competitiveness from the Megaregion Perspective

Principal Investigator: Catherine L. Ross, Georgia Tech

Over the next thirty years, the majority of population and economic growth in the United States will concentrate in the emerging networks of metropolitan centers and their areas of influence known as megaregions. Increasing international free trade in the global economy will place additional pressure on existing freight infrastructure within and between megaregions. This project will examine policy implications of the megaregional approach for freight planning in a global economy. The project will construct U.S. megaregion-level freight data, identify major region pairs of freight movement within and between megaregions, assess the characteristics of the identified major region pairs, and analyze the impacts of the identified freight movement on the regional economic growth in core and rural areas of megaregions.

GETTING THE MESSAGE ACROSS

Dr. Arindam Chowdhury (FIU) is working on updating industry standards for variable message signs to account for their heavier weight. This project will make highway signs safer and more economical.

Image courtesy of Flickr user listener42

Full-Scale Wall of Wind Testing of Variable Message Sign (VMS) Structures to Develop Drag Coefficients for American Association of State Highway and Transportation Officials (AASHTO) Supports Specifications (FIU, UAB)

Principal Investigator: Arindam Chowdhury, FIU

The use of ITS technologies on highways is an attractive option for traffic facility operators. VMS structures are the cornerstone of ITS infrastructure, as they relay messages to motorists warning of hazards ahead such as fog, traffic congestion, accidents, construction, and lane closings. VMS messages are of paramount importance in ensuring safety and avoiding fatal crashes. The objective of this project is to develop accurate drag coefficients for incorporation into AASHTO Supports Specifications to foster safer and more economic design of VMS structures.

Georgia SPLOST Database and Clearinghouse for Transportation Finance

Principal Investigator: Catherine L. Ross, Georgia Tech

This project developed a web-based tool and data repository of SPLOSTs (Special Purpose Local Option Sales Tax) for the state of Georgia to compare some of the variables that influence whether a SPLOST will pass or fail. This data is now available in a dynamic interactive format, which means that relationships between key factors in SPLOST approval, such as adjacencies and geographic patterns across the state, are now clearly visible. The accessibility of this data as well as the development of the both data repository and the interactive tool are critical. The results will provide comprehensive data source that helps local, county, RDCs, MPOs and other regional entities and state governments to better prepare for the consideration of financial and funding strategies for infrastructure for their constituencies.

GRTA/GDOT Real-Time Tracking and Choice Data

Principal Investigator: Randall Guensler, Georgia Tech

The primary goals of this project are: 1) to demonstrate the capabilities of smart phone systems to provide more reliable freeway and arterial travel time data than currently provided by VDS spot speed measurements, and 2) to facilitate the monitoring and analysis of real-time HOT corridor and GRTA Express Bus performance data. The team will collect second-by-second vehicle activity data from volunteers who use the HOT corridor and major arterials and compare these with travel time estimates derived from VDS spot speed data. The team will assess the potential benefits of more widespread deployment of the Commute Warrior App throughout the region. The team will also conduct focus groups to gather information regarding the potential impacts of real-time data on their use of HOT lane and express bus services.

HOV to HOT Conversion Impacts on Carpooling

Principal Investigator: Yanzhi "Ann" Xu, Georgia Tech

The carpool survey project investigates changes in carpooling activity before and after the I-85 HOV-to-HOT lane conversion project in Atlanta, GA, and examines potential reasons for this decline using data collected through a survey of about 2,000 frequent corridor commuters identified from license plate analysis and divided into specific markets based on a cluster analysis of their lane use. The researchers are also analyzing a sub-sample of Georgia Regional Transportation Authority (GRTA) express bus users. Recruitment is based upon established markets and demographic parameters. The research team is implementing a unique large-format mail-out/mail-back survey. Follow-up survey work will include an online survey option. Analyses are designed to assess potentially important demographic and land use factors associated with noted changes in carpooling activities within each sample strata. The findings should have significant policy implications for future HOV/HOT conversion projects with regard to the retention and promotion of carpools. The carpooling survey method can also apply to the implementation of similar surveys in other regions.

A WEIGHTY MATTER

Companies increasingly use larger trucks to move goods in order to reduce the number of vehicles on the road, but the impact of these heavy vehicles on roadways is not yet quantified. Dr. Nasim Uddin (UAB) is looking into the impact that heavier vehicles have on existing infrastructure.

Image courtesy of Flickr user listener42

Information Services in Social Networked Transportation
Principal Investigator: Hans Klein, Georgia Tech
Over the past twenty years, the transportation sector has experienced an information technology (IT) revolution, as the national program in ITS planned and launched a wide variety of IT-based systems. Today, the transportation sector is poised for a second IT-driven revolution, social networked transportation (SNT), which realizes the functionality of social networks in the transportation sector. SNT leverages preexisting IT investments to realize new services and functions that significantly enhance mobility. This project combines research in social networking and research in transportation to achieve useful insights into SNT. It seeks to understand the functions and the benefits of SNT, the processes that make SNT possible, and the institutional innovations needed to facilitate those processes.

Impact and Feasibility Study of Solutions for Doubling Heavy Vehicles (UAB, FIU, UCF)
Principal Investigator: Nasim Uddin, UAB
Many of the details used in older steel bridge girders are prone to fatigue failures directly related to truck weight. Repetitive loading may cause fatigue cracking in these steel members and limit the service life of a bridge. Truck weight frequency distributions by vehicle type (i.e., truck weight histograms) are needed to estimate the effects on remaining life and the costs caused by changes in legal and permit truck weights. Because carrying higher payloads can reduce the operating costs of truck operators, the possibility of a growing share of freight will be considered in estimating the future truck weight distribution and truck traffic. The goal of this project is to determine if allowing an increase in truck weight provides better or worse bridge durability and longevity when compared to increasing the number of trucks to meet freight demands.

Innovative Modular High Performance Lightweight Decks for Accelerated Bridge Construction (FIU, UAB, UCF)
Principal Investigator: Amir Mirmiran, FIU
This research aims at developing innovative, modular, high performance, lightweight deck options for accelerated bridge construction, replacement, or widening. Two configurations have been proposed that integrate ultra high-performance concrete (UHPC), high-strength steel (HSS), and fiber reinforced polymer (FRP); (1) UHPC waffle deck reinforced with HSS or carbon FRP, and (2) hybrid carbon/glass FRP deck with UHPC topping. After laboratory tests at FIU, the decks will go through dynamic wheel loading at FDOT's accelerated pavement testing facility in Gainesville. Successful alternatives will be offered to FHWA and State DOTs for possible implementation through the Innovative Bridge Research and Deployment (IBRD) Program.

Integrating Safety in Developing a Variable Speed Limit System Principal Investigator: Mohamed Abdel-Aty, UCF
Visibility is one of the most important impacts of weather on the road system; weather-related visibility reduction is most often due to fog. The Southeast and Florida are among the top-rated states in the United States with regards to traffic safety problems resulting from adverse visibility conditions caused by fog/smoke (FS). The reduced visibility also has a negative impact on traffic flow. This research attempt to identify the effect of reduced visibility on traffic flow as well as predict the reduced visibility events by using weather parameters including air temperature, wind speed, surface moisture, etc. In detail, this research will facilitate development of a fog detection algorithm and the corresponding software by using an array of low-cost environmental sensors, analysis of the effect of weather parameters on reduced visibility, analysis of the impact of reduced visibility on traffic flow characteristics, analysis of the distribution and influencing factors of fog duration, and determination of the drivers' reaction and behavior during reduced visibility events.

Managing Transportation System Health: Setting Performance Targets and Policies in Non-Uniform Regions and Jurisdictions to Achieve Uniform Statewide and National Objectives (Georgia Tech)

Principal Investigator: Adjo Amekudzi-Kennedy, Georgia Tech

The 2012 national surface transportation legislation: Moving Ahead for Progress in the 21st Century (MAP-21), articulated a performance-based process for decision making. This study provides guidance for addressing a multi-scalar issue involved in performance-based planning at multiple levels of decision making: namely, how to achieve broader statewide (or national) objectives while formally taking into consideration different regional priorities and constraints. The study applies the concept of health to transportation systems to provide support for performance-based decision making, recognizing that achieving better health at multiple scales results in a more robust system.

Micro-Dynamics of Business Location and Growth and its Effects on the Transportation Network and Congestion in Georgia and the Southeast Region

Principal Investigator: Frank Southworth, Georgia Tech

The project will examine selected industries that are: a) economically important in Georgia/the broader Southeast region, and b) some of the important drivers of demand for transportation. Examining the link between the micro-dynamics of industrial location and growth and the demand for transportation is important for several reasons. A more efficient and less congested transportation system, for example, will mean lower costs for the industries. To truly understand the complexities of transportation and its impact, our contention is that one needs to focus on some of the core industries that generate demand for the various modes of transportation. The research is novel in its use of pooling new as well as existing data sources to explore the little understood links between the micro-foundation of industry dynamics and economic activity, and the macro-congestion aspects of freight transport.

Image courtesy of Flickr User TruckPR

INNOVATING INTERSTATES

Dr. Mohammed Hadi (FIU) is developing ways to use new kinds of data and data collection methods to enhance the performance of highways, in order to improve highway safety and reduce delays for drivers and goods.

Image courtesy of Flickr user wmass

Mobile Technology Usage among the Transit-Riding Populace Principal Investigator: Kari Watkins, Georgia Tech

If transit agencies hope to retain choice riders and increase ridership, they need to allow riders to maintain some control over their trips by providing them with real-time information. Unknown wait times mean riders will stand at a corner scanning the horizon for an approaching bus, wondering when or if it will come. If riders can know when the bus will actually arrive, the entire picture changes. This project will analyze how transit information should be presented to the public in an equitable manner. This addresses the prevailing use of smartphones for real-time transit data, the market penetration of smartphones among transit riders, and other ways to make the data accessible to the public.

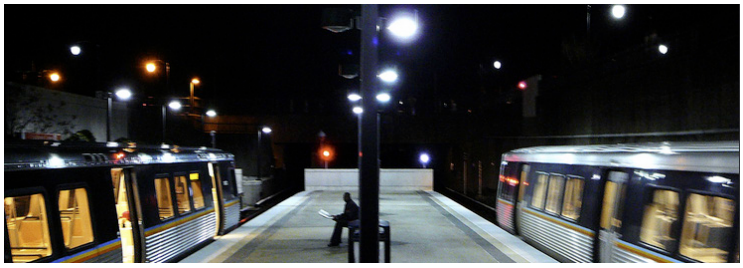


Image courtesy of Flickr User Brett Weinstein

Next Generation Crack Sealing Planning Tool for Pavement Preservation (Georgia Tech, UCF)

Principal Investigator: James Tsai, Georgia Tech

Drivers in the southeastern United States know well the annoyance of cracked, potholed pavement. For transportation agencies, prioritizing and planning these repairs can be a complex task requiring great expense and effort. Tsai and his team are working to develop a data-driven approach to crack sealing planning in order to help departments of transportation better maintain roadways. This tool is especially important as many agencies reduce their budgets and face financial strain.

Next-Generation Wireless Bridge Weigh-in-Motion (WIM) System Incorporated with Nondestructive Evaluation (NDE) Capability for Transportation Infrastructure Safety (Georgia Tech, UAB)

Principal Investigator: Yang Wang, Georgia Tech

Overloaded commercial vehicles can endanger the safety of transportation infrastructure and cause expensive premature structural damage. Bridge WIM is a method through which an existing bridge is used as a weighing scale to identify the axles and gross weight of passing trucks. The system can provide information on overloading and potentially protect the bridge from sudden collapse. This project will develop rapidly deployable, portable wireless bridge WIM systems with enforcement and monitoring capability. The research will deliver a low-cost, easy-to-install-and-maintain, reliable monitoring system for long-term next-generation WIM and NDE deployment on bridges.

JUST IN TIME: OPTIMIZING FIRST RESPONSE

Dr. Andrew Sullivan of UAB is currently researching ways of incorporating intelligent transportation system technologies into the existing emergency medical response systems in order to optimize response time and save lives.

Image courtesy of Flickr user bobowen

Optimizing Emergency Medical Services (EMS) Through the Use of Intelligent Transportation Systems (ITS) Technologies (UAB, FIU)

Principal Investigator: Andrew Sullivan, UAB

EMS operations can greatly benefit from the integration of ITS technologies into the transportation system's infrastructure and into the emergency vehicles themselves. The expected benefits from this synergy are tremendous for the healthcare sector, the transportation sector, and the public. This research project investigates needs and opportunities associated with the use of ITS as a tool for improving healthcare delivery practices during routine as well as emergency operations.

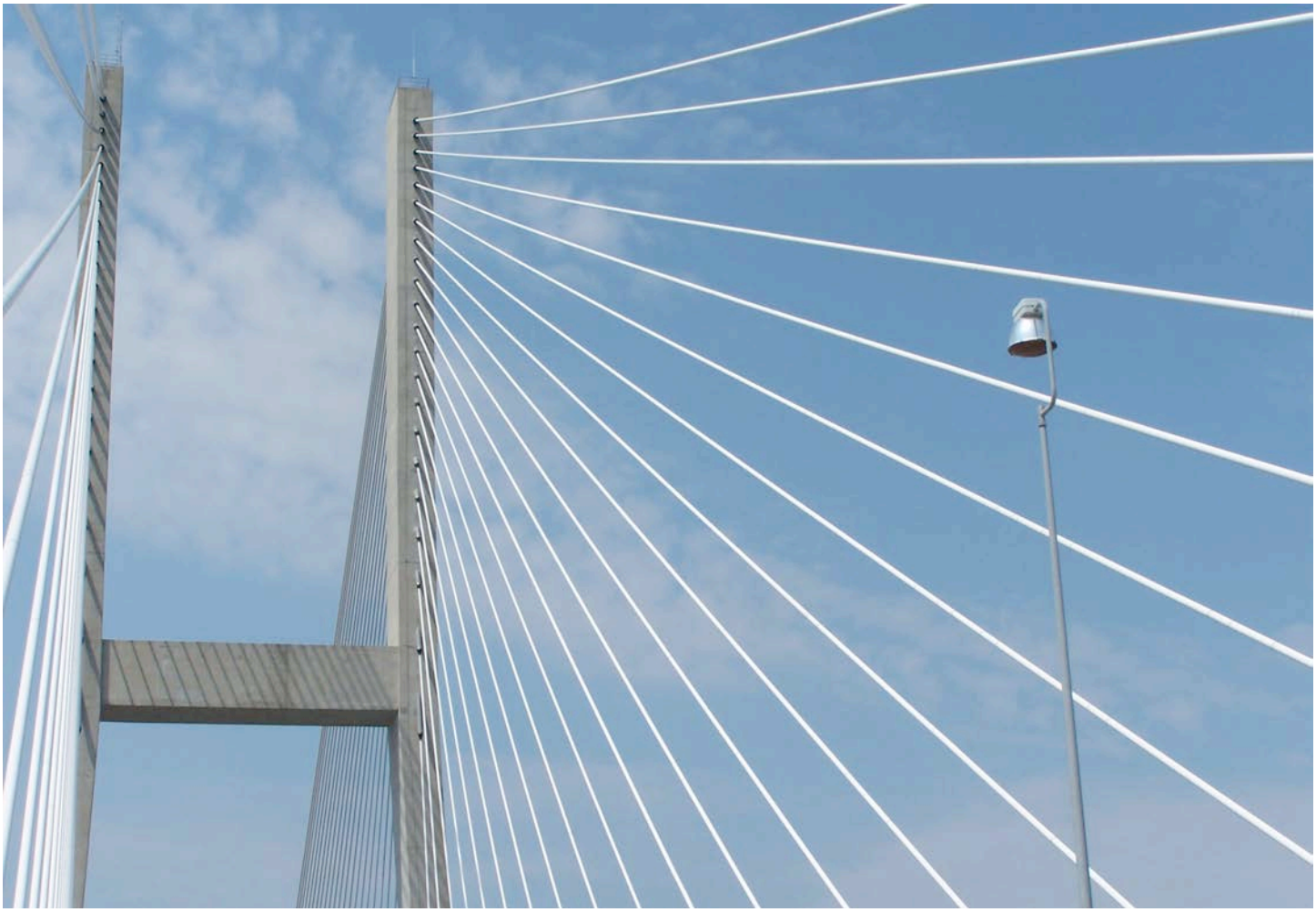
Performance Measurements of Transportation Systems Based on Fine-Grained Data Collected by Automatic Vehicle Identification (AVI) and Automatic Vehicle Location (AVL) Systems (UCF, FIU)

Principal Investigator: Mohammed Hadi, UCF

Performance measurement is an important component of planning and operating transportation systems. Increasingly, transportation agencies have been interested in using data collected from point traffic detectors installed for the estimation of transportation system performance measures and the use of these measures in the active management of transportation systems. Some agencies have utilized or are considering using AVL technologies for estimating travel time in real-time applications. This project investigates the opportunities for more detailed performance measurements of transportation systems based on AVI, AVL and automatic passenger counters (APC) data and the utilization of derived measures for active performance management of the transportation systems.

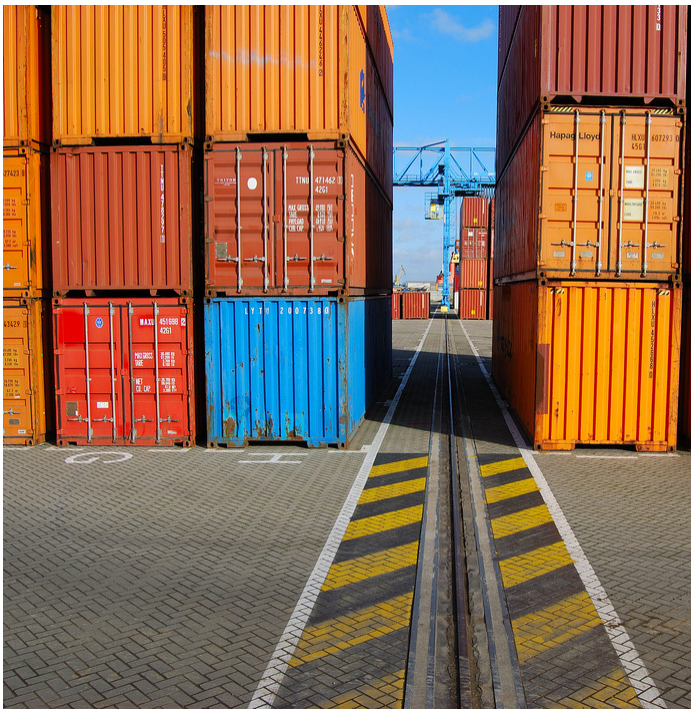
Reducing Service Interruptions in Linear Infrastructure Systems (Transportation and Water/Sewer) by Synchronizing Schedules for Selected Maintenance Activities Principal Investigator: Berrin Tansel, FIU

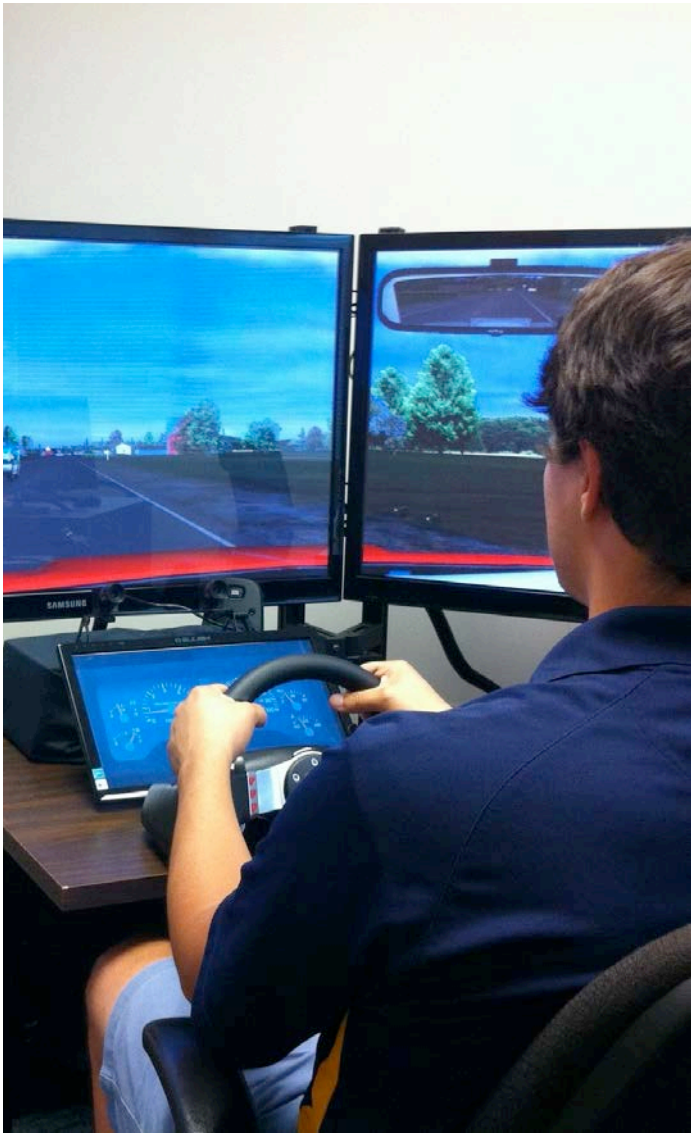
Lifeline systems are facilities that provide the main utility or transportation services to a community (e.g., electric and portable water transmission and distribution, wastewater collection and treatment). The extent of interdependency of the lifeline system plays a significant role in the vulnerability of a community. Increasing population density and increased vulnerability of the coastal areas to hurricanes has created major challenges for communities, especially with increasing awareness after recent disasters. This research will demonstrate the infrastructure limitations (design and operation) of lifeline facilities for coastal communities, identify critical bottlenecks in service quality, and show how failure will propagate through the system. It also looks at how to develop coordinated maintenance schedules to minimize (or reduce) service interruptions and increase maintenance cost effectiveness.



Traffic Management Centers: Challenges, Best Practices, and Future Plans Principal Investigator: Xia Jin, FIU

This project aims at providing a nationwide scan on best practices in TMCs with a focus on ITS in terms of innovative tools, technologies, methods, and policies. A web-based survey was conducted focusing on current applications as well as new methods and tools in various aspects of TMC operations and services. The survey covers five major areas of interest - current tools and applications used in TMC operations, practices in data collection and information sharing, potential enhancements with new technologies, staffing and skill needs, and incident management performance measures. The web-based survey was conducted during March and April 2014. A total of 42 responses from twenty-five different states were received and analyzed.





EDUCATIONAL INITIATIVES

NCTSPM sponsored research is helping to develop a framework to understand and solve some of the most significant transportation needs of our time. The Center's member universities also share a commitment to pioneering educational outreach programs to interest and engage the next generation of transportation scientists who will build upon the center's work to create solutions to challenges as yet unimagined.

For example, the University of Alabama at Birmingham (UAB) has created a new program aimed at teaching middle school students about sustainability and natural resources. This program targets children from inner-city schools and minority communities who might otherwise never have considered what "sustainability" means and how it impacts their lives.

During four Saturday sessions, the 45 Birmingham middle school students learned about both the concepts of sustainability and broader ideas, including sustainable transportation, energy conservation, environmental quality, and the health and livability of cities. The program, Sustainable Smart Cities Youth Champions, was sponsored by the Sustainable Smart Cities Research Center at UAB.

In Atlanta, a Georgia Tech program had pre-college students learning about future transportation-related problems by focusing on the development of smartphone "apps". Georgia Tech students partnered with teachers from Forest Park High School and Chamblee Middle School to work with students in sixth, seventh, and eighth grades.

In this program the students actually created their own app that modeled how travelers behave in the city during periods of heavy snowfall (inspired, of course, by Atlanta's grid-locked roads and 18 hour commutes after the ice and snow storm in January 2014).

Several Georgia Tech graduate students presented lectures to the group about a variety of civil engineering principles. The students also toured the Georgia Department of Transportation Traffic Management Center. Teachers used the camp's outcomes to develop their own curricula for teaching transportation application development.

At the University of Central Florida, a group of eighth, ninth, and 10th grade students participated in the third annual University of Central Florida Camp Connect program. In this program, students participated in laboratory tours and learned about science, technology, engineering and math with hands-on activities and projects led by professional engineers.

The week-long camp hosted minority students at the main UCF campus in three groups: Camp Connect I: Plant the Seed, an introductory experience for students who had not taken part in the camp before; and Camp Connect II: Get Rooted and Camp Connect III: The "E" in STEM, programs for returning campers invited to attend after completing Camp Connect I. The second- and third-level programs offered participants a deeper, more engaging experience.

A K-12 program at Florida International University mixed college preparation with transportation engineering at its 2014 Summer Transportation Camp in July. The two-week camp brought local high school students together to introduce them to transportation engineering applications and careers and provide them with opportunities to plan and prepare for college.

"My son truly enjoyed the experience," one parent told organizers afterward. "This was a special program for future young professionals, and you did an amazing job."

The students took part in driving simulations, data collection on intersection traffic, lessons on GIS and transportation planning, a "Traffic Bowl", field trips to local traffic management centers, and a final group project and presentation at the end of the camp.

"This program has not only assisted me with declaring a major but it has also enhanced my oral communication skills. ... I have also learned the importance of teamwork and what it means to come together as a group to accomplish goals and complete tasks."
– Summer Enrichment Program participant

NCTSPM's education efforts extend beyond K-12 students. UAB's Summer Enrichment Program provided transportation engineering training and enrichment to 17 college freshmen and sophomores who represented minority groups that are under-represented in the nation's engineering programs. Working in partnership with Alabama's historically black colleges and universities, this two-year-old program worked with the UAB Minority Health and Health Disparities Research Center and the UAB Sustainable Smart Cities Research Center to foster research, training, and outreach across a variety of scholastic disciplines. And in the end, we hope to increase the number of well-trained minority engineers and professionals as a result of these efforts.

Photos courtesy of University of Alabama Birmingham, Georgia Tech, University of Central Florida, Florida International University.

2014 UNIVERSITY TRANSPORTATION CENTER CONFERENCE FOR THE SOUTHEASTERN REGION

Eight hubs of university-based transportation research gathered at Georgia Tech in March to talk about their work and find new ways to collaborate.

It was the 2014 University Transportation Center (UTC) Conference for the Southeastern Region, and it was hosted this year by the National Center for Transportation Systems Productivity and Management.

The event, sponsored by the USDOT Office of the Assistant Secretary for Research and Technology (OST-R), attracted more than 150 professionals from universities, state departments of transportation, nonprofits and private companies to showcase research from the eight UTCs based in the Southeast U.S.

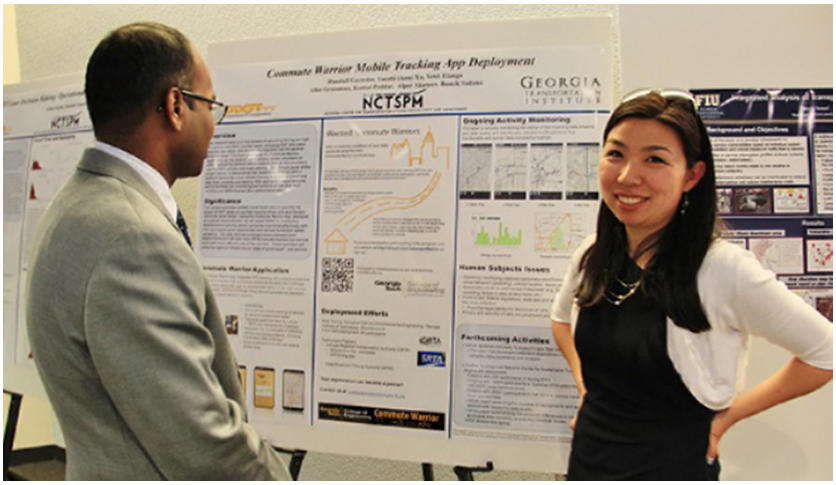
Scientists from 20 universities presented their research on a range of topics, including operations and management, cycle and pedestrian, economics and freight, transit, safety, and infrastructure.

The conference featured a panel discussion with representatives from the Alabama, Florida, Georgia, Mississippi, and North Carolina state DOTs.

Another panel explored how public agencies and private-sector companies can work together to address transportation challenges. That conversation featured Toby Carr, the director of planning at the Georgia DOT; Todd Long, GDOT deputy commissioner; Kenneth Petty, acting director of the Federal Highway Administration Office of Planning; and Randy Stashick, global vice president of engineering at UPS.

The conference also featured networking opportunities, a research poster session, and a session for student groups to discuss potential opportunities for collaboration.


WELCOME
- TO THE -
2014 UNIVERSITY
TRANSPORTATION CENTER
CONFERENCE FOR THE
SOUTHEASTERN REGION
CONFERENCE PROGRAM


Commute Warrior Mobile Tracking App Deployment
GEORGIA
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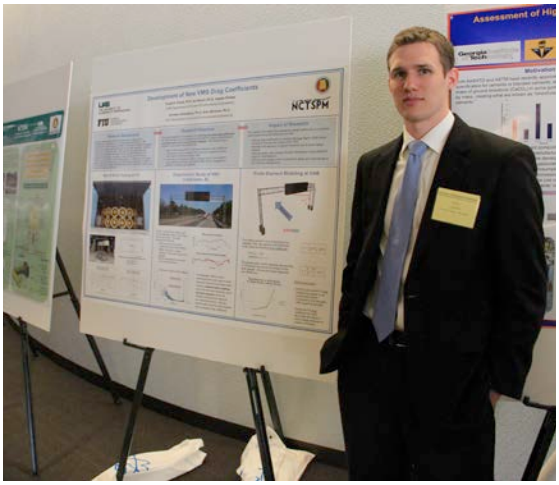
Human Subjects Issues
Deployment Efforts
Forthcoming Activities
Commute Warrior


NCTSPM

TRAINING AND OUTREACH

Transportation Research Board Annual Meeting
(Washington, District of Columbia, January 2014) Georgia Tech and NCTSPM kicked off 2014 with a reception at the Transportation Research Board Annual Meeting. Researchers and students from a number of universities attended the reception.

University Transportation Center Conference for the Southeastern Region
(Atlanta, Georgia, March 2014) Georgia Tech hosted this conference, bringing together faculty, students, practitioners, and public agencies in the Southeast to disseminate information about ongoing activities at all partner universities, and further enhance collaboration among the academic community as well as the private and public sector agencies in the region. Faculty, staff and graduate students, as well as federal and state agency representatives, MPOs, transit managers, and consultants in the region and around the country were invited to attend and participate in this conference. More than 20 universities in the Southeast, from 4 UTCs, were represented.

TransportationCamp South
(Atlanta, Georgia, April 2014) Georgia Tech hosted TransportationCamp South, an "unconference" for technologists, planning students, transportation professionals and others involved in transportation from across the region for a day of discussions, demos, and education related to transportation in the South. It was held in conjunction with Govathon, a civic hackathon bringing together technologists, developers, designers, subject matter experts, civic veterans and city officials to help solve problems that affect the local government and the community. Combining the two events maximized the exchange of ideas between transportation planners, advocates, experts & technologists. It resulted in a series of tangible, technology-based solutions to our most pressing transportation challenges.

University of Alabama at Birmingham Sustainable Smart Cities Symposium
(Birmingham, Alabama, June 2014) University of Alabama at Birmingham hosted the 2014 Sustainable Smart Cities Symposium. The Symposium included speakers both international and across the US. Issues addressed in the symposium included: urban transportation, transportation sustainability, and urban design. Over 230 people participated in the symposium, including students from the NCTSPM member universities.

GDOT Transportation Research Poster Session
(Atlanta, Georgia, September 2014) This event featured over 90 posters highlighting results from GDOT-sponsored research projects and was conducted at the headquarters of the Georgia Department of Transportation.

SEMINARS

Dr. Robert Bertini, P.E., "Can 'Big' Data Serve as a Foundation for Measuring and Improving Public Transport Operations." (Miami, Florida, February 2014).

Kyung-Hwa Kim, "Performance Analysis and Monitoring Manager at the Atlanta Regional Commission." (Atlanta, Georgia, February 2014).

Javier Rodriguez, P.E., "FDOT District Six Intelligent Transportation Systems and the Future of Managed Lanes in Southeast Florida." (Miami, Florida, February 2014).

Dr. Peter Campbell, "Modelling the Interaction of Traffic and Land Use Planning in South East Metro Sydney" (Atlanta, Georgia, February 2014).

Dr. Brian Smith, P.E., "Can Connected Vehicles "Connect" to the Transportation Infrastructure? How Transportation Agencies Can Improve Service through Connected Vehicles." (Atlanta, Georgia, March 2014).

Dr. Soheil Sajjadi, "Modeling Recurring and Non-Recurring Congestion Scenarios in Micro-Simulation using VISSIM." (Miami, Florida, March 2014).

Bill Hjelholt, "Design of a New Mining Railroad in West Africa." (Miami, Florida, March 2014).

Dr. Young-Jun Kweon, P.E., "Developing and Implementing Safety Performance Functions in Virginia." (Miami, Florida, July 2014).

Dr. Patricia Mokhtarian, "The Impact on Mode Choice of Activities Conducted while Commuting: Testing Transit-Advantage and Autonomous-Vehicle Scenarios." (Washington, District of Columbia, August 2014)

Dr. Ram Pendyala, "Multi-scale Models of Travel Demand and Supply: Bridging the Gap Between Research and Practice." (Atlanta, Georgia, August 2014).

Dr. Priyanka Alluri, P.E., "Application of Advanced Statistical Models in Highway Safety Analysis." (Miami, Florida, September 2014).

Dr. Anne Goodchild, "Moving Goods to Consumers: Land Use Patterns, Logistics, and Emissions." (Atlanta, Georgia, September 2014).

Dr. Fan Ye, P.E., "High Intensity Reflective Sheeting in lieu of External Lighting for Overhead Roadway Signs in Florida." (Miami, Florida, September 2014).

Dr. Eric Morris, "Is Travel Really That Bad?" (Atlanta, Georgia, October 2014).

Heather Alhadeff, AICP, Faye DiMassimo, Rukiya Eaddy, Margie Pozin, P.E., "Transportation Panel with WTS-GT." (Atlanta, Georgia, October 2014).

Rob Ross, P.E., Elizabeth Hammer, "Hitting Curveballs in a Fastball World: The Atlanta Braves DRI Traffic Study." (Atlanta, Georgia, October 2014).

Omar M. Meitin, P.E., "District 6 FDOT Transportation Systems Management and Operations (TSM&O) Program." (Miami, Florida, October 2014).

Jesus A. Martinez, P.E., "Autonomous Vehicles: State of the Practice and Applications." (Miami, Florida, October 2014).

Sen. Steve Gooch, "Legislative Considerations for Current Transportation Issues in Georgia." (Atlanta, Georgia, November 2014).

Rickey Fitzgerald, P.E., "Targeting Transportation Infrastructure Investments with GIS." (Miami, Florida, November 2014).

Evelin Legcevic, P.E., "ASCT Pilot Project Components and Lessons Learned." (Miami, Florida, November 2014).

Dr. Lisa Aultman-Hall, "Long Distance and Intercity Travel – Who, what, where, and when?" (Atlanta, Georgia, November 2014).

SCHOLARSHIPS AND AWARDS

Margaret-Avis Akofio-Sowah
Georgia Institute of Technology
2014 Leadership Legacy Scholarship for Graduates

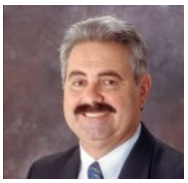
Gauen Rhys Alexander
University of Alabama at Birmingham
2014 Billy Jones Memorial Traffic Engineering Scholar Award from ALSITE

Stephanie Amoaning-Yankson
Georgia Institute of Technology
2015 International Road Federation Executive Fellowship

Adel Badiee
University of Alabama at Birmingham
NCTSPM Academic Scholarship Award

Candace Brakewood
Georgia Institute of Technology
Achievement Rewards for College Students

Xuanwu Chen
Florida International University
2014 Bill McGrath Transportation Scholarship – Florida Section of ITE
2014 District 10 ITE Best Student Paper



Frank Consoli
University of Central Florida
Best Regional Transportation Systems Management and Operations Paper for 2013

Ehsan Doustmohammadi
University of Alabama at Birmingham
NCTSPM Academic Scholarship Award

Tewari Edmonson
Florida International University
Eisenhower Transportation Fellowship

Somaye Fakharian Qom
Florida International University
Anne S. Brewer Scholarship

Jamie Fischer
Georgia Institute of Technology
Eno Leadership Development Conference
Rodney E. Slater Award

Alice Grossman
Georgia Institute of Technology
Eisenhower Graduate Fellowship

Shrikanth Mamidipalli
University of Alabama at Birmingham
NCTSPM Academic Scholarship Award

Evangelos Palinginis
Georgia Institute of Technology
North American Travel Monitoring Exposition and Conference Travel Grant (NATMEC)

Joseph Phillips
University of Alabama at Birmingham
NCTSPM Academic Scholarship Award

Prabha (Popa) Pratyaksa
Georgia Institute of Technology
2015 International Road Federation Fellowship Grant

Carly Queen
Georgia Institute of Technology
Eisenhower Graduate Fellowship

Ossama Ramadan
University of Alabama at Birmingham
2014 Outstanding Graduate Student in Civil, Construction, and Environmental Engineering for the University of Alabama at Birmingham

Atiyya Shaw
Georgia Institute of Technology
2014 WTS Helene M. Overly Memorial Scholarship

Denise Smith
Georgia Institute of Technology
Alfred P. Sloan Foundation Minority Ph.D. Program

Janille Smith-Colin, P.E.
Georgia Institute of Technology
2015 International Road Federation Executive, CH2M HILL Strategic Partner Scholarship, Eisenhower Graduate Fellowship

Chieh (Ross) Wang
Georgia Institute of Technology
2015 International Road Federation Fellowship Grant
Georgia Chapter of Institute of Transportation Engineers - Transportation Engineering Scholarship
Georgia Section of the American Society of Highway Engineers – Babs Abubakari Memorial Scholarship
Taiwanese Ministry of Education's Scholarship for Studying Abroad

Erik Winardi
University of Alabama at Birmingham
NCTSPM Academic Scholarship Award

FIU FLORIDA INTERNATIONAL UNIVERSITY

Florida International University
2014 District 10 ITE Best Student Chapter Award

STUDENT INTERNSHIPS

"My experience at FDOT was an amazing first realization of how my life is going to be like once I graduate." – Emelyn Venturi, intern with District 4 of the Florida Department of Transportation

"Before meeting Dr. Gan, I wasn't sure how [intelligent transportation systems] affected me and my community, but I was sure quick to learn at FDOT." – Rodney Carrero-Vila, intern with District 6 of the Florida Department of Transportation.

"[My] internship at MetroPlan Orlando has given me invaluable exposure to the transportation industry and metropolitan planning organization structure. I've appreciated getting to work alongside such talented and committed professionals and government leaders." – Barbara Kelley, intern with MetroPlan Orlando

These success stories reflect the valuable experiences gained by students through NCTSPM-sponsored internships. These students were provided with opportunities to gain real-world expertise while enriching their learning experiences. Students built important skills relevant to today's workforce and learned how to succeed in both the business world and the classroom.

FLORIDA INTERNATIONAL UNIVERSITY

Rodney Carrero-Vila, District 6 Florida Department of Transportation
Frine Marquez Martinez, Miami-Dade Department of Public Works and Waste Management
Emelyn Venturini, District 4 Florida Department of Transportation

UNIVERSITY OF ALABAMA AT BIRMINGHAM

Akash Chaudhary, UAB Civil Engineering Research Internship
Krzysztof Fedor, UAB Visiting Research Internship
Timothy Sanford, Conestoga-Rovers and Associates
Rachael Thompson, UAB Civil Engineering Research Internship

UNIVERSITY OF CENTRAL FLORIDA

Barbara Kelley, MetroPlan Orlando

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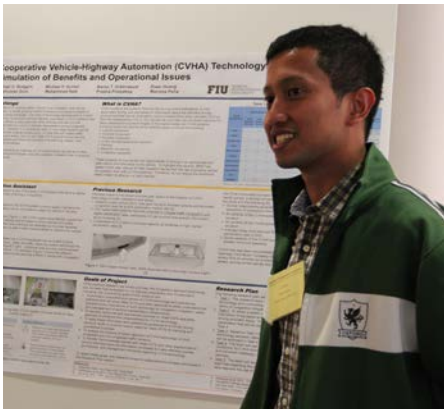

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