Since becoming a university transportation center of the U.S. Department of Transportation in 1999, The University Transportation Center for Alabama (UTCA) has conducted transportation education, research, and technology transfer activities throughout the state and region. Faculty and students at The University of Alabama (UA), The University of Alabama at Birmingham (UAB), and The University of Alabama in Huntsville (UAH) have participated in all of these service areas.

Our mission reflects the mission of the US Department of Transportation. Specifically, the UTCA seeks to advance technology and expertise in the multiple disciplines that comprise transportation through the mechanisms of education, research, and technology transfer while serving as a university-based center of excellence (2006 UTCA Strategic Plan, p. 12).

Our theme – Management and Safety of Transportation Systems – reflects the transportation needs of Alabama and the expertise of The University of Alabama System faculty. In 2007 the Executive Committee narrowed and sharpened the focus of the UTCA research program. Many management research projects now focus on maximizing traffic management and minimizing congestion. Similarly, some new safety research projects highlight infrastructure sustainability.

The Director’s Notes

Over the past decade many special people have worked to make UTCA a successful transportation research center. We are pleased to highlight two of those special people in this issue of UTCA News. Dr. Virginia Sisiopiku, faculty advisor of the Institute for Transportation (ITE) Student Chapter at UAB, was recently awarded the 2010 Dean’s Award for Excellence in Mentorship. Dr. Yingyan Lou, new Assistant Professor in the Department of Civil, Construction, and Environmental Engineering at UA was awarded the Pikarsky Award for Outstanding Doctoral Dissertation in science and technology by the Council of University Transportation Centers (CUTC). Congratulations to these outstanding faculty!

Sincerely,

Jay K. Lindly
New Projects Funded in 2010

The UTCA funded eight projects with 2010 monies. An additional project was funded by an external agency. These projects are briefly described in the following pages. Externally-funded projects are identified by a "4" as the third digit in the UTCA project numbering system.

**Project #10104 – Characterization of Non-recurrent Arterial Congestion**, Dr. Steven Jones, Principal Investigator, UA. This project is intended to develop a better understanding of the causes and characteristics of non-recurrent congestion (NRC) on arterials with an aim to developing tools that will aid in mitigating its impacts. The project will identify data needs necessary to characterize the onset of NRC and to understand the relationship between its causes and characteristics and other parameters such as traffic conditions (volumes, speeds, etc.), location on arterial (midblock or intersection), number of lanes, traffic signal spacing, number of external access points (side streets and driveways), roadway capacity and driver behavior parameters (lane changing, queue discharge, gap acceptance, control adherence, etc.). Data will be collected using the UTCA ITS/TMC lab, probes, field measurements and CCTVs on arterials in and around Birmingham, AL.

**Project #10105 – Advanced Transportation Institute 2010**, Dr. Daniel S. Turner, Principal Investigator, UA. The objective of the Advanced Transportation Institute 2010 (ATI-10) is to introduce junior and senior high school students, with preference to groups traditionally underrepresented in engineering disciplines, to transportation careers. The University Transportation Center for Alabama (UTCA) and the Alabama Department of Transportation (ALDOT) Personnel Bureau will co-sponsor the Institute.

**Project #10107 – Alternative Future Revenue Sources for Alabama Highways**, Dr. Jay K. Lindly, Principal Investigator, UA. Due to the weakening economy, the ever-improving fuel efficiency of vehicles, and other factors, the traditional funding sources for surface transportation – motor fuel taxes – are having difficulty generating sufficient revenue to meet construction and maintenance needs. This research proposes to explore alternative future financing schemes and to provide an assessment of the feasibility and effectiveness of those options in Alabama.

**Project #10204 – Use of WIM Data for Site-specific LRFR Bridge Rating**, Dr. Nassim Uddin, Principal Investigator, UAB. Transportation agencies are beginning to transition from the American Association of State Highway and Transportation Officials (AASHTO) Manual for Condition Evaluation of Bridges to the AASHTO Load and Resistance Factored Rating (LRFR) Specifications for bridge rating and evaluation. The LRFR specifications extend the states’ design philosophy from AASHTO load and resistance factor design to evaluation of existing bridges. For evaluation of existing bridges, site-specific information will be collected in this research project to characterize the local uncertainty, rather than relying on generalized information. Based on the methodology developed in the LRFR specifications, this project will develop a method of determining live-load factors for more realistic bridge rating for bridge structures using weigh-in-motion (WIM) data. Adaptation of the methods will be beneficial to account for unique site-specific characteristics of truck loads and permitting regulations in different states. The project will initially focus on two representative WIM sites in Alabama and investigate an innovative approach to determine the site-specific, live-load factors based on WIM data.

**Project #10206 – Impact of Distracted Driving on Congestion**, Dr. Despina Stavrinos, Principal Investigator, UAB. Few studies have examined the association of distracted driving and another critically important transportation related issue: congestion. This project seeks to fill the research gap by examining the driving behavior of 75 individuals between 16 and 25 years of age operating a virtual driving simulator with driving conditions varying across three levels of service as outlined in the *Highway Capacity Manual* (free flow, stable flow, and unstable flow) and three levels of distraction (cell phone conversation, text messaging, and undistracted). Results may enhance modeling simulation work completed by transportation engineers by providing a clearer account of distracted driver behavior.

**Project #10303 – Transportation Engineering Advancement and Mentoring Program**, Dr. Kathleen Leonard, Principal Investigator, UAH. The Principal Investigator will continue to work with local school districts to incorporate transportation engineering-related topics into the science curriculum. This year’s summer program will have a concentration in energy technologies. Students will use real world examples and new technologies in their hands-on activities.
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Project #10304 – Multimedia Resource Package for Load and Resistance Factor Rating (LRFR) of Bridges, Dr. Houssam Toutanji, Principal Investigator, UAH. With the introduction of the new AASHTO LRFR of highway bridges, there is a need to assess the impact of implementing the new manual on Alabama Department of Transportation's current bridge rating practices. This project will assist bridge engineers to comprehend and implement state-of-the-art design methodologies for concrete bridge design and rating. It will highlight key design steps for concrete superstructure including decks and girders. It will focus on the unified method of design for reinforced and prestressed concrete. The LRFR package will include an overview of the latest AASHTO LRFR load rating procedures and practices as they relate to concrete bridges in Alabama.

Project #10308 – Student Funding to Attend TRB Conference, Dr. Michael Anderson, Principal Investigator, UAH. The objective of this project is to develop a student research symposium, possibly to be hosted by the Institute of Transportation Engineers (ITE) Student Chapter at The University of Alabama at Birmingham (UAB), and select deserving students from each of the three University of Alabama campuses to receive funding to attend the Transportation Research Board Annual Meeting in Washington, DC.

Project #10401 – Pilot Car Driver Certification Program, Dr. Jay K. Lindly, Principal Investigator, UA. Pilot cars are the safety vehicles that accompany oversized vehicles on highways. The State of Alabama currently recognizes the pilot car driver certifications of other states but does not issue its own certification. The Alabama Department of Transportation (ALDOT) desires to initiate a certification program and obtain reciprocity of its certification with other states, and UTCA will aid in this effort.

TECHNOLOGY TRANSFER

TRB's 2009 Annual Field Visit

Every year representatives from the Transportation Research Board (TRB) visit state departments of transportation (DOTs) to identify problems these groups are facing and to investigate how TRB can assist in solving those problems. These visits often include meetings with universities, transit organizations, and industry leaders that work with DOTs.

Dr. Richard Pain, TRB’s Transportation Safety Coordinator, performed TRB’s 2009 Alabama Field Visit. On Tuesday, November 3rd, he met with Mr. Jeffery Brown of ALDOT’s Research and Development Bureau. The next day Dr. Pain and Mr. Brown visited the UTCA headquarters in Tuscaloosa and were welcomed by UTCA Executive Director Dr. Jay Lindly.

During the meeting that followed, Dr. Lindly discussed the history and mission of the Center and reviewed several research projects UTCA is currently conducting in collaboration with ALDOT. These projects include Project #08401 - Driver Reaction at Railroad Crossings, Project #08402 - Evaluation of Public Private Partnership Proposals, and Project #09403 - Development of Access Management Criteria.

Even though UTCA and ALDOT pursue unique research interests, UTCA is proud to support and extend the work of the Alabama Department of Transportation. This collaboration is essential to successfully meet the transportation challenges of the future.

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Traffic crashes pose a great danger to passengers’ lives. During the past decade, the rate of traffic crash fatalities in the United States has increased, and the numbers continue to rise. State troopers are determined to reduce these numbers, but patrol cars and manpower are limited. In UTCA Project #09104 – Optimal Traffic Resource Allocation and Management – Dr. Burcu B. Keskin, Principal Investigator, investigated ways to maximize these limited resources and eventually reduce the number of traffic accidents. The research team also included Mr. Dana Steil, PhD candidate from Computer Science; Mr. Rong Li, PhD student from Operations Management, and Ms. Sarah Spiller, an undergraduate Finance and Computer-based Honors Program student.

Dr. Keskin, Assistant Professor of Operations Management at The University of Alabama (UA), and Dr. Allen Parrish, Professor of Computer Science and the Director of Center for Advanced Public Safety (CAPS) at UA, collaborated with the Department of Public Safety in planning and managing effective resource allocation. They addressed such issues as determining the number and deployment of officers needed to reduce the number of crashes, minimizing the response time to a crash, and eliminating idle patrolling while increasing the visibility of officers.

Identifying “crash hot spots,” that is, certain lengths of highway with high frequencies of crashes over a certain time frame, is crucial to maximizing the effective use of patrol cars and state troopers. Complete electronic crash data is available in CARE (Critical Analysis Reporting Environment) approximately three months after the crash date. Using CARE crash data from 2006 to 2008, the research team first identified crash hotspots on Alabama highways.

Then, the hot spots were integrated into optimized patrol routes for state troopers. Development of this integrated optimization model is a methodological contribution to the current literature and an extension of the classical vehicle routing problem. In these optimized patrol routes, troopers can visit hot spots multiple times and choose whether to visit a hot spot or not as well as choose when to start and when to stop a visit.

The algorithm uses a clustering factor to limit travel time from one hot spot to the next to ensure efficient patrol routes. Intuitively, one thinks that with more state trooper cars, more hot spots can be covered. However, the marginal benefit of one additional car keeps decreasing, especially after a certain threshold hotspot coverage. The technical model helps estimate that threshold value and determine the optimal number of state trooper cars and their patrol routes. Based on these results, the research team is able to provide decision makers with recommendations on how many state trooper cars are needed per shift per day and per city; it also provides a numerical evaluation of the coverage percentage of hot spots.

During August and September 2009, Dr. Keskin and Mr. Steil conducted five workshops on crash hotspot identification. Over 165 participants – including representatives from the trucking industry, municipal agencies, safety commissions, ALDOT, and the Alabama State Troopers – attended these informative presentations.
Alabama Distracted Driving Summit

In December 2009, The University of Alabama at Birmingham’s University Transportation Center (UAB UTC), The University Transportation Center for Alabama (UTCA), and the Federal Transit Administration co-sponsored the Alabama Distracted Driving Summit. The summit, held in Birmingham, was the first statewide forum on this important issue.

Modeled on the national Distracted Driving Summit that the USDOT convened in the fall 2009, Alabama’s Summit brought together state leaders in transportation, policy, law enforcement, and science to discuss how to reduce motor-vehicle crashes resulting from distracted driving through legislation, enforcement, public awareness, and education. The summit also featured a keynote address from US Transportation Secretary Ray LaHood, who praised the UTCs for their initiative and leadership in hosting the event. “[This] summit – the first of its kind outside Washington – helps continue the national conversation on distracted driving and will put more good ideas on the table to prevent needless deaths. I hope other states will follow [Alabama’s] lead.”

During the first panel discussion, participants learned about the latest distracted driving statistics and findings from researchers representing The University of Alabama. Subsequent panels allowed the discussion of various approaches to reducing or regulating distracted driving and the development of an Alabama action plan.

“Secretary LaHood issued a challenge to the states to move quickly to address the issues of distracted driving,” said Russ Fine, PhD, Executive Director of the UAB UTC. “Alabama’s response has been gratifying.”

In support of Secretary LaHood’s challenge, UTCA has funded Project #10206 – Impact of Distracted Driving on Congestion, Dr. Despina Stavrinos, Principal Investigator, UAB.

(This article was written by Ms. Carla Little, Research Writer at The Western Transportation Institute (WTI), and Mr. Stephen Albert, Director, WTI. It first appeared in CUTC’s January 2010 newsletter. For more information on the Distracted Driving Summit, please visit the UAB University Transportation Center website at http://www.uab.edu/utc/.)
UTCA Student of the Year

The University Transportation Center for Alabama is proud to recognize Ms. Mary Beth Wilkes as its 2009 Student of the Year. Ms. Wilkes, a native of Andalusia, AL, earned a bachelor’s degree in civil engineering in 2008 from The University of Alabama. Mary Beth is currently pursuing a master’s degree in civil engineering at UA.

During her undergraduate years she was involved in the student chapter of ASCE in which she held an officer’s position for two years and was a team leader in the Steel Bridge and Concrete Canoe competitions. During her last semester as an undergraduate, Ms. Wilkes was nominated by peers and faculty to be a Senior Design Project Team Leader. Her team earned the First Place Overall Award for their completed project.

As a graduate student, she is a teaching assistant for the undergraduate course on highway design and construction. During the past two summers Ms. Wilkes served as the Co-Director of the Advanced Transportation Institute (ATI) with Dr. Daniel Turner. She is currently working with the Alabama Department of Transportation to update rules and regulations for oversize/overweight loads, create a permit information handbook for truckers, and develop a pilot car driver certification program.

The formal presentation of the Student of the Year award occurred in Washington, DC during the Transportation Research Board’s Annual Meeting. Accompanying Ms. Wilkes to the Awards Banquet were her parents, Mr. and Mrs. Guy Wilkes, and Dr. Jay K. Lindly, UTCA’s Executive Director.

4th Annual Student Awards Luncheon Celebrated the Achievements of Transportation Students

Students from the three campuses of The University of Alabama System are engaged in a variety of transportation-related research activities. A UTCA project (#09301) headed by Dr. Mike Anderson of The University of Alabama in Huntsville helped identify deserving transportation students and provided a forum in which they could present their research. First, students were invited to present abstracts of their research to a panel of representatives from each campus, and then winners were selected.

These students were invited to present their research at the 4th Annual Student Awards Luncheon on November 20, 2009. This award luncheon, held at The University of Alabama at Birmingham (UAB), was organized and hosted by the Institute of Transportation Engineers (ITE) Student Chapter at UAB.

Three students from each campus - UA, UAB, and UAH - presented technical papers to showcase their research activities. The following students made presentations: Ozge Cavusoglu (UAB), Morgan Chamberlain (UAH), Santosh Chitikesi (UAB), Mary Catherine Dondapati (UAH), Ian Hosch (UAB), Kenyona Pierre (UA), Nitin Sharma (UAH), Menassee Tekewold (UA), and Moses Tefe (UA). All presenters received monetary awards allowing them to attend the 89th Annual Meeting of the Transportation Research Board in Washington, DC in January 2010.
Dr. Lou Wins Prestigious CUTC Award

Dr. Yingyan Lou, Assistant Professor in the Department of Civil, Construction, and Environmental Engineering at The University of Alabama, was awarded the Pikarsky Award for Outstanding Doctoral Dissertation in science and technology from the Council of University Transportation Centers (CUTC). The Pikarsky Award is the highest award given by the CUTC. Lou was selected as one of the two recipients for the $2,000 award.

Lou’s dissertation, A Hierarchical Framework for Congestion Pricing of Transportation Networks, examines how road pricing methods can reduce traffic congestion.

“Congestion pricing tries to give drivers incentives to use roads that are not so congested by charging them some user fees if they want to take the most popular routes in the area,” said Lou. “My dissertation deals with where, how, and what amount to charge.”

Dr. Sisiopiku Awarded Excellence in Mentorship Award

Dr. Virginia Sisiopiku was one of 22 University of Alabama at Birmingham (UAB) professors recently honored with the 2010 Graduate Dean’s Award for Excellence in Mentorship during a ceremony on April 12, 2010. Dr. Sisiopiku is an Associate Professor in the Department of Civil, Construction, and Environmental Engineering at UAB.

This award recognizes faculty who have been outstanding mentors, advisors, and role models to the students and trainees with whom they have worked. These faculty honorees have demonstrated effective leadership, enthusiasm, an ability to make difficult information and concepts understandable, the willingness to serve as a role model, and a belief in the importance of mentoring.

Dr. Sisiopiku was also one of 13 faculty members honored with the President’s Award for Excellence in Teaching in 2007. During the past seven years she has been the Principal Investigator on six UTCA projects and the faculty advisor of the Institute of Transportation Engineers (ITE) Student Chapter at UAB.
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Photos from UTCA's New Headquarters
Bevill Building, UA