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Mack Nuggets

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Spring 2012

## Mack Nuggets, Spring 2012

Mack-Blackwell National Rural Transportation Study Center (U.S.)

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### Citation

Mack-Blackwell National Rural Transportation Study Center (U.S.). (2012). Mack Nuggets, Spring 2012. *Mack Nuggets*, 2 (5) Retrieved from <https://scholarworks.uark.edu/mack-nuggets/9>

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# Mack Nuggets

## Celebrating 20 Years of Mack-Blackwell

### Featured Stories

- Celebrating 20 Years of MBTC
- Freight Performance Measures Workshop
- Graduate Student Research Competition
- MBTC Student of the Year

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The Mack-Blackwell Rural Transportation Center (MBTC) is celebrating 20 years of providing transportation research, education and technology transfer. MBTC was established on the University of Arkansas campus as a University Transportation Center by the Intermodal Surface Transportation Efficiency Act of 1991. MBTC is named for Arkansas state senators Y.M. Mack and Lawrence Blackwell, who co-sponsored legislation to create the Arkansas Highway and Transportation Commission in 1952. In 2007, MBTC was named as a member of the U.S. Department of Homeland Security (DHS) National Transportation Security Center of Excellence (NTSCOE) and has since conducted research supporting the security and resiliency of our nation's transportation networks.

In the words of the founding MBTC Director, Dr. Walt LeFevre, "MBTC provides opportunity: the opportunity to sponsor rural transportation research with national applications, the opportunity to attract top-notch graduate students from all over the country and the world, and the opportunity to build a transportation program of excellence at the University of Arkansas." The opportunities that Dr. LeFevre envisioned in 1991 have been realized with over 200 funded research projects, over 300 student researchers, and numerous scholarship and fellowship



Kevin Hall, Jack Buffington, and Robert Elliott with Stacy Williams, 1998 MBTC Student of the Year

awards, education programs, and distinguished lectures.

MBTC's research contributions cover a myriad of subjects and disciplines related to transportation, including advanced pavement materials, foundation design, seismic modeling, structural analysis, economic analysis, emergency logistics planning, multimodal network optimization and alternative fuels.

MBTC has a strong history of working with government and industry to identify and provide impactful solutions to transportation challenges. Supporting funds have come from a variety of state and industry partners. MBTC gratefully acknowledges the continuing support of the Arkansas State Highway and Transportation Department (AHTD), which has been a major source of research funding and a significant collaborator since day one. According to Dr. Kevin Hall, MBTC Executive Director, "AHTD whole-heartedly

supported the center from the earliest days. They committed to the University of Arkansas, which cemented an already strong relationship."

The ability to fund transportation research has been instrumental in attracting high-quality faculty members to the University of Arkansas and supporting their research careers. Hundreds of professional presentations and peer-reviewed articles have disseminated research findings and resulted in career progression and numerous national-level awards and recognition for our researchers. MBTC researcher Dr. Micah Hale stated, "Because of the opportunities through MBTC, we have performed research that will help engineers better understand and predict the performance of structures that serve a critical role in our infrastructure."

The educational mission of MBTC cannot be overstated.

*continued on page 2...*

## Message from the Director



Heather Nachtmann,  
MBTC Director

Celebrating Mack-Blackwell's 20th year has given me the opportunity to reflect on all of the accomplishments that the Center has supported over the last two decades as we prepare our upcoming annual report. I also took the time to reflect on my own journey and how MBTC has helped to shape my own career.

In January 2001, my second semester on campus, then Director Melissa Tooley came to my office with an opportunity to complete a small tech transfer project related to economic analysis of Arkansas' water transportation system. Melissa took a risk offering

this project to a virtually unknown assistant professor. That project was the catalyst to my research career in transportation and logistics. Many of my accomplishments including training transportation professionals, disseminating research findings, and providing effective solutions to the community were made possible through the support of MBTC.

Then, in spring 2005, Director Jack Buffington took a risk by asking me – an Associate Professor of *Industrial Engineering* – to join him in leading MBTC as its Associate Director. The opportunity to

work with Jack and Executive Director Kevin Hall during my time as Associate Director and then Director afforded me the priceless opportunity to shape my leadership skills under the guidance of these two first class leaders.

Their actions are prime examples of the risk and reward practice necessary for operating a successful research center, and I am just one example of many people whose careers were supported by MBTC. I look forward to sharing our many success stories with you in our upcoming annual report.

Best wishes for a productive and enjoyable summer!

*continued from front page...*

Every MBTC research project has an educational component, where student research assistants gain expertise and experience in relevant transportation issues. MBTC is dedicated to building the transportation workforce of tomorrow. MBTC students have gone onto careers in academia and with organizations such as AHTD, J.B. Hunt Transportation Services, Inc., ABF Freight Systems, Inc., Union Pacific Railroad and Walmart Stores, Inc. For example, in 2012, two MBTC student researchers, Hugh Medal and Royce Floyd, will complete their Ph.D.s and have accepted jobs as faculty members at Mississippi State University and the University of Oklahoma respectively. "I gained my first experience doing transportation research through working on an MBTC project," said Industrial Engineering Ph.D. candidate Hugh Medal. "Later work with the NTSCOE led to my dissertation on designing transportation networks that

are robust to failures. This transportation research experience contributed to my receiving a job offer from Mississippi State University."

One of the most significant accomplishments of MBTC is the CTTT program. The Center for Training Transportation Professionals (CTTP) trains and certifies construction quality control personnel for highway contractors and quality assurance personnel for AHTD. This collaborative effort between MBTC and AHTD began in 1997 to ensure compliance with federal regulations and has become one of the model training and certification programs in the country. CTTT Director Dr. Stacy Williams, who was a civil engineering graduate student when CTTT began, has seen the evolution of this program from the first classes in February 1997 to the certification of over 6,000 technicians by the end of 2011. Changes she has seen include an increase in

the number and types of classes offered, the introduction of a lab certification program and increased interest in online instruction. Dr. Williams believes that having a "third party" such as CTTT conduct the certification program lends credibility to it in the eyes of the contractor personnel. She has been pleased to see an increase in the spirit of cooperativeness between industry and government as contractors and AHTD employees share the same classrooms.

Dan Flowers, retired AHTD Director, stated in a 2004 interview, "Working with MBTC has provided research results that we use daily in areas such as structural design and pavement design." This idea of useful and applicable research has been the hallmark of MBTC since its inception. For 20 years, MBTC has provided implementable solutions for transportation problems and educated the next generation of transportation engineers.



Dan Flowers speaks at the  
Dedication of the Dan Flowers  
Education and Training Facility  
In October 2004

## Dan Flowers Distinguished Lecture Series

The first lecture in the recently renamed “Dan Flowers Distinguished Lecture Series,” was a presentation on Transportation Engineering at Walmart, by Ami Spivey, Vice President of Innovations, Engineering and Global Processes for Sam’s Club. The lecture was held on April 23, 2012 on the University of Arkansas campus.

Ms. Spivey is a member of the Arkansas Academy of Industrial Engineering and a faithful Razorback fan. She grew up in Fayetteville, graduated from the University of Arkansas, and during her 18 years at Walmart has lived in NW Arkansas, Pennsylvania and Florida. Ms. Spivey has traveled throughout the world. She has worked on engineering teams and led both Distribution Center and Transportation Operations.

During her time in Transportation, she built and led an engineering team focused on

offsetting the rising cost of fuel and leveraging efficiencies to create a more sustainable Private Fleet. Ms. Spivey discussed how high fuel prices have significantly changed operations, performance measures and working relationships between suppliers and retailers. She discussed Walmart’s extensive distribution networks with overlays of retail stores, distribution centers, grocery distribution centers and return centers and stated that there is no simulation software that she has found that can handle the complexities of their entire network.

Ms. Spivey described her time managing Walmart’s Private Fleet drivers as the most challenging leadership role she has had, but also the job where she saw the most personal and professional growth. Ms. Spivey engrossed students and faculty members with anecdotes of her experiences

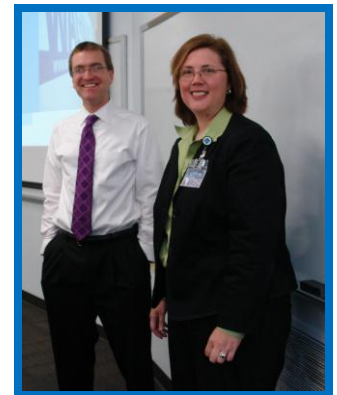
managing both operations and people. She stated that as a manager you have to listen and be receptive to what your employees have to say – the best ideas come from the people performing the job each day.

Ms. Spivey also discussed her experiences in Walmart’s emergency response and assistance efforts. She was running a distribution center in Northeastern Pennsylvania at the time of the terrorist attacks on September 11, 2001 in a community where many of the local residents commuted to work in New York City. Walmart employee volunteers set up and ran distribution centers for the Salvation Army. During her tenure in Florida, they were hit by seven major hurricanes, and she discussed some of the management strategies she used to ensure continuity of operations.

The lecture was educational as well as motivating. Ms. Spivey is a leading expert in the field of transportation, and it was an honor to host her.



Dr. Tish Pohl, Ami Spivey, and Dr. Heather Nachtmann



Dr. Andrew Braham, Assistant Professor of Civil Engineering and Ami Spivey

## FHWA Freight Performance Measures Workshop

MBTC hosted a regional Freight Performance Measures Workshop at the University of Arkansas on Thursday, February 28, 2012. The one-day, interactive workshop on the federal Freight Performance Measurement (FPM) initiative was conducted by representatives from the Federal Highway Administration (FHWA), with support from the American Transportation Research Institute (ATRI). The FPM initiative is a federally-led research effort that utilizes data from commercial vehicles, gathered via Global Positioning Systems, satellite and cellular technologies, to derive measures of speed, travel time and travel reliability.

Ed Strocko, from the FHWA Office of Freight Management and Operations, discussed how performance measures can be used in transportation planning and decision making and led a group exercise to develop freight performance measures in categories such as demand, efficiency, safety and environmental conditions. He also discussed a proposed performance-based federal aid program designed to achieve national goals.

Jeff Short and Lisa Park, from ATRI, demonstrated FPMweb and the National Corridors GIS tool, which are web-based data processing tools that have been developed to utilize a vast database consisting of commercial vehicle positions collected

over the last seven years. Jeff presented maps produced with these tools that indicate highway congestion throughout the country and in Arkansas. The program goal is to provide data and analytical tools to freight transportation stakeholders to support analysis of congestion along the interstate system.

The regional workshop was attended by representatives from federal, state and local agencies within Arkansas, Oklahoma, Missouri, Kansas and Texas. Also in attendance were faculty and student researchers and freight industry representatives.





## Center for Training Transportation Professionals

The Center for Training Transportation Professionals (CTTP) has completed its fifth 3-year contract with the Arkansas Highway and Transportation Department (AHTD) and is well into its 16<sup>th</sup> year of providing training and certification for the highway construction industry. Keeping an eye on its mission to educate personnel and improve the quality of the transportation industry, CTTP continues to improve its programs to provide technician certification, laboratory certification, and professional development. This year, CTTP has already hosted 12 of the 26 required annual contract courses. Overall, course enrollment is on an upswing, with most scheduled courses operating at or near capacity. It is anticipated that several additional courses will be scheduled this year in order to meet the increasing demand for recertification. The primary courses in greatest demand continue to be the Concrete Field Testing and Soils Testing Technician courses.

In addition to the primary courses, additional courses are also being offered this year, including the National Pollutant Discharge Elimination System (NPDES) certification, and the

Concrete Patching course. New course development activities relating to traffic signal installation and maintenance are also slated for 2012.

The Basic Aggregates Refresher Certification course is currently available online, and a notice to contractors has been issued by AHTD stating that effective January 1, 2013, all certified technicians must have completed the Basic Aggregates Refresher Certification in order to continue testing for AHTD projects. If this deadline is not met, then certifications in Basic Aggregates, Concrete Field Testing, Hot Mix Asphalt, Soils Testing, and Concrete Strength Testing will be revoked. For non-certified technicians, the Basic Aggregates Refresher modules may also be accessed in "view only" mode prior to attending an in-house CTTP Basic Aggregates course as a means for enhancing class preparation. Approximately 1500 technicians are expected to complete the Basic Aggregates Refresher course this year, with nearly 300 already having completed the requirement. Additional online course topics are currently under development.

Laboratory certification has displayed steady enrollment, with approximately 100 participating laboratories. The sixth inspection tour has come to a close, and scheduling has begun for the seventh tour. As this program matures, CTTP continually strives to improve the quality of laboratory testing in the state. In order to streamline laboratory and equipment processes, a new data management system for laboratory inspection is currently under development, which will greatly aid participating laboratories in maintaining equipment calibration and maintenance records.

Professional Development Hours (PDHs) are also offered by CTTP for in-house and online courses. Beginning in 2012, certificates will be provided directly from CTTP for all Professional Engineers providing registration information. Additional opportunities for continuing education are anticipated this year on a variety of topics such as decorative concrete and asphalt patching. For more information on opportunities at CTTP, visit us at [www.cttp.org](http://www.cttp.org) or email [cttp@uark.edu](mailto:cttp@uark.edu).

## Graduate Student Research Competition

Jingjing Tong, a doctoral student in industrial engineering, was honored by the University of Arkansas' Chancellor G. David Gearhart and Provost Sharon Gaber after competing in the Graduate Student Research Competition. Her poster, MBTC DHS 1110-Supporting Secure and Resilient Inland Waterways, won second place in the Supply Chain category. Her advisor is Dr. Heather Nachtmann.

Gov. Mike Beebe presented awards to 23 first-place winners during a ceremony Thursday, Feb. 23, at the Janelle Y. Hembree Alumni House.

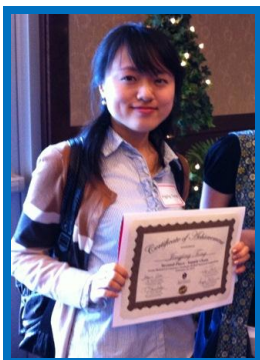
The governor told the students that no one realizes, at this point in time, the problems they will solve and the ways they will make lives better through their research. He exhorted them to persevere because the world

will need the products of their work and the jobs that their work will make possible.

This is the fifth year of competition. It was the largest with three times as many students entered over the previous year, the broadest with double the number of categories of study and the first time that both first and second prizes were awarded in each category.



Frances Griffith, Stacy Williams, Rita Parrish, Mary Fleck, Charles Steelman and Roselie Conley



Jingjing Tong

## MBTC's Recently Completed Projects

Listed below are projects completed since our Fall 2011 newsletter. Full reports for these and all other completed MBTC projects are listed on our website at [www.mackblackwell.org](http://www.mackblackwell.org).

### January 2012

MBTC DOT 3026  
Relative Advantages and Disadvantages of Independent Contractor Status: A Survey of Owner-Operators' Opinions and Rationale  
*Principal Investigator:*  
Steven L. Johnson, Ph.D., P.E., C.P.E.  
University of Arkansas

### March 2012

MBTC DOT 3020  
Performance of Flexible Pavement Systems Containing Geosynthetic Separators  
*Principal Investigators:*  
Richard Coffman, Ph.D., P.E.  
University of Arkansas  
  
MBTC DOT 3027  
The Development of Novel and Non-Invasive Germplasm Selections Native to Arkansas for

Highway Re-Vegetation Projects  
*Principal Investigator:*  
Garry V. McDonald, Ph.D.  
University of Arkansas

MBTC DHS 1101  
Designing Resilient and Sustainable Supply Networks  
*Principal Investigators:*  
Edward A. Pohl, Ph.D., and Chase Rainwater, Ph.D.  
University of Arkansas  
Scott J. Mason, Ph.D.  
Clemson University



## MBTC Student of the Year

Royce Floyd was selected as the 2011 Mack-Blackwell Rural Transportation Center *Outstanding Student of the Year* for his research efforts that will have direct impact on the construction and design of prestressed concrete bridge girders. Royce traveled to the 15<sup>th</sup> Annual Council of University Transportation Centers (CUTC) Awards Banquet held in Washington, D.C. on January 21, 2012.

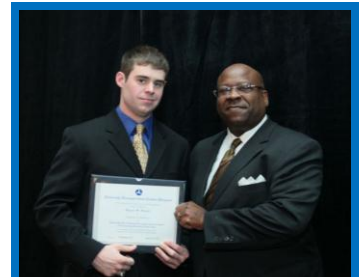
He was nominated by Dr. Micah Hale, who said, "Royce is a rarity among students, combining exceptional academic ability, a strong work ethic, and a remarkable sense of

'real world practicality' regarding his graduate work. He is easily among the top one percent of all graduate students at the College of Engineering; he was the first civil engineering student to move directly from his undergraduate program to our Ph.D. program and win the highly competitive Distinguished Doctoral Fellowship (DDF) at the University of Arkansas." Royce has been working on the MBTC project "Strand Bond in Lightweight Self-Consolidating Concrete."

Royce has also taken on the role of instructor-of-record for both introductory courses and senior-level

design courses in the civil engineering department. Students in his courses praised his practical approach, availability, and problem-solving abilities as an instructor. A prolific writer, Royce has amassed an impressive publication record during his doctoral program. By any and all metrics, Royce Floyd is a truly outstanding student, and MBTC was proud to recognize him with this honor.

Upon completion of his doctoral degree this summer, Royce is joining the University of Oklahoma as an Assistant Professor of Civil Engineering & Environmental Science.



Royce Floyd receiving his award at the TRB Awards Banquet and presented by RITA Administrator Greg Winfree



Heather Nachtmann, MBTC Director, Royce Floyd along with his mother, Mrs. Willie May Floyd



## Goodbye

MBTC Communications Director Dana Williams left her position with MBTC in April. Jack Buffington, former director of MBTC, hired Dana in December 2005. He had this to say about Dana's departure, "Dana, I seriously appreciate all you have done for us. I wish you the very best for the future and you will always be remembered as a key player in MBTC. It was an honor to work with you."

We wish Dana all the best in her future endeavors!



## Mack-Blackwell Rural Transportation Center

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The Research and Innovative Technology Administration (RITA) coordinates the U.S. Department of Transportation's (DOT) research programs and is charged with advancing the deployment of cross-cutting technologies to improve our Nation's transportation system and Mack-Blackwell is proud to be a participating university.



The Department of Homeland Security's National Transportation Security Center of Excellence (NTSCOE) is developing new technologies, tools and advanced methods to defend, protect and increase the resilience of the nation's multi-modal transportation infrastructure and education and training base lines for transportation security geared towards transit employees and

**Kevin Hall, Ph.D., P.E.**  
 Executive Director

**Heather Nachtmann, Ph.D.**  
 Director

**Letitia M. Pohl, Ph.D.**  
 Assistant Director

**Sandra Hancock CAP, M.S.**  
 Fiscal Support Analyst

**We're on the Web!**

See us at:  
[www.mackblackwell.org](http://www.mackblackwell.org)

## MBTC Researchers Receive College-Level Awards

Two MBTC researchers were recently recognized by the College of Engineering as the 2012 recipients of the John L. Imhoff Awards for Research and for Teaching. Dr. Brady Cox and Dr. Manuel Rossetti were honored at the college's annual Alumni Awards Banquet on Saturday, April 21. These awards were established in 2004 by Dr. John Imhoff, former head and founder of the Department of Industrial Engineering, to recognize faculty members who have excelled in research and teaching in the College of Engineering.



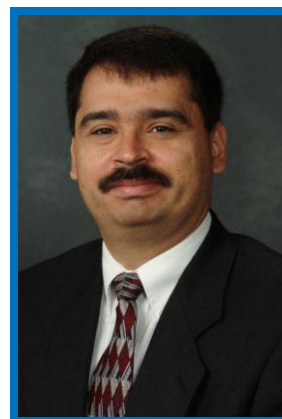
Dr. Brady Cox, assistant professor of civil engineering, is the 2012 recipient of the Imhoff Award for Research. Cox earned his doctorate at the University of Texas and joined the University of Arkansas faculty in 2006.

A geotechnical engineer, Cox focuses on ways to measure the effects of earthquakes on soils and structures. He studies earthquake loading, soil dynamics and non-destructive material

characterization using stress waves. One of his research goals is to quantify uncertainty in surface wave methods, which provide information that is necessary to design structures that can resist earthquake damage.

As part of several Geotechnical Extreme Events Reconnaissance teams, Cox has traveled all over the globe to study the effects of major earthquakes, including the earthquakes in New Zealand and Haiti in 2010. On campus, he operates a Vibroseis shaker truck known as "the Hawg."

Dr. Cox has been the principal investigator on three MBTC projects, including "Practical Recommendations for Evaluation and Mitigation of Soil Liquefaction in Arkansas," which was completed in February 2011.



Dr. Manuel Rossetti, professor of industrial engineering, received the Imhoff Award for Teaching. He received his PhD in industrial and systems

engineering from The Ohio State University. Rossetti began teaching at the University of Arkansas in 1999 and currently holds the John L. Imhoff Chair in Industrial Engineering.

Rossetti teaches courses in the area of simulation, transportation and logistics, database systems, and inventory management. He was selected as a Lilly Teaching Fellow in 1997/98, was twice voted Best IE Teacher by IE students and has won the industrial engineering department's Outstanding Teacher Award three times.

In his research, Rossetti focuses on the design, analysis, and optimization of logistics, manufacturing, health care, and transportation systems using computer simulation and operations research techniques.

Dr. Rossetti has been the principal investigator on eight MBTC projects, including "Model for Disaster Relief Shelter Location and Supply Routing," which was completed in January 2010.

Congratulations to Brady and Manuel for their many accomplishments!

