



MAUTC, a five-university consortium led by The Pennsylvania State University, seeks to attract talented researchers and students to the study of transportation, and to engage them in new approaches to the transportation issues of today and tomorrow. MAUTC's theme is Technology for Integrated Transportation Systems Operation and Performance.

## Student Profiles - 2009

As articulated in the MAUTC mission statement, attracting and engaging students is a key focus and motivation of MAUTC's service to the mid-Atlantic region. Their engagement, achievement and successes are ours as well. Following are profiles of a few of the many talented and dedicated students whose time and effort hold great promise for the future of transportation.

### Ahmed Amer, Virginia Tech

Ahmed Amer, a 3<sup>rd</sup> year Ph.D. student, earned the 5<sup>th</sup> place International Student Paper Award in the 2<sup>nd</sup> International Symposium on Freeway and Tollway Operations, to be held in Honolulu, HI, June 20-24, 2009. His paper is entitled "Tight Diamond Interchange versus Single Point Urban Interchange: Pedestrians Prospective," and he will be presenting his paper at the symposium. Ahmed was granted a \$2,000 travel award to attend the symposium.



### Sashikanth Gurram, Virginia Tech

Sashikanth Gurram is a graduate student in the Charles E. Via Jr. Department of Civil and Environmental Engineering at Virginia Tech. He is currently working as a graduate research assistant at the Virginia Tech Transportation Institute (VTTI) under the supervision of Dr. Hesham Rakha.



Sashikanth is passionate about the field of transportation and believes that the progress of any country depends on its transportation facilities and infrastructure. With Transportation Engineering as his major in the current master's program, he developed great interest in various areas of traffic engineering, transportation planning and signal systems control. He is also interested in projects related to dilemma zones because he believes focused dilemma zone research holds great potential for improving road user safety. During the past 18

months at Tech, he has worked on various projects that deal with dilemma zones, red light running and Virginia Tech visitor parking management. Currently, he is working on the development of a Web-based interactive system using PHP and MySQL as a part of the VT Visitor Parking Project sponsored by the Virginia Tech Transportation Office.

Sashikanth has also been recognized academically by the Virginia Section of the Institute of Transportation Engineers (VASITE), which awarded him the 2008 Kenneth E. Wilkinson Scholarship. The scholarship is intended to promote the advancement of the transportation profession through the development of educational assistance to student engineers. It was presented to him during the 2008 VASITE fall seasonal meeting in Wintergreen, VA.

Sashikanth, who is scheduled to graduate with his master's degree in August 2009, says his immediate goal is to get a challenging job in a transportation consultancy firm that helps him showcase his abilities and optimally apply the knowledge of his graduate studies. After having gained considerable real-time exposure in the transportation field, his long-term goal is to earn a Ph.D. degree and continue to pursue research in his areas of interest at a much greater depth.

### Rahul Nair, University of Maryland

Rahul Nair is a Ph.D. student in transportation engineering at the University of Maryland, College Park. Along with advisor Dr. Elise Miller-Hooks, he is currently studying the role of vehicle sharing systems in alleviating urban transportation problems. Shared vehicle programs involve a fleet of vehicles positioned strategically at stations across the transportation network. Users are free to lease vehicles (cars, electric vehicles or bicycles) to complete a trip and drop the vehicle at a station close to their destination. Such systems are a sustainable and economical alternative for urban movement, offering a level of flexibility that traditional transit cannot provide. Rahul's



### In This Issue:

Student Profiles . . . . .	1
Faculty News . . . . .	3
Research . . . . .	3
Calendar . . . . .	4
Contacts . . . . .	4

## **Student Profiles** (from page 1)

research focuses on design and operations of shared-vehicle systems, and evaluating their role in the larger context of urban mobility. This work is partially funded by MAUTC. Rahul is also supported by an I-95 Corridor Coalition Fellowship. He expects to graduate in May 2010 and plans to pursue a career in academia.

### **James Richardson, University of Virginia**

James Richardson's primary interest in the transportation field is in furthering the use of information technologies to improve the planning and operation of the transportation system. James is currently working on a project to evaluate and integrate travel time data sources for the Virginia Department of Transportation. This project is utilizing a number of different information technologies such as Oracle data warehousing, ArcGIS, data mining and statistical analysis tools, GPS, etc. to build a prototype central repository of travel time information for the state.



Before James began studying at the University of Virginia, he worked for a number of years as a database administrator and programmer for the *Washington Post*. In this line of work he learned a great deal about how to design efficient information systems and how to use Internet technologies to make information more accessible. At the same time, he was noticing the growing number of interesting uses of information technology in the world of transportation, and this spurred his interest in learning more about how he could apply his skills as an information technology specialist in the transportation domain. The end result was that he began working in the Smart Travel Lab at the University of Virginia and studying transportation engineering. "I have enjoyed very much the opportunity to learn more about how information technology is affecting transportation and how I can play a role." Outside of his academic and professional interests, James is an avid cyclist who rides for both sport and transportation.

James graduated in May 2009 with a Master of Science Degree in Civil and Environmental Engineering. He plans to continue in the Ph.D. program where he will further develop his research.

### **Jason Stine, Penn State**

As a mechanical engineer, Jason's primary area of interest in the transportation field lies with vehicle systems. He is particularly interested in vehicle dynamics, and his current research work reflects this. Jason is currently working with Dr. Sean Brennan and Dr. Eric Donnell to bring the NCHRP 22-21 project to a close. For this project, several thousand vehicle dynamics simulations were run in an effort to evaluate the safety of highway medians through the simulation



of off-road excursions. Several different vehicle classes, speeds, encroachment angles, and driver inputs were tested in the simulations. Resulting vehicle positions and state are being analyzed for various median profiles, with emphasis on investigating the design tradeoff between preventing vehicles from rolling over or entering the opposing lanes of traffic. The results from this study will support future highway safety evaluation, as well as the design and placement for new in-median cable barriers.

Jason intends to graduate in August with a Master of Science in Mechanical Engineering (MSME), at which time he will seek a position in an automotive-related field.

### **Aly Tawfik, Virginia Tech**

Aly Tawfik, a 3<sup>rd</sup>-year Ph.D. student, was elected President of the Alliance of Transportation Engineering Students at Virginia Tech for the 2008/2009 academic year. Aly also received the Virginia Tech College of Engineering Dean's Graduate Teaching Fellowship for the AY 2008/2009. He was also selected as the Virginia Tech Graduate School's Featured Graduate Student for the month of March, 2009.



Aly won the 2<sup>nd</sup> place award for Engineering poster presentations in the 2009 Virginia Tech Graduate Students Assembly Research Symposium for his poster, "A Psychological Analysis of Drivers Route Choice Behavior."

### **Dilya Yusufyanova, University of Maryland**

Dilya Yusufyanova is a Ph.D. student in the Department of Civil and Environmental Engineering at the University of Maryland, College Park. Her supervisor is Dr. Lei Zhang, an assistant professor in the department. Dilya began her program in the fall of 2008 and expects to graduate in 2011. Her primary research interests are transportation policy and planning. Currently she is working on a project called "Integrated Urban Systems Model with Multiple Transportation Supply Agents."



"The main idea of the project is to understand how transportation authorities in the Washington Metropolitan Region currently make systems management decisions and investment choices, and how these decisions translate into actual transportation facilities and overall system performance in the future years." The objective of the research is to develop a general modeling approach for planning and policy analysis that is capable of capturing the effect of different investment policies on future transportation network growth. The project is sponsored by MAUTC, and the PI of the project is Dr. Zhang. 🐾

## Research

A number of new research projects were initiated and final reports completed during the period from February 2009 through June 2009.

### New Research Projects

Definition of the Role of Lineaments in Pennsylvania through Re/Os Sulfide Geochronology: Impacts on Civil Transportation Structure, Dr. Barry Scheetz, Penn State (PSU-2008-05)

Hydrogen Plant Module (HPM) & Vehicle Fueled by Same, Dr. Joel Anstrom, Penn State (PSU-2008-03)

Modeling Single Occupant Vehicle Behavior in High-Occupancy Toll (HOT) Facilities, Dr. Brian Smith, University of Virginia (UVA-2008-04)

Tools to Support GHG Emissions Reduction: A Regional Effort, Dr. Elise Miller-Hooks, principal investigator, University of Maryland, and Dr. Hesham Rakha, Virginia Tech (MAUTC-2008-01)

Traffic Signal Control Enhancements under Vehicle Infrastructure Integration Systems, Dr. Hesham Rakha, principal investigator, Virginia Tech, and Dr. Brian Park, University of Virginia (MAUTC-2008-02)

Supply Chain Management in Disaster Response, Dr. Abbas Afshar and Dr. Ali Haghani, University of Maryland (UMD-2008-01)

### Recent Final Reports

*Development of Guidelines to Minimize Moisture Damage with PennDOT District 1 Local Aggregates in HMA*, Mansour Solaimanian, Chieh-Tang Chang, Ghassan Chehab, and Scott Milander, Penn State; co-sponsor: Pennsylvania Department of Transportation.

*Internal vs. External On-Premise Sign Lighting: Visibility and Safety in the Real World*, Philip M. Garvey, Martin T. Pietrucha, Steven Damin, and Damian Deptuch, Penn State; co-sponsor: United States Sign Council.

### Publications and Presentations


\*Rakha, H., and Wang, W. (2009), "Procedure for Calibrating Gipps Car-Following Model" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (Paper 09-0225).

\*Ahn, K., and Rakha, H. (2009), "Energy and Environmental Assessment of High-Speed Roundabouts" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (Paper 09-1475).

\*Park, S., and Rakha, H. (2009), "Environmental Impacts of High-Emitting Vehicles" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (Paper 09-0311).

\*Wu, N., and Rakha, H. (2009), "Derivation of Van Aerde Traffic Stream Model from Tandem-Queueing Theory" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (Paper 09-0149).

## Pietrucha Named ASCE Fellow

**Dr. Martin T. Pietrucha**, executive director of MAUTC and interim director of The Thomas D. Larson Pennsylvania Transportation Institute, was recently elected as an ASCE Fellow. Fellows are elected based on their technical and professional contributions and demonstrated achievements in engineering for at least 10 years following election as an ASCE member. 



\*Katz, B., Coffey, P., and Rakha, H. (2009), "Analysis of Enforcement Techniques for DWI Checkpoints and Their Impact on Traffic Operations" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (Paper 09-1224).

\*Li, P., and Abbas, M. (2009), "Optimal Advance Detectors Design for the Multi-detector Green Extension System at High-Speed Signalized Intersections" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (Paper 09-3305).

Adam, Z., Abbas, M., and Li, P. (2009), "Evaluating Green-Extension Policies Using Reinforcement Learning and Markovian Traffic State Estimation" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (Paper 09-3734).

Li, Z., Madanu, S., Wang, Y., Abbas, M., and Zho, B. (2009), "Optimization Modeling for Trade-off Analysis of Highway Investment Alternatives" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (09-2342).

Abdelaziz, S., Abbas, M., and McGhee, C. (2009), "Determination of Significant Critical Movements to Generate Traffic Scenarios for Large Arterial Networks" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (09-3461).

Abdelaziz, S., Abbas, M., and McGhee, C. (2009), "Evaluation of Pattern-Matching Traffic Responsive Control Mode in a Large Arterial Network" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (09-3032).

Kasaraneni, Y., Abbas, M., and McNair, L. (2009), "Web-Based Game to Improve Learning of Driver Behavior and Control at Signalized Intersections" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (09-2266).

Adam, Z., Abbas, M., and Li, P. (2009), "Modeling the Complexity of Driving Behavior During Signal Yellow Interval Using Reinforcement Learning" Transportation Research Board 88th Annual Meeting, Jan. 11-15, Washington D.C. (09-3133).

Gross, F., Vanasse Hangen Brustlin, Inc.; Jovanis, P. P., Pennsylvania State University; and Eccles, K. A., Vanasse Hangen Brustlin, Inc. (2009), "Safety Effectiveness of Lane and Shoulder Width Combinations on Rural, Two-Lane, Undivided Roads," poster session Transportation Research Board 88th meeting, January 11-15, Washington, D.C.

## *Calendar of Events, 2009*

December 9-11 – Transportation  
Engineering and Safety Conference,  
Penn State

### *The MAUTC Partners:*

Penn State (lead)  
University of Maryland  
University of Virginia  
Virginia Polytechnic Institute  
and State University  
West Virginia University

### *Strategic Alliances:*

University of Delaware  
Morgan State University  
University of Pennsylvania

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## *Research (from page 3)*

Aguero-Valverde, J., Universidad de Costa Rica; and Jovanis, P. P., Penn State (2009), "Bayesian Multivariate Poisson Log-Normal Models for Crash Severity Modeling and Site Ranking," Transportation Research Board 88<sup>th</sup> meeting, January 11-15, Washington, D.C.

\*Donnell, E., and Cruzado, I., Penn State (2009), "Evaluating Effectiveness of Dynamic Speed Display Signs in Transition Zones of Two-Lane Rural Highways in Pennsylvania," Transportation Research Board 88<sup>th</sup> meeting, January 11-15, Washington, D.C.

\*Seo, J.-W., Linzell, D. G., and Rado, Z., Penn State (2008), "Crash Performance of X-Shaped Support Base Work Zone Temporary Sign Structures," *International Journal of Crashworthiness* 13(4), 437-450.

Gallupalli, A., Lee, J. H., Lopez de Murphy, M., and Bakis, C., The Pennsylvania State University (2009), "Sustained Loading and Temperature Response of FRP/Concrete Bond," Transportation Research Board 88<sup>th</sup> meeting, January 11-15, Washington, D.C.

Donnell, E., Himes, S., The Pennsylvania State University; Mahoney, K., Fairfield, CT; and Porter, R., Texas Transportation

Institute (2009), "Understanding Speed Concepts: Key Definitions and Case Study Examples," Transportation Research Board 88<sup>th</sup> meeting, January 11-15, Washington, D.C.

Vemulapalli, P., and Brennan, S., Penn State (2009), "Design and Testing of a Terrain Mapping System for Median Slope Measurement," Transportation Research Board 88<sup>th</sup> meeting, January 11-15, Washington, D.C.

Donnell, E., Karwa, V., and Sathyanarayanan, S., Penn State (2009), "A Methodology to Explore the Relationship between Pavement Marking Retroreflectivity and Traffic Crash Frequency on Highways in North Carolina: Application of Artificial Neural Networks and the Generalized Estimating Equations," Transportation Research Board 88<sup>th</sup> meeting, January 11-15, Washington, D.C.

Ben-Tal, A., Technion - Israel Institute of Technology; Mandala, S. R., and Yao, T., Penn State (2009), "Evacuation Under Data Uncertainty: Robust Linear Programming Model," Transportation Research Board 88<sup>th</sup> meeting, January 11-15, Washington, D.C.

\*MAUTC sponsored