



UNIVERSITY OF MARYLAND

National Transportation Center

2015 ANNUAL REPORT



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Dear colleagues, sponsors, students and friends,

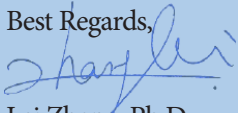
On behalf of Center faculty, staff, and students from seven consortium universities, I am proud to present you the 2015 annual report of the National Transportation Center @Maryland. Building on decades of transportation research, education, and technology transfer excellence, NTC@Maryland was established in October 2013 as one of the five National Centers funded by the U.S. Department of Transportation OST-R University Transportation Center Program. Since then, we have enjoyed support from many additional federal, state, and local agencies, as well as the private sector. In 2015, the total new research project awards won by our National Center through open competition exceeded \$10 million. I would like to thank all our research sponsors for your support to our Center, and ask for your continued support as we build a world-class top Transportation Engineering Program based at UMD with multi-university collaboration.

This support has allowed us to involve 103 faculty members across 34 degree programs to participate in research and education programs at NTC@Maryland. In 2015, 172 undergraduate, 211 Masters, and 32 Doctorate students across our member universities graduated with degrees in Transportation or with a concentration in Transportation. Our talented faculty and students published 275 journal articles and offered 687 presentations just last year. NTC@Maryland and Transportation@Maryland are widely recognized as the home to the best program in Transportation Big Data and Data Analytics, Computing and Visualization, System Monitoring and Performance Analysis, Multimodal Congestion Mitigation, and Transportation Modeling and Simulation. We are also among the top programs on Information and Communications Technology Applications, Freight and Logistics, Transportation Systems Optimization, and Infrastructure Resilience and Adaptation.

Several projects completed in 2015 best exemplify how NTC@Maryland products have a real-world impact. Our seven consortium universities collaborated and developed solutions to improve freight mobility and reliability at the nation's freight ports through an e-navigation system, to support national-level transportation management and investment decision-making, to reduce recurrent and non-recurrent congestion with mobile apps and multimodal sharing economy, and to assist day-to-day operations and planning decision-making at state and local agencies. In 2015, UMD officially launched the first-of-its-kind Online Master of Engineering Program in Transportation, which will be expanded to other member universities. In 2015, NTC@Maryland organized and sponsored more than 40 training academies, workshops, conferences, seminars and webinars for technology transfer on many fronts, and our summer and year-long internship programs have attracted a diversified group of future transportation engineering professionals.

NTC@Maryland aspires to the highest level of performance for our stakeholders and constituents with impactful practice-ready products. We aim to establish a campus-wide Maryland Transportation Initiative at UMD within the next three years to better serve our sponsors, communities, faculty, and students. This Initiative will allow us to innovate in new ways through interdisciplinary collaboration and to bring NTC@Maryland to new heights in coming years.

Best Regards,



Lei Zhang, Ph.D.
Herbert Rabin Distinguished Professor
Director, National Transportation Center
Department of Civil and Environmental Engineering
A. James Clark School of Engineering
University of Maryland – College Park



Center Overview & Theme

“Strategic Transportation Policies, Investments and Decisions for Economic Competitiveness.”

The National Transportation Center at the University of Maryland, College Park (NTC@Maryland) is hosted in the Department of Civil and Environmental Engineering at the University of Maryland. The theme of the NTC@Maryland is “Strategic Transportation Policies, Investments and Decisions for Economic Competitiveness.” The NTC@Maryland, conducts research and provides education and technology transfer related to strategic transportation policies, investments and decisions for economic competitiveness, and directly supports the U.S. Department of Transportation’s (DOT) strategic goal of economic competitiveness. **The University of Maryland** leads the consortium that includes six partner universities:

Arizona State University (ASU)
Louisiana State University (LSU)
Morgan State University (MSU)
North Carolina State University (NCSU)
Old Dominion University (ODU)
University of New Orleans (UNO)

To focus the research on economic competitiveness, the NTC@Maryland has defined three primary research areas:

- Freight efficiency and reliability
- Congestion mitigation with multimodal strategies
- National-level multimodal transportation investment analysis and decision-support

The NTC@Maryland is also involved in promoting education, workforce development, technology transfer, and diversity. During this reporting period, the members of the NTC@Maryland have built on their impressive track record of sharing expertise and relevant research findings with a multitude of audiences including academic professionals, government representatives, and private practitioners. Our members have also made significant contributions to educate and diversify the next generation of transportation professionals. On this front, UMD is officially recognized as an Asian-Pacific Islander Minority Serving Institution. Among our member universities, ASU is a Hispanic Minority Serving Institution, while MSU is a historically black college and university. An overview of the research, education, workforce development, technology transfer, and diversity efforts during this reporting period are discussed in later sections of this report.

Key Personnel at The National Transportation Center

University of Maryland Staff

Lei Zhang, Ph.D., Director

Mark Franz, Assistant Director of Outreach and Technology Transfer

Carlos Carrion, Ph.D., Assistant Director of Research and Education

Katie Le, Research Business Manager

Blessing Awe, Program Management Specialist

Executive Committee

Lei Zhang, Ph.D., Director, University of Maryland

Kamil Kaloush, Ph.D., Associate Director, Arizona State University

Brian Wolshon, Ph.D., Associate Director, Louisiana State University

Andrew Farkas, Ph.D., Associate Director, Morgan State University

Nagui Rouphail, Ph.D., Associate Director, North Carolina State University

Mecit Cetin, Ph.D., Associate Director, Old Dominion University

Bethany Stich, Ph.D., Associate Director, University of New Orleans



Students and Alumni at the TRB Reception

Principal Investigators

Aghdashi, Behzad, PhD, North Carolina State University

Asmar, El Mounir, PhD, Arizona State University

Aydilek, Ahmet, PhD, University of Maryland

Beck, R. Melissa, PhD, Louisiana State University

Cetin, Mecit, PhD, Old Dominion University

Chang, Gang-Len, PhD, University of Maryland

Chavis, Celeste, PhD, Morgan State University

Chester, V. Mikhail, Ph.D, Arizona State University

Cirillo, Cinzia, PhD, University of Maryland

Collins, Andrew, PhD, Old Dominion University

Cui, Qingbin, PhD, University of Maryland

Franz, Mark, PhD, University of Maryland

Frey, Christopher, Ph.D, North Carolina State University

Golub, Aaron, PhD, Arizona State University

Haghani, Ali, Ph.D, University of Maryland

Karner, Alex, PhD, Arizona State University

Khattak, Asad, Ph.D, University of Tennessee

List, George, PhD, North Carolina State University

Lou, Yingyan, PhD, Arizona State University

Mamlouk, Michael, PhD, Arizona State University

Martin, James, P.E., North Carolina State University

Miller-Hooks, Elise, PhD, University of Maryland

Mirchandani, Pitu, PhD, Arizona State University

Murray, Eugene, North Carolina State University

Robinson, Mike, PhD, Old Dominion University

Rouphail, M. Nagui, PhD, North Carolina State University

Schonfeld, Paul, PhD, University of Maryland

Schroeder, Bastian, PhD, North Carolina State University

Schwartz, Charles, PhD, University of Maryland

Shin, Hyeonshic, PhD, Morgan State University

Short, Carol, University of New Orleans

Stempihar, Jeffrey, PhD, Arizona State University

Stich, Bethany, PhD, University of New Orleans

Underwood, Shane, PhD, Arizona State University

Williams, M. Billy, PhD, North Carolina State University

Wolshon, Brian, PhD, Louisiana State University

Zhang, Lei, PhD, University of Maryland

Zhou, Xuesong, PhD, Arizona State University

UMD TRANSPORTATION PROGRAM OVERVIEW

The Transportation@Maryland Program brings together multidisciplinary research already under way across 8 out of 12 Colleges the University of Maryland (UMD) and creates new opportunities for research collaboration, innovation and education excellence.

NTC@Maryland is ranked in the top 5 of all Transportation Programs in the nation for publications, top 5 for research expenditure, and top 3 for graduate education. Annual external research funding exceeds \$23 million. Transportation research at UMD contributes to economic development and quality of life in Maryland, across the nation, and internationally by keeping goods and services moving, reducing costs for businesses and households, and saving lives.

The strategic vision of Transportation@Maryland for 2016~2020 is to double its external funding to \$40 million per year, develop the most innovative graduate education and technology commercialization program in transportation, and establish a joint infrastructure - the Maryland Transportation Institute - to support and harness many UMD transportation-related activities under one umbrella.

Transportation-Themed/Related Centers, Programs and Labs at UMD

- National Transportation Center @ Maryland
- Center for Advanced Transportation Technology
- National Center for Smart Growth
- Human Computer Interaction Lab
- Management Sciences and Logistics Program and NEXTOR FAA Air Transportation Excellence Center
- Experimental Economics Lab
- Center for Health and Risk Communications
- Maryland Optics Group
- Traffic Operations and Safety Lab

There are additional units and labs on campus on Cybersecurity, Psychology and Human Factors, Mechanical Engineering, Electrical Engineering, and Information Studies that also conduct transportation-related research that collaborate with the core Transportation@Maryland groups.

Students Supported as Research Assistants

120 graduate students and 350 undergraduate students are currently involved in research and financially supported by Transportation@Maryland in 8 of 12 UMD Colleges.

Current student research assistants are from Computer Science, Library/ Information Sciences, Telecommunications, Arts, Geography and GIS, English, Civil and Environmental Engineering, Electrical Engineering, Computer Engineering, Philosophy, Archaeology, Communications.

Transportation@Maryland has also supported 35 high-school students in 2015 through STEM internship programs.

UMD TRANSPORTATION PROGRAM OVERVIEW

Research Sponsorship from 2010-2015

Federal

- National Science Foundation
- U.S. Department of Transportation
- U.S. Department of Energy
- U.S. Department of Homeland Security
- U. S. Department of Defense
- Federal Highway Administration
- Federal Transit Administration
- Federal Aviation Administration
- National Aeronautics and Space Administration
- U. S. Army Corps of Engineers

State

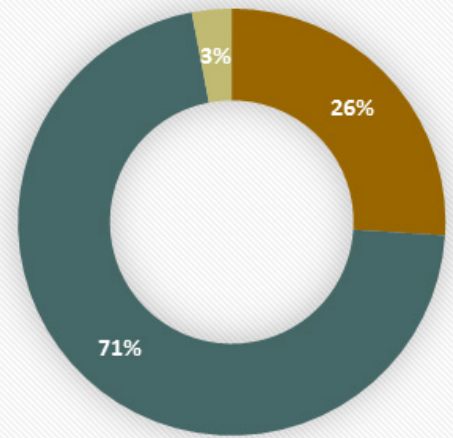
- Maryland Department of Transportation
- Maryland State Highway Administration
- Maryland Department of Planning
- Maryland Transit Authority
- Maryland Toll Authority
- Maryland Aviation Administration
- Maryland State Police
- I-95 Corridor Coalition
- State Departments of Transportation in 18 States

Other

- Metropolitan Planning Organizations in DC, Baltimore, and other Metro Areas
- European Commission of the European Union
- I-95 Corridor Coalition
- Maryland Counties (e.g. Prince George's, Montgomery counties)
- Private Sector: INRIX, HERE, TomTom, Oracle, Leidos, SAIC, 3M, Battelle, SkyComp, Booz Allen, Honeywell, Parsons Brinckerhoff, Telvent, etc.

Total External Funding

\$141 Million since 2010
(Average of **\$23.5 Million/yr.**)



Program Reputation

NTC@Maryland is the:

Best Program in Transportation Big Data and Data Analytics, Computing and Visualization, System Monitoring and Performance Analysis, Transportation and Economic Competitiveness, and Transportation Modeling and Simulation.

NTC@Maryland is among the:

Top programs on Transportation and Energy, IT Technology Applications, Freight and Logistics, and Optimization.

Member Universities and Associate Directors



Dr. Nagui Roupail, NCSU



The NCSU Transportation Materials and Systems group researches the planning, analysis, design, construction, and management of transport facilities and the materials from which they are built. Our research group focuses on two main sub-areas related to transportation: (1) Transportation materials, including pavement design, mix design, and materials characterization; (2) Transportation systems, including planning, design, operations and safety. Many of these research activities are conducted within the Institute for Transportation Research and Education (ITRE) and the Center for Transportation and the Environment (CTE).



Dr. Bethany Stich, UNO



The Merritt C. Becker, Jr. University of New Orleans Transportation Institute combines applied research, education, and outreach initiatives incorporating both passenger and freight systems to positively impact the transportation field. The Institute promotes innovative policies and practices for the users and providers of transportation as well as strategic partnerships with the public and private sectors. Faculty and staff associated with the Institute are recognized for their expertise in: transportation policy for sustainability, livability, resiliency and disaster recovery, freight-based economic development, maritime and port planning, bicycle and pedestrian planning and safety, transit oriented development, megaregion research and development and globalization planning and policy.



Dr. Kamil Kaloush, ASU



The ASU Transportation Engineering program has two themes: Transportation Systems and Pavements and Materials. The Transportation Systems program addresses a broad range of education and research focus areas, and faculty in the transportation systems program focus on traffic operations and simulation, intelligent transportation technologies, traveler safety and risk, travel behavior, transportation systems simulation, and transportation planning applications. The Pavements and Materials program addresses pavement analysis and design, pavement performance and management, material testing and characterization, and developing new and more efficient construction materials that are applicable to transportation needs.

Member Universities and Associate Directors



Dr. Andrew Farkas, MSU



MSU's National Transportation Center supports research on traffic models to improve mobility and accessibility. Completed research simulated vehicle infrastructure integration impact on incident management, congestion and disaster evacuation, and trip generation impacts of town center and senior housing developments. The Center has conducted research on driver behavior, impairment, and engineering features' effects on safety. Research has included understanding the effects of social networks on alcohol-impaired drivers, road engineering influences on motorcycle crashes and improving safety through intervention. Research continues on highway infrastructure, freight, and urban public transit systems.



Dr. Brian Wolshon, LSU



The LSU Civil Engineering Department is housed in Patrick F. Taylor Hall. Among the laboratories used for graduate studies and research are geotechnical, environmental, structural, mechanics of materials, water resources, and computer laboratories. Graduate civil engineering students use the TEM/SEM microscopy mineralogical analysis laboratory of the Department of Mechanical Engineering and the remote sensing and image processing facilities of the Division of Engineering Research Units. The civil and mechanical engineering departments also share a new Wind Tunnel Laboratory. Laboratories for state-of-the-art materials testing may become available for use at the nearby Louisiana Transportation Research Center.



Dr. Mecit Cetin, ODU



The Transportation Research Institute (TRI) and the Center for Innovative Transportation Solutions (CITS) at ODU work collaboratively on both basic and applied research centered on modeling and simulation of transportation systems. With six faculty members across the campus, the transportation engineering program at ODU provides students unique interdisciplinary opportunities to study multimodal transportation networks, human behavior, traffic operations, transportation planning, network modeling and optimization, intelligent and connected transportation systems, sustainable transportation, and transportation policy and economics.

Key NTC@Maryland Statistics in 2015

Center Funding

USDOT OST-R: **\$2.8M**

USDOT Modal Agencies: **\$1.9M**

USDOE: **\$4.5M**

State Agencies: **\$3.1M**

Universities: **\$0.6M**

Transportation Education

Affiliated Faculty: **103**

Degree Programs: **34**

Courses: **204**

Transportation Degrees Earned at Member Universities

Undergraduate: **172**

Masters: **211**

Doctorate: **32**

Students Funded

Undergraduate: **36**

Masters: **20**

Doctorate: **32**

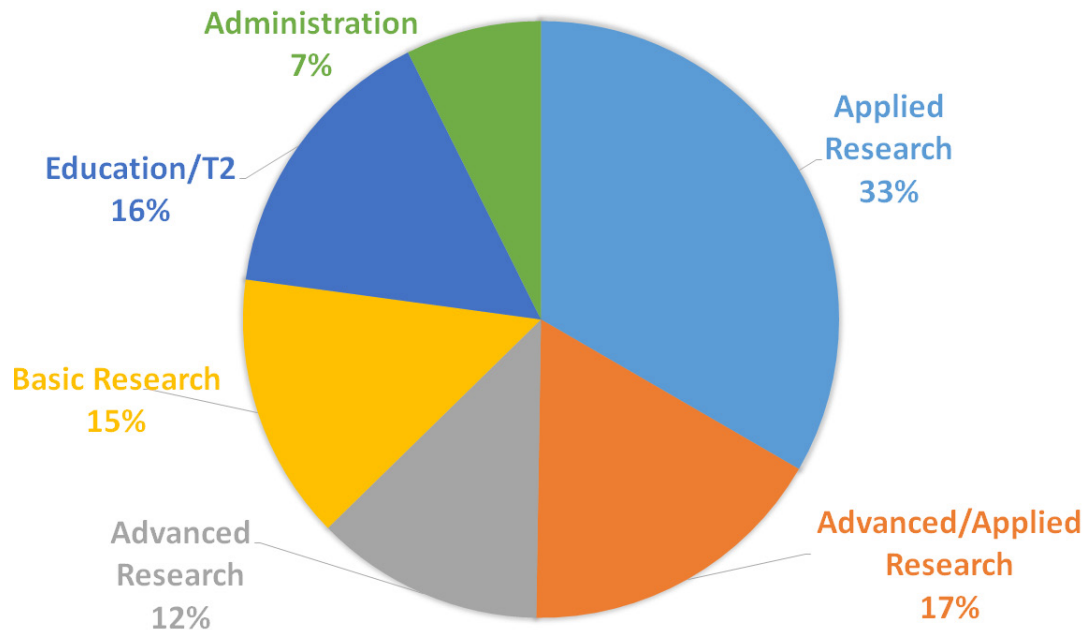
Research Impact

Journal articles: **275**

Presentations: **687**

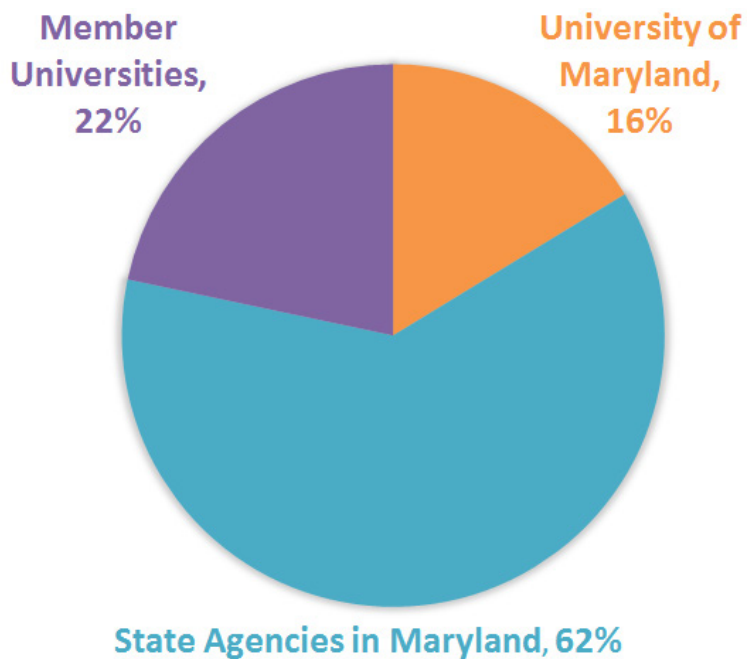
Center reports: **22**

Expenditures by Activity



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Matching Fund Sources



In 2015, the NTC@Maryland sponsored 10 collaborative projects, many of which are changing how practitioners are addressing transportation challenges. In this section, two examples are provided.

Development and Demonstration of Advanced Methods for Quantifying Freight Truck Activity, Energy Use, and Emissions

By H. Christopher Frey (NCSU),
Nagui M. Rouphail (NCSU) and
Xuesong Zhou (ASU)

Heavy duty trucks are a key freight transportation mode and are responsible for substantial consumption of energy, emissions of pollutants harmful to human health including nitrogen oxides (NO_x), particulate matter (PM), and greenhouse gas emissions, particularly carbon dioxide (CO₂). Freight trucks operate as part of a mix

of vehicles, and thus interact with vehicle traffic in complex ways. This project has the following objectives: (1) develop and demonstrate a new capability for the DTAlite dynamic traffic assignment model to simulate heavy duty freight trucks, including estimation of 1 Hz speed trajectories; (2) extend the capabilities of a simplified microscale vehicle emissions model, MOVESLite, to estimate energy use and emissions of heavy duty freight trucks; (3) couple DTAlite and MOVES Lite; (4) calibrate and evaluate the modeling framework; (5) apply the modeling framework to demonstrate

capability; and (6) disseminate new capabilities to practitioners.

This research will demonstrate how the energy use and emissions of freight trucks can be assessed with respect to the impact of traffic and transportation control measures, changes in fuels (e.g., biodiesel versus diesel), and changes in vehicle technologies (e.g., impact of technologies to reduce vehicle energy use, such as planned under U.S. fuel economy standards). Thus, a comprehensive picture for decision makers regarding policy options that can be effective in reducing energy use and emissions will be provided.



Understanding Regional Disparities in Public Transit Performance Using Realtime Transit Data

By Aaron Golub (ASU), Alex Karner
(ASU), Celeste Chavis (MSU)

Congress has indicated a desire to ensure that explicit and objective-based performance targets are set in the areas of congestion reduction, system reliability, and environmental sustainability, among others. This project contributes to these goals by leveraging emerging data sources to ensure that transportation systems are planned and evaluated using the best available data and methods, increasing the likelihood that transit supply and demand will be well-matched.

Recent advances in the spatial and temporal representation of public transit supply combined with emerging datasets that provide highly-resolved information about the location and socio-economic nature of public transit demand are opening up analytical possibilities for public transit operations, planning, accessibility, and optimization. These newer datasets allow for accessibility and other performance characteristics to be calculated at the level of individual stops or routes in a transit network in real time - at a particular instant on a particular day. The goal of this project will be to develop open-source software that makes transit performance analysis based on real-time possible and to study the difference between actual and expected service within and between metropolitan regions in the United States. The tool may also be used for the planning and evaluation of future transit improvements.

The objectives of this project are to contribute to the academic literature while developing software and tools that will facilitate improved public transportation planning. Although some authors have explicitly investigated disparities in transit service at the neighborhood level, they have relied on imprecise measures of public transit supply and demand. More commonly, authors seek to determine whether there is a “gap” between public transit supply and demand on average across an entire region, which provides little in the way of information that can guide public transit planning. Our work will identify areas in a city or region where actual public transit service is performing poorly relative to expected service and will provide a method for other cities to conduct similar analyses. We will also determine whether there is systematic variation in space in terms of this disparity conditioned upon demographic characteristics across the city or region.

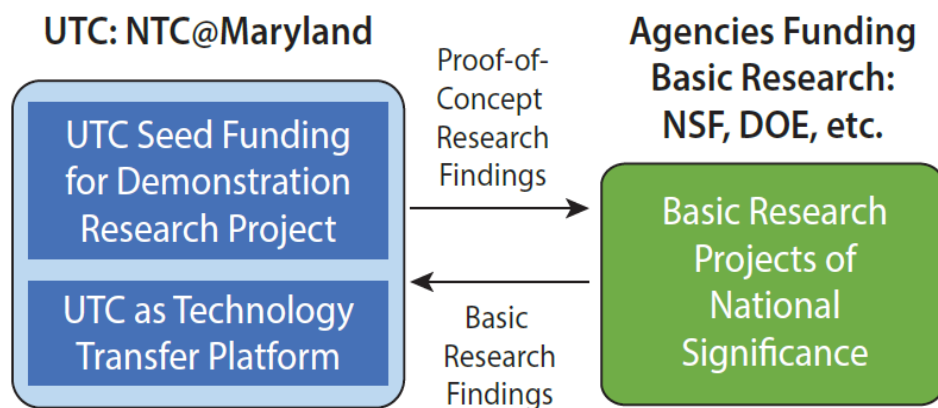
OTHER COLLABORATIVE PROJECTS IN 2015

- Developing a Multi-resolution Traffic Simulation Platform for Integrated Active Traffic Operations Evaluation in Metropolitan Areas
- Evaluation of Infrastructure Impacts from Movements near Seaports
- Data Fusion Aided Freeway Analysis for HCM
- Guidance for Field and Sensor-Based Measurement of HCM and Simulation Performance Measures
- Identification of Potentially Hazardous Roadway Network Locations Using Microscopic Observational Vehicle Data
- Safety and Travel Time Reliability: Analyzing Large-Scale Truck Involved Crashes and Macroscopically Modeled Reaction Time
- Open Toll Lanes in a Connected Vehicle Environment: Development of New Pricing Strategies for a Highly Dynamic and Distributed System – Phase II
- Improving the Reliability of Freight Transportation



NTC@Maryland Seed Funding Model

The NTC@Maryland has established an approach for integrating and streamlining basic research, applied research, and technology transfer within a UTC setting is explored and exemplified with two recent success stories at the NTC@Maryland. The process begins with our researchers first identifying a basic research need consistent with the Center theme of economic competitiveness, and then proposing a related proof-of-concept research project with direct real-world relevance suitable for UTC funding. Through a competitive process involving external peer review, NTC@Maryland provides seed funds to the relatively low budget applied demonstration project. This funding allows for research concepts to materialize into demonstrable results illustrating the potential broad impact. Results from these UTC-funded studies are then employed to pursue much larger amounts of basic research funding



The process for making real-world impacts using NTC@Maryland funding.

from sources such as the National Science Foundation (NSF) and the U.S. Department of Energy (DOE). If our researchers are successful in winning basic research grants, NTC@Maryland, with strong partnerships with federal, state, and local transportation agencies and the private sector, could again serve

as a platform for technology transfer during and after the project period. This model for leveraging UTC resources to meet basic and applied research needs and to promote technology transfer is presented in the flowchart above, and is illustrated through two project examples.

Transportation Network Resilience with Respect to Disasters and Climate Change

In 2013, NTC@Maryland funded a seed research project that is led by Dr. Elise Miller-Hooks NTC@Maryland PI, (millerhooks.umd.edu) and titled, "Objective Decision-Making Tool for Transportation Infrastructure Investments to Combat the Impacts of Sea Level Rise". This project developed tools to aid governments and infrastructure owners and operators in effectively addressing the threats from potential sea level rise and significant, sustained flooding

events. This project experience contributed to Dr. Miller-Hooks' win of a \$2.5 Million basic research project from the NSF in 2014. Her NSF project focuses on developing a broader theoretical and modeling framework for "Disaster Resilience of Critical Infrastructure" that considers interdependencies between transportation systems and related cyber, power, natural gas, water, waste water, and societal systems. Results from this pioneering NSF research will help

agencies integrate public policy, organizational policy, emergent organizational behaviors and risk communication considerations into a comprehensive quantitative framework for disaster resiliency analysis. During and upon completion of this project, Dr. Miller-Hooks plans to take advantage of the outreach and technology transfer resources at the NTC@Maryland to disperse her research findings in the form of workshops, webinars, and conferences.

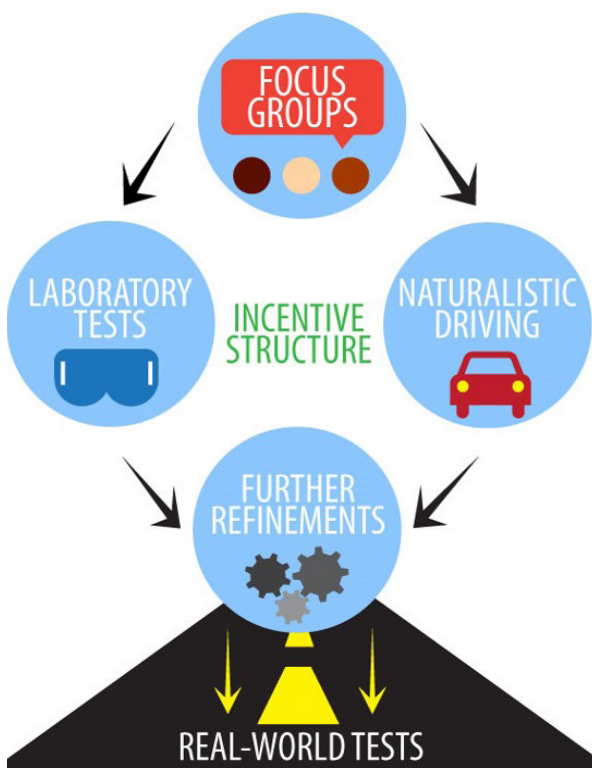
Mitigating Congestion and Reducing Transportation Energy Use with Personalized Incentives and Information

In 2014, Dr. Lei Zhang (NTC@Maryland Director and PI, <http://lei.umd.edu>), through an applied research project jointly funded by NTC@Maryland and one of its agency partners – the Maryland State Highway Administration (SHA), developed an innovative personalized traveler information and incentive concept and successfully demonstrated its effectiveness in mitigating congestion and reducing fuel use along the heavily congested Baltimore-Washington commuting corridor. While the full development of this concept into practice-ready technology is beyond

the scope of any UTC-based research, this early success led to a full proposal to the U.S. DOE Advanced Research Project Agency – Energy's (ARPA-E) TRANSNET Program. In August 2015, Dr. Zhang's team that involves three NTC@Maryland consortium universities (UMD, NCST, ASU) was awarded a \$4.5 million ARPA-E grant to fully develop their proposed iPretii (Integrated, Personalized, REal-time Traveler Information and Incentive) technology. iPretii uses extensive basic behavior research data to stimulate the effects of traveler choices on congestion mitigation and energy use. NTC@

Maryland researchers will identify and optimize personalized incentives to encourage drivers to alter routes, departure times, and driving styles, or take mass transit or ride-sharing services. Incentives will include both economic and social rewards that are personalized based on individual preference, behavior history, and real-time traffic conditions. For technology transfer, NTC@Maryland is again providing support for this DOE ARPA-E research to enable real-world demonstration and future deployment by connecting researchers with potential technology users (e.g. government agencies, private sector).

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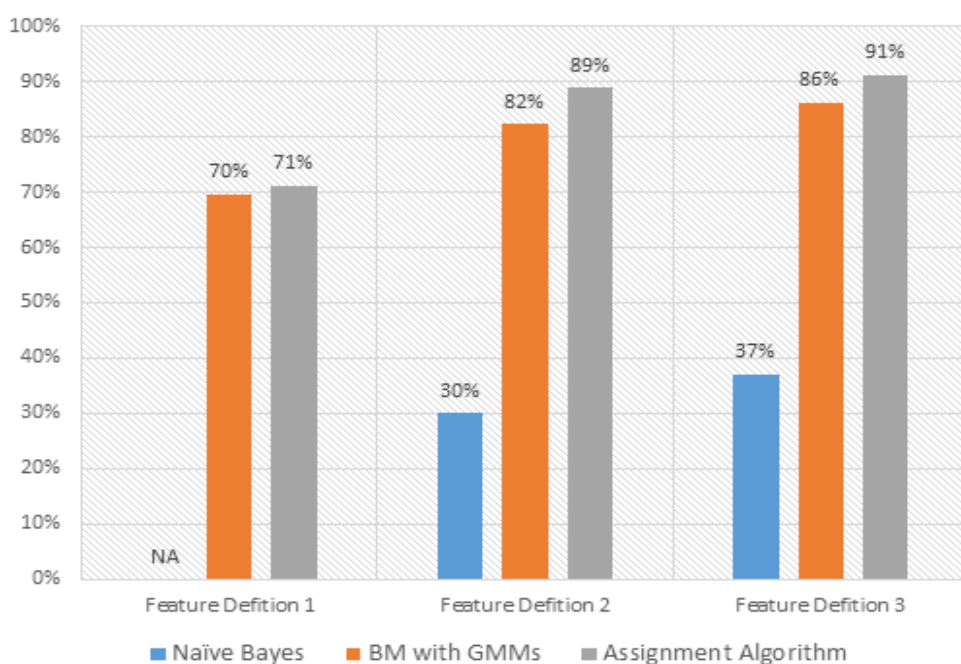
Behavior research plan and conceptual visualization of the app interface.

Predicting Origin-Destinations for Trucks in Large Networks by Solving the Vehicle Re-Identification Problem

By M. Cetin (ODU)

While other modes are clearly important for freight transportation, trucking is the dominant mode in terms of tonnage and value in the USA. Monitoring freight movement and freight transportation performance is essential for implementing effective policies and making informed decisions to enhance and to efficiently manage the freight transportation system. One of the key aspects of monitoring freight over the highways has to do with determining the flow patterns of trucks, which can be achieved by uniquely identifying trucks at specific points along the roads or by tracking individual trucks using technology such as GPS. However, not all trucks are equipped with tracking devices. While point sensors along the highways allow determining the total truck volumes, they do not provide much information about the paths and origin-destinations for trucks. By exploiting vehicle-specific attributes (e.g., axle spacings, length) collected by such sensors vehicles can be re-identified (matched) to enable prediction of paths taken by trucks. In this project, re-identification models for matching vehicles between two Continuous Count Stations (CCSs) are developed. At a typical CCS, total vehicle length, and axle spacings are measured per vehicle basis. Such data are then archived for future use.

% Accurate Matches vs Model Types



Vehicle matching accuracy by model types for various vehicle features.

Through this NTC funded project, Dr. Cetin and his students developed advanced statistical models to match vehicle records collected at two sites as accurately as possible. For solving the re-identification problem, they considered various modeling options including Naïve Bayes (NB), Bayesian Models (BM)s fitted by Gaussian Mixture Models (GMMs), and solving the re-identification problem via a mathematical Assignment Algorithm (AA). In addition, they evaluated the influence

of selecting specific vehicle features and similarity measures through numerical experiments conducted on real-world data. The results demonstrate that the accuracy in matching is higher in Bayesian Models fit by GMMs when compared with the NB models. However, the results from the AA outperforms those from the Bayesian models. In addition, expressing the similarity between measurements from two stations as a percentage difference is found to be more advantageous.

Port City Challenges E-Nav (“Electronic Navigation”): The Future of Waterborne Shipping

By B. Stich (UNO)

This NTC funded research paper investigated the importance of implementing the various technologies associated with electronic navigation strategies, or E-nav. The objective was to find the main conceptual barriers within the maritime community to the fullest possible implementation of this technology. To this end, the researchers conducted a self-administered email survey of the most knowledgeable individuals we could find regarding this topic. The survey questions were based on the most pressing issues related in the literature review. A content analysis of the survey responses was conducted to uncover the dominant themes in the thinking of these professionals concerning the benefits and challenges of global implementation of these navigational technologies, some of which are emerging and evolving during the course of this writing. The findings indicate that for this study, the primary concerns about fully implementing E-nav technologies are: 1). the technology may be oversold to a younger generation of mariners, leading to the unintended consequence of an increase in maritime accidents related to the mariners’ failure to sufficiently blend the technology with traditional seafaring– this is most often referred to in the literature and by our respondents as “looking out the window”; and, 2): that E-nav technologies are being cultivated



with the purpose of implementing “drone” or pilotless shipping which mariners are resistant to because of safety and labor concerns. We relate the history of development of the E-nav concept as well as that of the more relevant technologies, such as satellite relaying, electronic buoys, web-based platforms for communications between vessels and shore. Next, the study discussed the history of some international maritime bodies’ attempts to implement these strategies globally and the various roadblocks these attempts have encountered. In addition, E-nav’s

impacts concern overall maritime cybersecurity, the advantages it has in terms of general shipping safety and the efficient global movement of goods, and its capacity to mitigate certain environmental impacts associated with shipping, such as oil spills were presented. Finally, the outcome of our efforts to identified relevant stakeholders in the implementation of the E-nav strategy, and their openness or resistance to opportunities for implementing these recommended navigational changes, for the purpose of cultivating a workable proposed implementation strategy for the full realization of the E-nav paradigm.

Putting the L-08 Freeway Reliability Modeling Tool Through Its Paces

By B. Williams (NCSU)

The soon-to-be-completed year 1 project titled Validation of Travel Time Reliability Prediction from Probe Data will provide a rigorous assessment of the accuracy and use case effectiveness of the FREEVAL-2015 tool. The FREEVAL tool (FREEVAL is short for FREeway EVALuation) was first developed as part of the methodological advances provided by the 2000 edition of the Highway Capacity Manual. The original FREEVAL tool provided the sorely needed capability to model multi-segment freeway facility under a full range of conditions, including periods of oversaturation where one or more freeway queues form.

Building on this base model, FREEVAL-2015 models a specific study period (such as PM Peak, 6 a.m. to 10 p.m., or 24 hours) over a reliability reporting period. The distribution of speeds and travel time over the reliability reporting period is created by analysis of a carefully designed set of scenarios, which each have a specific probability of occurrence during the reporting period. Using either national or local data traffic demand profiles, crash rates, and incident to crash ratios along with detailed local weather station data, the FREEVAL-2015 scenario generator creates a series of scenarios with varied demand, incident, and weather conditions that sufficiently span the conditions that may arise during the reliability reporting period.

For each site (on I-540, I-95, and I-40), a long-term Bluetooth data collection effort was undertaken. The process Bluetooth data, along with processed INRIX data from RITIS (and in the case of I-540, side fire radar data) are used to establish near ground truth travel time distribution. These observation-based travel time distributions are compared



Shown is the typical Bluetooth (BlueMAC) unit: the sensor unit with its attached solar panel is mounted above the battery pack unit.

to FREEVAL-2015 outputs. For this comparison, a variety of study periods will be evaluated, and FREEVAL-2015 will be run using various levels of local data. That means FREEVAL will be run first using as many program defaults as possible, then it will be run using local crash, incident, and demand data, and finally, it will be run with this local data plus as close a replication to actual weather occurrences as possible. Comparison of the first two methods will yield information on the accuracy gains from the use of local incident and demand data. These two methods are likely to have specific use cases in practice.

The final method, where an attempt is made to accurately duplicate the actual weather conditions experienced during data collection, is not likely to be a useful method in practice. However, comparing the relative accuracy of this method to the others will isolate the possibility of errors due to the data collection period experiencing abnormal weather and will therefore allow assessment of the ability of FREEVAL-2015 to accurately reproduce travel time distributions when incidents, demand, and weather are all represented as accurately as possible in the model inputs. Stay tuned for the project final report in Spring 2016.

Intersection Capacity Analysis: An International Perspective

By C. Davis (MSU)

Dr. Celeste Chavis, assistant professor in the Department of Transportation & Urban Infrastructure Studies at Morgan State University, conducted a mobility study in Nairobi, Kenya sponsored by IBM. Interestingly, most intersections do not have traffic signals and congestion at roundabouts can turn a 20-minute trip into a two-hour one.

The main roads in Nairobi, a city of about 3 million people, are home to trucks, cars, minibuses, motorcycles, bicycles and pedestrians, and when they back up, there are few alternative routes. In the downtown area, the streets are narrow, and in the outlying areas, many minor roads are unpaved and pushcarts are still in use, not to mention the occasional herd of grazing cattle meandering into a road. In the city, traffic police officers are stationed at the roundabouts, which are a constant choke point. Dr. Chavis spent



A busy intersection in Nairobi, Kenya.

six weeks researching ways that police can better control those intersections to improve traffic flow. She used sensor data from cellphones installed on government vehicles and video cameras to create a

database of traffic flow, and she is still gathering the final data to complete her research. Her objective is to optimize the time dedicated to each approach to increase the overall intersection capacity.

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Distracted Driving, Inattention Blindness, and the Analysis of Failed Pedestrian Detection

By B. Wolshon (LSU)

Inattention blindness is a failure to notice unexpected events due to an individual performing an attention-demanding task, even if the unexpected event occurs in the individual's line-of-sight. While operating a motor vehicle, drivers must pay attention to other moving vehicles while remaining vigilant to their surrounding environment in order to detect and process critical information related to the driving task.

As the visual complexity of the driving environment increases, the ability to detect critical targets degrades. This study seeks to understand the effects of inattention blindness on driver performance. Using a state-of-the-art driving simulator, 180 participants were asked to track neighboring vehicle movements under various roadway environments with the independent variables being number of vehicles to track, the visual complexity of the environment, and the expectations for a

critical target. This research advances the understanding of how drivers allocate attention between various stimuli and the trade-offs between a driver's focus on an assigned task and external objects within the roadway environment. Moreover, the results of this research lend insight into how to construct roadway environments that encourage driver attention toward the most immediate and relevant information to reduce both vehicle-to-vehicle and vehicle-to-pedestrian interactions.

FEATURED RESEARCH PROJECTS

A City with Fully Coordinated Vehicle Sharing System:

Finding Optimal Solutions for Vehicle Routing Problem with Pickup and Delivery Services with Time Windows

By X. Zhou (ASU)

Optimization of on-demand transportation systems and ride-sharing services involves solving a class of complex vehicle routing problems with pickup and delivery with time windows (VRPPDTW). This paper first proposes a new time-discretized multi-commodity network flow model for the VRPPDTW based on the integration of vehicles' carrying states within space-time transportation networks, so as to allow a joint optimization of passenger-to-vehicle assignment and turn-by-turn routing in congested transportation networks. Our three-dimensional state-space-time network construct is



able to comprehensively enumerate possible transportation states at any given time along vehicle space-time paths, and further allow a forward dynamic programming solution algorithm to solve the single vehicle VRPPDTW problem. By utilizing a Lagrangian relaxation approach, the primal multi-vehicle routing problem

is decomposed to a sequence of single vehicle routing sub-problems, with Lagrangian multipliers for individual passengers' requests being updated by sub-gradient-based algorithms. We further test our algorithms on medium-scale and large-scale transportation networks, namely the Chicago sketch and Phoenix regional networks.

intelliRoute: A Prototype Mobile System for non-recurrent Congestion Mitigation Driven by Crowdsourced Data

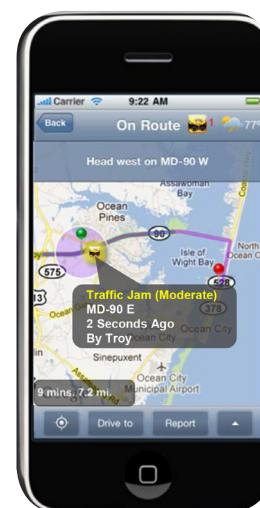
By G.L.Chang (UMD)

This research seeks to develop a smartphone-based prototype system that supplements the 511 system to improve its real-time traffic routing service to state highway users and mitigate non-recurrent traffic congestion.

The development of the proposed product shall not require any hardware investment in the current 511 system; the maintenance and further improvements of the Smartphone application could be done through software upgrades, which would make the application reusable for future developments. Finally, the

application would provide a critical piece of the long-term push toward enabling the advanced data communication capabilities of the 511 system.

The proposed research will result in huge economic savings for the transportation industry (e.g., thousands of tons of reduced fuel wastage and emissions, millions of vehicle-hours travel time savings of motorists, less operational costs for freight companies, and reduced economic loss due to less secondary incidents). Such benefits will increase greatly in the future, with an expected increase in traffic on state highway network.



The app interface.

The Maryland Integrated Transportation Analysis Modeling System

By L. Zhang (UMD)

The Maryland State Highway Administration (SHA) recognizes the value of an integrated, multi-modal, safe, reliable, and efficient transportation system to support and sustain economic growth in the region, state and nation. The State of Maryland, home to 5.8 million people, is located in the middle of the eastern seaboard of the United States. Contained within the State's boundaries is the heavily congested Baltimore-Washington metropolitan region. The dense land use, economic activity, over-saturated conditions and limited system expansion capabilities over time have presented unique mobility, reliability, environmental and economic vitality challenges. SHA has been working very closely with the Baltimore Metropolitan Council (BMC) to develop and advance complimentary tools and applications



to support regional and statewide transportation decision-making.

The MITAMS project is composed of integrated advanced travel demand models with fine-grained time-sensitive traffic network models to

support agency goals in the areas of planning, integrated planning and operations, and transportation systems management and operations (TSM&O) at statewide, metropolitan, and subarea/corridor levels.

A System-of-Systems Approach to Creating Resilient Transportation Systems given Interdependencies with Other Critical Lifelines

By E. Miller-Hooks (UMD)

Having a resilient transportation infrastructure system that performs well under multiple hazard situations is critical to a community. A transportation system is a complex, multi-modal system consisting, among other modes, of rail, highway, air, and maritime networks, and ports

or other intermodal connections which link such networks. Moreover, transportation networks are inherently interconnected with other critical lifelines, including power, telecommunications, water, sanitation, and building infrastructure networks, which are themselves complex systems. This work develops a deeper understanding of the effects of interactions between critical

infrastructure lifelines (including water, wastewater, power, natural gas, communications and cyber) and transportation systems. It further investigates the role of these interdependencies in transportation system resilience, and develops resilience quantification tools that account for the impact that arises from these interdependencies on resilience level.

PROJECT LIST

Universities	PI/Co-PI	Category	Funded Project Titles
ASU, MSU	Aaron Golub, Alex Karner, Celeste Chavis	Applied Research	Understanding Regional Disparities in Public Transit Performance Using Realtime Transit Data
ASU, UMD	Pitu Mirchandani, Xuesong Zhou, Lei Zhang	Basic Research	Developing a Multi-resolution Traffic Simulation Platform for Integrated Active Traffic Operations Evaluation in Metropolitan Areas
ASU, UNO	Shane Underwood, Bethany Stich	Advanced Research	Evaluation of Infrastructure Impacts from Movements near Seaports
NCSU, ASU	Christopher Frey, Nagui M. Rouphail, Xuesong Zhou	Applied Research	Development and Demonstration of Advanced Methods for Quantifying Freight Truck Activity, Energy Use, and Emissions
NCSU, ASU	Behzad Aghdashi, Xuesong Zhou	Advanced /Applied Research	Data Fusion Aided Freeway Analysis for HCM
NCSU, ODU	Bastian Schroeder, Mecit Cetin	Advanced /Applied Research	Guidance for Field and Sensor-Based Measurement of HCM and Simulation Performance Measures
NCSU, LSU	Billy M. Williams, Brian Wolshon	Basic Research	Identification of Potentially Hazardous Roadway Network Locations Using Microscopic Observational Vehicle Data and Macroscopically Modeled Reaction Time
NCSU, UMD	George List, Asad Khattak, Lei Zhang	Advanced Research	Safety and Travel Time Reliability: Analyzing Large-Scale Truck Involved Crashes
ODU, UMD	Mecit Cetin, Andrew Collins, Mike Robinson, Lei Zhang	Basic Research	Open Toll Lanes in a Connected Vehicle Environment: Development of New Pricing Strategies for a Highly Dynamic and Distributed System – Phase II
UMD, NCSU, MSU	Paul Schonfeld, George List, Hyeonshic Shin	Applied Research	Improving the Reliability of Freight Transportation
NCSU, UMD	James Martin, Eugene Murray, Mark Franz	T2	“Moving Transportation Research to Practice” Webinar Series
UMD, ASU	Lei Zhang, Xuesong Zhou	T2	Workshop on DTALite and Integrated AgBM-DTALite Model
ASU	Mikhail V. Chester	Basic Research	The Saturation, Economic, and Energy Effects of Maturing Urban Roadway Networks
	Yingyan Lou	Basic Research	Distributed Traffic Monitoring and Prediction with Vehicle-to- Vehicle Communications
	Michael Mamlouk	Applied Research	Effect of Traffic Roundabout on Safety in Arizona
	Mounir El Asmar	Applied Research	Analysis of Funding Streams for Public Private Partnerships in the U.S. Transportation Sector
LSU	Melissa R. Beck	Applied Research	Minimizing Driver Errors: Detecting Unexpected Targets In Familiar Environments

PROJECT LIST

Universities	PI/Co-PI	Category	Funded Project Titles
UMD	Ali Haghani	Advanced	Advanced Volatility Models for Improving Travel
	Elise Miller- Hooks	Advanced /Applied Research	A System-of-Systems Approach to Creating Resilient Transportation Systems given Interdependencies with Other Critical Lifelines
	Gang-Len Chang	Applied Research	intelliRoute: A Prototype Mobile System for Non-recurrent Congestion Mitigation Driven by Crowd-sourced Data
	Cinzia Cirillo	Advanced /Applied Research	Understanding Changes in Travel Behavior due to Managed Lanes
UNO	Bethany Stich	Applied Research	Incorporating Freight and Trade in the Comprehensive Plan: A Megaregion Case Study
UMD	Ahmet Aydilek	Research	Hydraulic and Environmental Behavior of Roadway Millings in Highway Shoulder Applications
	Qingbin Cui	Research	Efficient and Effective Implementation of Alternative Project Delivery
	Paul Schonfeld, Miller-Hooks	Research	Safe Accommodation of Bicyclists on High Speed Roadways in Maryland
UNO	Bethany Stich and Carol Short	Education	Master of Science in Transportation Degree Program Development
UMD	Mark Franz	Education	NTC@Maryland Undergraduate Summer Research Program
	Ali Haghani	Education	On-line Master of Engineering Program in Transportation Systems Engineering and Planning
	Lei Zhang	Education	UMD Transportation Seminar and Webinar Series
UMD	Mark Franz	T2	Enhancing the Impact of the Freight Academy via Academic Collaboration
	Lei Zhang and Paul Schonfeld	T2	Workshop on Broader Economic Benefits of Multimodal Projects
	Charles Schwartz	T2	UMD-SHA Undergraduate Student Internship Program
	Lei Zhang	T2	NTC@Maryland Student-Professional Networking Event
	Lei Zhang and Mark Franz	T2	NTC@Maryland Exhibition at ARPA-E Summit, US DOT Datapalooza, and TRB
	Qingbin Cui	T2	PPP Workshop
	Cinzia Cirillo	T2	Autos, People and Policies (APPs): Addressing the Issues of the New Millennium
ASU	Xuesong Zhou and Kamil Kaloush	T2	Rail and High Speed Rail Symposium
ALL	Various PIs	T2	NTC@Maryland Co-funded 6 additional projects with State DOTs

FEATURED PRINCIPAL INVESTIGATORS

Mecit Cetin, Ph.D.



Mounir El Asmar, Ph.D.



Sherif Ishak, Ph.D., P.E.



Dr. Mecit Cetin is the Director of Transportation Research Institute and Associate Professor at the Civil and Environmental Engineering Department at Old Dominion University. He also holds a joint appointment with Modeling, Simulation, and Visualization Engineering Department and is affiliated with the Virginia Modeling, Simulation, and Analysis Center. He is also a member of the TRB Committees on Urban Transportation Data and Information Systems, and on Artificial Intelligence and Advanced Computing Applications. His publications include 50 refereed international conference proceedings and 17 articles in archived journals.

Dr. Cetin is currently directing various research projects as the principle investigator totaling more than \$1.5M. He is currently leading a project funded by NTC@Maryland to investigate new pricing strategies for toll roads in a connected/automated vehicles environment. His research area include mining big transportation data, modeling and simulation of traffic operations, congestion pricing and sustainable transportation.

Dr. Mounir El Asmar is a faculty member at Arizona State University's School of Sustainable Engineering and the Built Environment in the Del E. Webb School of Construction. He also is a Senior Sustainability Scientist with the Global Institute of Sustainability, an Honors Faculty with the Barrett Honors College, and the Co-Director of Sustainable Construction with the National Center of Excellence on SMART Innovations.

Dr. El Asmar has focused on improving the performance of the built environment and the stakeholders delivering it through his research. He uses mathematical and statistical modeling of industry data to enhance performance through Innovative Project Delivery Systems, and developing Decision-Making Tools for the industry. He has successfully conducted applied work for diverse organizations, ranging from the Construction Industry Institute (CII); to the Design-Build Institute of America (DBIA); the National Science Foundation (NSF); and organizations in the U.S., Europe, and the Middle East. His scholarship has received numerous recognitions and awards.

Dr. Sherik Ishak is the Interim Associate Dean of Engineering for Academic Affairs and the Lloyd J. Guillory Professor of Civil Engineering at Louisiana State University. He is also the founder of the Intelligent Transportation Systems lab at Louisiana Transportation Research Center and the LSU driving simulator facility, and the chair of the TRB Committee on Artificial Intelligence and Advanced Computing Applications (ABJ70). Dr. Ishak is also a board member of the Gulf Region Intelligent Transportation Society, and an associate editor for the Canadian Journal of Civil Engineering, and was nominated to serve on NCHRP panel 20-102, charged with research regarding the Connected and Automated Vehicles roadmap.

His research area includes traffic operation and control, traffic safety, and applications of intelligent transportation systems. Since joining LSU, he served as a PI or co-PI on 35 research projects funded by the Louisiana Department of Transportation and Development, Louisiana Board of Regents, National Science Foundation, USDOT, and University Transportation Centers.

FEATURED PRINCIPAL INVESTIGATORS

Hyeon-Shic Shin, Ph.D.



Dr. Hyeon-Shic Shin is an assistant professor in the School of Architecture & Planning at Morgan State University. His research interests include transportation economics and safety, freight transportation demand management, land use and transportation, and social/environmental justice. Recently completed research includes Measuring the Economic Contribution of the Freight Industry to the Maryland Economy; Safety Analysis for the Prioritized Three Safety Improvement Locations on I-495; The Development of Local Calibration Factors for Implementing the Highway Safety Manual in Maryland; and Maryland Motor Carrier Program Performance Enhancement.

Currently, he is conducting several studies funded by various sponsors that include the U.S. Department of Transportation, Maryland State Highway Administration, and U.S. Environmental Protection Agency. He also teaches classes in quantitative analysis methods for planners, transportation planning, urban economics for planners, and public policy analysis.

Bethany Stich, Ph.D.



Dr. Bethany Stich is the Department Chair of Planning and Urban Studies and the Interim Director of the Merritt C. Becker Transportation Institute (UNOTI) at the University of New Orleans. Stich serves as the Co-Principal Investigator of UNOTI's two University Transportation Centers, the National Center for Strategic Transportation Policies, Investments and Decisions housed at the University of Maryland and the Maritime Transportation Research & Education Center housed at the University of Arkansas. Additionally, Stich serves as the Principal Investigator for the Department of Homeland Security Center of Excellence for Maritime Resiliency housed at Louisiana State University. Stich serves on the Transportation Research Board's Intermodal Freight Committee as the Subcommittee Chair and on the Committee on the Logistics of Disaster Relief and Business Continuity. She serves on the American Society for Public Administration's Section for Public Administration Research and is the Past President of the Section on Transportation Planning and Administration.

Billy Williams, Ph.D., P.E.



Dr. Billy Williams is an associate professor at the Department of Civil, Construction and Environmental Engineering at North Carolina University. Prior to his academic career, he served four years' active duty in the United States Navy's Civil Engineer Corps where he was awarded the Navy Commendation medal, and he spent five years as a consulting engineer with Kimley-Horn and Associates.

Since joining the North Carolina State Faculty in 2002, Dr. Williams has been involved in projects that have contributed to system performance measurement and improved the understanding and modeling of stochastic capacity and travel time reliability. Dr. Williams is a member of ASCE (serving as chair of the Transportation and Development Institute's Advanced Technologies Committee from 2010 to 2015), TRB, and ITE.

Dr. Williams is currently leading two UMD NTC research projects, one about a new version of the Highway Capacity Manual freeway evaluation tool FREEVAL, and the other about improving the predictive accuracy of safety performance functions.

FEATURED STUDENTS

David Ramsey



Siavash Shojaat



Laura Bianca-Pruett



David Ramsey's Ph.D. research focuses on benchmarking the performance of Public-Private Partnerships and design-build in the U.S. transportation sector. He has co-authored five journal articles on the topic; two of which are accepted and three currently under review. David's work received several awards, including the ASU Engineering Dean's Fellowship.

Working with Dr. Mounir El Asmar on a grant from the National Center for Strategic Transportation Policies, Investments, and Decisions at UMD David was the lead Ph.D. student conducting research to quantify and benchmark the performance of U.S. PPP transportation projects. The findings, based on a study of 81 projects, reveal that PPP can improve cost control on transportation projects. David also worked with Dr. El Asmar to quantify the PPP financing contributions of public and private sources in the U.S. transportation sector, finding PPP as a process to leverage public financing and almost double the amount of infrastructure delivered to the public.

Siavash Shojaat is an Iranian student with a Master's degree in Civil Engineering in field of Transportation Planning and pursuing a Ph.D. Degree at Louisiana State University. Siavash has also worked as a consulting engineer in the transportation field on six projects with Imen Taghato Company, and was in charge of traffic justification of two roads.

From different courses in his Master's program, Siavash became particularly interested in Traffic Engineering, and decided to pursue his passion. In his thesis, titled "Stochastic Model of Freeway Capacity and its Application to Times of Disaster," Siavash explored the estimation of freeway capacity with stochastic approach and suggesting that capacity does not have a single value but is regarded as a random variable closely related to demand. He estimated both parametric and non-parametric capacity distribution functions of two sections in one direction of Tehran-Karaj freeway (as the oldest and busiest freeway in Iran) as a function of traffic volume.

Laura Bianca-Pruett is a Master's student studying City and Regional Planning at Morgan State University. She is working with Dr. Hyeon-Shic Shin, an assistant professor in the City & Regional Planning program at Morgan, on research into freight villages and urban distribution centers. The work takes on renewed significance in Maryland as Sparrows Point, the former site of Bethlehem Steel, is redeveloped into a global logistics hub. Bianca-Pruett is also interning at the Maryland Transit Administration, where she is working on the development of the new, comprehensive BaltimoreLink transit system for the greater Baltimore area. In 2015 Laura was among the nominees for NTC@Maryland Student of the Year.

Bianca-Pruett graduated from Lynchburg College in Virginia, where she majored in English and writing. While taking an elective, *The Rise of the American City*, the self-proclaimed "roadgeek" who has always been fascinated by transportation decided to follow her passion at Morgan State.

FEATURED STUDENTS

Elizabeth Williams



Elizabeth Williams is pursuing her doctorate degree at North Carolina State University. She has previously graduated from North Carolina State University with her Bachelors of Science in Civil Engineering and her Master of Civil Engineering. She is a research assistant for Dr. George List, studying freight reliability, truck safety, and high speed rail. In addition, Elizabeth is a teaching assistant for the Introduction to Traffic Engineering course and the Railroad Engineering course. She is currently working on completing her Certificate of Accomplishment in Teaching through the Graduate School at North Carolina State University. Upon finishing her degree, Elizabeth hopes to stay in academia as a professor.

During her graduate career, Elizabeth has gained recognition through the WTS NC Triangle: Leadership Legacy Graduate Scholarship and the Bruce Edward Matthews Graduate Scholarship. She is treasurer of the student chapter of Institute of Transportation Engineers at North Carolina State University.

Olcay Sahin



Olcay Sahin is currently a Ph.D. student at Old Dominion University, Norfolk. He received his Bachelor of Science in Industrial Engineering from International Black Sea University, Tbilisi, Georgia, where he worked on enterprise resource planning and modeling. He holds a Master of Business Administration degree from Strayer University and Master of Science degree in Modeling, Simulation, and Visualization Engineering from Old Dominion University.

He is currently working on modeling vehicle crash frequency using multiple structured and unstructured data sources. He worked on the vehicle re-identification project funded by NTC@Maryland. His research interests include data mining, big data, intelligent transportation systems, microscopic traffic simulation, statistical analysis, and database development. He is proficient in various programming languages and statistical analysis tools including Java, C++, Python, SQL, Hadoop, Spark, VISSIM, ArcGIS, R, SPSS, and Matlab.

Kyle Griffith



Kyle Griffith is pursuing his doctoral degree in urban studies with a focus on economic development and freight transportation planning at the University of New Orleans. His dissertation research centers on the process of policy change using United States-Cuba diplomatic relations as a case study. His current research interests include economic development policy, freight transportation planning, and public policy analysis throughout the Americas and Caribbean.

A researcher with the Merritt C. Becker Jr. UNO Transportation Institute, Kyle investigated freight corridor investment in the US Gulf Coast megaregion, assessed the feasibility of a Liquefied Natural Gas bunkering facility in the New Orleans metro region, and co-authored a paper discussing an expanded role for public administrators in freight transportation planning. He received a USDOT Dwight D. Eisenhower Graduate Fellowship, the 2015 Outstanding Student of the Year award from the Council of University Transportation Centers, and a UNO Latin American Studies Summer Travel Grant.

FEATURED STUDENTS & STUDENT AWARDS

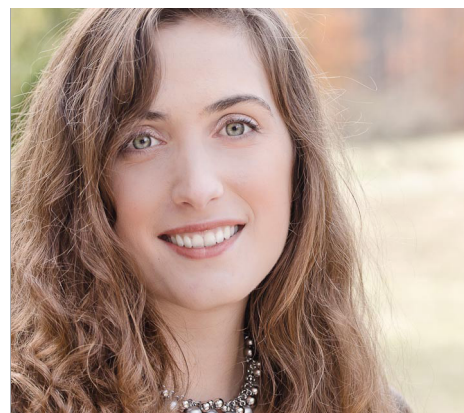
Featured Student from The University of Maryland: Anna Petrone

Anna Petrone is a 2nd year Transportation Engineering master's student working in the lab of Dr. Gang-Len Chang. In her first year as a master's student, Anna served as a seminar coordinator and website administrator for the ITS/ITE Maryland Student Chapter, which involved redesigning the group's website, posting upcoming events, taking notes at speaker events, and writing event reviews for the NTC website.

In the summer of 2015, Anna received a scholarship to attend the Shandong

University International Summer School on Transportation, in Qingdao China. That summer she also began an internship with a ride-sharing startup company called Split, based in Washington, D.C., which is allowing her to put her thesis research into practice.

The research aims to design an algorithm for an on-demand transportation system that matches a fleet of vehicle to individuals, who specify an origin and destination location and a desired arrival time.



Selected Student Awards



Jina Mahmoudi

2015 Women Transportation Seminar (WTS)
Ph.D. scholarship



Yanshou Sun

2015 recipient of the Electric Energy Utilization
Scholarship by American Railway Engineering
and Maintenance-of-Way Association (AREMA).

Recipient of a \$10,000 research stipend as part
of the Graduate Research Award Program on
Public-Sector Aviation Issues for the academic
year 2015-2016.



Arefeh Nasri

Ann G. Wylie Dissertation Fellowship for the
academic year 2015-2016

SELECTED STUDENT AWARDS

Selected Student Awards



Hyoshin Park

Award for ITS America 2015 Student Essay Competition

2nd prize winner of student paper award of the 2015 Transportation Research Forum (TRF) Annual Meeting



Derreck Deason

4th Annual Innovate UNO award (the University's juried undergraduate research, scholarship and creative showcase) for his research: "Pulling GIS into Port: Implementation of Enterprise Geographic Information Systems (GIS)"



Kyle Griffith

The National Transportation Center's 2015 Outstanding Student Award

2015 U.S. Department of Transportation, Dwight D. Eisenhower Graduate Fellowship Recipient



Online Master of Engineering Program in TRANSPORTATION SYSTEMS

IN HIGH DEMAND

Technological advancements and environmental concerns have compelled both engineers and policymakers to reexamine transportation systems and infrastructure across the U.S. and around the world. As transportation rapidly evolves, demand for transportation engineers continues to rise. Recognizing this, the University of Maryland A. James Clark School of Engineering has launched the first-ever online Professional Master of Engineering Program in Transportation Systems, with support from the National Transportation Center at Maryland.

The online program is modeled closely after the Department of Civil and Environmental Engineering's Master of Science degree in Transportation Engineering and Planning, a top-three national program.

PROFESSIONAL MASTER OF ENGINEERING

Students of the online Transportation Systems program will develop robust knowledge of transportation planning, travel behavior, traffic operations, safety, and design. Even more, students will tackle topics critical for understanding the myriad challenges impacting transportation today, including system optimization, transportation economics and policy, infrastructure vulnerability and protection, emissions estimation, and sustainability analysis.

With expertise in all transport modes, UMD students are trained to tackle problems involving both passengers and freight that arise along our roadways, airways, railways, and waterways,

as well as in their intermodal components. The problems that arise in the interdisciplinary field of transportation are complex and continue to change in character with changes in society, technology, and the environment.

Students will complete 10 total courses (30 credits) from below:

CORE COURSES

- Highway Traffic Characteristics and Measurements
- Regional Transportation Planning
- Urban Transportation
- OR Models for Transportation System Analysis
- Discrete Choice Analysis
- Transportation Network Algorithms and Implementations

TECHNICAL ELECTIVE COURSES

- Project Risk Management
- Cost Engineering & Control
- Project Performance Measurement
- Intelligent Transportation Systems
- Highway Safety
- Urban Transit Planning and Rail Transportation Engineering
- Applications of OR in Transportation Systems Management
- Transportation Economics

**** The online Professional Master of Engineering program is designed to allow full-time students to complete the degree in two academic years.**



A. JAMES CLARK
SCHOOL OF ENGINEERING

OFFICE of ADVANCED ENGINEERING EDUCATION
advancedengineering.umd.edu

EDUCATION & WORKFORCE DEVELOPMENT

The University of Maryland transportation engineering program graduates professionals who have mastered material in many disciplines, including for example mathematics, computer science, architecture and urban planning, operations research and management science, logistics, economics and psychology.

With this training and an emphasis on both academic education and professional development, our graduates are now professors and researchers at universities and research institutes in the U.S. and abroad; industry experts in local, national and international firms; and local, state and federal government officials.

FACULTY EXPERTISE

University of Maryland transportation engineering faculty have contributed expert knowledge and celebrated research success in areas ranging from transportation network modeling, transportation economics and policy, and discrete choice analysis, to real-time traffic simulation, emergency preparedness and incident management, and mass transit operations. Their successes are evidenced by research activities currently underway in the Center for Advanced Transportation Technology (CATT), the federally-funded National Transportation Center (NTC), and the recently funded ARPA-E project, “Integrated, Personalized, Real-time Traveler Information and Incentive Technology for Optimizing Energy Efficiency in Multimodal Transportation Systems.”

NOW IS THE TIME TO START!

The University of Maryland and the Clark School of Engineering have been leaders in distance education for many years, earning a reputation for offering top-quality programs around the world. The online Professional Master of Engineering in Transportation Systems incorporates a cutting-edge, multidisciplinary curriculum designed for working engineers and technical professionals.

ADMISSION REQUIREMENTS

- A bachelor's degree in engineering or science from an accredited institution
- GPA of 3.0 or better
- Three letters of recommendation

Completed applications are reviewed and considered for admission on a case-by-case basis.

Applicants who have a GPA between 2.7 and 3.0 could be admitted provisionally. Under provisional admission, students must earn a grade of “B” or better in their first two to four courses in order to gain full admission.

CONTACT

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Master of Science Degree in Transportation at UNO



UNO Students at Port of New Orleans Tour.

The Louisiana Board of Regents has approved a new Master of Science in Transportation degree at the University of New Orleans, making it the first degree of its kind in the state. The program, which will launch in the fall semester of 2015, will also be one of the first in the United States that will train students in multimodal freight and passenger transportation systems.

“This program will fill a vital need in training Louisiana residents to advance in a well-paid industry with an abundance of job opportunities,” said John Renne, associate provost of urban initiatives and director of the Merritt

C. Becker Jr. UNO Transportation Institute. “The transportation industry is one of the fastest growing in the state, and it has an average salary of nearly \$70,000 in the metro New Orleans area. We are excited that UNO will further solidify its role as a university that trains the nation’s future transportation leaders.”

The Master of Science in Transportation will be designed for working professionals seeking career advancement. It will be offered in a hybrid online and on-campus format, similar to many other executive master’s degree programs. It will

provide students with the flexibility of an online program and the benefits of concentrated on-campus meetings that will allow students to build a professional network with classmates, instructors and industry-affiliated partners.

The program will be 33 credits, including an 18 hour credit core. Students will choose among one of three specializations: transportation planning, transportation administration or a self-directed concentration. Students will also complete a six-credit capstone or thesis option.

Smart Lecture Series

In 2015, NTC@Maryland member universities offered 42 seminars and webinars in total that reached more than 2,000 attendees from universities, government agencies, and the private sector.

In the fall of 2015, UNOTI launched an online “Smart Lecture Series” featuring experts in the transportation field. The lectures, which are part of the MST curriculum, are held at UNO. Video recordings can be accessed on the UNOTI website as well as YouTube and are available to the public.

The fall 2015 lectures featured the following:

- **Mr. Billy App, CEO of JW Allen and Co, a New Orleans-based global logistics company providing customs clearance and freight forwarding services since 1932.** Mr. App spoke to his decades of experience as a transportation professional, with lessons for transportation students and young professionals seeking to enter the freight forwarding field.
- **Captain Douglas J. Grubbs, a retired Crescent City River Port Pilot.** In 1962, Captain Grubbs began his maritime career as a deckhand, and in this talk, took students and attendees on his professional journey from a \$1-an-hour deckhand job to a Louisiana State commissioned River Pilot.
- **Dr. William D. Ankner, CEO Transportation Solutions, former Louisiana Transportation Secretary.** Dr. Ankner discussed the role of transportation in society past, present and future.



NTC@Maryland students and faculty attending a Smart Lecture.

UMD-SHA Internships

The NTC@Maryland hosted 17 undergraduate student interns from the University of Maryland and Morgan State University to work at the Maryland State Highway Administration (SHA). The internship program covers a multitude of subject areas, including surveying, structure inspection, pavements and geotech, community design, and highway hydraulics. The selected student interns earned these prestigious positions based on outstanding academic performance and professional recommendations.

SHA Office	UMD Intern
Office of Highway Development, Highway Hydraulics Division	Krystal Yhap, Jacob Schaperow, Mark Montgomery, Samantha O'Donnel
Office of Highway Development, Highway Design Division	Joy Wang, Jill Smith, Paige Cannon, Benjamin Devine
Office of Highway Development, Plats and Surveys Division	Joseph Palazzo
Office of Highway Development, Design Technical Services Division	Yating Zhang
Office of Planning and Preliminary Engineering	Jeremy Knight
District 4	Daniel Webb
Office of Materials Technology	Matthew Terrier
Office of Environmental Design	Esanye Ogbe
Office of Structures	Daniel Pedraza, Yifan Zhu, Binato Qin



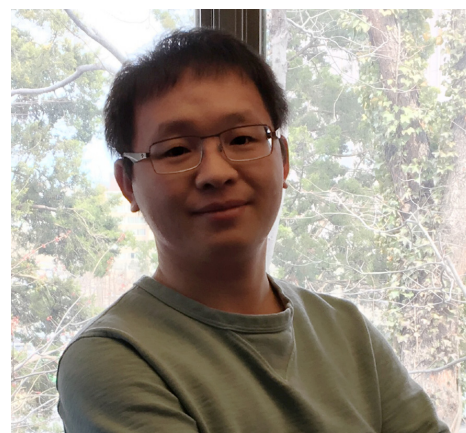
Benjamin Devine

"I had a very good experience during my internship. I was an intern for the Community Design Division and was assigned to a small team of 3 engineers, under the direct supervision of a team leader. This internship helped me learn about transportation engineering, Micro Station, better organizational and communication skills."



Esanye Ogbe

"Working with the SHA has been a very beneficial step forward in my engineering career. This internship was a great starting point, and I only see myself building on my skills as I continue towards graduation and eventually working within environmental engineering and consulting."



Binato Qin

"My internship at Maryland Highway Administration, Office of Structures was a wonderful experience that I would recommend to anyone interested in getting some real world experience. It provided a tremendous opportunity for me to understand what it is like to work in a design office that maintains and repairs bridges."

EDUCATION & WORKFORCE DEVELOPMENT



Jacob Schaperow

"During my internship, I grew fascinated with techniques for predicting stormwater flows. The semester after the internship, I joined a research team at my university to work on developing a stormwater model of the campus. This fall, I will start graduate study in hydrology, with a focus on hydrologic modeling."



Joy Wang

"As an intern at SHA, I was able to get a better understanding of the transportation field, and I hope to gain experiences in other fields too. I also have a better understanding of my own interests and the type of work environment that would suit me. Working at SHA has opened more doors to career opportunities, and I am very grateful."



Matthew Terrier

"My summer internship with the SHA was a valuable experience that showed me the interesting and challenging aspects of pavement design and engineering. It piqued my interest in highway design and construction, and inspired me to continue to explore this area of study as I complete my degree in civil engineering."

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Krystal Yhap

"This internship allowed me various learning experiences and opportunities to interact with different types of professionals. It was a unique and uplifting experience and hope to work with State Highway Administration in the future. I will be forever grateful for my time spent as an intern at State Highway Administration."



Joseph Palazzo

"As an intern, the majority of my time was devoted to working with a surveying crew on multiple projects across Maryland. Having no prior surveying experience, I found this internship to be both practical and meaningful. This great opportunity with SHA has exposed me to a vital application of engineering that will benefit me in my future career."



Yifan Zhu

"My internship at State Highway Administration had been a wonderful experience and I would recommend doing an internship with SHA to anyone interested in getting some real world experience. What I had gained in this internship is much more than I can say and I really appreciate that I could have this opportunity to work with SHA."

Undergraduate Summer Research Program

NTC@Maryland sponsored 8 undergraduate students as part of the inaugural Undergraduate Summer Research Program, 6 of which were from universities other than UMD. The program participants worked with UMD transportation faculty on cutting edge research projects and participated in other events such as participating in Datapalooza at the USDOT Headquarters in Washington, DC.

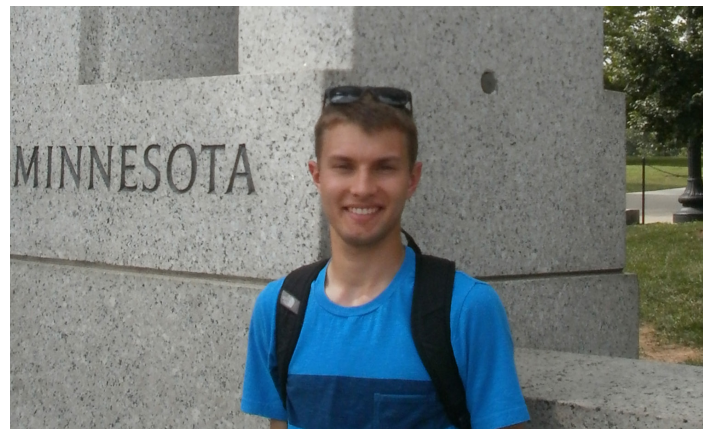


2015 USRP Participants with NTC@ Maryland Faculty.



Jamille Almeida Brito,
University of Maryland

"During this past summer, I have been challenged into joining the USRP group and engage in new projects led by Dr. Cirillo. I immersed myself in reading, listening and learning as much as I could about Transportation Engineering. I am very thankful for participating in the program; it has helped me develop many skills and made me able to work in my area of interest."



Robert Rudin,
University of Minnesota

"At the UMD, I participated in research for two different projects. It was a marvelous opportunity to experience research as an undergraduate student before having to make a commitment to graduate studies. I had a positive experience and I gained a lot of firsthand knowledge with the research field and was able to meet many wonderful people."

EDUCATION & WORKFORCE DEVELOPMENT



Evan Lockhart,
University of Tennessee

"I am very grateful for the opportunity to have worked for the UMD and learn how transportation engineering research is conducted. Not only did this program benefit me academically, but also independently. I was introduced to a new environment in Maryland and can honestly say that I thoroughly enjoyed it."



Gina Rivera,
Arizona State University

"I grew not only professionally but personally as well. This experience is something that I feel sets me apart from all other students in Civil Engineering. My internship helped me find out what it is that I truly want to do research on during my graduate years. Dr. Zhang is a great professor and I can tell that he truly cares about his student's success."



Noah Bell,
University of Vermont

"I really enjoyed my time working in the transportation lab. One aspect that I particularly enjoyed was the networking opportunities. I attended a transportation data conference at the USDOT office and met a lot of interesting professionals. I also attended networking luncheons and met businesses that do work with the NTC@Maryland."



Lisa Chauvet,
City College of New York

"My summer research experience focused on a school bus scheduling problem. Under the guidance of a graduate student and faculty advisor I learned how transportation engineers and researchers apply mathematical optimization to current transportation problems. I look forward to improving and expanding my research skills in preparation for graduate studies."



Ryan Saline,
Valparaiso University

"I especially enjoyed my research experience at the NTC because it gave me invaluable tools, strategies, and ideas for conducting research in my undergraduate studies. I also received a glimpse into the life of graduate research work, which will give me an edge should I choose to pursue such a program."



Justine Fox,
University of Maryland

"I am grateful to have been able to participate in the Undergraduate Summer Research Program this summer. It was a pleasure to work personally with professors to gain this hands-on experience. I am now considering the possibilities of furthering my education past an undergraduate degree in civil engineering."

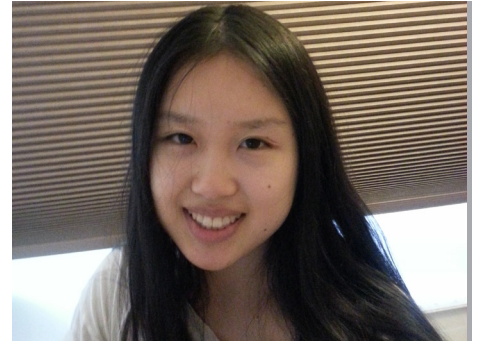
EDUCATION & WORKFORCE DEVELOPMENT

High School Internship

Angel Wen is a student at Montgomery Blair High School in Maryland. Angel earned an internship co-sponsored by the NTC@Maryland and the National Center for Smart Growth (NCSG). "I was pretty excited since I was interested in how public policy, particularly that relating to transportation and zoning, was made," Angel said. Currently Angel is working

on Freight Analysis using ArcGIS and several data sources, including Leonard's Guide, to locate possible warehouse locations. The goal of this project is to create a comprehensive map of Maryland distribution centers to optimize transport routes.

In total, 12 high school interns were mentored by NTC@Maryland Faculty in 2015.



Online ITS Course Development

Several of the NTC@Maryland staff and faculty have worked with Consortium for ITS Training and Education (CITE). This award winning online training program brings together experts from academia and industry to generate comprehensive advanced transportation online courses, including topics such as:

Deploying ITS: Strategic Planning and Implementation

Road Safety Audits

Traffic Signal Timing

Managing High Technology Projects in Transportation

Performance Measures

Improving Highway Safety with ITS

Many of the courses offered by CITE can be used for college-level credits at CITE's university partners.

Online Gaming for Emergency Responder Training



Online gaming used for emergency response training at CATT.

Working with the Center for Advanced Transportation Technology Laboratory (CATT Lab) at UMD, curriculum developers have designed multi-media courses that can be web-based or installed directly on a computer. This collaboration produced a massively multi-player online gaming system that enables real-world, complex simulation and communications-based exercises that can be rehearsed and analyzed in the realm of emergency response.

NTC@Maryland Students Participate in USDOT Beyond Traffic Town Hall Event

On Tuesday, April 21, 2015, the U.S. Department of Transportation hosted an in-person and virtual, nationwide Town Hall about Beyond Traffic, a draft framework about the future of transportation in America.

During the event, the faculty and students from the NTC@Maryland participated by providing comments and questions on the content in the draft version of the US DOT document “Beyond Traffic 2045: Trends and Choices” which summarizes the forecasted trends, challenges, and potential solutions for the future of US transportation.



UMD Students with USDOT Officials at the Beyond Traffic Town Hall Event.

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NTC@Maryland Hosts Networking Event

On Friday, June 26, 2015, the NTC@Maryland partnered with the ITS-MD Student Chapter to host a networking lunch. At the event, UMD alumni, current students, Undergraduate Summer Research Program (USRP) participants, Faculty, and local transportation engineering professionals mingled over lunch and discussed various topics related to the UMD engineering fields.

The event allowed students and faculty to interact with practitioners. Practitioners learned about the ongoing research at UMD, while faculty and staff learned about the current best practices and needs for the transportation industry.



Students, Alumni, Faculty, and Practitioners at the Networking Event.

International Workshop on High Speed Rail



40 Arizona State University and The University of Maryland, as part of our National Transportation Center, hosted a high-speed rail workshop “International Workshop on High-Speed Rail Planning and Operations, Toward Economic Development and

Sustainability” on October 30, 2015 in Washington DC. This one-day, free technology transfer event featured leading high-speed rail planners, practitioners, and researchers from the United States, Denmark, and China. Speakers discussed the economic

and environmental challenges and opportunities for future high-speed rail systems using case examples. The workshop audience included consultants, researchers, government agency personnel, and students which generated excellent multi-perspective.



NTC@Maryland Researchers and Staff with US DOT Officials at the High Speed Rail Workshop.

Workshop on Broader Economic Benefits of Multimodal Projects

This workshop was part of a research project, jointly funded by the Maryland State Highway Administration and NTC@Maryland and led by project co-PIs Professors Paul Schonfeld and Lei Zhang. The training session, taught by the project co-PIs and Eirini Kastrouni and Elham Shayanfar from UMD, and Richard Margiotta from Cambridge Systematics, was attended by professionals from Maryland State Highway Administration, Baltimore Metropolitan Council, Cambridge Systematics, UMD Center for Advanced Transportation Technology, and faculty and students from University of Maryland. The purpose of this training session was to transfer a practical tool for qualifying and evaluating the



Economic Benefits Workshop Participants.

broader economic benefits to intended users in Maryland. The toolbox is based on the integration of the Maryland

Statewide Transportation Model and the SHRP2 C11 products customized for Maryland.

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FHWA Connected Vehicle Demo at UMD

Researchers from the Turner-Fairbank Highway Research Center (TFHRC), Taylor Lochrane and Cory Krause, gave a presentation entitled “Moving Forward at the Turner Fairbank Highway Research Center of the Federal Highway Administration.” The presentation covered were dynamic

speed harmonization, cooperative adaptive cruise control (CACC), and the five levels of vehicle automation: (1) none, (2) function-specific, (3) combined function, (4) limited self-drive, and (5) full self-drive.

Following the seminar, there was a live demo of a FHWA connected

vehicle. This portion of the NTC hosted event allowed participants to see and interact with a state-of-the-art connected vehicle used for FHWA research. Attendees were able to sit in the vehicle to experience how the vehicle communicates and interacts with the driver.



NTC@Maryland Students and Faculty with FHWA Presenters at the Connected Vehicle Demo.

Collaboration with the I-95 Corridor Coalition Freight Academy

The NTC@Maryland collaborated with the I-95 Corridor Coalition Freight Academy by offering two scholarships for exceptional program nominees. This year's award winners were Subrat Mahapatra and L'Kiesha Markley from the Maryland State Highway Administration. Congratulations Subrat and L'Kiesha!

In addition to providing scholarships the NTC@Maryland was actively involved in developing the capstone projects for the participants. At this year's Academy, the NTC@Maryland presented an overview of the impact of freight movements on the U.S. economy, provided guidance on successfully tackling the capstone projects, and mentored the capstone



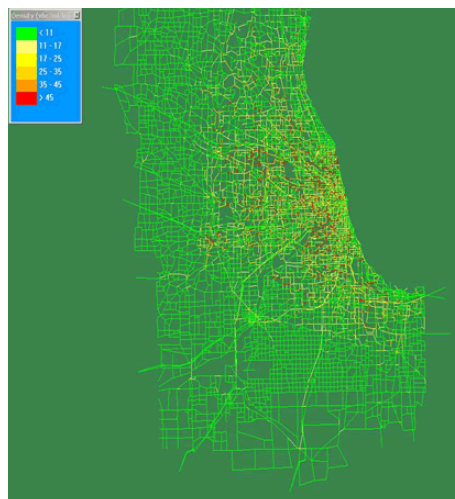
Scholarship winners Subrat Mahapatra and L'Kiesha Markley.

groups in development of the final capstone reports and presentations.

Workshop: DTALite and Integrated AgBM-DTALite Model

This DTALite and Integrated AgBM-DTALite Model training workshop introduced participants to the DTALite/NeXTA open source software package through hands-on exercises. The event taught participants to import data, code a network in order to analyze toll facilities and work zones, and evaluate simulation results using the visualization and reporting features in NeXTA.

Participants were also introduced to the AgBM-DTALite integrated model, and were presented the capabilities of the integrated model using examples of planned applications.



The DTALite Network.

Connected Vehicle 101 Training Workshop



Partnering with the Intelligent Transportation Society of Maryland, the Maryland Transportation Technology Transfer and the U.S. DOT, the NTC@Maryland hosted a Connected Vehicle 101 training workshop. Workshop participants included planners, managers, and engineers at state and local agency levels, who were interested in learning more about the Connected Vehicle Program and its benefits and implications for public agencies. Topics covered included safety, mobility and environmental applications envisioned for the connected vehicle environment. Participants also learned about the infrastructure requirements being developed, including communication standards, and operations and maintenance implications, and upcoming policy decisions.

Technology and Innovation in Transport: A UK Perspective

NTC@Maryland welcomed Dr. Miles Elsdén to the University of Maryland on May 1 for remarks to a campus audience and an interactive webinar simulcast. Dr. Elsdén presented a UK perspective on major external challenges facing transportation today, such as population growth and extreme weather, and discussed the role of technology and innovation in

developing future transport systems.

His presentation outlined technology drivers impacting the UK transport sector, as well as recent activities the UK Government has taken to support technology and innovation in the way goods and people move around. Dr. Elsdén also addressed future challenges and opportunities to be faced by a new UK Government.



Dr. Miles Elsdén at webinar event.

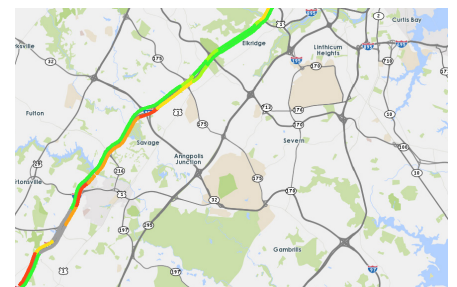
Improving Freight Transportation Reliability

This webinar focused on research being conducted at North Carolina State University and the University of Maryland to help make the freight transportation system more reliable. Engineering faculty George F. List, PhD, PE, of NC State, and Paul M. Schonfeld, PhD, PE,

of UMD, presented on improving our understanding of the sources of unreliable travel times, making it possible to predict what the reliability will be in specific situations, and estimating the resources and operating plans needed to ensure that reliable service will be provided.

First Outsourced Probe Data Symposium

The National Transportation Center at Maryland (NTC @ Maryland) hosted symposium discussed emerging probe data products and applications of private sector data in planning, operations, and performance management. The event provided a venue for industry to discuss currently available data products in the areas of speed, travel time, O-D, freight, emissions, and volume. In addition, the symposium allowed leading state executives and managers to discuss the critical data needs in their organizations, so that industry could hear and respond.



Probe data visualization.

Applications of Vehicle Probe Data for Performance Measurement

Speakers and renowned experts Kaveh Farokhi, Masoud Hamed, Elham Sharifi, Sepideh Eshragh, John Allen, and Reuben Juster from the University of Maryland Center for Advanced Transportation Technology (CATT) presented their research on the following topics via webinar:

- Background on Probe Data and Validation
- Vehicle Probe Project (VPP) Suite of Data Visualization and Retrieval Tools
- Freeway Performance Measurement: The Maryland Mobility Report
- Arterial Performance Measurement
- Winter Weather Impact and Recovery
- Freight Fluidity
- Work Zone Performance Measurement

Selected Seminars and Guest Lecturers

In total, the NTC@Maryland offered 24 seminars in 2015. A select few are mentioned below:

U.S. DOT Secretary Anthony Foxx Visits NCSU: The Honorable Anthony Foxx, United States Secretary of Transportation visited NCSU and participated in an interactive forum on the Department's Vision for Sustaining and Growing our Transportation Infrastructure. Secretary Foxx visited The Institute for Transportation Research and Education (ITRE) at NCSU on February 19, 2015

Dr. Alex Bond. Transportation Funding and Finance in the Post-TEA Era. the Center for Transportation Leadership at the Eno Center for Transportation, February 6, 2015.

Prof. Kato. Tokyo's Rail on the Move: Latest Discussions on Long-term Urban Rail Planning in Tokyo. Civil Engineering Department at the University of Tokyo, January 16, 2015.

Dr. George Yannis. Traffic and Safety Data Analysis: From Correlation to Causation and Policy Support. Department of Transportation Planning



Secretary Foxx delivers speech at NCSU.

and Engineering of the School of Civil Engineering at the National Technical University of Athens (NTUA), January 15, 2015.

Dr. Heng Wei from the University

of Cincinnati presented his work on Integrating Urban Development and Traffic Control Measures with Environmental Sustainability. April 16, 2015.



USDOT Datapalooza Figure

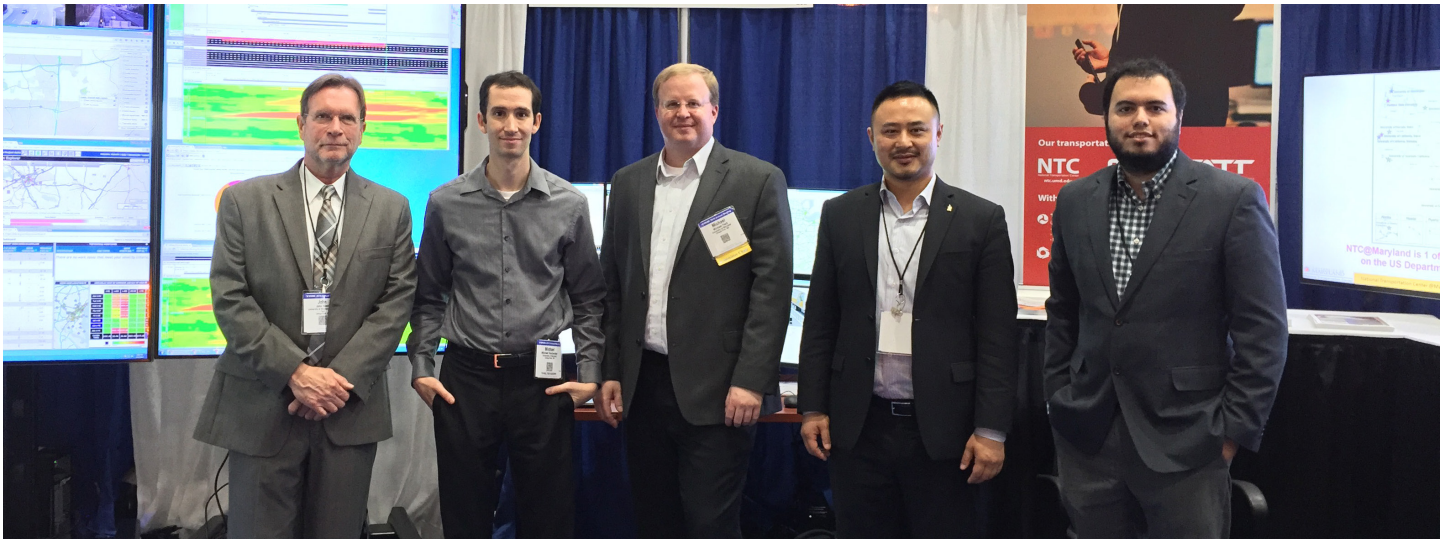
NTC@Maryland Exhibits at USDOT Datapalooza

On Tuesday, June 16-Wednesday, June 17, the NTC@Maryland participated in the 2015 Transportation Datapalooza hosted at the U.S. DOT Headquarters in Washington, D.C. The theme of this year's event was, "Celebrating Data Application Innovations in Delivering a Safe and Efficient Multimodal Transportation System for Strong Economic Development."

At the event, NTC@Maryland faculty and staff participated as both attendees and exhibitors. The NTC@Maryland exhibition highlighted the uses of "big data" to address critical and timely transportation research questions. Attendees of the event learned of the data collection and analysis methods used to apply "big data" to the efficiency, safety, and sustainability of all transportation modes.

NTC@Maryland Exhibition at TRB

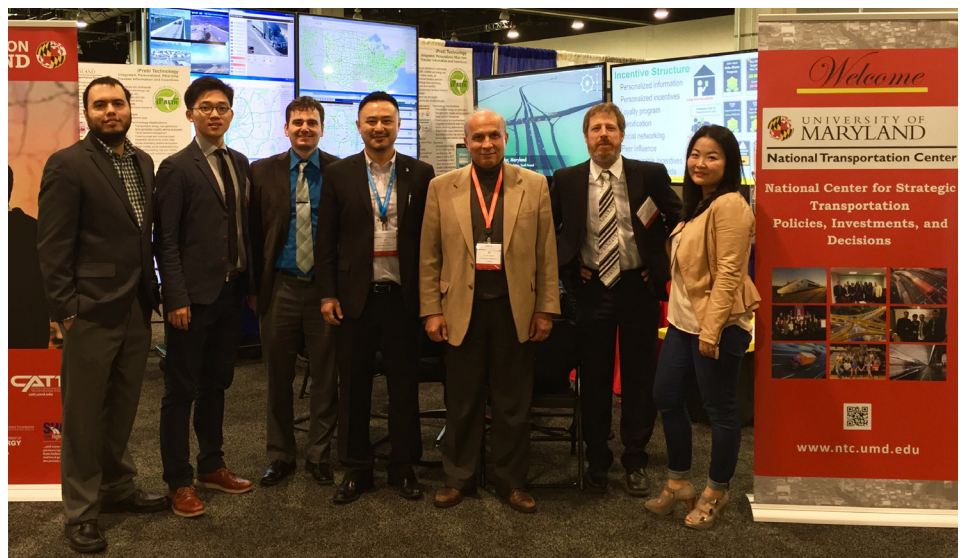
The NTC@Maryland participated as exhibitor at the Annual Transportation Research Board (TRB) Conference in Washington, DC. The booth attracted over 200 visitors, eager to learn about the research, education, workforce development, and technology transfer activities with the consortium and within the UTC program.



NTC@Maryland Researchers at the TRB Exhibition Booth.

NTC@Maryland Exhibition at ARPA-E Summit

Leveraging research originally started with UTC program funding, a NTC@Maryland team including faculty and students from UMD, NCSU, ASU, and the University of Florida was awarded a \$4.5 million dollar project as part of the US Department of Energy (DOE) Advanced Research Project Administration-Energy (ARPA-E) Transnet program. The research will develop a smart phone app to assist travelers in making energy conscious decisions using personalized incentives. To begin spreading the word about this cutting-edge technology, the NTC@Maryland exhibited at the Annual ARPA-E summit in Washington, DC.



NTC@Maryland Researchers at the ARPA-E Summit Exhibition Booth.

NTC@Maryland Minority Student Spotlight

The NTC@Maryland proudly promotes diversity in transportation research and career development. This year we highlight two outstanding students from ASU, Ms. Monireh Mahmoudi and Mr. De'Von Jennings.



Monireh Mahmoudi

Monireh Mahmoudi received her master of science in Industrial Engineering from Tehran Polytechnic in Iran. She is currently working with Dr. Xuesong Zhou on the concept of ridesharing. In fact, since the recent emerging trend of self-driving cars is likely to create a revolutionary paradigm shift in the coming years for real-time traffic system automation and control, they were motivated to focus on one of the self-driving cars use mode, shared autonomous vehicles (SAV), which can offer an economically efficient approach to meet increasing transportation demand. She is looking forward to have more collaboration with many emerging ridesharing companies in the near future.



De'Von Jennings

De'Von Jennings is a senior majoring in Civil Engineering at Arizona State University. In the future, he plans to attend graduate school and work in the transportation engineering sector on a global scale. De'Von is currently working on a learning document for ride sharing problems. He is modeling multiple scenarios with different ride sharing issues in order to show how ride sharing optimizes the paths that the vehicles travel. He has been working with Dr. Xuesong Zhou's research group to prepare a set of open learning documents and video lessons to explain basic concepts of the constraints and modeling of the optimization problems.

LSU Women's Transportation Seminar, Louisiana Chapter

Dr. Bethany Stich, Director of UNOTI, and Carol Short, Associate Director, are excited to be founding members of WTS Louisiana and proud to have UNOTI as an inaugural sponsor of the first WTS chapter in Louisiana.

Founded in 1977, WTS is an international organization dedicated to building the future of transportation through the global advancement of women. Boasting more than 5,000 members – both women and men – WTS is helping women find opportunity and recognition in the transportation industry. Through its professional activities, networking opportunities and unparalleled access to industry and government leaders, WTS is turning the glass ceiling into a career portal.



**Dr. Bethany Stich and Carol Short
hosting a WTS Event.**

MSU Structures and Materials Lab



The Structures and Materials Laboratories at MSU contain some unusual equipment that is utilized by both graduate and undergraduate students. Hunkered deep within reinforced walls, an earthquake simulator – which can go up to 8.0 on the Richter scale – offers a 3-meter-by 3-meter platform that can hold specimens of up to 10,000 kilograms. MSU also has a smaller shake table, and a machine that can do static and dynamic testing and torsion in a temperature-controlled chamber. It's used for, among other experiments, fatigue testing. "Our whole goal is to use advanced materials for sustainability," says Dr. Head. "Here, students can see how theory meets practical application. They can put weight on something and see how it holds up."



Top: a student works in the MSU Materials Lab. Right: Dr. Head in the MSU Materials Lab.

High School Student Outreach

Each year, the NTC@Maryland reaches out to high schools to promote STEM education and to encourage under-represented students to pursue STEM careers in transportation and planning. These efforts include sponsoring student transportation fairs and competitions to get the next generation of transportation problem solvers thinking about how transportation impacts their daily lives.

Right: Maryland high school students pose for a photo while attending an annual student transportation fair.



MSU Transportation Institutes



A teacher poses with a sign at the MSU Teacher Transportation Institute.

The NTC@Marland hosts two annual Transportation Institutes. They include:

The Summer Transportation Institute

The Summer Transportation Institute (STI) is a free program designed to encourage high school students to pursue careers in transportation. The non-residential program features four weeks of field trips, hands-on projects, and networking opportunities with industry professionals. The curriculum also includes SAT prep and activities that promote self-awareness.

Teacher Transportation Institute

The Teacher Transportation Institute (TTI) is a free program for middle and high school teachers. The STEM TTI offers unique learning experiences, opportunities to meet industry professionals and a chance to share with fellow educators.

In 2015, the National Transportation Center offered more than 60 undergraduate and graduate courses while supporting almost 70 students, 44 of which worked directly on NTC@Maryland funded research projects. During 2015, 3 undergraduates, 6 masters, and 3 doctoral students supported by NTC@Maryland funds graduated from their respective programs.

A full list of program-wide indicators broken down by university can be found below.

Performance Indicators	Total	UMD	ASU	LSU	MSU	NCSU	ODU	UNO
1. Number of transportation-related courses offered during the reporting period that were taught by faculty and/or teaching assistants who are associated with the UTC								
Undergraduate	26	3	11	2	4	3	1	2
Graduate	36	9	16	1	1	6	3	0
2. Number of students participating in transportation research projects funded by this grant								
Undergraduate	11	1	4	3	0	3	0	0
Graduate	33	3	12	4	2	6	3	3
3. Number of transportation-related advanced degree programs that utilize grant funds to support graduate students								
Masters level	17	0	8	1	4	2	0	2
Doctoral level	17	7	4	1	1	1	2	1
4. Number of students supported by this grant								
Undergraduate	17	12	2	3	0	2	0	0
Masters	20	3	8	2	4	2	0	1
Doctoral	32	14	4	2	4	4	2	2
5. Number of students supported by this grant who received degrees								
Undergraduate	3	0	2	0	0	1	0	0
Masters	7	4	2	0	0	0	0	1
Doctoral	5	2	0	0	1	1	1	0

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UPCOMING NTC@MARYLAND EVENTS

Transportation Innovation and Policy Summit (April 14, 2016)

The theme of this event is “Innovative Multimodal Solutions for Reducing Congestion.” This daylong event will feature a plenary talk from U.S. Secretary of Transportation Anthony Foxx, and Maryland Secretary of Transportation Pete Rahn. A Plenary Panel discussion will feature Maryland State Highway Administrator Gregory Johnson, Director Robert Arnold from the FHWA Office of Transportation Management, and Elise Miller-Hooks, professor and the NSF Program Director for Civil Infrastructure Systems.

Hands-on Workshop on Dynamic Assessment of ATM Strategies (April 1, 2016)

The topic of this workshop is a new dynamic software tool for assessing the value of Active Traffic Management (ATM) strategies in a freeway facility context. The tool's underlying traffic model is FREEVAL, a faithful representation of the latest HCM methodology update (to be published later in 2016). The version covered is called FREEVAL-DSS for Dynamic Strategy Selection. Workshop participants will be given free access to the software and the FREEVAL user manual.

Automated Vehicle Policy and Regulation: A State Perspective Workshop (May 18, 2016)

The focus of this workshop is to identify key principles the states will need to make effective policy decisions to enable the safe operation of advanced automated vehicles (sometimes called autonomous, self-driving, or driverless vehicles) on their roadways. This workshop seeks to identify key principles that can provide a foundation for the common operation of automated vehicles across the states. This is critical to insure safe operations, efficient travel, and environmental benefits at the introduction of automated vehicles as well as to speed the deployment of future advances.

New Paradigms in Revenue Management: Methods and Applications (May 25 – 27, 2016)

This Summer School Program will provide basic and advanced methodologies for revenue management problems related to the transportation sector. The course aims at integrating different disciplines to solve both theoretical and practical concerns that arise in the design and development of systems for network revenue management, pricing, and operation. The summer school is open to Master, Ph.D. and post-doctoral students, researcher and practitioners and will facilitate professional networking and exchange of ideas about the theory and practice of research in revenue management.

MSU Summer Transportation Institute (Summer 2016)

Each year MSU offers this free program to encourage high school students to pursue careers in transportation and offers SAT preparation.

MSU Teacher Transportation Institute (Summer 2016)

MSU will once again offer free STEM training to high school teachers to promote the education needed for in-demand careers in science, engineering, and technology.

I-95 Corridor Coalition Operations Academy (Fall 2016)

The program will use a mix of classroom instruction, workshops, and analysis of existing systems to ensure the retention of the principles presented. It will provide opportunities to practice and internalize the principles learned which is not possible in traditional classes and short courses. The academy will provide a significant development opportunity to career professionals in transportation management and operations.



NTC@Maryland Staff, Researchers and Friends at TRB Reception.

Joint Regional Traffic Signal Forum and ITS Annual Meeting (Fall 2016)

The Joint Baltimore Metropolitan Council and ITS Maryland Traffic Signal Forum and ITSMD Annual Conference will be co-sponsored by the NTC@Maryland. This event is a venue for professionals involved in planning, design, research, and implementation of Intelligent Transportation Systems to gather together for training, discussion and networking.

I-95 Corridor Coalition Freight Academy (Spring 2017)

The NTC@Maryland will once again be collaborating with the I-95 Corridor Coalition to develop innovative and unique capstone projects. In addition, NTC@Maryland will assist in mentoring the participants through the capstone project generation process.

Agent Based Modeling and Simulation Workshop (Spring 2017)

This FHWA and NTC@Maryland sponsored workshop invites experts from various fields to share their knowledge and experience in applying ABMS to various applications reaching beyond traditional transportation research.

International Transportation Economic Development Conference (Spring 2018)

This conference sponsored and co-organized by the NTC@Maryland will focus on the issues and challenges related to the economy, global concerns, and financial constraints. Participants will discuss and address the emerging transportation needs of businesses and economic development. The scope at which this conference applies includes local, regional, state, national, and global levels.



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