

U.S. DOT Awards \$1.4 Million Tier 1 Grant to Morgan-led Transportation Consortium

The U.S. Department of Transportation (DOT) has awarded a \$1,402,200-million grant (approximately \$6 million over four years) to a three-university consortium led by Morgan State University, to establish a University Transportation Center at Morgan. The newly formed Urban Mobility & Equity Center (UMEC) will focus on research to improve the mobility of people and goods in an environmentally sustainable and equitable manner. In addition to Morgan, the consortium includes the University of Maryland, College Park and Virginia Polytechnic Institute and State University (Virginia Tech). All three institutions have strong track

records in transportation research.

"As Maryland's premier public urban research university and an anchor institution in the city of Baltimore, it is important that the research we conduct examine all facets of improving daily life for everyday people, and enhancing transportation should be at the forefront of that examination," said David Wilson, president of Morgan State University. "We have a top-notch transportation center at Morgan and are looking forward to working with our consortium partner institutes on finding solutions to the transportation challenges of today and tomorrow."

The grant is one of 35 five-year

grants awarded under the University Transportation Centers (UTC) program, which was reauthorized by the Fixing America's Surface Transportation Act. Identified as a Tier 1 center, UMEC will concentrate on improving access to opportunities, "smart cities" technologies, novel modes of transport, systems integration, analytical tools to optimize movement, and regional planning. Researchers from any of the three consortium universities can apply for transit-related research funding.

"Many low-income urban residents in the United States experience a spatial mismatch between affordable housing and jobs,"

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Researchers testing Eco-Speed Control system

Everybody knows the fundamentals of eco driving, which at its simplest is piloting a car in a way that conserves fuel – don't stomp on the gas pedal to accelerate, don't slam on the brakes to stop, make sure the tires are inflated properly.

But today's technology networks promise much greater fuel savings than those gained by individuals modifying their driving habits. What if traffic could flow better at traffic lights, eliminating much of the stopping, starting and idling altogether, especially in areas with



buses? What if vehicles could communicate with each other to reduce congestion and accidents?

Researchers at Morgan State

University and Virginia Tech are developing and testing a dynamic Eco-Speed Control (ESC) system, designed to reduce fuel consumption at intersections, which computes the optimum vehicle trajectories of traditional internal combustion engine vehicles, hybrid electric vehicles (HEVS) and buses.

"This project will be looking at coordinated signals to adjust driving, and it will focus on buses, since they're a major contributor to congestion," says Dr. Celeste Chavis, one of the principle investigators at

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A Message from the NTC Director

DR. ANDREW FARKAS



We are very proud and happy that Morgan State University (MSU) will lead the new Urban Mobility & Equity Tier 1 University Transportation Center (UMEC). MSU has researched access to employment for urban, low-income minority communities and provided research opportunities in transportation for minority graduate students for over 35 years. Along with our partners in UMEC, Virginia Tech and University of Maryland, we will focus on research to improve urban mobility of people and goods in a safe, environmentally sustainable, and equitable manner.

UMEC partners have observed several long-term trends in the U.S. The population is growing and aging. Population and economic activities are moving to metropolitan areas, but also decentralizing within those areas. Many low-income urban residents experience a spatial mismatch between affordable housing and jobs in the suburbs. Transportation provides access to jobs, housing, education, and health care, but our transportation infrastructure and services have not diminished “social divisions and income inequality.” The working poor contend daily with inferior access by automobile and public transit to economic opportunities. Aging infrastructure and transit systems and low vehicle-ownership rates constrain Baltimore and other urban areas. Automobile ownership is expensive, and transit commutes are often lengthy and slow. Freight bottlenecks and congestion negatively affect urban goods movement, and delivery during off-peak hours can impact nearby neighborhoods.

More public investment in transportation infrastructure would pay off with increased access to opportunities and heightened economic growth, but paying for transportation strains governmental and household budgets alike; it is already the second-largest household expense after housing. Funding for transportation infrastructure and services relies on regressive user fees, such as tolls and motor fuels taxes, which disproportionately burden low-income households. UMEC’s research will be immersed in these socioeconomic challenges and equity issues; we plan not only to add to the research literature but find some solutions for urban communities.

ABOUT THE CENTER

The National Transportation Center (NTC) at Morgan State University is committed to transportation research and education that support the well-being and economic development of communities.

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In Memoriam: Dr. Mark Bundy

Research Professor Mark Bundy passed away on June 1 at the age of 69. Dr. Bundy was an Associate Research Professor at Morgan State University Patuxent Environmental & Aquatic Research Laboratory (PEARL) and had been the Director of Environmental Programs at PEARL for the past eight years.

Mark was involved in the strategic

planning of all of PEARL’S programs, including PEARL’s commercial oyster support programs, and the Power Plant Environmental Training Program.

Every day friends and colleagues here can feel his impact on the Patuxent River. Mark brought to PEARL a much-needed view of the importance of environmental science and working with natural resource managers. While

understanding the importance of basic research, he worked to ensure that the researchers at the PEARL were mindful of science’s obligation to society. At each presentation at PEARL,
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Dr. Mark Bundy

It's all material when it comes to this lab

Wouldn't it be great if you could use self-consolidating concrete that wouldn't need to be vibrated but rather poured like cake batter? What's the optimal dosage to create such a product? Would that concrete still bond properly to materials like rebar, especially if that rebar were made from a rust-proof composite (or plastic) material? And would those composite bars within concrete still provide structural resistance to withstand an earthquake?

Those are the kinds of questions that faculty and students explore in the 4-year-old Structures and Materials Laboratories at Morgan State University, which contain some unusual equipment. 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.

"We can do qualification testing," says Dr. Monique Head, associate professor of structural engineering, explaining the table has six degrees of freedom and can go back and forth and sideways. "Yaw, roll and pitch are the technical terms." The Structures and Materials Lab is used to test all types of materials.

Morgan 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. To capture sensory information, the lab boasts a scanning vibrometer, which works like an incredibly high-speed camera to take pictures of specimens that are moving fast or dynamically.



Dr. Monique Head



A freeze-thaw chamber lets researchers examine the effects of weather, while other machines measure how much force it takes until a piece of rebar snaps or a concrete beam flexes, shears or even collapses. Two large overhead cranes ferry samples of up to 5 tons. A drop tower finds out how much energy it takes to punch through various materials, which has applications that, although somewhat scary to the layman, are useful in the aeronautical field and for material characterization.

"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."

The lab is used not just by engi-

neering majors but by architecture students as well, who observe tests on what might well be the building materials of the future. Graduate and undergraduate students participate in the ongoing research conducted in the lab.

Examples of recently completed research reports include Structural Health Monitoring to Determine Long-term Behavior of AFRP Composite Bars in Prestressed Concrete Panels for Field Deployment, Stainless Steel Prestressing Strands and Bars for Use in Prestressed Concrete Girders and Slabs, and Durability Assessment of Prefabricated Bridge Elements and Systems. The reports are available at http://www.morgan.edu/school_of_engineering/research_centers/national_transportation_center/research/completed_projects.html.



NEW RESEARCH PROJECTS

Climate Change & Non-Motorized Transport

*Dr. Ardeshir Faghri (University of Delaware), **Dr. Hyeon-Shic Shin***

Impact of Level of Service (LOS) on the Driver's Behavior on Arterials

*Dr. Behzad Aghdashi (North Carolina State University), **Dr. Celeste Chavis, Dr. Mansoureh Jeihani, Sangkey Kim***

Eco-Speed Control for Hybrid Electric Vehicles and Buses in the Vicinity of Signalized Intersections

*Dr. Hesham Rakha (Virginia Tech), **Dr. Mansoureh Jeihani, Dr. Celeste Chavis, Dr. Hai Chen (Virginia Tech)***

Quantifying the Impact of On-Street Parking Information on Congestion Mitigation

Dr. Celeste Chavis, Dr. Mansoureh Jeihani, Dr. Hesham Rakha (Virginia Tech)

Inlet Cleaning Pollutant Characterization Study for Total Maximum Daily Load (TMDL) Compliance

Dr. James G. Hunter, Dr. Dong Hee Kang, Dr. Neely Law (Center for Watershed Protection), Bill Stack (Center for Watershed Protection)

Improving the Reliability of Freight Transportation

*Dr. Paul Schonfeld (University of Maryland), Dr. George List (North Carolina State University), **Dr. Hyeon-Shic Shin***

ONGOING RESEARCH PROJECTS

Connected Vehicle Technologies for Energy Efficient Urban Transportation

*Dr. Ajay Prasad (University of Delaware), Dr. Suresh Advani (University of Delaware), **Dr. Hyeon-Shic Shin***

Needs, Barriers, and Analysis Methods for Integrated Urban Freight Transportation

Dr. Hyeon-Shic Shin, Dr. Paul Schofeld (University of Maryland)

Mitigating Pollutants from Highway Infrastructure for Total Maximum Daily Load (TMDL) Compliance: Monitoring Efficacy of Best Management Practices and Advancing Decision Support

Dr. James Hunter, Dr. Dong Hee Kang, Dr. Teresa Culver (University of Virginia)

Environmental and Safety Attributes of Electric Vehicle Ownership and Commuting Behavior: Public Policy and Equity Considerations

Dr. Andrew Farkas, Dr. Hyeon-Shic Shin

Multi-layered Integrated Urban Freight Delivery Network – Phase I: Identification of Policy Preferences based on Qualitative and Conjoint Analysis

Dr. Hyeon-Shic Shin, Dr. Michael Callow

Quantifying Travel Time Reliability Perception and Developing Disaggregate Behavior Models under Information Provision Using a Driving Simulator

Dr. Mansoureh Jeihani, Dr. Farzad Moazzami

For more information about our research, visit www.morgan.edu/soe/ntc

2016 COMPLETED RESEARCH PROJECTS

Development of Local Calibration Factors for Implementing the Highway Safety Manual PHASE II: Freeway and Ramp Applications

Dr. Hyeon-Shic Shin, Dr. Young-Jae Lee, Seyedehsan Dadvar

Evaluation of Waste Concrete Road Materials for Use in Oyster Aquaculture – Phase 3

Dr. Mark M. Bundy, Dr. Dong Hee Kang

Validation of Source Approval of HMA Surface Mix Aggregate

Dr. Frederick K. Wilson, Dr. Oludare Owolabi, Arthur Willoughby, Dr. James Whitney II

Highway Runoff Stormwater Management Potential (HRSMP) Site Characterization Using NASA Public Domain Imagery

Dr. Frederick K. Wilson, Dr. Oludare Owolabi, Arthur Willoughby, Dr. James Whitney II

Measuring User Acceptance of and Willingness-to-Pay for CVI Technology

Dr. Hyeon-Shic Shin, Dr. Michael Callow, Dr. Young-Jae Lee, Dr. Z. Andrew Farkas, Seyedehsan Dadvar

Integration of Multimodal Transportation Services

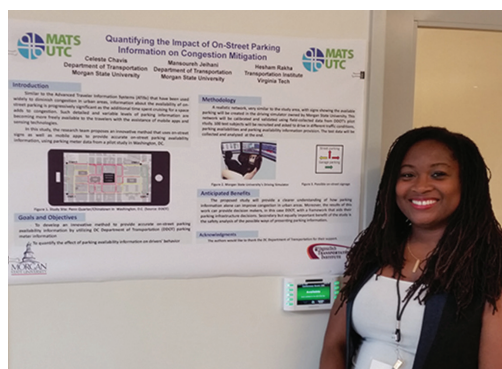
Dr. Celeste Chavis, Dr. Vikash Gayah (Penn State), Dr. Elise Miller-Hooks (University of Maryland), Dr. Paul Schonfeld (University of Maryland)

Understanding Regional Disparities in Public Transit Performance Using Real Time Transit Data

Dr. Alex Karner (Arizona State University), Dr. Aaron Golub (Arizona State University), Dr. Celeste Chavis

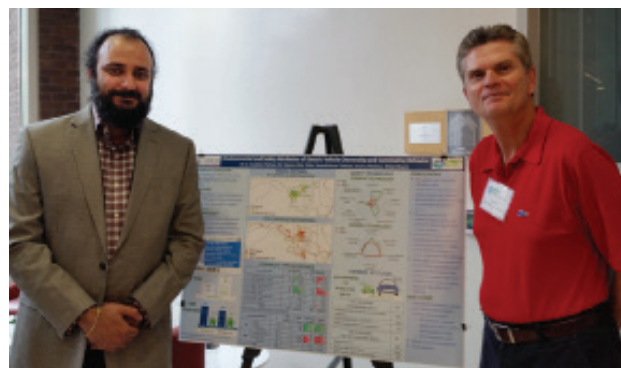
Applications of Connected Vehicle Infrastructure Technologies to Enhance Transit Service Efficiency and Safety

Dr. Kitty Hancock (Virginia Tech), Dr. Young-Jae Lee, Dr. Hesham Rakha (Virginia Tech)



Poster Perfect

The second annual MATS UTC meeting took place in August. At left, Dr. Celeste Chavis presented a poster about her research into parking in Washington, D.C. At right, Seyedehsan Dadvar, left, and Dr. Andrew Farkas also found their poster, which focused on electric vehicle ownership, to be well received.



Dr. Mark Bundy ... from page 2

researchers were prodded with his now iconic question: “So what are the management implications of your work?”

Under Mark’s influence PEARL began to expand its programs. He initiated and developed the Oyster Aquaculture Program, and a program to train Nuclear Power Plant operators on the impact of the environment on plant operations. Wind power and the suitability of using road materials for oyster aquaculture were other research areas of interest.

Mark came to PEARL from the Maryland Department of Natural Resources, where he served as the Assistant Secretary for Chesapeake Bay Programs. He was responsible for the overall administration of the Department’s activities related to the State’s policies on the restoration of the Chesapeake Bay.

His career was spent protecting Maryland’s environment through policy and research. Professionally and personally Mark was a lover of the outdoors. He had a passion for sport fishing and photography. Mark lived his life unapologetically and was loved for it. He truly will be missed. •

MDOT/MSU interns are in demand

Technically, Olushola Ogundele didn't finish the MDOT/MSU Graduate School Internship Program, which is why he wasn't given a certificate at the program's concluding luncheon on June 21, 2016. He didn't finish because he was hired as a database specialist by the Maryland Transit

ing, said, "We have to ensure the data is accurate; that's why effective communication is so important."

Graduate students in the MDOT/MSU program, who work full time in the summer and part time during the school year, are assigned to mentors at various agencies within the Maryland

Department of Transportation.

"This program gives you the working experience you often can't find anywhere else," said Dr. Andrew Farkas, director of the National Transportation Center at Morgan, which administers the program.

Dr. Gloria Gibson, provost and senior vice president for Academic Affairs at Morgan, told the students and their mentors, "We know when we look at data that students who have engagements – mentorships, internships – are going to do much, much better. It's excellent that our students have access to internships."

The program also gives students not just a leg up on their career, but on what they want to contribute.

"If you have a passion for transpor-

tation or infrastructure, if you have a passion for what you do it is never a job. Even on the most frustrating day – and I can attest to that," Dr. Gibson said, drawing a laugh, "it is an extension of you and what you do to make a difference."

The program has served as a national model.

Moges Ayele, senior liaison for higher education with the Federal Highway Administration, noted that such programs are critical for readying future workers. "Workforce development and preparing the next generation is of huge interest to the federal government," he said.

Mentors in the various agencies also noted more immediate benefits.

Stuart Wilkins, a mentor in the MTA's Office of Strategic Management, said, "They perform a very valuable service us – they are able to help with some tasks involving daily information that we have to deal with. We can have the intern deal with it, and it frees up time for us. They deal with more tactile information, and we deal with more strategic information."

Phil Sullivan, also of the MTA's Office of Strategic Management, noted that interns often have a background that employees don't, such as economics.

"It's useful to have that perspective," he said. •



Dr. Andrew Farkas, left, and Dr. Gloria Gibson, fourth from right, congratulate the 2016 graduate-level MDOT/MSU interns.

Administration (MTA), for which he was interning.

"I've learned a lot about data management," the recent Morgan State University MBA grad told his former fellow interns and their mentors at the luncheon. "This opportunity has been remarkable."

The internship also taught him the value of teamwork and effective communication. Ogundele, who has a bachelor's degree in computer engineer-

2016-17 FELLOWS AND INTERNS

EISENHOWER FELLOWS

Odunmorayo (Joseph) Abujana
Robert Wilson

SHA SUMMER INTERNS

Adrianna Rhoden
Christopher Simon
Darius Scott
Ta'sha Duppins
Samuel Ingram
Seth Ingram

MDOT/MSU INTERNS

Nneka Njoku
Sushma Shrestha
Oluwatobi Sonoiki
Andrew Williams
Oghenekevwe Oberiko
Ibrahim Aka
Adeyinka Komolafe
Kathlina Richburg
Oluwatobi Aderonmu
Blessing Esimobi

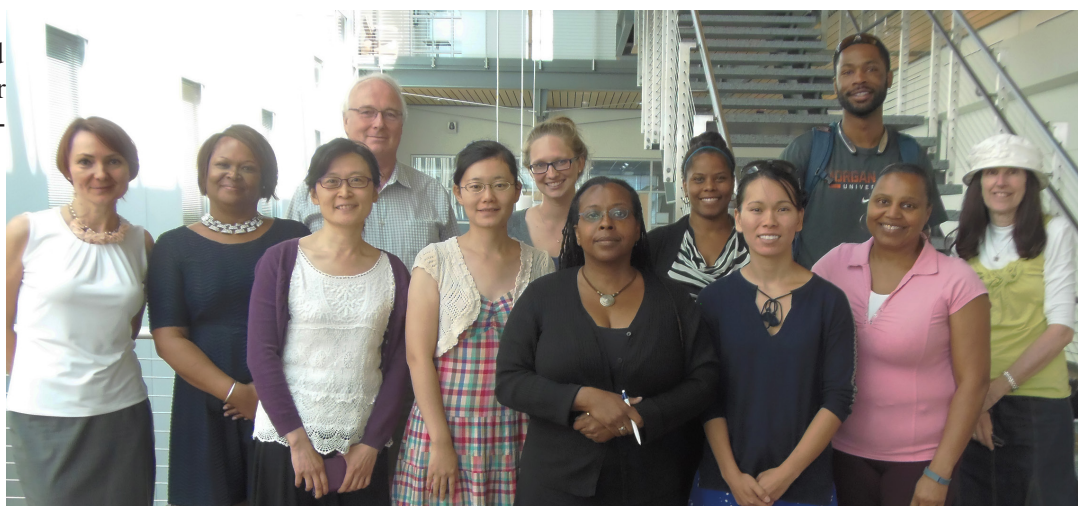
Teachers take STEM lessons to their classes

The Teacher Transportation Institute, a program sponsored by the National Transportation Center at Morgan State University in cooperation with the Center for Continuing and Professional Studies, promotes STEM concepts and opportunities in the transportation field by giving teachers a chance to function as traffic engineers and design a roundabout.

At concluding presentations, the 12 teachers in the program this summer focused on design, safety and STEM education.

The Baltimore City teachers, who earned four AUs, studied traffic roundabouts, visited and analyzed existing roundabouts and a problematic signalized intersection, and designed their own roundabout, working in teams.

Sherina Bonaparte-LaTorre noted that roundabouts eliminate head-on collisions because traffic all flows in the same direction. Michael Canady Jr. added T-bone collisions are eliminated as well. Tonya Allen Grier focused on pedestrian safety, noting that crossing in the middle of the block or jaywalking is the leading cause of pedestrian accidents. Making roundabouts safe for pedestrian starts with design, and one team incorporated textured pavement to



The 2016 Teacher Transportation Institute participants enjoyed a chance to think like engineers.

help visually impaired students as well as solar-powered sensors for connected vehicles.

The biggest advance, teachers agreed, is what they take back to the classroom.

"I think what we take away as teachers is the skills needed," said Xiao Chen. "When we have science classes, these hands-on techniques are good for our students."

Added Bonaparte-LaTorre, "What do students need to be prepared for these STEM careers?"

Joyce Kalish, a special educator at Western High School, noted that "many students lack basic math and algebraic

skills." Mei-Lin Fegan, a math teacher at Western, suggested elementary schools focus on introductory-level STEM courses.

Canady said designing a roundabout gave teachers insight into the specific interactive steps engineers use to organize their ideas.

Added Richard Quinn, "For me, being a math teacher, I'm always looking for real-life applications."

Dr. Andrew Farkas, director of the National Transportation Center, urged teachers "to convey to your students that we have a rich array of transportation degree programs at Morgan."•

Students inspired by transportation field

The best place to see Baltimore's working port is from the water.

Some of the high school students in the Summer Transportation Institute (STI) stepped gingerly onto the top deck of the Inner Harbor Spirit, grabbing at railings, while other stepped confidently, asking questions about the depth of the water and the Francis Scott Key Bridge. The students enjoyed a two-

hour cruise past marine terminals, container ships, tugboats and the Key bridge. Typical teen-agers, they found their sea legs enough later to dance to music by the Spirit's DJ.

STI, which is sponsored by Morgan State University's National Transportation Center with funding from the Federal Highway Administration and the Maryland State Highway Administration,

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Members of the 2016 Summer Transportation Institute

Morgan named Tier 1 Center ... from page 1

says Dr. Andrew Farkas, director of the National Transportation Center at Morgan, who will also direct UMEC. “They contend daily with poor access to economic opportunity. Baltimore and other urban areas are constrained by aging infrastructure and congestion, and transportation of goods can burden

nearby residential areas.”

The center will establish a public interest research and community technical assistance program to develop problem-solving projects that address citywide and community concerns, such as employment access and economic development. UMEC also will promote

education and research opportunities for minorities and women to prepare them for transportation careers.

Morgan State University, founded in 1867, is a Carnegie-classified Doctoral Research Institution offering more than 70 academic programs. •

Students ... from page 7

exposes high school students to all aspects of the transportation field as well as a university campus in a four-week enrichment program.

“We learned what transportation really is – that’s pretty cool,” said Malee McCarthy, 16, a Western School of Technology student who plans to major in business or accounting in college and perhaps focus on transportation.

Omolade Odedoyin, 15, from Baltimore Polytechnic Institute, particularly enjoyed the speakers from various transportation agencies who shared their stories. “It was inspiring,” he said.

“I liked the field trips,” said Maya Carter, 15. “I like learning new things.” A favorite was a trip to the Maryland Department of Transportation to get an up-close look at road signs. Students also enjoyed a more primitive form of

transportation, horseback riding.

The program concluded on July 29, 2016, with a banquet. The keynote speaker was Gregory Johnson, administrator for the State Highway Administration, who oversees 3,200 employees.

“Everyday transportation touches our lives,” he said. “We have a number of engineers, civil, mechanical and electrical, who design roadways plans and signal operations,” he said. “They do a number of things you take for granted when traveling.” He detailed exciting developments in transportation such as autonomous vehicles and connected infrastructure.

“I need folks like yourself,” he said.

He also spoke about the importance of having a diverse transportation field, citing the history of building highways through poor neighborhoods. He noted



Gregory Johnson of the SHA

that Baltimore stopped I-70 from cutting a swath across Baltimore, creating a historic precedent that resulted in legislation mandating public hearings for highways.

“Even if you don’t become a transportation professional, it is important to be an educated transportation consumer,” he noted. •

Eco Driving ... from page 1

Morgan.

The ESC system will consider traffic conditions, the type of powertrain, and the state of the battery charge in electric vehicles. The team is developing ESC algorithms for HEVs and buses using predictive energy estimation models to identify optimum speed profiles using information from the surrounding vehicles and upcoming signalized intersections.

The project, “Eco-Speed Control for Hybrid Electric Vehicles and Buses in the Vicinity of Signalized Intersections,” is funded through the Mid-Atlantic Transportation Sustainability University Transportation Center. Dr. Chavis and

Dr. Mansoureh Jeihani, co-principle investigator at Morgan, will use Morgan’s Safety and Behavioral Analysis Center, which has two state-of-the-art driving simulators, to implement and test the proposed ESC algorithms under different conditions and speeds. Dr. Hesham Rakha and Dr. Hao Chen will be conducting field tests of the system at Virginia Tech’s Smart Road test facility.

“We will use the driving simulator to look at the effect of signal timing if you don’t provide information to the driver vs. if you do provide information to the driver,” Dr. Chavis says. “If you know that there is no chance you will catch the light, maybe you won’t speed up.”

“We are telling the cars and drivers how to drive to have the minimum emissions impact,” Dr. Jeihani says. “We will study how people react – do they really listen to the information? How frequently is the information provided? We will test different scenarios.”

In the future connected infrastructure could control the speed of the car through the car’s cruise control, dictating a speed that ensures a smooth traffic flow through the intersections.

“We are looking at ways like connected vehicles where you can actually control the car,” Dr. Chavis says.

The project is expected to be completed in the fall of 2017. •