



# Transportation Institute

North Carolina Agricultural and Technical State University

## *First Annual Transportation Awareness Day*

On April 9, the North Carolina Agricultural and Technical State University Transportation Institute and the Center for Advanced Transportation Mobility (CATM) hosted its first Transportation Awareness Day (TAD) at BB&T Stadium on the university's campus. With free admission and open to the general public, the event was attended by over 3,000 students, ranging from third grade to high school, from 34 local schools. TAD premiered in conjunction with N.C. A&T's 10th annual Energy Day, which featured the Oak Ridge National Lab Traveling Science Fair.

TAD included various interactive exhibits by transportation entities from around the state. Greensboro Transit Authority brought one of their new "green" buses for the kids to explore. N.C. Department of Transportation and Duke Power provided assorted highway construction equipment and educational displays. Volvo Trucks let the kids climb behind the wheel of an 18-wheeler they parked on-site. Other exhibitors were:

- *N.C. A&T College of Engineering Auto Drive Project*
- *Triad Aviation Academy*
- *N.C. A&T Department of Marketing and Supply Chain Management*
- *UNC-CH Highway Safety Research Center*



*Wes Kumfer from the UNC-CH Highway Safety Research Center explains the challenge to the kids to use signs and tools so that pedestrians can get from point A to point B safely.*



### Fall 2019 Issue

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## *Transportation Awareness Day* continued

Teresa McRae, program manager for the N.C. A&T Transportation Institute said:

*"We were fortunate and grateful to be able to premiere Transportation Awareness Day at the popular N.C. A&T Energy Day. The two occasions added to each other. We hope to make Transportation Awareness Day an annual event to draw attention to the importance of transportation in our society. It is also our goal to make our youth aware of the many and rewarding educational and career paths in transportation areas."*

TAD was sponsored by CATM which is a consortium including N.C. A&T, Virginia Tech Transportation Institute and Embry-Riddle Aeronautical University. Maranda McBride Ph.D., the director of N.C. A&T's Transportation Institute in the College of Business and Economics, is also the director of CATM.



## *N.C. A&T Transportation Institute Hosts N.C. Department of Transportation Research & Innovation Summit*

On May 7, the N.C. A&T Transportation Institute hosted the North Carolina Department of Transportation (NCDOT) Research and Innovation Summit. The all-day event was held in the Alumni-Foundation Event Center on the campus of N.C. A&T. The conference was attended by 181 transportation professionals from North Carolina and surrounding states. Roughly 35% of participants were from the public sector and 65% came from the academic and private sectors.

The purpose of the summit was to facilitate the sharing of information regarding current research, technology and innovations among the public and private sectors and academia. Specifically, the gathering allowed people involved in the transportation industry in the geographic area to discuss and exhibit transportation research results, showcase innovative transportation technologies and practices and plan and archive next steps in addressing transportation-related issues.

The conference was opened by Maranda McBride Ph.D., director of CATM and the N.C. A&T Transportation Institute. She was followed by NCDOT Research and Development Manager Neil Mastin, PE, CPM. Mastin discussed the importance of collaboration in research and stressed that an innovation is only an innovation if it's put into practice. NCDOT Chief Deputy Secretary David Howard addressed the group and emphasized the key role of innovation and research in driving transportation initiatives forward and the importance of building relationships with historically black colleges and universities partners. Thomas Harmon, director USDOT Federal Highway Administration Center for Accelerating Innovation, delivered a discussion on innovation in the transportation industry. After the speakers' presentations took place, the following morning breakout sessions occurred - bike and pedestrian traffic, environmental concerns and traffic issues (Part I).



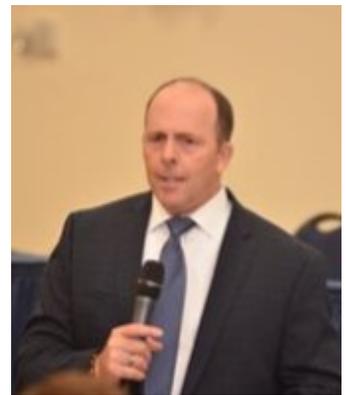
*Maranda McBride, director of CATM and the N.C. A&T Transportation Institute, opened the event and welcomed conference attendees.*



*NCDOT Research and Development Manager, Neil Mastin, PE, CPM, discussed the importance of collaboration in research and stressed that an innovation is only an innovation if it's put into practice.*



*David Howard, chief deputy secretary, NCDOT, emphasized the key role of innovation and research in driving transportation initiatives forward.*



*Thomas Harman, director USDOT Federal Highway Administration Center for Accelerating Innovation, delivered a discussion on "Innovation: 'How do we find it? How do we define it? What will the innovation accomplish?'"*

## *N.C. A&T Transportation Institute Hosts N.C. Department of Transportation Research & Innovation Summit* continued

The afternoon keynote speaker was James H. Trogdon III, secretary of the NCDOT. Trogdon discussed the impacts of transportation disruptors, for example, technology, population growth and climate change. He talked about the importance of collaborations between the academic community and NCDOT as well as cooperation between universities. Trogdon noted how research has had and should continue to have positive impacts on transportation, such as improved safety, faster and automated permitting processes, enhanced multimodal efforts and resolved congestion issues.

He also emphasized the importance of opportunity pipelines and relationship building through HBCU engagement, internships and fellowships. The afternoon consisted of more breakout sessions concerning multimodal transportation, structures, pavement, transit, research and implementation and traffic issues (Part II).



James H. Trogdon, secretary of NCDOT



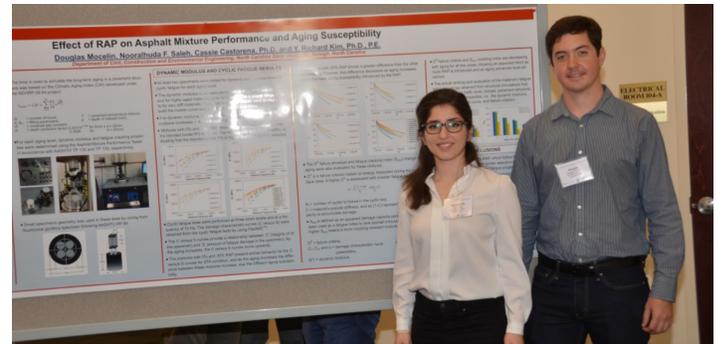
Attendees applaud the conclusion of a talk.



The conference audience listens to a presentation in the main ballroom.



Al Alston (left), director of Historically Black Colleges and Universities Outreach for North Carolina, and Edward Parker, assistant division administrator, Federal Highway Administration, share a laugh.



Nooralhuda Selah and Douglas Mocelin, from N.C. State University, present their poster explaining “Effect of Asphalt Mixture Performance and Aging Susceptibility.”

## *The Summer Transportation Institute 2019*

N.C. A&T conducted the 27<sup>th</sup> Summer High School Transportation Institute (STI) from June 27 to Aug. 2. STI is offered through the N.C. A&T Transportation Institute in the College of Business and Economics and is a five and one-half week, non-residential program for rising high school juniors and seniors.

This summer, STI introduced 14 students to career opportunities in the public and private sectors of the transportation industry and supply-chain management. It also demonstrated how science, technology, engineering and math (STEM) skills are utilized in the industries and, specifically, in the various modes of transportation – from air to highway and from rail to water.

*From left: Tyree Scales, Nicholas Gerald, Jalyn Winstead, Jalyn Edwards, Makari Vann, Kiara Smith, Arianna Graham, Kenan Moore. From left front: Lela Smith, Jordyn Staley, Brianna Mitchell, Soumeya Adjito, Joshua Whitfield, Ronicia Barnes*



*In the “Shark Tank” competition, the winning team, Stay Secure - The Anonymous Autonomous, included (standing from left )Kiara Smith, Mikari Vann, Brianna Mitchel and Nicholas Gerald.*

“Each year we strive to develop a robust program that exposes our participants to the newest evolving technologies and innovations in the transportation industry,” said Teresa McRae, STI director. This summer included classroom lectures, personal development workshops, trips to industry conferences and visits to transportation-related locations. On the academic side, students participated in SAT preparation and took a three-credit hour college-level English course.

STI ended the summer with a new activity consisting of a group project competition inspired by the TV show “Shark Tank.” Students proposed ideas addressing current transportation-related challenges and pitched them to a panel of four industry professionals. Each student on the winning team received a \$50 gift card.

## *The Summer Transportation Institute 2019 continued*

The STI program is the beginning of a pipeline for students, which can end in lucrative transportation and supply chain management jobs after college. STI participants have gone on to careers with Fortune 500 firms, federal and state agencies, and public and private companies.

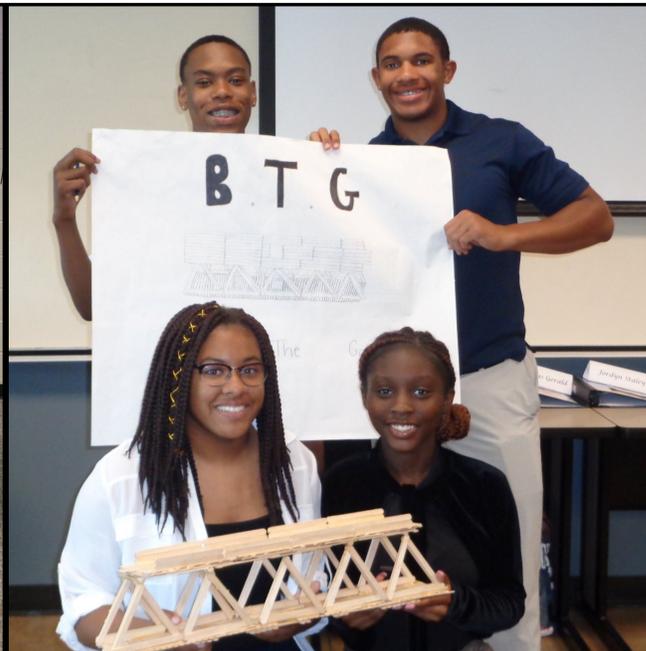
To qualify for the STI program, students had to have a minimum 2.5 GPA on a 4.0 scale, submit a typed 250-word essay expressing their interest in attending and explaining how they felt it would help them advance their education and career goals. They also had to commit to attend every day of the summer program. Each student received a weekly stipend and certificate of completion.

The Federal Highway Administration, North Carolina Department of Transportation and Center for Advanced Transportation Mobility sponsor the STI in partnership with N.C. A&T's Transportation Institute in an effort to recruit talented young people to the transportation industry and increase minority representation in the workforce.



*Right: Jalyn Edwards rides the virtual reality simulation bike at Turner-Fairbanks Highway Research Center in McLean, Va.*

*Below: The STI class toured a NCDOT highway construction site.*



*The winning bridge building team, Bridging the Gap, took first place in aesthetics and strength - holding 89.88 pounds. From left top: Makari Vann, Kenan Moore, (left bottom) Brianna Mitchell and Ronicia Barnes.*



## *STI 2019 Outstanding Students*

Three STI students received awards at the closing ceremony for their participation and conduct throughout the summer program activities.



**Jalyn Edwards**  
16 years old  
Dudley High School  
Greensboro, N.C.

Jaylyn received the award of excellence for having the highest final grade in the English and SAT preparation classes.

*“I didn’t understand all of the important jobs that it took to operate the transportation system. Before coming into this program, I thought I knew what career I wanted to pursue, but after learning about the many aspects of transportation, I’m open to the field and have decided to explore my options further.”*

### **Kiara Smith**

15 years old  
Triad Science and Math Academy  
Greensboro, N.C.



Kiara received the director's award for outstanding leadership qualities.

*“The most important thing I’ve taken away from the program is to be open to anything because you never know what it could lead to later in life. I’ve started to consider careers in transportation, but they are still in the forensics field, which is where my interest is.”*



**Joshua Whitfield**  
16 years old  
Ragsdale High School  
Jamestown, N.C.

Joshua received the outstanding achievement award for exemplifying the most positive attitude, participation and leadership qualities while putting forth a genuine effort to be successful in all aspects of the program.

*“The STI program has made me aware of the many career options available to me in the transportation field. I now realize how extremely large and broad the transportation industry is.”*

## CATM Research Spotlight



N.C. A&T Assistant Professor Dr. Hyoshin (John) Park's research expertise is in the area of decision making under uncertainty in transportation system analysis and network modeling. His current projects span several multidisciplinary areas in transportation engineering, including technologies in roadside sensors, emergency response, safety, focusing on operational learning in stochastic and dynamic systems and developing artificial intelligence (AI)-based decision tools. His AI algorithms have been applied to connected and autonomous vehicle operations sponsored by federal and state/local agencies including NSF, NASA, USDOT, VDOT, DOE, I-95 Corridor Coalition, Maryland Coordinated Highways Action Response Team (CHART) and NCDOT.

One of the projects Park is currently working on, sponsored by CATM, is titled "Travelers' Rationality in Online Anticipatory Emergency Response Model." This research aims to contribute to understanding the relationships between freeway emergency events, optimizing online look-ahead decisions and guiding the behaviors of travel agents during the assignment of emergency response vehicles (ERV). The project also seeks to analyze updated, real-time traffic information to predict secondary events with the end goal being to save lives, time and money. Park explained the logic behind the research design like this:

*"We generated two sets of scenarios in transmodeler with two incidents at different locations. Transmodeler lets you 'save' the state of the travelers so that each scenario will begin with the same configuration and settings. Each incident occurs at random locations on both routes and the duration is between 15 to 40 minutes with the simulation running from 8 a.m. to 12 a.m. to make sure that each traveler can reach their destination, and we can get an accurate estimation on the delay. Each traveler in the simulation is assumed to be uninformed, without prior knowledge of any incident nor the exact time savings of each route."*

The algorithms derived from Park's research would be useful for a city area or highway with frequent accidents to reduce the response time of ERVs. The modified work function algorithms his team came up with can be employed when a limited number of servers are in use for a large network or in any emergency transportation situation. The flexibility of the availability of servers can reduce the needed computational time for an emergency response system. The ERVs have differing availability due to the varying length of time required to clear a current incident and the occurrence of new incidents arising in the network. The simulation model developed would put emergency response systems one step closer to accurately predicting incidents and employing a more advanced model of an emergency dispatch system.

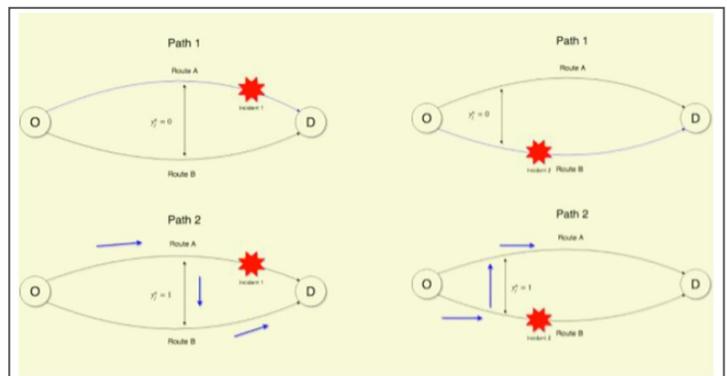


Diagram depicting an emergency response scenario.

## *Virginia Tech Transportation Institute Smart Roads Update*

The Virginia Smart Roads are state-of-the-art, closed test-bed research facilities managed by the Virginia Tech Transportation Institute (VTTI) in cooperation with the Virginia Department of Transportation (VDOT).

VTTI opened the first Virginia Smart Road, which was the highway section, in partnership with VDOT in 2000. The Smart Road became one of the world's most advanced testing facilities for transportation technology and safety research, with more than 30,000 hours of research conducted on the road since its opening. The Smart Road facilities have evolved as the needs of the transportation community have progressed. In November 2017, VTTI launched the Virginia Smart Roads, an additional suite of test tracks that enable advanced-vehicle testing in a comprehensive cross section of roadways.

The full Smart Roads project is expected to be open by the summer 2020. The Smart Roads play a critical role in the overall success of the institute and its research mission, which is ultimately to save lives. The Virginia Smart Roads are FAA approved testing facilities for unmanned aircraft systems.



### **Rural Roadway Expansion**

Opening by the end of 2019, the Rural Roadway Expansion is a unique testing facility designed to recreate the challenges of rural roadways. The roads in this section are built to older standards, specifically 1965, to test advanced and autonomous vehicles in realistic settings. For example, hilly, winding roads with short sight distances, interfering terrain and foliage, small bridges, narrow sections and intersections might be encountered by a rural driver.



### **Live Roadway Connector**

The live roadway connector links the highway section of the Smart Road to U.S. 460 Business in Blacksburg, Virginia. Equipped with traffic control devices and protocols, this connector allows VTTI to route test vehicles seamlessly between a live traffic environment and closed test tracks, enabling long-duration studies.



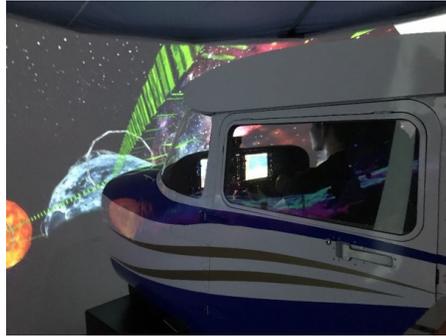
## *Embry-Riddle Holds STEM Workshop*

On July 23-24, Embry-Riddle Aeronautical University, located in Daytona, Florida, held a workshop to introduce college bound students to the science, technology, engineering, and math (STEM) fields. Five students participated in the event which involved hands-on experiments, lab tours, a modeling lecture and educational interactions with graduate students.

The number of STEM graduates in the United States is considerably below other industrialized and developing nations. Studies show that being exposed to STEM research earlier in their education increases the likelihood that students will study and go into STEM careers in the future.



Working in the composite lab



In-flight simulator



In the wind tunnel

## *Low-speed Ahead: Meet VTTI's Automated Shuttle*

The future is coming to the Virginia Tech Transportation Institute at 12 mph. VTTI's newest automated vehicle is a low-speed, electric shuttle that will be used for a mobility study on the institute's entry road.

Researchers at VTTI and N. C. A&T are evaluating whether an automated shuttle system could improve public transportation access for vulnerable road users, such as the elderly and people with disabilities. Those who depend on public transportation often face the challenge of how they will travel from transit endpoints, such as bus stops, to their homes and destinations. This is called the "first mile/last mile" problem in the transportation industry. For individuals with accessibility needs or other challenges, an additional transportation method is required to help bridge the gap.

A timely, on-demand shuttle system with automated scheduling and routing processes could be a possible solution, according to Andy Alden, the project's team leader at VTTI. Automated "last mile" systems, he explained, have been suggested as a way to improve bi-directional access between users' homes, destinations, and public transportation access points. They could also be used to provide direct access to nearby goods and services. Alden leads VTTI's Eco-Transportation and Alternative Technologies Group and serves as the executive director of the I-81 Corridor Coalition.





N.C. A&T  
Transportation Institute  
College of Business and Economics  
402 Craig Hall  
Greensboro, NC 27411

Phone: 336-334-7745

Fax: 336-334-7093

<http://bit.ly/ncattransportationinstitute>

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