



Transportation Institute

North Carolina Agricultural and Technical State University

CATM Sponsors New Research Projects

Analyzing the Role of Air Transportation in COVID-19 Pandemic Disaster

The COVID-19 pandemic has disrupted lives, businesses and economies around the world. In many instances over the past year, pandemic restrictions led to a complete standstill of all non-essential activities resulting in severe hardships for many business sectors.

In particular, the pandemic has dramatically impacted air travel, which is normally a significant driver of the global economy through the movement of people and goods. COVID-19 was especially problematic because, from December 2019 to April 2020, the virus raced around the globe much more rapidly than experts had predicted. The spread of infectious disease is intricately related to air travel.



Air travel has been identified as a leading factor in the transmission of several epidemic diseases, including influenza, SARS, tuberculosis and measles. It is essential to understand how air travel contributes to the spread of epidemics to improve the ability to respond to and contain the diseases.

The two primary methods of transmission in the initial stages of the COVID-19 pandemic were transportation across long distances through air travel and local spread within a community. The information charting COVID-19's path across the world can be represented as spatiotemporal point data on a map. By analyzing the transmission data in terms of transportation related cases and local spread cases, researchers can learn how to mitigate the spread of COVID-19 variants and possible future pandemics. ([continued on page 3](#))

Spring 2021 Issue

New CATM-sponsored Research

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- International Analysis of COVID's Impact on Traffic
- Acoustic Situation Awareness Effects on Pedestrian Safety

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International Analysis of the COVID-19 Pandemic's Impact on Traffic

Fanny Kristiansson, who is earning a master's degree in civil engineering with a specialization in transportation at Embry-Riddle Aeronautical University (ERAU) in Daytona Beach, Florida, studied the impact of COVID-19 on road transportation for her thesis. Under the guidance of Scott Parr, Ph.D., assistant professor of civil engineering, the project compared road-based transportation levels during pandemic restrictions in regions of the U.S., Sweden and China. Each country responded to the pandemic at different times with differing restrictions.

The research compared roadway traffic increases and decreases in areas of the three countries with the progression of reported COVID-19 cases and the restrictions imposed in each area to slow the virus' spread.

([continued on page 3](#))



CATM Sponsored Research *continued*

Acoustic Situation Awareness Effects on Pedestrian Safety



A primary focus of the U.S. Department of Transportation is ensuring safe and efficient mobility for pedestrians and vulnerable road users (VRUs). Statistics show that college students have the highest rate of pedestrian accidents due to the use of personal listening devices (PLDs), which includes earphones, headphones and bone conduction earphones. Due to PLDs, VRUs are also experiencing reduced levels awareness and engaging in risky street crossings.



This research, which began in February 2020 and is scheduled to be complete by January 2022, is being conducted by Rafael Patrick, Ph.D., and Myoungsoon Joen, Ph.D., at Virginia Tech and is exploring the effects of acoustic situation awareness and the use of PLDs on pedestrian safety by allowing pedestrians to make “safe” or “unsafe” street crossings in a simulated virtual environment. The research seeks to determine:

1. information about on-campus vehicle and pedestrian behaviors,
2. evidence of reduced acoustic situation awareness due to the use of PLDs,
3. evidence for the utilization of vehicle-to-pedestrian alert systems.

(top left:) Rafael Patrick (bottom left) Myoungsoon Joen)

The research is in the middle of the first phase of three planned experiments. This stage is an observation study in which the researchers collect data on natural pedestrian behavior. The information gathered will be used to create a database of pedestrian behaviors while crossing the street on a rural college campus. Special focus is placed on noting the use of PLDs and mobile phones. The observations are conducted through video recordings at different sites on the Virginia Tech Blacksburg campus. Researchers are also surveying pedestrians and speaking to focus groups to collect more data.

The second experiment will take place in virtual reality (VR). Virtual environments will be built to recreate crosswalks on campus, complete with ambient sounds and vehicles. The VR settings will be designed using a mid-hi fidelity system with a 1:1 mapping to the real world. Participants will be immersed in the VR environment using a head-mounted display with sounds coming from speakers. Participants will listen to distracting audio through earphones and attempt to perform street crossings in different scenarios.

The third experiment will also be conducted in VR. In this experiment, different auditory types of communication (e.g. alerts, signals) will be delivered via differing methods from the approaching vehicles to the pedestrians' PLD or mobile device. The study hopes to determine the efficacy of the various forms of communication and if they improve pedestrians' situation awareness while using PLDs.



The crosswalk on Virginia Tech's campus at Alumni Mall Street, which is a one-way street with buses parked all along it, was observed as part of the research project.



On the Virginia Tech campus, the crosswalk between Newman Library and Eggleston Hall, on a two-way street, was observed as part of the research project..

CATM Sponsored Research *continued*

Role of Air Transportation in COVID-19 Pandemic *continued from page one*

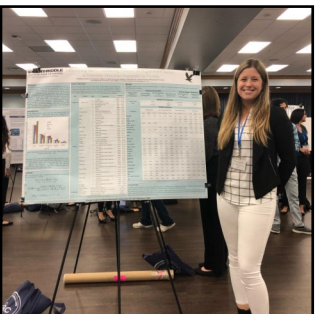


The team at Embry-Riddle Aeronautical University, consisting of Sirish Namilae Ph.D., and Dahai Liu, Ph.D., is investigating the spread of COVID-19 using Hawkes Point process models. The models are based on a different mathematical framework than the more popular mathematical models. This approach will yield new insights into the spread of epidemics, specifically allowing researchers to differentiate the air travel related epidemic events and local spread events. Hawkes' point process models have been especially successful with seismology in predicting main shock and related after-shocks in earthquakes. More recently this approach has been applied to interconnected social phenomenon. For example, epidemic characteristics of mass killings related to gun violence, stock-market selloffs and crime forecasting.

The research hopes to help estimate the contribution of long-distance air travel to the overall spread of COVID-19, which can aid devising targeted public health and transportation policy decisions to reduce the spread of pandemics in the future.

(top left) Sirish Namilae (bottom left) Dahai Lui

International Analysis on the Traffic Impact of the COVID-19 *continued from page one*



Kristiansson, who is originally from Stockholm, Sweden, found that road traffic was directly impacted by the pandemic directives issued by the governing entities, such as lockdowns and business and school closings. She compared 2020 daily traffic volumes to corresponding days in 2019 using a paired t-test in the US, China and Sweden.

Urban roads had a more rapid response than rural roads to the various restrictions, such as school and restaurant closures and work from home orders, because they largely affected urban areas. Rural roads experienced closer to normal traffic levels on weekdays with weekends showing the largest decreases, and they returned to normal traffic levels quicker when restrictions were lifted.

The data suggested that rapid traffic decreases may have aided in delaying the initial COVID-19 peak and that longer times for traffic to return to normal may have helped delay the second COVID-19 peak. This research provides insights for practitioners, researchers, and government entities developing and accessing plans for future pandemics. View the research poster [here](#).



Other Transportation Research News

VTTI Research Informs SAE International Best Practices for Public Safety and Automated Driving System-Dedicated Vehicles



Every year, first responders assist at millions of roadway incidents. As automated driving system-dedicated vehicles (ADS-DVs) become more common on the road, their interaction and communication with first responders needs to be thought through and proceduralized. ADS-DVs are vehicles that can drive themselves and lack human driver controls, such as steering wheels and brake pedals.

In December 2020, the Society for Automotive Engineers International's Automated Vehicle Safety Consortium released a set of [best practices](#) designed to help police, firefighters, and emergency medical services personnel interact safely with ADS-DVs — even without the presence of human drivers.

The report also identifies procedures and protocols for automotive manufacturers to follow in their development and deployment plans. [Research](#) by the Virginia Tech Transportation Institute (VTTI) and the Consortium of Automotive Manufacturers organized through the Crash Avoidance Metrics Partnership, LLC (CAMP) assisted in developing the scenarios and interaction types referenced in the SAE guidelines. The VTTI contributors were Travis Terry, Tammy Trimble, Myra Blanco, Kaitlyn Fitzgerald, Michelle Chaka and Vikki Fitchett.

In the CAMP report, VTTI researchers identified seven primary scenarios through in-depth literature reviews. Additionally, VTTI and the University of Massachusetts Traffic Safety Research Program interviewed 79 experts from law enforcement, fire and rescue, and emergency medical services to determine the most common scenarios where public safety officials would interact with other vehicles. Read the full report [here](#).

Developing Hurricane Drone Technology

A team at N.C. A&T led by assistant professor, Hyoshin Park, Ph.D., is developing software to better predict the path and intensity of hurricanes. The software will be loaded onto drones that the National Oceanic and Atmospheric Administration send into the eye of hurricanes in an effort to improve drone flight patterns to maximize the usefulness of the data collected. The information could then be used to improve the accuracy of predictions which could save lives.

Many factors, including temperature, air pressure, wind speed and other environmental variables interacting with each other, go into predicting hurricanes. Better information gathered by drones would allow scientists to greatly improve forecasting a hurricane's path and life. The research could also have a real economic impact. According to Larkin Folsom, a Ph.D. candidate working on the project:

"If the forecast is inaccurate, you might have to have more cities evacuate than necessary. Only evacuating places that are necessary obviously saves a lot of money for economies that aren't going to be impacted."



CATM Webinars

Collaborative Multimodal Decision-making with Advanced Transportation Technologies and Computing



On Dec. 18, 2020, Hyoshin Park, Ph.D., assistant professor in the Department of Computational Science and Engineering at N.C. A&T State University conducted a webinar focusing on LEarning, Active sensing, Robust optimization (LEARN) of transportation systems and users with probabilistic modeling addressing the computational burden.

The webinar touched on research being conducted by faculty and students at the three CATM consortium member institutions as well as the Jet Propulsion Laboratory at the California Institute of Technology and the Institute for Transportation Research and Education. Optimal solutions for an array of transportation problems based on realistic simulation

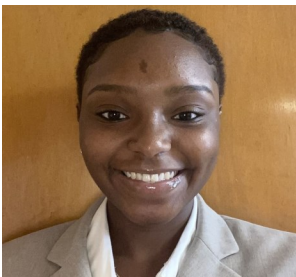
considering travelers dynamically changing choices given uncertainty and availability of information were discussed. A video of the webinar can be viewed [here](#).

Student Honors and Activities

2020-2021 Center for Advanced Transportation Mobility Scholars



Lauren Atkinson is a junior supply chain management student from Raleigh, North Carolina. She intended to study speech pathology, but changed her major after learning about supply chain management. While at N.C. A&T, Atkinson has studied abroad in Barcelona, Spain, peer mentored freshman business students and held several leadership positions, including senator for the Deese College of Business and Economics. Last summer, she interned at IBM as a procurement professional.



Rhyan Baker is a freshman supply chain management major from Greensboro, North Carolina. She was a participant in the Summer High School Transportation Institute at A&T during the summer of 2018. Baker has recently joined the university's Alpha Lambda Delta Honor Society and plans to pursue a career in the operations management field.

2020-21 Center for Advanced Transportation Mobility Scholars



Quadir Donaldson, from Newark, New Jersey, is in his junior year at N.C. A&T. He was a participant in the Summer High School Transportation Institute program in 2018 which ignited his interest in the transportation field. Donaldson plans to major in supply chain management and is still evaluating his career options. He is hoping that an internship this summer can help him decide. Donaldson is currently in the N.C. A&T Honors Program and has worked at an electrical company and United Parcel Service in the past.



Amanda Gray, from New Brunswick, New Jersey, is a senior supply chain student and the first person from the maternal side of her family to attend college. Gray, who always aspired to achieve more in her life, set goals and worked hard to become a college student at N.C. A&T. She feels confident about her career options and is determined to change the socioeconomic status of her family for generations to come.



Winston Griffin, from Greensboro, North Carolina, is a senior majoring in supply chain management. In the summer of 2020, he interned for John Deere as an order fulfillment process buyer and plans to again in the summer of 2021. Griffin started his own carpentry business, Southern Pine Carpentry, in 2019, and builds everything from furniture to treehouses. He earns money for school and experience in manufacturing and quality control working at CCI Machine & Fabrication. Griffin is also a member of Supply Chain Aggies.



Nicole Lewis is a junior supply chain management major from Cary, North Carolina. She is a Thurgood Marshal College Foundation Apple HBCU scholar, and a member of Beta Gamma Sigma and Alpha Lambda Delta Honors Society and N.C. A&T Honors Program. Lewis is the founder of the charity, "Lewis Gives," serves as a chair on the National Communication Residence Hall Association and is the secretary for the Supply Chain Aggies organization. She has experience working for IBM and Dow Chemical.



Aliyah McCray is a senior supply chain management student from Raleigh, North Carolina. She has been a member of the Blue and Gold Marching Machine throughout her years at N.C. A&T. McCray is in the University Honors Program and has been a CATM Transportation Scholar for the 2019-2020 and 2020- 2021 academic years. She has also served on the executive board for the NCAT Association for Supply Chain Management, focusing on marketing and recruitment. Her future plans include attending graduate school immediately after graduating while also working in a logistics or operations management role.

Center for Advanced Transportation Mobility Scholars continued



Felicia Park is a junior supply chain management student with a 4.0 GPA. Originally from Georgetown, Guyana, Park now calls Seat Pleasant, Maryland home. She is a member of Alpha Lambda Delta Honor Society, Beta Gamma Sigma Business Honor Society and the Caribbean Student Association. Park is also a Thurgood Marshall College Fund Wells Fargo Scholar. She is finishing a co-op position with Unilever this semester and will be working an internship with Dow Chemical Company this summer.



Kalyn Robertson is a senior supply chain management student from Martinsville, Virginia. She is a member of Beta Gamma Sigma Business Honors Society and is active in several other organizations on campus. Robertson is currently employed at CarMax and works in the Student Health Center as a peer facilitator.



Rami Sawaged is senior supply chain student from Greensboro, North Carolina. Throughout his college career, he has worked at United Parcel Service and is currently a part-time transportation and customer support supervisor there. Sawaged aspires to have a career in industrial engineering and plans to attend N.C. A&T as a graduate student in industrial engineering immediately after graduating.



Patrick Stanley is a Master of Business Administration graduate student with a supply chain management concentration from Four Oaks, North Carolina. He interned as a research assistant with CATM over the summer of 2017. Stanley was a Dwight D. Eisenhower Transportation Fellowship Program recipient in 2019 and a Transportation Research Board fellow for 2021. In the summer of 2018, Stanley participated in the U.S. DOT Summer Transportation Internship Program for Diverse Groups with the Federal Railroad Administration. He is a member of Beta Gamma Sigma Honor Society and will graduate in May 2021. At that time, he will be starting his career with XPO Logistics in their graduate program.



Miles Staton is a junior supply chain management major from Greensboro, North Carolina. He is a member of Supply Chain Aggies and has worked on campus in the Office of Student Development since 2019. He is a United Negro College Fund Best Buy Scholar. Staton is currently working with RippleMatch as a leadership development intern and will be working with Abbott Labs this summer as an operations intern.

Center for Advanced Transportation Mobility Scholars continued



Josette Stewart is a sophomore supply chain management major from Cleveland, Ohio. She is the CEO of her own business, JB Signature Collection, which is a fashion accessory line she started in 2015 at age 13. Stewart is active in the National Honor Society of Leadership and Success and serves on the executive board of Supply Chain Aggies. Her high grades have landed her on the chancellor’s list every semester she’s been at N.C A&T. She will be interning with IBM as a procurement professional in the summer.



Kiana Williams, of Columbus, Ohio, graduated in December of 2020 with a degree in supply chain management and was employed immediately upon graduating. While at N.C. A&T, she was a Honors Program mentor, an Aggie Toastmaster participant, Dwight D. Eisenhower Transportation Fellowship Program recipient and Management Leadership for Tomorrow career prep fellow. Williams has been a member of the Zeta Alpha Chapter of Zeta Phi Beta Sorority Inc. since the spring 2017.

Ashia Vance, who is a freshman from Greensboro, North Carolina and participated in the Summer High School Transportation Institute in 2018, was a CATM scholar for the fall semester of 2020.

Five N.C. A&T Students Selected for the Dwight D. Eisenhower Transportation Fellowship Program

Five N.C. A&T students, four from the Willie A. Deese College of Business and Economics and one from the College of Engineering, were awarded grants from the Administration of the Dwight David Eisenhower Transportation Fellowship Program (DDETFP) totaling \$34,500.

The funds provided tuition assistance for the 2020-2021 school year as well as a stipend and registration expenses for the 100th Transportation Research Board (TRB) annual meeting. TRB was held as a virtual event this year in January, and each recipient gave a live poster presentation. You may view those [here](#).

The purpose of the DDETFP local competition is to stimulate interest among students attending a minority serving institution of higher education or community college to conduct transportation-related research, pursue transportation-related degrees, enter the transportation workforce and enhance the breadth, scope and diversity of knowledge of the entire transportation community in the United States. The local DDETFP competition provides funds for students to pursue associate, bachelor, master and doctoral degrees in transportation-related fields.

The awards are given on the basis of merit considering: academic records, class standing, GPA, transcripts, transportation work experience and personal recommendations.

DDETFP Recipients *continued*

Amanda Gray - Gray expressed her gratitude.

"I am more than grateful to receive this award and proud to represent N.C. A&T in this way. I'm happy to be 'Aggie bred and Aggie led.'"

(See picture and information previously listed under CATM scholars.)

Aliyah McCray - A quote McCray lives by is:

"You cannot have a positive life and a negative mind." ~ Joyce Meyers

(See picture and information previously listed under CATM scholars.)

Felicia Park- A personal quote that Park lives by is below. This quote is meaningful to her because it reminds her that her opinions are important and need to be given a voice.

"When I am afraid to speak is when I speak. That is when it is most important." ~ Nayyirah Waheed

(See picture and information previously listed under CATM scholars.)

Miles Staton - Staton's favorite inspirational saying is:

"When things go wrong, as they sometimes will, When the road you're trudging seems all uphill, ...And you never can tell how close you are, It may be near when it seems so far, So stick to the fight when you're hardest hit – It's when things seem worst that you must not quit."

~ John Greenleaf Whittier

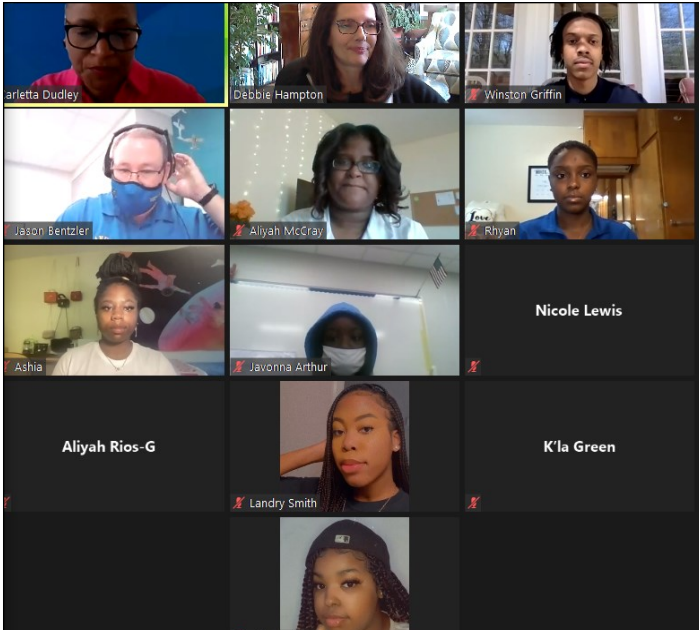
(See picture and information previously listed under CATM scholars.)



Erica Thompson is a senior civil engineering student from Charlotte, North Carolina. While at N.C. A&T., Thompson has served as "Miss Senior" in the Student Government Association and secretary of the American Society of Civil Engineers. She has also been the secretary and treasurer of Tau Beta Pi, an engineering honor society.

Thompson likes the quote *"a million dreams are keeping me awake"* from the movie, *The Greatest Showman*, because it reminds her of all the things she wants to accomplish and inspires her to keep working towards her goals.

CATM Scholars Student-to-Student Workshops



In March, CATM scholars from N.C. A&T conducted two online information sessions with high school students and teachers from around North Carolina to introduce them to the education and career paths in the transportation and supply chain management areas.

(From top left) Carletta Dudley, Debbie Hampton, Winston Griffin, Jason Bentzler, Aliyah McCray, Rhyan Baker, Ashia Vance, Javonna Arthur, Nicole Lewis, Aliyah Rios-G, Landry Smith, K'la Green, Alajah White



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