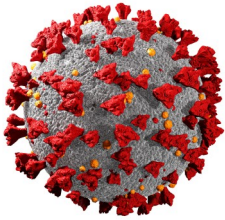


# Transportation Institute

North Carolina Agricultural and Technical State University

## *COVID-19 Pandemic Abruptly Interrupts Transportation and Education Systems Globally*



On Dec. 31, 2019, the Municipal Health Commission in Wuhan, China, reported a cluster of a pneumonia-like illness. Soon thereafter, a novel coronavirus was identified and named coronavirus disease 2019 or COVID-19. On Jan. 20, the first case of COVID-19 was confirmed in the U.S., and on Jan. 31, the World Health Organization (WHO) issued a global emergency. Despite countries imposing air travel restrictions and quarantines, the virus spread quickly around the globe. On March 11, the WHO declared COVID-19 a worldwide pandemic.

In just months, the world became a very different place. By the middle of March, many educational institutions, from kindergarten to college, had abruptly sent students home and transitioned to online classes when applicable. Parents became home-school teachers overnight. Almost all in-person spring graduation ceremonies were cancelled, and summer school instruction was moved online.

By the end of March, shipments to most non-essential businesses had stopped. Curbside pickup and delivery became the only options for restaurants. Essential businesses like grocery and hardware stores, pharmacies, gas stations and auto repair shops stayed open often with reduced hours for extra cleaning.

The pandemic created such instant exponential growth in e-commerce that carriers, like FedEx and UPS, were and still are pushed to capacity. Many large retail chains closed their physical locations, some for good, to only maintain digital storefronts. Other offices and businesses scrambled to operate with all but the necessary on-site employees working from home. #WFH (work-from-home) became a popular hashtag, and Zoom became the popular way to communicate. As the virus spread, disruptions in manufacturing and supply chains were felt around the world. It quickly became evident just how much of a global economy existed, and panic buying and price gouging ensued. Toilet paper and hand cleaner were nowhere to be found.

Some industries saw astronomical surges in demand. When possible, manufacturers converted facilities to make masks, face shields, test kits, gowns or gloves, which all required materials to be delivered by a wounded global supply chain. Products were funneled to manufacturing plants, and in some cases, private homes equipped with 3D printers or sewing machines. For a brief period, almost all modes of transportation around the globe, came to a standstill. Only the essential movement of goods was permitted and given priority as countries tried to contain the virus. In the U.S., regulations were relaxed allowing more people to drive trucks for longer hours. In many of the world's cities, traffic and travel decreased by 80–90%, and [two-thirds of the world's passenger jets were grounded by mid-April](#). Finding places with room enough to park all the planes became a challenge.

By April 2, the pandemic had sickened more than one million people in 171 countries across six continents, killing at least 51,000. Around the world, governments issued “shelter-in-place” and “lockdown orders” intended to slow the virus and flatten the curve.

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## COVID-19 *continued*

The pandemic caused the [largest global recession in history](#). In the U.S., in a matter of just months, nearly 10 million Americans were out of work. By April 26, the pandemic had killed more than 200,000 people and infected more than 2.8 million worldwide, [according to The New York Times](#).

While stay-at-home orders did slow the virus in many places, they did not halt its advance. As economic damage mounted and with no vaccine in sight, the Centers for Disease Control and Prevention and the U.S. government released a three-part plan for “Opening Up America Again” in May, which largely deferred the timing to each individual state. Many experts predicted that easing restrictions and getting back to some sense of normalcy would result in spike infection rates in certain locations and cost lives. Researchers [doubled death forecast projections](#). Policymakers were forced to strike a difficult balance between protecting people’s health and protecting their livelihoods. Businesses began to resume operations and enforce physical distancing and hygiene measures while the most vulnerable populations were encouraged to still limit their outings and contact with others. Municipalities and places of business mandated face coverings.



Mid-summer, many colleges announced that they would be reopening for in-person instruction in the fall with social distancing protocols, mask-wearing requirements, low-density living arrangements and regular testing for students and employees. As start dates approached, hundreds of colleges reversed or altered plans because of poor testing availability, student and faculty safety concerns, state regulations and the worsening public health crisis. Some scrapped their in-person plans shortly after opening after experiencing virus spikes. Like all businesses, colleges and universities are feeling financial pressure due to the pandemic. The news isn’t all bad though. The Forbes article, [“Here’s A Look At The Impact Of Coronavirus \(COVID-19\) On Colleges And Universities In The U.S.”](#) quoted Gaidi Faraj, dean of African Leadership University, as saying:

*“COVID-19 has forced all of us to reimagine how we deliver an engaging and holistic learning experience for students. While it presents its challenges, it is also a massive opportunity to break out of old habits and create new, impactful, relevant modes of learning that take advantage of technology and this moment.”*

There is no way to tell the what the extent of the damage from COVID-19 will be—to the economies of the world, to societal infrastructures, such as medical and transportation systems, to lifestyles and traditions, like sports or music events, and to countless families, who have lost loved ones, or individuals, who may have lasting conditions after recovering from the virus. According to an [article](#) from The Hill, written June 22, virus cases are showing record spikes in 12 states, and the virus is expected to resurge with cold weather.

The only real hope for returning to any kind of normal life is a vaccine. By the end of the year, there could be half a dozen coronavirus vaccines in clinical trials. Research is happening at breakneck speed. Currently, [there are 29 vaccines being tested in multiple human trials](#), running simultaneously around the world. When one is available, distribution will be challenging. The leading vaccine candidates would have to be shipped and stored at temperatures ranging from -20 to -70 °C. These conditions are not readily available at the global scale needed. The [International Air Transport Association said 8,000 Boeing 747 cargo planes would be required](#) to meet world-wide demand for a vaccine. Despite the interruptions due to COVID-19, transportation research and planning continues to press forward.



## *News in Transportation Research*

### *Namilae and Team Research Fuel Shortages During Hurricanes: Epidemiological Modeling and Optimal Control*



Shirish Namilae, Ph.D., associate professor of aerospace engineering at [Embry-Riddle Aeronautical University](#), led a team of professors and students studying the mass evacuations during Hurricane Irma, occurring in September 2017. Specifically, the team looked at information pertaining to the gas shortages and gridlock traffic patterns after Irma. The resulting data will be used to determine methods to allow for smoother evacuations in the future. The study began in October 2019, and concluded in June 2020. View the final report [here](#).

The study utilized Embry-Riddle’s Cray CS cluster supercomputer. The computer ran simulations taking variables into account and calculating results based on, for example, fuel levels of cars, evacuation routes, the number of lanes on various roads, gas station locations and incidents of emergencies and traffic jams due to accidents and gas shortages. By conducting simulation runs using various parameters, the researchers could get a better idea of the potential problems when large numbers of people are forced to evacuate via a particular route, in a short period of time.

The research was part of a sub-grant from the [Center for Advanced Transportation Mobility](#). Namilae conducted a webinar presenting the final conclusions of the research project. View that [here](#).

### *Virginia Tech Transportation Institute External Research Awards Exceed Record*

Externally sponsored awards at the [Virginia Tech Transportation Institute](#) (VTTI) topped \$50 million in just over a year. The number achieves a new record for the institute and allows VTTI to continue to lead further advancements in roadway safety and technology research. VTTI received several large-scale grants and contracts from public- and private-sector partners over the course of the last fiscal year.

*“This has been a tough fiscal year for us, given COVID-19 and its impact on our ability to conduct research that is largely based on human interactions,” said Institute Director, Tom Dingus. “But now, not only are we safely resuming operations to lead critical transportation research efforts, we are seeing award numbers surpass those of previous years. It is a testament to the extraordinary talent, hard work, and determination of our team of researchers.”*



Read more about the specific research advancements underway and planned on the VTTI website [here](#).

*A VTTI Virginia Smart Roads Bridge.*

## *News in Transportation Research* continued

### *Song Invents Artificial Intelligence to Hijack Rogue Drones*



Houbing Song, Ph.D., an assistant professor of electrical engineering at Embry-Riddle Aeronautical University, has invented an artificial intelligence program that can hijack rogue drones, avoiding possible danger. The technology proposes a safe and affordable way to neutralize intruding drones – without having to shoot them down or force them to crash-land. This response is much more preferable in civilian settings such as large outdoor entertainment arenas and airports.

Song came up with the idea after noticing an increase in unauthorized drone activity. "Reports of unmanned aircraft sightings from pilots, citizens and law enforcement have increased dramatically over the past five years," Song said.

The technology will be a movable, intelligent system that creates an invisible “drone-proof dome” over a designated location, places like airports, sports arenas, schools or even private residences. If a drone enters the airspace in the protective dome, Song’s developed system would be able to determine if it’s authorized, and if it is not, the software will be able to hijack control of the aircraft from the unknown pilot and land it somewhere where authorities can respond accordingly. Drone Defense Systems LLC has received the exclusive rights to commercialize the technology. The company will work with Song and Embry-Riddle to further refine the concept, build a prototype and pursue commercial products.

## *CATM Webinars*

### *Low Speed Autonomous Vehicles - Real World Implementation*

On April 30, VTTI researchers, Andrew Aldin and Kevin Grove, reported on their experience with the implementation of a Low Speed Autonomous Vehicle (LSAV) at a public test site in Blacksburg, Virginia. The LSAV shuttle was deployed to support CATM’s Automated Last Mile Connectivity for Vulnerable Road Users research project. Click [here](#) to view the webinar video. Click [here](#) for the research abstract.

### *Mobility, Fairness and Accessibility for Vulnerable Road Users in Socio-Technical Systems with Advanced Transportation*

On May 1, Yeohno Seong and Sun Yi, both researchers at [North Carolina Agricultural and Technical State University](#), moderated a discussion in which humans were given top consideration over technology in an effort to “fit the machine to human” rather than the other way around. Virtually all research on autonomous vehicles to date focuses on the technical requirements of the mechanics of successfully constructing driverless vehicles. Very few studies have looked at the role of humans and vulnerable road users interacting with autonomous vehicles naturally in society. Click [here](#) to view the webinar video.

### *Transportation Applications of Multiscale and Epidemiological Models*

On Aug. 27, Shirish Namilae, Ph. D., associate professor of aerospace engineering at Embry-Riddle University, presented the final conclusions of the research project. Read further details about the research in this newsletter [here](#) and view the webinar video [here](#).

## *Student Honors*

### *Patrick Stanley Accepted as a 2021 Transportation Review Board Minority Student Fellow*



Patrick Stanley, a N.C. A&T Master of Business Administration graduate student with a supply chain management concentration, has been accepted as a Transportation Research Board (TRB) Minority Student Fellow for 2021.

As a fellowship recipient, Stanley will write and submit a research paper which he will present at the annual TRB meeting, which will be held virtually, in January 2021. In reciprocation, his expenses, including transportation, meals and lodging, for the event are to be covered. Stanley's research will focus on the trucking industry and the resulting changes in the hours of service (HOS) standards that were adopted in the U.S. during the COVID-19 pandemic.

Specifically, Stanley intends to analyze commercial vehicle accident data from trucking capacity statistics recorded on government sites and in articles written during the COVID-19 pandemic. He will compare the pandemic information with data from past time periods of standard operations. HOS regulations were relaxed during the pandemic, and it is anticipated that they will be adjusted again at some point in the future. Stanley's comparison could provide a useful reference point to determine what changes are needed in such crises situations in the future and how effective they prove to be. He explained:

*"Trucking capacity, delivery times and hours driven are important factors influencing supply chain efficiency. These areas interest me because HOS standards directly impact supply chain design, distribution and transportation decision making. I would like to be employed working with these factors after graduation."*

### *Josh Blackwell Completes CATM Summer Research Internship*



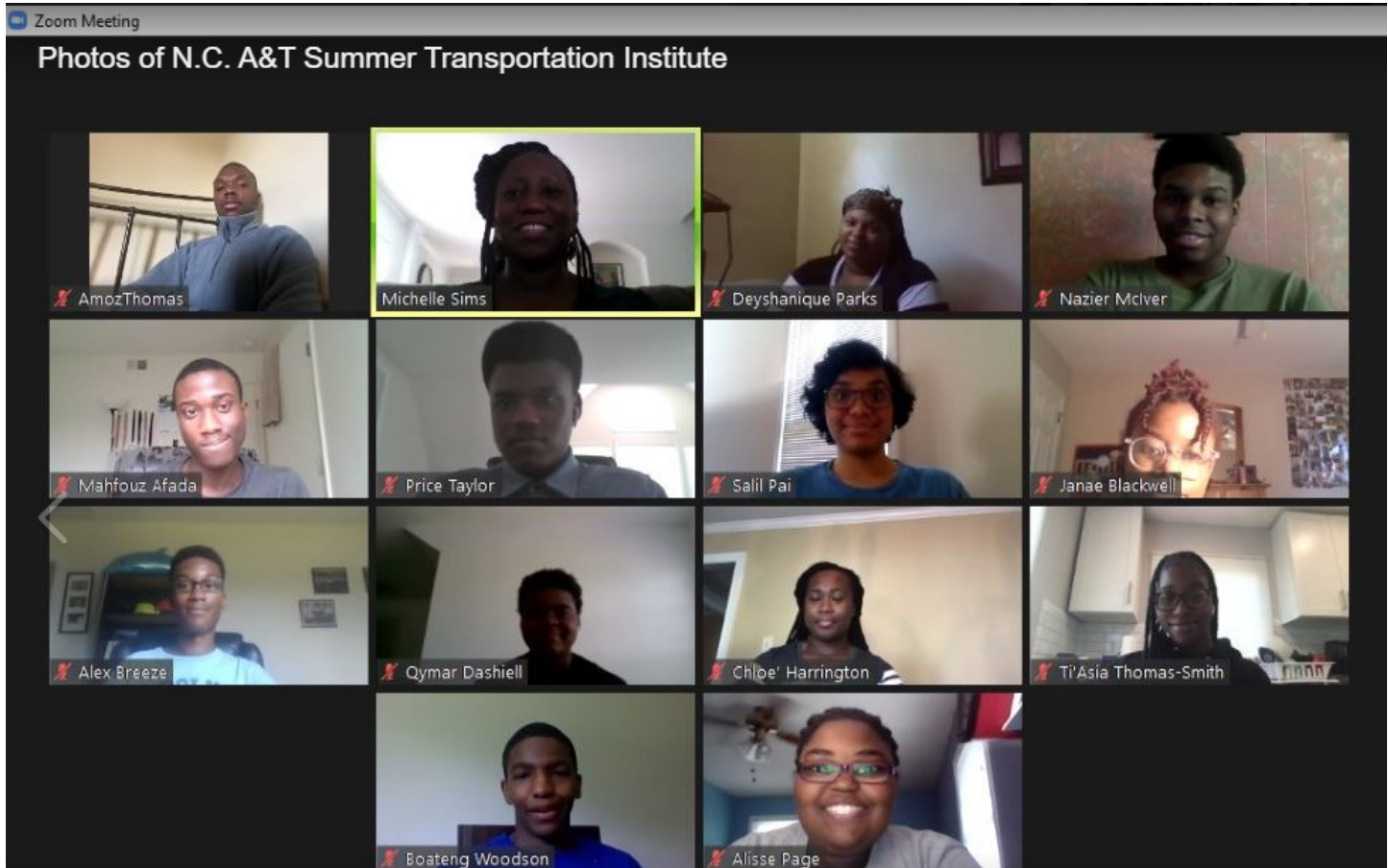
Amidst the COVID-19 pandemic, Josh Blackwell, a senior industrial and systems engineering student at N.C. A&T, worked under the guidance of Xiuli Qu, Ph.D., an associate professor in the Department of Industrial and Systems Engineering. Blackwell researched Hurricane Dorian, occurring on Aug. 24, 2019, traffic data and the ensuing evacuations in North Carolina.

All instruction, research and communication were accomplished virtually. The resulting information will be used to assist in identifying specific factors that directly impacted hurricane evacuation traffic. The resulting information could prove beneficial in future evacuation emergencies.



## *The Virtual Summer Transportation Institute 2020*

Due to the COVID-19 pandemic and for the safety of the students, staff and professional participants, the 2020 N.C. A&T Summer High School Transportation Institute (STI) was held online as a completely virtual event. From Monday, July 13, through Friday, July 31, the Virtual STI program consisted of three weeks of educational, interactive and engaging activities ranging from individual guest speakers and speaker panels to virtual on-site tours and group projects.



Thirteen high school juniors and seniors attended STI from 9 a.m. to 2 p.m. with an hour lunch break, Monday through Friday. Most of the students came from across the state of North Carolina with one logging on from New York. The STI introduced the group to the various educational paths and career opportunities in the public and private sectors of the transportation industry and supply-chain management. The STI program emphasized how science, technology, engineering and math (STEM) skills are in demand and utilized in the industries and within the individual modes of transportation — from air to highway to rail to water. Teresa McRae, director of the STI, said:

*"This year certainly presented unique challenges. As the oldest STI program in the nation, it was important for us to continue to provide a quality experience. Although we didn't get to physically travel and have face-to-face experiences, we were still able to expose the students to a wealth of transportation and supply chain scholars, professionals, mentors and places across the nation. From the feedback I've received, I know both the students and parents feel that this year's program successfully provided a solid introduction to the transportation industry, as well as SAT preparation and inspiration and personal development information—just like we have in-person in the past."*

## Virtual STI 2020 *continued*

Some of the program activities included:

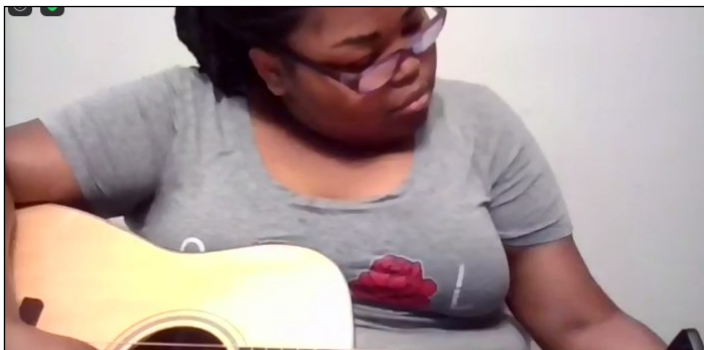
- A virtual talent show
- A “Shark Tank” team company competition
- A virtual tour of the Turner-Fairbanks Research Center in Washington, D.C.
- Solar power car kit assembly and video production
- SAT math and English preparation and practice
- Bridge building kit assembly and video production
- A virtual tour of the Charlotte Light Rail Command Center in Charlotte, N.C.
- Public speaking coaching by Toastmasters
- Introduction to supply chain and engineering education and career paths by various speakers



*In a video, Price Taylor makes a convincing pitch explaining the assembly process and selling points of his solar powered car.*



*Sai Dekakata, a Ph.D. candidate at N.C. A&T College of Engineering, gave students an overview of the autonomous vehicle research and development being conducted at the college.*



*Alisse Page played a few tunes on the guitar for her skill in the talent show.*



*Marie Darby, rail transportation manager, and Essence Douglas, interim chief controller, from the Charlotte Light Rail Transit in Charlotte, N.C. gave a virtual tour of the grounds and system.*



*Wes Kumfer, from the UNC-CH Highway Safety Research Center, conducted an exercise with the students to place signs and other transportation tools so that pedestrians could navigate safely.*



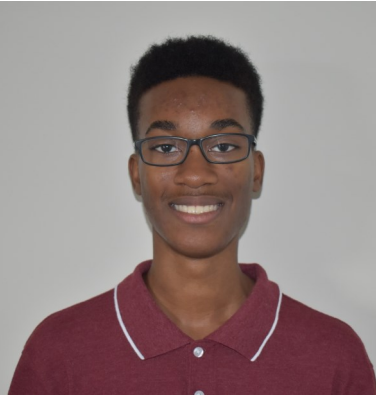
*In a friendly competition, each student was challenged to assemble a solar car, decorate it and make a video of the process and results. Janae Blackwell's, STI participant, finished solar car is pictured above.*

## Virtual STI 2020 Outstanding Students

Three students participating in the STI program received awards at the closing ceremony for their exemplary efforts and conduct throughout the program's activities.

### Alex Breeze

17 years old  
Eastern Guilford High School  
McLeansville, N.C.



Alex received the award of excellence for his advanced level of knowledge and participation in all of the virtual activities. He also demonstrated thorough planning and execution in his independent assignments.

*"Before participating in the STI program, I didn't know much about the field of transportation and was set on majoring in computer science. The program showed me that the transportation industry is very broad and includes all kinds of diverse degrees. Now, I'm more receptive to and aware of many new career options."*

### Chloe' Harrington

16 years old  
Northern Nash High School  
Rocky Mount, N.C.

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

*"The program gave me many experiences which I feel will aid me in my future education and career goals. Not only did it greatly expand my knowledge of the transportation industry, it also gave me tips on how to ace a job interview and communicate more effectively. I'm thankful for having had the opportunity to attend. Remember, never have a closed mindset to anything, you are holding yourself back from being great!"*



### Salil Pai

18 years old  
Early College at Guilford  
Greensboro, N.C.



Salil received the award for outstanding leadership qualities.

*"I wasn't sure what to expect when I logged onto Zoom to join STI for the first time. As I became involved in the program, I found it to be more informative and explorative than I had originally anticipated. I learned that there was much more to transportation than just the logistics conducted from a driver's seat or in an office. It was a surprise, to be sure, but a welcome one."*



## *Opinions on the 2020 Virtual Summer High School Transportation Institute: “I wouldn’t change a thing.”*

Chloe’ Harrington, a junior at Northern Nash High School in Rocky Mount, N.C., wanted to participate in the N.C. A&T Summer High School Transportation Institute (STI) because she aspires to be an Aggie and attend N.C A&T. She also liked the idea of exploring a career option that was in-demand yet few people knew about. Chloe was introduced to supply chain in her high school civics class, but didn’t know much about the transportation industry. According to Chloe’, pictured below with her bridge-building project:



*“Before the STI program, transportation was just planes, trains and automobiles to me. After STI, I have an entirely new perspective on the industry. When I hear the word ‘transportation’ now, I think of logistics, transport, infrastructure and different systems. It’s hard for me to get in a car now without thinking about all the things that go into making it and maintaining the roadways.”*

Chloe’ had a little hesitation about participating in the program all online. While she did feel that she missed out on the social interaction and travel that an in-person program would have offered, she still believes it was a worthwhile learning experience. “Not only did I learn a lot about an industry I had little knowledge of, but I also learned a lot about myself,” Chloe’ said. Her favorite activity was the bridge-building kit and video competition, in which she won first place.

Chloe’s has always dreamed of becoming an Aggie and a career in sports medicine. After participating in the STI program and having been exposed to all the possibilities in transportation, she may be reconsidering that. “This is an extremely interesting field, I’m not sure if it should be completely off of the table,” said Chloe’.

Hattie Harrington, Chloe’s mother, encouraged her to participate in the program thinking it would allow Chloe’ to get a taste of college, explore education and career options and continue to build self-development and leadership skills. According to Hattie, the virtual STI program accomplished that and more.

*“My expectations were exceeded. With the pandemic, Chloe had been doing virtual learning since March, which didn’t really give her the opportunity to engage, interact or explore. The virtual STI was the complete opposite of her previous experience. I immediately recognized that my child was in a learning environment where she was encouraged to flourish and be herself. The entire STI staff and all of the presenters were phenomenal, and as Chloe’ put it, ‘these are the most genuine people.’ I haven’t seen my child that excited about learning in a long time, and I truly believe that it has enabled her to better her approach to online learning this school year. In a virtual program, I wouldn’t change a thing.”*



## *CATM Scholars Student-to-Student Workshops*

Before COVID-19 halted all in-person interactions, CATM scholars from N.C. A&T visited Dudley High School in Greensboro, N.C., twice to tell students about the varied education and career opportunities in supply chain management and transportation.



*CATM scholars, (from left) Quadir Donaldson, Marvin Edge and Amanda Gray, talk to Chris Snead's business management class at Dudley High School on March 10 about the transportation and supply chain curricula in college.*

*CATM scholars, (standing from left) Aliyah McCray and Kiana Williams, speak to Lionel Bryant's class at Dudley High School on March 11.*



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