

CCEE NEWS

DEPARTMENT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING



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LETTER FROM THE DEPARTMENT HEAD

I have been thinking a lot about the importance of community. Philosopher Charles Taylor contends that modern Western societies have been defined by a “generalized culture of ‘authenticity,’ or expressive individualism, in which people are encouraged to find their own way, discover their own fulfillment, ‘do their own thing.’” In his book *The Ethics of Authenticity*, he writes, “The dark side of individualism is a centering on the self, which both flattens and narrows our lives, makes them poorer in meaning, and less concerned with others in society.”

One of the great privileges of leading CCEE is that our community draws people who counter this trend toward unrestricted individualism with a passionate commitment to make communities safer and more sustainable for everyone. This newsletter features many examples of how our faculty and students are working for the broader social good:

- Graduate student **Savanna Smith**, advised by Glenn E. and Phyllis J. Futrell Distinguished Professor **Francis de los Reyes**, wrapped up a study characterizing the microbial communities of pit latrines in Malawi. Her results will improve the management of pit latrines to prevent the transmission of infectious diseases in communities lacking access to modern sewage treatment technologies (page 02).
- Graduate student **Emily Floess** and Professor **Andy Grieshop** published a new study showing that replacing charcoal, wood or dung with electricity or liquefied petroleum gas to fuel cookstoves in low- and middle-income countries would not only save lives by cutting exposure to particulate matter in indoor air but also would substantially decrease emissions of greenhouse gases (page 03).
- Professors **Shane Underwood** and **Cassie Castorena** and their students tested roadway samples across North Carolina to help the NC Department of Transportation (NCDOT) predict which roadways have diminished skid resistance to help prevent risks in automobile accidents (page 04).

Also featured are stories about CCEE alumni who have dedicated their careers to making a difference for others. **Joey Hopkins** (page 36) has spent 27 years in public service, culminating in his recent appointment as the NCDOT Secretary of Transportation. The alumni briefs (page 37) and biographies of new inductees to CCEE’s Hall of Fame (page 20) feature many more examples of alumni who have given back to their communities and to CCEE.

One member of our community who embodied the concept of community wellbeing was Distinguished University Professor Emeritus Dr. **Paul Zia**, who passed away in August 2023 at age 97. As a final testament to his care for others in this generation and beyond, he left \$250,000 of his estate to support activities at CCEE’s Constructed Facilities Laboratory (CFL). This facility, with its multi-story interior open bay, enables faculty and students to perform advanced research and testing of construction materials and structural systems. It is outfitted with unique structural stress-testing equipment that enables new construction materials to be tested at scale before they are deployed in real buildings, helping to prevent structural failure risks that otherwise might have been undetected. It also allows researchers to identify underlying causes of past structural failures like the collapse of buildings and bridges. It is one of very few facilities of its kind and, as a result, attracts interest and requests for help from companies across the world. If CCEE is able to identify sponsors who can supplement Dr. Zia’s gift to reach a total fund of \$1 million, then we will name the main working floor of the CFL in Dr. Zia’s honor. Income from this fund would support hands-on experiential learning for students. There is perhaps no better way to continue to build on Dr. Zia’s extraordinary legacy than to contribute to this fund.

Reaching the \$1 million goal to dedicate the CFL main floor to Dr. Zia is my major fundraising priority for CCEE this year. If you can help by making a contribution and/or encouraging others to do so, please contact me at jmacdon@ncsu.edu. You can also make a contribution directly at go.ncsu.edu/zia. Whether or not you can support this cause, I encourage you to visit us in Fitts-Woolard Hall to share in the passion and sense of community that fill our corridors every day.

Thank you for your ongoing support and connection to CCEE.

Jackie MacDonald Gibson

CCEE Department Head



Photo credit:
Sustainable Sanitation Alliance

concern,” said **Savanna Smith**, first author of the study and a CCEE Ph.D. student.

For this study, researchers collected waste samples at three different depths from 55 lined pit latrines on the outskirts of two cities in Malawi. The researchers used genetic sequencing to identify the types of microbes

present in each sample and the relative abundance of each type of microbe.

“One interesting finding was that the microbial community in any given pit stayed fairly constant, regardless of depth,” Smith said. “Also, while there was some variability from pit to pit, there was relatively little variation when you looked at all the samples together. That’s useful to know, because it can inform the development of new pit latrine management techniques in this region.”

“The findings also confirm an existing hypothesis about exactly how these microbial communities break down the human waste,” said de los Reyes. “Different subsets of the microbial community are more represented at different levels, with aerobic microbes more abundant near the surface and anaerobic microbes more abundant deeper in the pit. The more we understand about this process, the better able we are to develop management techniques that might hinder methane production.”

The paper, “Microbial Community Function and Bacterial Pathogen Composition in Pit Latrines in Peri-urban Malawi,” is published in the open-access journal *PLOS Water*. The paper was co-authored by Benjamin Risk of Emory University; Rochelle Holm of Mzuzu University (Malawi) and the University of Louisville; Elizabeth Tilley of ETH Zurich; Petros Chigwechokha of the Malawi University of Science and Technology; Drew Capone of Indiana University; and Joe Brown of the University of North Carolina at Chapel Hill. The work was done with support from the Bill & Melinda Gates Foundation, under grant OPP1094923.

This story was first published in NC State News. ■

How can we better build pit latrines to improve public health?

A new study sheds light on the complex microbial ecosystems found in pit latrines, which are used by billions of people around the world. Despite their wide use, little is known about how microbes and pathogens may vary within and across pits. Using new genetic tools, CCEE researchers characterized the composition of pit latrines in Malawi, with implications for public health.

Properly designed and managed pit latrines are not just holes in the ground to store human waste: They are biological reactors that help break down the waste and reduce the likelihood that mismanaged waste will contribute to human health or environmental challenges.

“This is one of the first efforts to use genetic tools to better understand basic sanitation technologies in low-income countries,” said **Francis de los Reyes**, corresponding author of a paper on the work and Glenn E. and Phyllis J. Futrell Distinguished Professor. “Improving our understanding of the microbial ecosystems in these pit latrines can help us develop new management techniques that influence the behavior of those ecosystems. Those changes, in turn, could facilitate a more rapid breakdown of human waste and reduce greenhouse gas emissions.”

“This work also serves as a proof of concept for using these scientific tools to monitor pit latrines for pathogens of

What are the benefits to transitioning to “cleaner” cooking options?

Approximately 2.4 billion people, or 40% of the global population, lack access to clean cooking fuels and technologies, causing more than 3 million premature deaths annually through household air pollution. A recent study by CCEE researchers emphasizes the urgent need for transitioning to cleaner cooking options, which will help to decrease environmental damage and human health impacts, especially on the women and children who are most exposed in homes.

The study, led by CCEE graduate student **Emily Floess** and Professor **Andy Grieshop**, reveals the substantial health and climate benefits associated with expanding the use of liquid petroleum gas (LPG) and/or grid electricity for cooking in low- and middle-income countries. While prior studies have explored the global carbon footprint of biomass dependence and the individual climate impacts of various cooking choices, this study represents the first comprehensive global analysis of the health and climate implications of large-scale transitions from traditional polluting fuels to LPG or electricity.

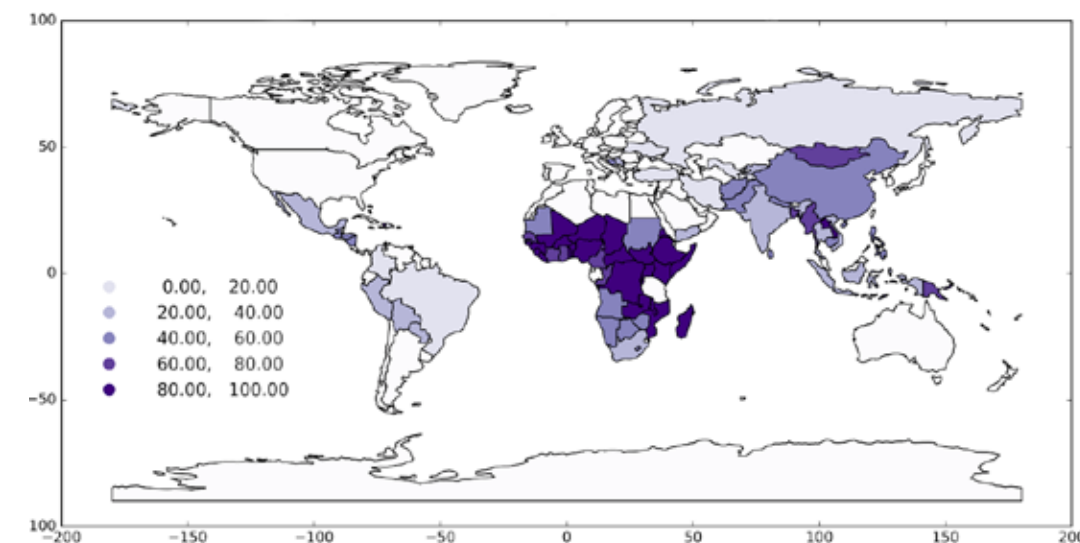
The research analyzed and projected the fuel used for household cooking from 2018 to 2040 in 77 low- and middle-income countries and estimated the associated emissions and climate impacts. By comparing typical fuel used with

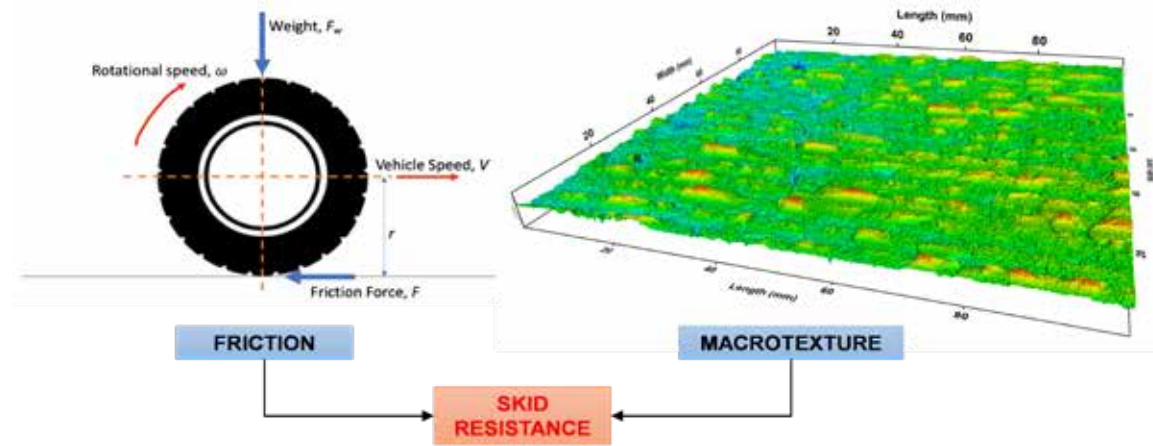
several alternative pathways for household energy, the study demonstrates that a full transition from biomass-fueled cooking to LPG or electricity can lead to a remarkable reduction in cumulative greenhouse gas emissions — between 17% and 47%, equivalent to 2.3 to 4.3 gigatons of carbon dioxide by 2040. This reduction is comparable to removing 500 to 900 million cars’ annual emissions. Additionally, the shift significantly decreases emissions of harmful pollutants such as particulate matter and carbon monoxide by more than 95%, thereby diminishing the risks of illness and premature death caused by household air pollution.

The work was motivated by the perception among some researchers working on addressing global energy poverty that a transition to LPG or grid-based electricity, which are both fossil-fuel-intensive options, would increase emissions that contribute to climate change. This study shows this perception to be incorrect, and even after accounting for “upstream” emissions from extraction, processing, long-distance transportation and last-mile distribution, both LPG and grid-based power result in lower emissions of all major pollutants contributing to climate change and possible health effects from air pollutants.

The paper, “Scaling up gas and electric cooking in low- and middle-income countries: climate threat or mitigation strategy with co-benefits?”, recently published in *Environmental Research Letters*, involved researchers from NC State, the Stockholm Environment Institute, the Universities of Liverpool, Oxford and Leeds in the UK, and the University of California-Berkeley, with support from the Clean Cooking Alliance. ■

A map showing the percentage of population relying on solid fuels (wood, charcoal, dung) for their primary household energy in countries with at least 1 million solid fuel users.





How can we predict changes in friction and texture of roads to help keep drivers safe?

Skid resistance is a critical factor affecting highway safety during wet conditions such as rain, snow or flooding. When skid resistance is higher, a braking vehicle can stop in a shorter distance, and the chances of a collision may be reduced. Wet conditions reduce the skid resistance because the water can lubricate the driving surface and also affect the overall interactive forces between the tire and pavement surface. This lubricating effect is dependent on many factors including the surface’s micro- and macro-texture, surface texture connectivity, tire characteristics and speed.

Shane Underwood, professor; **Cassie Castorena**, professor; and **Boris Goenaga**, postdoctoral scholar, along with **Paul Rogers**, Ph.D. student and project manager at KPR Engineering PLLC, conducted research for the North Carolina Department of Transportation (NCDOT) to better understand the effects of friction and texture on safe driving.

“The NCDOT was interested in doing this project because it wanted to get a better handle on pavement skid resistance behaviors,” Underwood said. “The NCDOT has a really difficult job in managing the annual Highway Safety Improvement Program. This program, among other things, addresses crashes occurring when cars leave their lanes. Understanding the effects of friction and macro-texture is important to mitigating these kinds of crashes.”

The team measured friction and texture features at 153 sites in North Carolina. Asphalt samples were collected in the field and studied in the lab for a subset of these sites. The researchers developed models to understand how friction and texture change with time and proposed threshold limits for friction and texture that could help prevent wet lane departure collisions and increase safety.

The models help the NCDOT understand and predict how texture and friction can change on its pavements over time. The researchers found the same rate of deterioration for friction was applicable across roads of different classifications such as interstates and state highways across several regions. They found that for texture, different rates must be considered: Faster deterioration was observed in some regions of the state relative to others.

The team also did a cost-benefit analysis to evaluate the viability of widespread adoption of mitigation strategies such as adding surfaces with greater texture or better water drainage or shotblasting the existing surface to increase texture. Their analysis showed that such strategies could be potentially viable, but that further analysis relating to the complexities of such policy decisions is warranted. The team is currently performing a follow-up study to evaluate new pavement surfacing options with respect to safety and long-term performance implications.

This research was published in a paper titled “Using Continuous Traffic Counts Extracted from Smartphone Data to Evaluate Traffic Reductions During COVID-19 Pandemic in North Carolina” in *Latin American Transport Studies*, and in a paper titled “Early Friction and Texture Evolution after an Asphalt Overlay” in *Transportation Research Record: Journal of the Transportation Research Board*. The research was also presented at various national venues including the Annual Meeting of the Transportation Research Board, The Road Users and Profilers group, and various state venues. ■

In the second half of 2023, CCEE launched new research projects with funding from federal and state agencies, foundations and industry sponsors. This support will enable CCEE faculty members, their research teams and their collaborators to address problems in infrastructure and the environment in North Carolina and around the world.

FEDERAL GRANTS

Katherine Anarde, assistant professor, will lead a study supported by NASA to quantify the spatial extent of chronic floods in two communities in North Carolina: New Bern and “Down East” Carteret County. The team will advance remote sensing techniques (optical and radar SmallSat data) to collect new observations of flood incidence and spatial extent, along with measures of impacts and inequities, to provide much-needed knowledge on the effects of sea-level rise on communities and households distant from tide gauges. The results of this project will directly address climate justice issues in two coastal communities that are underserved by existing observational networks and will demonstrate a framework for translating remotely sensed data to address questions and needs of communities on the frontlines of climate change globally. The project team includes social and physical scientists from NC State, the

University of North Carolina at Chapel Hill and the University of North Carolina at Greensboro, as well as community partners.

Eleni Bardaka, assistant professor, will lead a study funded by the National Science Foundation (NSF) to test and evaluate smart, technologically enabled and community-supported solutions for distributing travel demand over time and increasing ridesharing and efficiency in public microtransit systems in an equitable manner. The envisioned microtransit system will be piloted in Wilson, North Carolina, a city with a high proportion of economically disadvantaged and carless households. The research team will develop a Cooperative Adaptive Ride-Sharing system (CARS) that creates empathy-building messaging based on real-time user information and powered by artificial intelligence (AI), to motivate prosocial behavior for the benefit of other users

and the system as a whole, such as encouraging users to shift the time of more flexible trips (e.g. errands) to accommodate other users' urgent and critical trips (e.g. work), and walking farther, when able, to share rides. The research team includes Munindar Singh (Department of Computer Science), Christopher Mayhorn (Department of Psychology), Crystal Chen Lee (College of Education), Samitha Samaranyake (Cornell University), Pascal Van Hentenryck (Georgia Tech) and Kai Monast (NC State Institute of Transportation Research and Education).

Casey Dietrich, associate professor, and Erin Seekamp (College of Natural Resources) are working with stakeholders on North Carolina's Hatteras and Ocracoke islands to explore the idea of participatory transformation. Barrier-island communities face flooding due to rising sea levels and stronger storms, and they are now faced with extreme adaptations, such as allowing an island section to return to nature by removing roadways and other infrastructure. In repeated collaborations with stakeholders, the research team will identify acceptable adaptations and explore how they may change the flood risk, how these changes may affect the community's relationship with its environment, and whether adaptations can be selected

to minimize the risks while maximizing community attachments. This project is supported by the NSF.

Dietrich is leading a project to modernize the coupling between models for hurricane waves and storm surge. These processes are different enough to require separate models, but they interact strongly during storms — waves drive currents and push water farther onshore. There is an opportunity to speed up the model predictions (with benefits both to real-time forecasts and long-term design) by being smarter about where and when the coupling is considered. The research team will advance the coupling to allow more user control and develop guidelines for operations. This project is supported by the U.S. Army Corps of Engineers (USACE) Engineering Research and Development Center (ERDC).

Brina Montoya, professor, and **Pegah Ghasemi**, a postdoctoral scholar, along with Amy Grunden, Will Petry and Celso Castro-Bolinaga (College of Agriculture and Life Sciences), received funding from the USACE ERDC to study the compatibility of plants with microbial induced carbonate precipitation (MICP). MICP can be used to stabilize flood defense infrastructure like levees, but the effect of MICP on existing and future plants that would

be beneficial to grow on the levees is unknown. The research team will assess plant characteristics, the plant-associated microbiome, the fate of relevant nutrients and the soil engineering properties with MICP. The results of the work will lead to a more holistic understanding of MICP as a natural and nature-based engineering solution for flood defense infrastructure.

Shane Underwood, professor, and a team of NC State researchers including **Montoya**; **Kevin Han**, associate professor and Edward I. Weisiger Distinguished Scholar; **Cassie Castorena**, professor; and **Richard Kim**, Jimmy D. Clark Distinguished University Professor, have begun a five-year cooperative agreement with the Federal Highway Administration (FHWA) on Advancing Sustainability and Resilience in Pavements. The project, which is being carried out with researchers at the NC State Climate Office and a consortium of partners including the University of California, Davis (lead), University of California, Berkeley and other industry/consultant partners, will further FHWA's efforts to improve the sustainability of the nation's pavement network and its resilience to extreme events.

FOUNDATIONS AND INSTITUTES

Tasnim Hassan, professor, and **Abhinav Gupta**, professor, teamed up with the NC State Department of Nuclear Engineering and Electric Power Research Institute (EPRI) investigators to address the technology gaps of molten salt reactors. EPRI has sponsored this Phase I project to develop a novel in-situ multiaxial molten salt mechanical test system with the goal of designing and building a large-scale molten salt research facility at NC State to explore corrosion degradation and failure mechanisms of advanced reactors' alloys and components. Southern Company and TerraPower are collaborating with EPRI in this effort.

for the Wisconsin Department of Transportation (WisDOT) to help reduce pavement buckling failures. Pavement buckling results when extreme heat events cause significant pavement expansion. The design tool will allow WisDOT engineers to evaluate buckling vulnerability throughout the Wisconsin roadway network, investigate scenarios to understand and quantify the consequences of buckling, and assess the characteristics that contribute to significant and non-significant consequences resulting from buckling. The outcomes of these investigations will be used in a risk assessment to prioritize buckling-affected sites throughout Wisconsin.

STATE

Kim received funding from NCDOT to investigate shear fatigue performance of asphalt overlays using FlexPAVE™, a three-dimensional viscoelastic finite element program that is capable of simulating the moving traffic loads. The simulation results will be used along with the laboratory-developed shear fatigue performance relationship to determine the effectiveness of different tack coat materials and application rates.

Underwood will collaborate with researchers from Marquette University to develop a design tool

Underwood is working with researchers from Arizona State University to develop a tool to help the California Department of Transportation (Caltrans) design safer roadsides and improve environmental sustainability. Caltrans must comply with the National Pollution Discharge Elimination permit and ensure stormwater runoff infiltrates the soil at acceptable rates. It accomplishes this goal by adding amendments, like compost, to native soils. However, this can create soft soils that lead to accidents. Underwood's research will develop a tool so that Caltrans can increase roadside infiltration without negatively affecting safety. ■

PICTURE THIS



Since October, the new dean of the NC State College of Engineering has gone on walking tours of all 12 engineering departments. Dean Jim Pfaendtner visited CCEE's labs in Fitts-Woolard Hall and the Constructed Facilities Lab in early January, meeting with faculty members and students and learning about the department's research activities. ■

From Fitts-Woolard Hall labs to the beaches of eastern North Carolina to the bright lights of Dubai, CCEE faculty members and students spent the fall conducting research, bonding through external activities, hosting workshops and studying abroad. Check out these photos of some of their activities.



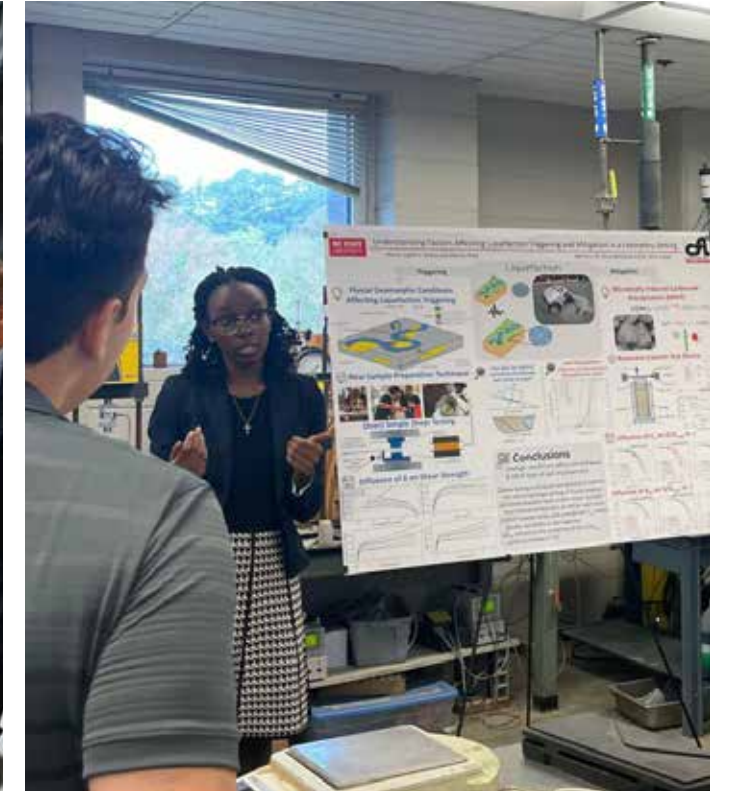
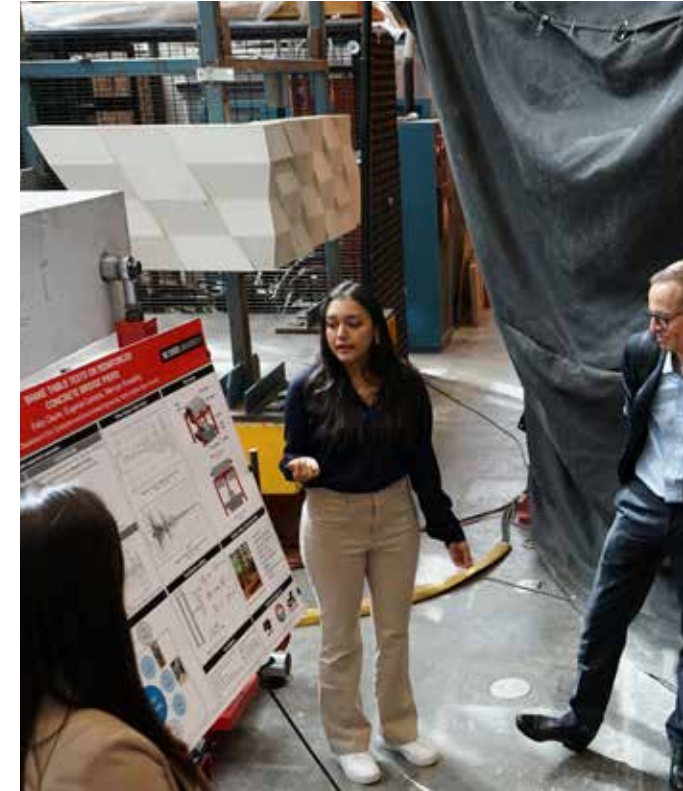
Assistant Professor **Katherine Anarde**, left, and postdoctoral researcher **Christine Baker**, right, deployed two cameras mounted on masts atop a dune at Masonboro Island, near Wilmington, North Carolina. The camera imagery can be combined to generate elevation maps of the beach from the shoreline to the dune toe. The maps will be used to examine how the beach erodes or accretes over daily to seasonal timescales. These observations can contribute to the advancement of existing models of storm impact and subsequent beach recovery. ■



PICTURE THIS



Professor **Andy Grieshop** chaired the 41st American Association for Aerosol Research Annual Conference last fall. There were more than 800 people in attendance, and more than 700 abstracts were accepted at the conference. ■



The Global Training Initiative and NC State Dining hosted the university's inaugural Culinary World Cup this fall. Student chefs sharpened their knives — and their cooking skills — to showcase their mastery of international dishes. The winning team included CCEE student **Roopa Velraja** (right), who is an environmental engineering major. The team's recipe will be featured in one of the campus dining halls. ■



As part of the annual Paul Zia Distinguished Lecture, sponsors and guests have the opportunity to tour NC State's Constructed Facilities Lab (CFL), a large-scale structural engineering laboratory. The CFL enables faculty members and students to perform advanced research and testing of construction materials, structural systems and processes that enhance the sustainability and economy of civil infrastructure through innovation and vision. During this one-hour tour, the visitors learned about ongoing research projects, experiments and latest innovations while engaging in scholarly discussions with graduate students. ■

PICTURE THIS

A rainy Saturday didn't slow down the CCEE crew from showing prospective students and their parents all the great things about being part of the Wolfpack. During the annual College of Engineering Open House, CCEE students and faculty members gave tours of Fitts-Woolard Hall and led information sessions. The event is a great opportunity to get a deeper look at what it's like to be a civil, construction, or environmental engineering student at NC State. ■



About 100 leaders and innovators from the nuclear energy industry met in NC State's James B. Hunt Jr. Library for the Digital Engineering in Nuclear Technology conference, where they exchanged knowledge on digital engineering to enable more efficient nuclear power plants deployment, operation and maintenance. Presenters included Professor **Abhinav Gupta**, Associate Professor **Kevin Han**, and Ph.D. student **Nick Crowder**, who works for the Idaho National Lab. ■



Department Head **Jackie MacDonald Gibson** attended the United Nations Climate Change Conference in Dubai at the invitation of the Abu Dhabi Public Health Centre. The conference included a workshop on quantifying the environmental burden of disease. ■





Paul Zia Distinguished Lecture: Taking a closer look at the construction of ALLEGIANT STADIUM

Thousands of Las Vegas Raiders football fans packed the sold-out Allegiant Stadium in Las Vegas on September 21, 2020, for the first game at the team's new \$2 billion stadium. The air hummed with excitement and energy inside the 1.75-million-square-foot, 65,000-seat domed behemoth, which boasts one of the largest cable net roofing structures in North America. The 7-acre ethylene tetrafluoroethylene (ETFE) roof is suspended 195 feet by stainless-steel cables, and the stadium's four 50-ft-wide glass-and-steel doors gives fans a sweeping view of the Las Vegas strip.

The 2023 Paul Zia Distinguished Lecture on the design and construction of the Allegiant Stadium in Las Vegas discussed the challenges and successes of the stadium's aggressive project schedule — less than three years from start to completion throughout the peak of the pandemic.

At this year's lecture, Frank Freudenberger, a structural engineer and associate principal at the Arup Los

Angeles office, and Ellen Spangler, senior project manager at Mortenson Construction, discussed the efforts behind the fastest-designed and constructed U.S. football stadium of its size.

To meet the accelerated schedule, the firms worked in parallel, with overlapping design, permitting and construction. The Raiders required the capacity to be able to expand from 65,000 to 72,000 to host the Super Bowl in 2024, the stadium had to be fully enclosed to allow climate control, and there had to be large doors that provided a full view of the Las Vegas strip. The playing surface had to be natural grass turf with a retractable field (one of only two in the U.S.), which meant that there had to be a door wide enough to allow the 160-foot-wide field to be moved in and out of the stadium. This opening occurred under the seating for the entire end zone of the stadium.

The firms utilized design repetition with a pan-joint floor and limited

number of connection types, selected the most-balanced seismic force resisting system (SFRS), embraced parametric modeling and automation, and took advantage of structural separation.

The general structural arrangement included a cable truss and ETFE roof, which has a high corrosion resistance and strength over a wide temperature range; a cantilever steel canopy and compression ring; a steel vessel; a steel bowl; cast in-place concrete bowl and retaining wall; precast concrete bowl; steel field tray and piled foundations.

"We decided to have the first two levels of the building be constructed in cast-in-place concrete because that would give us time for our steel detailing and procurement," Spangler said. "Once we got to our main Concourse level, which is the level most folks walk in on at Allegiant, we switched to an all-steel structure, and the steel superstructure was the last permit package."



Frank Freudenberger

Freudenberger is a structural engineer and associate principal at the Arup Los Angeles office. Before moving to Los Angeles in 2011, Freudenberger worked



Ellen Spangler

Spangler, senior project manager at Mortenson Construction, earned a degree in architectural engineering with a focus on construction management from the University of Colorado Boulder. After graduation, she was hired as a field engineer at Mortenson Construction. Spangler, who has worked at Mortenson for nine years, is a senior project manager currently leading construction of the St. Louis City SC Major League Soccer (MLS) Stadium. She has worked on three major sports projects leading up to

for Arup in other offices across three continents. In his more than 19-year career with Arup, he has delivered challenging and complex structures such as transportation facilities, high-rise structures, museums and stadiums all over the world as the structural engineer and/or Arup's multidisciplinary project manager. As Arup's project manager and structural engineer for the Allegiant Stadium project, Freudenberger and the Arup team delivered the structural and façade engineering in an extremely short timeframe.

the St. Louis MLS Stadium including U.S. Bank Stadium in Minneapolis, where she worked with the team handling heating, cooling and life safety systems; Milwaukee's Fiserv Forum, where she was a key player in the structural steel phase and the scoreboard installation; and Allegiant Stadium, home to the Las Vegas Raiders, where she was the Enclosure Team leader.

On the Allegiant Stadium project, she led the team to a successful execution of a difficult glazing, metal panel and roofing scope. Spangler also led the formidable closeout effort, working through punch list completion and substantial completion requirements, helping the team achieve an early and under-budget turnover of a landmark project in the midst of a pandemic. With each successive project, she continually tackles the challenges head on and aims to apply each gained experience to the next project. ■



QUICK FACTS ABOUT ALLEGIANT STADIUM

Contains
28,000 tons
of structural steel and
105,000 cubic yards
of concrete

The sliding field tray weighs
19 million pounds
and is powered by
72 motors

First NFL stadium powered exclusively
by renewable energy

Home to the
93-foot-tall
Al Davis Memorial Torch, the largest
3D-printed object in the world

Now in its 22nd year, the Paul Zia Distinguished Lecture Series was established in 2002 to showcase some of the world's most exciting and challenging projects and the engineers who work to make them happen. The lecture series honors Professor Emeritus **Paul Zia**, a former professor and department head of CCEE and a structural engineer who was eminent in research, professional society leadership and practice. For more than 50 years, he was engaged in teaching, research and consulting in many areas of concrete materials, reinforced and prestressed concrete structures, and construction. He advised more than 60 master's and doctoral students.

"This lecture series serves as a tremendous legacy to Dr. Zia. He and his legacy have meant so much to this department, college and university," said NC State College of Engineering Dean Jim Pfaendtner.



CCEE launches peer advisor program to help students navigate college career

Navigating the academic and social aspects of college and the nuances of engineering can be challenging for many new students. To help, CCEE launched a program to bolster the confidence of undergraduate students by connecting them with CCEE Peer Advisors.

Each advisor works with about 10 students within their major for an academic year. Advisees are transfer students from other universities or students who recently changed or added majors/degrees and are now a part of CCEE. The advisors meet with their students on a consistent basis, providing the opportunity to check in, share knowledge and offer social activities.

"The advisors were chosen based on their strengths of [being] outgoing, respectful, confident, dependable, flexible, collaborative and proactive," said CCEE Student Services Specialist **Rachael Ayres**. "Overall, the goal of the program is to foster a sense of community and belonging within the department. We are hoping that students who participate, both as advisors and advisees, feel more connected to CCEE and to NC State."

A few of CCEE's peer advisors shared what being a part of the program means to them, their campus and department involvement and plans for the future. Answers are edited for clarity and brevity.

Ellie Hannum Civil Engineering, Senior

What does it mean to you to be a peer advisor? What made you want to apply?

I was excited about contributing to strengthening the community of the CCEE department. I understand how challenging it can be to transition into engineering courses, therefore I wanted to be a part of the support system to help students succeed.

Are you involved in any clubs or organizations on campus?

I am involved in The Engineering Place's STEM Night Program, where I work as the volunteer coordinator to help organize STEM Night events for elementary school students. I am also involved in NC State's chapter of American Society of Civil Engineers (ASCE). Through ASCE, I am the team captain of the Sustainable Solutions competition, and I am on the concrete

canoe team. I am also an Engineering Ambassador and teaching assistant for the First-Year Engineering Program.

What has been your favorite class at NC State?

My favorite class has been CE 583, Engineering Aspects of Coastal Processes. I really enjoy learning how to analyze coastal processes from a civil engineering perspective and how to apply this knowledge to predict how coastal processes might change as a result of climate change.

What are your plans after graduation?

I plan to work for AECOM as a water resources engineer in Raleigh. I will mainly be working on drinking water and wastewater revitalization projects for military bases throughout the U.S.

Best advice for CCEE students?

Don't be afraid to ask for help, and take advantage of office hours.

Alvin Mutongi Civil Engineering, Senior

What does it mean to you to be a peer advisor? What made you want to apply?

I wanted an opportunity to connect

with students who were still early on their journey to earn their degree so I can offer a perspective that may be helpful. Being a peer advisor means the ability to gain perspective on the challenges students are facing.

Are you involved in any clubs or organizations on campus?

I am president of the Eta Omicron Chapter of Alpha Phi Alpha and the programs chair of the National Society of Black Engineers. I am also a member of the Engineers Without Borders Guatemala Water Systems team.

What is your favorite thing about being a CCEE student?

My favorite thing is the way the research is accessible to students and impactful on the world.

Best advice for CCEE students?

My best piece of advice is to really dedicate yourself to doing the work day-in and day-out. It's a difficult curriculum, but the best thing you can learn from your 200 level classes is how to work.

Brandon Tucker Civil Engineering, Senior

What has been your favorite part about being a peer advisor? Any specific memories or events?

My favorite part has been meeting motivated undergraduates and helping put them in positions to succeed. I specifically enjoyed the beginning of this semester when I was able to help my advisees find clubs that fit their interests and give them a space to build connections. I also really enjoyed class advising, because I was able to walk through degree plans with several students and help them become more confident in their path over the next few years at NC State.

What is your favorite thing about being a CCEE student?

It's hard to pick just one! My favorite part of being a CCEE student is the department-wide support that I feel, from teachers who are passionate about what they teach to advisors who truly care about my success as a student, and even research mentors and study abroad faculty who continue to check in with me and support my success. It's very clear to me that the people who make up the CCEE department are here because they care about what they do and the people they impact.

What are your plans after graduation?

After graduation, I'll be returning for the accelerated bachelor-master's (ABM) degree program in civil engineering, concentrating in transportation systems. Along the way, I plan to pursue an internship where I can work in transportation systems planning and engineering, which is where I see myself after my master's graduation.

Best advice for CCEE students?

Get involved early! I highly recommend joining ASCE for both the student community and the academic/professional connections. I've only become involved with ASCE this year, but the concrete canoe team is already one of my favorite things I do! I also highly recommend becoming involved with undergraduate research, even just for one semester. The CCEE faculty, across the board, are fantastic mentors and want to help students grow. I've made some of my most valuable connections and career decisions because of research. ■

Read all the peer advisor Q&As at CCEE.NCSU.EDU.



ELLIE HANNUM



ALVIN MUTONGI



BRANDON TUCKER



Abhinav Gupta

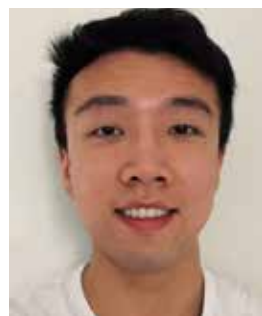
Professor **Abhinav Gupta** received the 2023 Best Paper Award from the American Nuclear Society Thermal Hydraulics Division. The paper, written by Gupta and Paridhi Athe and Nam Dinh (Department of Nuclear Engineering), is titled “Knowledge Representation to Support EMDAP Implementation in Advanced Reactor Licensing Applications.” The award was selected on the basis of originality, creativity, impact and scientific integrity and will be presented at the 2024 ANS Annual Meeting in June.



Jeremiah Johnson

Associate Professor **Jeremiah Johnson** was named a 2023 Senior Faculty Fellow for the Kenan Institute for Engineering, Technology & Science (KIETS) Climate Leaders Program. KIETS provides opportunities for NC State faculty members and students to work on initiatives for potential solutions to societal challenges being caused by climate change throughout the

world. Scholars and faculty fellows provide an expanded focus on the specific steps that individuals, companies, academics, communities, countries and world leaders can take to adapt to and mitigate these changes.



Gongfan Chen

Postdoctoral Research Scholar **Gongfan Chen**’s paper “Motivating Reliable Collaboration for Modular Construction: Shapley Value-Based Smart Contract,” was selected as Editor’s Choice in the American Society of Civil Engineers *Journal of Management in Engineering*. Chen earned his Ph.D. from CCEE in 2023 and works with Professor **Edward Jaselskis**.



Doyun Lee

Postdoctoral Research Associate **Doyun Lee** received a Ph.D. Award at the Technological Innovations in Nuclear Civil Engineering Conference in Paris. His paper and presentation were titled “Development of Autonomous Welding Robot for Construction Motion Planning and Control of Weaving Patterns.” Lee was advised by Associate

Professor and Edward I. Weisiger Distinguished Scholar **Kevin Han**.



Harleen Sandhu

Postdoctoral Research Scholar **Harleen Sandhu** won first place in the NC State Postdoctoral Association’s Postdoc Pitch Competition. The event, which was held as part of National Postdoc Appreciation Week, involved 19 competitors who presented their research in two minutes without any slides or images. Sandhu’s speech was titled “Twin Tech’s Clean, Safe Emission Dream.”



Thomas Thelen

Ph.D. student **Thomas Thelen** was awarded the 2023 Megan Cornog Memorial Highway Safety Scholarship from the University of North Carolina Highway Safety Research Center. Thelen, advised by Assistant Professor **Katherine Anarde**, conducts research focused on coastal resilience and adaptation to sea level rise. The scholarship aims to foster the

education and professional development of graduate students interested in transportation-related areas including, but not limited to, engineering, driver behavior, planning, public health and environmental issues.



Left to right: Prottasha Sarker, John van Schaik, Leah Weaver and NC State Graduate School Dean Peter Harries.

Leah Weaver scores second place in NC State’s 3MT Competition

Ph.D. student **Leah Weaver** won second place in the 9th Annual Three Minute Thesis competition hosted by the Graduate School.

First held at the University of Queensland in 2008, the 3MT competition celebrates the exciting research being conducted at universities worldwide and seeks to cultivate students’ academic, presentation and research communication skills.

Weaver competed against 10 NC State graduate students on Monday, Nov. 6, at Duke Energy Hall in Hunt Library. The 10 finalists represented four colleges at NC State. The competition was attended by dozens of colleagues, students and community members. Weaver received a \$750 cash prize for placing second. John van Schaik (Chemical and Biomolecular Engineering) won first place, and Prottasha Sarker (Chemical and Biomolecular Engineering) won the “People’s Choice” award.

Weaver, advised by Assistant Professor **Tarek Aziz**, gave a talk titled “Fantastic Fungi: Improving Stormwater Quality with Mycoremediation.”

Her dissertation research is focused on answering the question, “Can we sustainably remove hydrophilic pesticides from stormwater systems using fungal bioremediation?” While the fungus *Phanerochaete chrysosporium* was able to degrade imidacloprid in stormwater batch reactors, Weaver is working to evaluate whether this degradation remains feasible under realistic environmental conditions for stormwater infrastructure, such as bioretention cells. Additionally, Weaver is evaluating other bioretention cell amendment alternatives through a life cycle assessment.

Watch Weaver’s 3MT presentation at go.ncsu.edu/leah3mt. ■

SIX ALUMNI inducted into the 2023 CCEE Hall of Fame

The Department of Civil, Construction, and Environmental Engineering Alumni Hall of Fame was established to inspire our current students and alumni and to celebrate the accomplishments of those extraordinary graduates who have used their education to excel in a profession, career or service.

The six inductees of the 2023 CCEE Hall of Fame represent an inspiring, interesting and influential group of alumni. Membership in the Hall of Fame is limited to about 1% of CCEE alumni. This year's Hall of Fame induction ceremony was held on Oct. 27, 2023.

Ph.D. candidate **Kelly Flanagan**, advised by Distinguished Professor of Civil Engineering and Construction **Mo Gabr**, also spoke at the event, saying "the inductees not only have lengthy and impressive resumes, but have improved their respective communities through their efforts.

"I am privileged to be included as a member of the same CCEE community from which these exceptional

individuals have emerged," she said. "Their endeavors are an inspiration to students and professionals alike and are certainly an inspiration to me."

Read more about each of the 2023 inductees:

Tom Caldwell

Tom Caldwell earned his B.S. in civil engineering at Colorado School of Mines in 1984 and his MCE at NC State in 1993. He founded Atlas Engineering in 1996. In the late 1990s, two unusual assignments introduced Caldwell to engineering under emergency conditions: a terrorist bombing in Sri Lanka, and the Northridge earthquake in California. His work at these sites led to an invitation to train and qualify as a FEMA Structures Specialist for VATF2, one of 28 Federal Urban Search and Rescue teams that serve at national disaster sites. In 2017, Caldwell began work with Donnie Barrier, the North Carolina Department of Public Safety, and the legislature to create, fund, train and equip a cadre of first-



**TOM
CALDWELL**

responder engineers for the state. These 15 North Carolina engineers deploy with state and local agencies to hurricanes, floods, collapsed buildings and other disasters. Caldwell has deployed as an engineer first-responder with FEMA, state agencies and federal investigators at more than 50 disaster sites, assessing stability and risk, designing emergency shoring, entering collapse zones with rescuers, and assisting with live rescues and recoveries. He is a FEMA Structures Instructor and author of peer-reviewed papers on emergency engineering. Caldwell was lead engineer for a water supply project in Guatemala with Engineers Without Borders. He is active with the ASCE Structural Institute and serves on the SEANC Structural Engineers Emergency Response committee. Caldwell has been a frequent guest speaker for CCEE and the CE Extension Service.

S. James "Jim" Ellen, Jr.

From a young age, S. James "Jim" Ellen, Jr. knew how to work hard — first on a farm, then as a carpenter's assistant, and eventually as an entrepreneurial civil engineering student who went on to run his own companies. To help bring in money for his family, the Nash County, North Carolina, native started working on a farm as a child before landing a job as a teenager with a carpentry crew. He helped build barns, sheds and wood-frame farm equipment, and he decided then that he wanted to go into construction. Ellen had never doubted that NC State was the school for him. But

coming from a small town, he decided to start at a smaller school. He spent two years at Mars Hill Junior College (now Mars Hill University) in western North Carolina, where he took pre-engineering courses and worked as a janitor before transferring to NC State in 1957. Ellen was the first of three brothers to graduate from NC State with a BSCE, construction option in 1959. After college, Ellen worked for 12 years in different parts of the construction industry



**S. JAMES "JIM"
ELLEN, JR.**

before starting Richmond, Virginia-based Capital Masonry Corporation, a commercial masonry contractor, in 1971. He later started a second company, Capital Interior Corporation, which specializes in drywall, ceilings and floors. While running his companies, Ellen also went into real estate. He specialized in renovating unused properties and turning them into usable rental properties. He retired in 2013. In 2011, Ellen endowed the S. James Ellen, Jr. Distinguished Professorship. He also created the Samuel James Ellen, Jr. Family Scholarship Endowment, which supports students majoring in civil engineering, with priority for those from Nash County and other rural eastern North Carolina counties.

Berry G. Jenkins, Jr. (posthumous)

Berry G. Jenkins, Jr. earned his BSCE in 1965. He began his career in the transportation industry with the North Carolina Department of Transportation (NCDOT) and served in various leadership positions, including resident engineer, state construction engineer and state construction and materials





BERRY G. JENKINS, JR.

branch manager, before retiring in 1997 as the deputy highway administrator of preconstruction. While at NCDOT, he was instrumental in the development of the sedimentation and erosion control program. Jenkins received several awards including State Government Manager of the Year, Governor's Award of Excellence and the Order of the Long Leaf Pine. In 1997, after retiring from NCDOT, Jenkins began working with the Carolinas Associated General Contractors (CAGC) as North Carolina director, NC government relations highway-heavy division. During his 22-year tenure, he helped strengthen relationships between highway contractors and NCDOT through his leadership of several joint committees and specialty committees. Jenkins was a founding member of NC Go!, which provides education and advocacy for transportation funding; he served as the organization's chairman of the board of directors for many years. In 2016, Jenkins received the Build with the Best Pinnacle award from CAGC. He retired from CAGC in 2019. Jenkins was a longtime member of the Wolfpack Club and served on the board of directors for the NC State Engineering Foundation.

Sam McCachern

Sam McCachern, PE, serves as chief executive officer and president of Thomas & Hutton, a professional services and consulting firm for land and infrastructure. His tenure at Thomas & Hutton began shortly after graduating from NC State with a BSCE in 1985. Demonstrating consistent hard work and dedication, he progressed in leadership at Thomas & Hutton, becoming chief financial officer, and

was later elected president in 2013 and CEO in 2015. He is responsible for Thomas & Hutton's strategic plan, which led to the company's reach to 10 regions in North Carolina, South Carolina, Georgia and Tennessee. McCachern spearheaded Thomas & Hutton's expansion into the Raleigh-Durham region in 2022. He led the company in securing the historically largest economic development projects in Georgia, South Carolina and Tennessee. Named to the 2023 Junior Achievement's Savannah Business Hall of Fame, McCachern is recognized for his valuable contributions to education and community



SAM MCCACHERN

development within the Southeast. McCachern was a past Georgia Engineering Alliance's Engineer of the Year in Private Practice and is recognized for the second consecutive year on Georgia Trend's prestigious "Georgia 500" list of influential leaders in the state. A third-generation NC State grad, McCachern serves on the NC State College of Engineering Foundation Board and was on the CCEE Advisory Board. Additionally, he contributed to the construction of Fitts-Woolard Hall on Centennial Campus and to the Dean's Circle.

Charles "Chuck" T. Wilson, Jr.

Charles "Chuck" T. Wilson, Jr., earned his BSCE in 1965. After graduation, he enlisted in the Navy. He served as a damage control officer on a U.S. Navy Destroyer and as a chief engineering officer on a Landing Ship Tank before joining his father in the family business in 1969. Charles Wilson Sr. (BSCE 1930), founded commercial construction company C.T. Wilson Construction Co. in 1952 to perform



CHARLES "CHUCK" T. WILSON, JR.

preconstruction and construction management services across North Carolina. In 1980, he passed leadership to his son. When Charles Sr. passed away in 1995, Wilson and his mother created the Charles T. Wilson scholarship for CCEE students pursuing a degree in construction management. Wilson and his wife, Jean, later endowed the C.T. Wilson Construction Co. Association of General Contractors (AGC) Student Chapter fund to honor his father's role as a founder of the AGC student chapter at NC State — the first AGC student chapter in the nation. The family has also been active in the professional chapter, Carolinas AGC, with his son, Charlie (BSCE 1993), finishing his board of directors' term in 2023. C.T. Wilson Construction Co. is now in its third generation of management. Wilson has served on numerous boards for both civic and industry-affiliated organizations as an advocate for education, minority participation, workforce development and health care. He has been a strong supporter of NC State's College of Engineering and is an active member of First Presbyterian Church in Durham, North Carolina. He serves on the Durham Tech Community College Board of Trustees. His philanthropic efforts have included Families Moving Forward, Urban Ministries, The Institute for Minority Economic Development and Lincoln Health. Wilson was inducted into the CAGC Hall of Fame in 2017 and received the Lincoln Health Center Foundation Legacy Award in 2023.

Louis E. Wooten, Sr. (posthumous)

Louis E. Wooten, Sr.'s endeavors helped fuel North Carolina's expansion as a state with modern infrastructure

and a diverse scope of industry, elevating the quality of life, protecting the environment and creating opportunities. Wooten earned a BSCE in 1917. He enlisted in the U.S. Army and was promoted to second Lieutenant. From 1920-34, Wooten taught at NC State and lectured for a year at Yale University. With just \$750 in his bank account, he founded the Wooten Company on Oct. 3, 1936. The company's early accomplishments in North Carolina include expanding Camp Lejeune, providing advance planning for the Tactical Group Area for the Marine Corps at Cherry Point, and proposing and acquiring rights-of-way for the alignment of major Raleigh thoroughfare Western Boulevard. Along with NC State professor Charles Howard Kahn, Wooten designed and oversaw construction of NC State's Carter-Finley Stadium, which earned acclaim from the Illuminating Engineering Society. After passage of the Clean Water Act in 1972, Wooten partnered with dozens of rural communities to establish essential water and wastewater systems. Many relationships forged in the following decades continue today with Wooten Company's six regional offices. Wooten was involved in several engineering organizations including as vice president of the NC Section of the American Society of Civil Engineers and the inaugural president of the American Council of Engineering Companies of NC. In addition, Wooten supported the Kiwanis Club of Raleigh. Following his passing in 1993, his family donated 21 acres to the City of Raleigh for Wooten Meadow Park. In 1998, The Wooten Company established the Louis E. Wooten, Sr. Memorial Endowed Scholarship for students pursuing a degree in environmental engineering at NC State. ■



LOUIS E. WOOTEN, SR.



CCEE, ITRE prep for big changes coming to PE Civil Exam in 2024

NCEES Exam Discipline	PE Review Topic Areas				
	Transportation	Geotechnical	Water Resources & Environmental	Construction	Structural
Transportation	✓	+	+	+	
Geotechnical		✓		+	
Water Resources & Environmental		+	✓	+	
Construction		+	+	✓	+
Structural					✓

✓ = Core subject matter
 + = Additional relevant content

There are countless reasons why engineers decide to pursue a Professional Engineer License: increased credibility and authority, career advancement, higher earning potential, job security, professional development — the list goes on.

At CCEE, our focus is prepping students and professionals for the future, including preparing graduates for the Principles and Practice of Engineering (PE) Exam. The test, which was designed for engineers with a minimum of four years of post-college work experience in their chosen engineering discipline, has undergone many changes over the years — including a change in 2016 to remove the four-year experience requirement to take the exam. Starting in April of 2024, the National Council of Examiners for Engineering and Surveying (NCEES) is making a big update to PE Civil Exam Specifications to better test engineers on their specific discipline within civil engineering.

While the test previously included sections based on the breadth of civil engineering knowledge topics, the test will now only focus on content related to the test taker's discipline, whether that is construction,

geotechnical, structural, transportation, or water resources and environmental engineering. The five PE Civil Exams will include updated topic and subtopic question distribution and industry terminology. The goal is to better focus the exam on each individual engineer's professional experience and evaluate the knowledge of specific disciplines.

Some things will stay the same: The exams will still include 80 questions in eight hours, be computer-based and be administered year-round at NCEES-approved test centers.

To help engineers prepare for the new changes and stay ahead of the curve, NC State's Institute for Transportation Research and Education (ITRE) and CCEE have updated their PE Review Courses. The courses are taught primarily by CCEE alumni and faculty:

- CCEE Teaching Professor **Steve Welton** teaches the topics on structural engineering.
- **Daniel Findley** (BSCE 2005, MSCE 2006, Ph.D. 2011), CCEE adjunct professor and associate director of ITRE, and **Chris Cunningham** (BSCE

2002, MCE 2004), associate director of ITRE, are two instructors for the transportation track.

- **Mike Batten** (BSCE 2008, MCE 2011) teaches the geotechnical track.
- **Russell Briggs** (BSCE 1978, MSCE 1980) teaches the water resources track.
- **Erin Gallimore** (MCE 2010) teaches the environmental track.
- **Kelly Marshall** (MSCON 2010) teaches the construction and materials track.

The courses are offered in person, live online and self-paced online to accommodate working engineers' schedules.

"The world of civil engineering is diverse and extensive; our PE exam review course helps focus participants on the topics that are most likely to appear on the exam and presents an exam strategy that will help them be successful," Findley said. "As civil engineers, our work is often specialized, so a review class can provide the structure to align your studying and preparation with the broader expanse of topics specified for your discipline's exam." ■

Our research and teaching are only possible with the assistance of our nearly 300 graduate students. We shine a spotlight on a few students.



Subid Ghimire is a fourth-year Ph.D. student in transportation systems engineering. His research includes examining the determinants of travel behavior and travel demand among low-income populations as well as exploring the planning, policy and implementation challenges of emerging mobility services. He served as the vice president of the Institute of Transportation Engineers Student Chapter at NC State during the last academic year and has volunteered as a reviewer for academic journals and the Transportation Research Board Annual Meeting. Ghimire grew up in Kathmandu, Nepal. He is advised by Assistant Professor **Eleni Bardaka**.

SUBID GHIMIRE

What influenced you to go into engineering?

GHIMIRE (G): Growing up, I had a subconscious admiration for large structures like buildings and hydropower dams, and I was also fairly good at math and problem-solving. I decided to study civil engineering. In my final years of earning my undergraduate degree, I took courses in transportation planning, which made me think of technical problems from a holistic perspective. Realizing that transportation is a multidisciplinary domain that requires knowledge and skills across disciplines such as economics, statistics, urban/land-use planning, philosophy and even politics sparked my enthusiasm for transportation studies.

What problem(s) are you trying to solve? Why was NC State / CCEE a good fit for you?

G: I am trying to better understand the spatiotemporal differences in travel characteristics and car-dependence among low-income and vulnerable communities in the U.S. and come up with contextual mobility solutions that will help improve the mobility outcomes of low-income communities and increase their access to opportunities so that they can participate in civic life easily. I am interested in developing mobility solutions that will help eliminate the mobility barriers that are potentially keeping a large proportion of low-income communities disadvantaged. The diverse set of subject matter expertise in the transportation systems engineering program at NC State as well as the quality of research in transportation systems at CCEE is what makes NC State ideal for me. I have the flexibility to think freely about research ideas and amazing advisors who guide me when needed.

Where do you see yourself in five years?

G: I see myself leading a team of researchers, engineers and scientists to develop new ideas that improve the mobility outcomes for people from all walks of life. I would like to see myself as a thought-leader in the domain of transportation planning and transportation policy.



JESSICA LEVEY

What influenced you to go into engineering?

LEVEY (L): Although my undergraduate degree is in climate science/geoscience, I was interested in transitioning into engineering for my Ph.D. because of the applicability of the research to current water resource problems.

What problem(s) are you trying to solve? Why was NC State / CCEE a good fit for you?

L: My current research focus is on forecasting subseasonal-to-seasonal hydrologic extremes for water-resource management. Long-range forecasts will allow for advanced planning of water resource allocation for water supply, hydropower, agriculture and ecological demands.

CCEE was a good fit for me because I knew I wanted to focus my research on hydroclimatology, and the CHWR group was working on projects in this discipline.

Where did your passion for this particular focus come from?

L: I have always been interested in most fields of science. As an undergraduate, I found it difficult to pick a field that interested me the most. Ultimately, I chose to focus on hydrology because this field intersects with many disciplines of natural science and is relevant as the effects of climate change are becoming increasingly evident. Climate change is altering global hydroclimatology, causing precipitation extremes to become more intense and threatening many of the world's freshwater resources. As hydrologic extremes are intensifying, water resource management becomes critical. Reservoirs serve various purposes including water supply, flood control, hydropower, agriculture and irrigation, water quality and environmental/ecological. My current research focuses on forecasting large-scale changes in hydroclimatology and the adaptation of water resource management practices accordingly.

Where do you see yourself in five years?

L: I see myself continuing to work on research, but I have not decided if that will be at an academic institution or at a government agency.

Jessica Levey is a fourth-year Ph.D. candidate with a concentration in hydroclimatology. She is interested in how climate change is altering hydrologic extremes and how to adapt civil infrastructure to these expected changes. Levey, who grew up in Massachusetts, is advised by Professor **Sankar Arumugam** and is part of the Climate, Hydrology, and Water Resources (CHWR) group.



VIE VILLAFUERTE

Vie Villafuerte is a second-year master's student in environmental engineering with a concentration in environmental process engineering. She grew up in Arequipa, Peru, but found a new home in North Carolina. She is advised by Professor **Morton Barlaz**. She is an NC State Social Innovation Fellow and the graduate representative of the Sustainability Fund Advisory Board.

What influenced you to go into engineering?

VILLAFUERTE (V): Getting into this field came naturally to me. Growing up in a country with rich biodiversity like Peru made me fall in love with nature, but the impact of anthropogenic activities — particularly mining — on our rivers deeply affected me. It wasn't just about polluted water: The ripple effect extended to the health of wildlife and people. As a kid flipping through TV channels, the persistent coverage of issues like the ozone layer hole and oil spills emphasized the continuous threats to our natural world. I didn't want our biodiversity to decline because of these problems, so I was determined to help protect our environment by solving pressing environmental problems. Luckily, I enjoyed my math and science classes in school, so I was much more excited to dive into engineering.

What problem(s) are you trying to solve? Why was NC State / CCEE a good fit for you?

V: I want to solve environmental problems that deal with water contamination. I am very curious about the different pollutants that our water could have that we don't know about that could be affecting our environment and public health. CCEE was a good fit for me for graduate studies because I had greatly enjoyed my time as an undergraduate in the department and had the opportunity to get to know the professors and research being conducted. During my undergrad, I became interested in per- and polyfluoroalkyl substances (PFAS) research, and our department is doing great work in this area, so staying for my master's was a great decision. Having an environmental lab in Fitts-Woolard Hall is a big plus.

Where did your passion for this particular focus come from?

V: My first time learning about forever chemicals was during my junior year of college and it completely caught my attention. These chemicals are everywhere and knowing that they are found in our drinking water was very concerning. Conducting research on PFAS has given me a new interest in the area of organic contaminants in our water systems.

Where do you see yourself in five years?

V: I see myself working in environmental remediation. I would love to continue with research in an academic position, but I'm also interested in learning more about what an industry pathway looks like.



MILA (LIUDMYLA) YUTSKEVYCH

What influenced you to go into engineering?

YUTSKEVYCH (Y): Mainly my mother. She was an engineer herself — albeit, electric — and she always told me that I'd be good at it; she wasn't wrong!

What problem(s) are you trying to solve? Why was NC State / CCEE a good fit for you?

Y: Air quality is my main passion, as I worked for almost 10 years in Kyiv, Ukraine, as a civil engineer. The last five years were devoted to developing HVAC equipment and indoor air climate control systems; I learned a lot about European Union norms and standards for indoor air quality and eco-friendly engineering systems. I've switched my focus to outdoor air quality, as it is the precursor to indoor air pollution. I was particularly interested in the greenhouse effect and carbon prevention technologies, but after the Russian invasion of my home country, my focus switched to the war-related air pollution. My master's thesis will be on the topics of air pollution due to war actions and long-term health-related outcomes for the population of the polluted areas. I am also working with Department Head and Professor **Jacqueline MacDonald Gibson** on a project examining the connection between indoor air quality and sick building syndrome.

Thanks to Drs. Gibson and Grieshop, I discovered the health-related effects of environmental pollution and climate change. This is a fascinating topic, and the best part of it is that it's really practical. I am a person of action, and I love solving practical problems, not theoretical ones.

Where do you see yourself in five years?

Y: For me, it's really hard to tell right now, because my country is at war and it's hard to predict anything. I hope to be back home in peaceful Ukraine, and I will definitely work on the restoration of my country. In what position? I don't know. It might be engineering, it might be environmental policies and legislations, it might be an environmental expert working with climate damage caused by Russia — both in fields, trying to restore it, as well as on the international level, trying to prosecute war criminals for climate damage. I hope to give back to my people as much as they have given me by being the bravest people in the world! ■

Mila (Liudmyla) Yutskevych is a first-year master's student with a concentration in environmental engineering and air quality. She was born and grew up in the small town Smila in the Cherkasy region of Ukraine, and moved to Kyiv, Ukraine, in 2007, where she lived until 2022. She is a Fulbright Scholar and is advised by Professor **Andrew Grieshop**. Yutskevych is also a member of NC State's International Student Advisory Council (ISAC).

There are more than a dozen chapters of professional organizations available for CCEE students. Membership is a way to meet peers, make industry connections, strengthen leadership skills and engage in community service. Participation offers the chance to attend conferences, compete against peers from other institutions, learn outside of the classroom and interact with professional engineers.



American Concrete Institute (ACI)

Members of ACI traveled to Boston in October to participate in the student Fiber-Reinforced Polymer (FRP) Composites Competition at the Fall ACI Conference. Teams were challenged to design, construct and test a concrete beam reinforced with FRP. The NC State team placed ninth out of 28 teams. Teams were scored based on the best cost-to-load ratio, as well as the best performance prediction.

The NC State team included CCEE students **Eleni Nakos, Andres Aguilar-Alvarez, Cole Flowers, Sam Valmassoi, Paul Acuna, Dawson Payne, Walter Johnson, Gabby Boley, Gabriela Gomez, David Joynes, Jesenia Montes-Aviles, Cameron Stevenson, Taylor Brodbeck** and **David Childress**. They first began developing concrete mix designs in the summer of 2023 and tested multiple test batches. After the final mix design was selected, multiple beam design options were analyzed and prototypes were cast and tested. The team worked hard to gather materials and cast the trial mixes and beams. The team used a combination of equations from ACI 440.11-22 as well as finite element modeling to predict the beam's performance.

The ACI Conference also provided an opportunity for students to network and attend seminars and committee meetings. Brodbeck gave a research presentation on FRP reinforcement in concrete beams.

"The conference provided a chance to network with other universities and meet local, national and international concrete companies," said **Cole Flowers**, a construction engineering student. "Interacting with other students allowed our team to discuss career paths, make lasting friendships and learn a few helpful tricks for future competitions."

"Attending the conference was a valuable experience for me because I was able to learn about new and promising developments in the world of concrete, network with various other university teams and representatives, and experience a beautiful host city," said **Walter Johnson**, a construction engineering student. "My most valuable experience was attending the presentations. I loved learning about the various new uses of Ultra High Performance Concrete within the construction industry — this directly applies to the work I am involved in."



American Society of Civil Engineers (ASCE)

The NC State student chapter of ASCE hosted students from North Carolina Agricultural and Technical State University, the University of North Carolina at Charlotte (UNCC) and Duke University's ASCE student chapters for a field day event last October. The event, held on NC State's Centennial Campus, included yard games such as cornhole, spikeball, freeze tag and volleyball.

The event was put on to create community among the North Carolina student chapters of ASCE. A similar event was hosted in the fall of 2022 and included students from NC State and UNCC. This event was expanded in 2023 to include all North Carolina student chapters.

"It was so great to meet people from different schools whom we usually only get to see once a year at the symposium," said **Ellie Reimer**, who is majoring in civil engineering. "Strengthening the bonds between student chapters of ASCE helps us continue to grow and improve our chapter and build a community among North Carolina schools. I hope this event will continue in the future."



ASCE and American Institute of Steel Construction (AISC)

Twenty-seven students from Teaching Professor **Steve Welton's** steel design and senior design classes, alongside members of the NC State student chapter of ASCE, traveled to Gerda Steel Mill in Petersburg, Virginia, to learn about the steel industry and to see firsthand the process whereby steel is recycled and reshaped for reuse. AISC provided funds to help cover the transportation costs associated with the trip.

After the students were briefed at a safety meeting, they were given a tour of the mill,



where they learned about the processes and functions of various equipment. They had the opportunity to see how recycled steel scrap was melted down, formed, shaped, rolled and straightened to become a new product. After the tour, Gerdau provided lunch to the students and a technical perspective on the processes that had been observed.

"Everyone at the mill was very informative and invited questions from the students," Welton said. "The students really appreciated the incredible experience provided by everyone with Gerdau Mill and the support of AISC."

Coasts, Oceans, Ports & Rivers Institute (COPRI)

COPRI organized a stream cleanup of Lake Raleigh. Members picked up trash around the lake and surrounding parks, trails and wooded areas. The group of about 10 volunteers collected waste in their efforts to preserve the environment surrounding Lake Raleigh.

"Participating in events like the COPRI Stream Cleanup is important for our members," said **Nicole Arrigo**, a graduate student. "This initiative goes beyond the simple act of picking up trash; it signifies a collective effort to preserve the beauty and well-being of Lake Raleigh and its surroundings and serves as a reminder of the responsibility we bear in preserving the world around us."

COPRI also recently played a pivotal role in co-hosting a virtual Global Change Science Seminar. COPRI President **Thomas Thelen** served as a facilitator and COPRI Treasurer **Jenero Knowles** as a session organizer. The event featured a panel of distinguished guests discussing the translation of science from research to application to adaptation. Panelists included former CCEE Assistant Professor Elizabeth Sciaudone, a coastal engineer with Moffatt & Nichol; Timothy Glotfelty, a researcher at the NC State Climate Office; and Jeffrey Beane, a herpetology expert at the North Carolina Museum of Natural Sciences. Addressing the question of how scientific research can be effectively translated into applications in the physical world, the seminar explored the post-publication space that acts as a bridge between experimental findings and tangible, real-world impacts. The discussion encompassed challenges and adaptation strategies across broad disciplines. ■



FACES OF CCEE

Our FACES of CCEE media project celebrates outstanding alumni and illustrates to current students the varied careers available to them. In addition to the newsletter, featured alumni's bios are displayed on a monitor in Fitts-Woolard Hall. This is an ongoing project, so if you'd like to bring someone to our attention (including yourself), then please do so. We want to know what our alumni are doing. Please send an inquiry or information to our communications director, **Taylor Wanbaugh** (twanbau@ncsu.edu).





PETE JERNIGAN, JR.
PE (BSCE 1990)

From humble beginnings, Jernigan founded Tower Engineering Professionals (TEP) in 1997 from his kitchen on a \$15,000 second mortgage. The company has since grown to become the third-largest telecom engineering firm in the U.S., as measured by gross revenues. He remained the CEO for the first 18 years until sidelined with cancer. The tower mapping process that Jernigan created in 1995 remains in use industry-wide. TEP has been the lynchpin of cellular communications and wireless infrastructure buildout.



TERRY SNOW
PE (BSCE 1988)

Snow is a vice president and South Carolina business leader at STV, Inc. in Charleston, South Carolina. He is responsible for strategic growth, project management, sales, business development, financial performance and client service. His technical expertise includes multimodal transportation planning/engineering, environmental planning, structural design and public engagement.

GARY HARTONG
PE (BSENE 1998, MCE 2009)

Hartong is president of The Wooten Company, a professional services firm providing civil and environmental engineering services across the Carolinas with a concentration in drinking water and wastewater systems. He collaborates with state and federal funding programs to improve infrastructure systems for small and rural communities. As a staunch advocate active in state and national industry associations, Hartong helped lobby Congress for the successful passage of the 2021 bipartisan infrastructure bill and aims to develop the next generation of engineers.



DANIELLE TROUTMAN
PE (BSCE 2019)

Troutman is a transportation project engineer at Bolton & Menk, Inc. in downtown Raleigh, North Carolina. She specializes in traffic impact analysis studies for private sector developers with expertise in capacity analysis, Synchro/HCM 6th/SIDRA scenario simulation applications, design computation and feasibility studies. Troutman is passionate about traffic engineering and the positive impact it has on the communities of her clients. •





CCEE alum, advisory board member named NC Department of Transportation Secretary

CCEE alum and advisory board member **Joey Hopkins** (BSCE Construction Option 1989) was tapped as the new North Carolina Department of Transportation (NCDOT) Secretary by NC Gov. Roy Cooper. Hopkins succeeds Eric Boyette, who is retiring from state government after 27 years of service. Hopkins served previously as NCDOT Chief Operating Officer.

"I'm grateful to Governor Cooper for asking me to take on this role and continue my career at NCDOT," Hopkins said. "I'm really looking forward to this opportunity and the chance to continue the great work with all our partners across the state. I'm also grateful to Secretary Eric Boyette for his leadership and his friendship over many years. He devoted 27 years of his life to state government and was able to accomplish a great deal and really help advance transportation in North Carolina."

"I'm confident that Joey Hopkins will continue this outstanding work as Secretary of the Department of Transportation when he steps into this new role," Cooper said.

Hopkins has worked at NCDOT for more than 30 years in a variety of roles. As chief operating officer, Hopkins oversaw the Division of Highways, Ferry Division, Aviation Division, Rail Division, the Integrated Mobility Division, Division of Planning & Programming and the Communications Office. As deputy chief engineer, he managed the Division of Planning and Programming, the Transportation Planning Division and the Regional Accountants. He also served as division engineer, deputy division engineer, division maintenance engineer and division operations engineer in Division 5.

He was a member of NCDOT's Transformation Management Team and was instrumental in developing the Strategic Prioritization Process, the forerunner of the Strategic Mobility Formula. This data-driven process is used to help prioritize transportation projects in North Carolina. The Strategic Transportation Investments Law passed in 2013 allows NCDOT to use existing funding more efficiently and effectively to enhance North Carolina's infrastructure, while supporting economic growth, job creation and improved quality of life.

"Throughout my career, I've been fortunate to work with a talented team, made many great friends, helped the department overcome challenges and ultimately helped to improve transportation and mobility for communities across North Carolina," Hopkins said. "Over the last few years, the department has worked hard to strengthen our finances, improve project delivery and build stronger relationships with the communities we serve. I'd like to continue prioritizing those areas, while also focusing on:

- Improving safety and mobility, and working with our local partners to deliver a transportation system that meets the needs of travelers across all modes;
- Recruiting and developing a workforce that is more reflective of our population so we can better meet the diverse demands of our state;
- Ensuring equitable access to opportunities and creating a more diverse and inclusive culture within the department; and
- Working with our partners to prepare North Carolina for a clean transportation future and leading the state's effort to build out electric charging infrastructure so communities can access new electric vehicle technologies." ■

Mike Brinchek (BSENE 1998, MCE 2006) was promoted to vice president of Smith Gardner, Inc. Along with his expanded role in firm management and operations, he will continue to serve as a senior project manager for the firm, providing planning, permitting and engineering design services for firm clients and mentoring young engineers in the growth of their careers. Brinchek has more than 25 years of experience in environmental engineering and has provided planning, permitting and engineering design services for a wide range of solid waste projects including traditional landfill containment and closures, post closure end use for closed solid waste facilities, and solid waste transfer station and convenience centers.

Morgan DiCarlo (Ph.D. 2022) was named to the 51st class of American Association for the Advancement of Science's Science & Technology Policy Fellowships (STPF) program. STPF fellows are chosen from a select group of scientists to engage in a one-year immersive educational opportunity to gain hands-on experience in the public policy arena while leveraging their expertise to help confront major societal issues in the U.S. government. DiCarlo's fellowship is with the Environmental Protection Agency, where she serves as a Translational Science and Climate Change Research Fellow in the Office of Research and Development.

Shannon Goff (BSCE 2005) was promoted to principal of civil engineering firm Delve Underground. Goff has 16 years of structural and geotechnical engineering experience working in Australia, New Zealand, Canada and the U.S. She has expertise in numerical modeling for static, seismic and slope stability analyses specializing in soil-structure interaction and segmental lining design in a variety of ground conditions.

Lee Jernigan (BSCE 1997) was named acting Division 6 engineer for the NC Department of Transportation (NCDOT). The highway division, which has more than 400 employees and is responsible for maintaining more than 13,000 lane miles, is responsible for Bladen, Columbus, Cumberland, Robeson and Harnett counties.

Paul Kallam (BSCE 1996) was named director of transportation for the City of Raleigh, North Carolina. He previously served as an assistant director of transportation leading the Infrastructure Services Division, which includes Mobility, Strategy and Infrastructure; Parking; and Traffic Engineering.

William Marshburn (BSCE 1965) was installed as a Nash Community College trustee. Marshburn has spent more than 59 years as a general contractor for D.J. Rose & Son Inc. and all his professional life as a member of the Association of General Contractors, the nation's largest construction trade association. In 2003, he was elected chairman of AGC's Carolinas Chapter and is currently a national director of AGC of America.

Joel Roberts (BSCE 2008) was named Officer in Charge of Construction Florence Civilian Engineer of the Year. Roberts serves as a construction manager for OICC MCIEast (Marine Corps Installations East).

Jeremy Stroud (BSCE 2006) was appointed as the new division engineer for NCDOT Division 2. Stroud, who has worked at NCDOT in various roles over the past 17 years, will lead ongoing projects in Beaufort, Carteret, Craven, Greene, Jones, Lenoir, Pamlico and Pitt counties. ■

SHARE YOUR NEWS

There are thousands of alumni of the Department of Civil, Construction, and Environmental Engineering working throughout the nation and around the globe. We invite you to provide us with updates about career accomplishments, awards or recognitions, as well as other news. We aspire to create a community of alumni who remain connected to the department and to each other. We also want to keep your contact info current so we can keep you up to date on department events. Send your information to **Taylor Wanbaugh** at twanbau@ncsu.edu.

Name, Mailing and Email Address
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Degree, Major and Class Year
Announcements

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HOW YOUR SUPPORT MAKES A DIFFERENCE

ENDOWED FACULTY SUPPORT

The Department of Civil, Construction, and Environmental Engineering is home to more than 55 dedicated scholars and educators. Endowments and named professorships are an essential part of our effort to recruit and retain the very best faculty and then provide them with opportunities to explore new research ideas with the involvement of graduate and undergraduate research assistants. Relative to our peer institutions, the department has a low number of endowed professorships.

ENDOWED GRADUATE FELLOWSHIPS AND AWARDS

We strive to attract the best and brightest graduate students from the U.S. and around the world. Departmental rankings, faculty recruitment, research success and undergraduate education all depend on the presence of talented graduate students. Competition for the best graduate students is intense, and finances can be a deciding factor for students when choosing a graduate program. To recruit the best students, and to create a vibrant learning environment for undergraduate students, CCEE must be able to provide competitive graduate fellowships.

ENDOWED UNDERGRADUATE SCHOLARSHIPS

Undergraduate scholarships enable us to prepare tomorrow's leaders in civil, construction and environmental engineering. Students are drawn to NC State and CCEE by our reputation for excellence. Cost is a major consideration for students and their families. Scholarships represent a mechanism to support and reward our top students.

CCEE ENHANCEMENT FUND

A regular gift to the CCEE Enhancement Fund makes it possible to provide students the best possible education and extracurricular experiences. The enhancement fund allows us to respond to emerging needs and exciting challenges.

One example of an initiative supported by the fund is the CCEE undergraduate ambassadors program. The carefully selected undergraduate student ambassadors come from diverse backgrounds and areas of study within the department and bring their different perspectives to the table to help guide potential students. A student ambassador's role is to be a representative of the department while maintaining a wide range of responsibilities including outreach, recruitment events and providing a student perspective while giving tours to potential students and visitors.

"Ambassadors play a key role in recruiting students, and in highlighting what the CCEE department has to offer," said **Rachael Ayres**, CCEE student services specialist.

Your support enables recruitment and retention of the best and brightest faculty and students, support for our

student organizations, field trips to complement classroom instruction and opportunities for faculty and students to present at conferences. Our enhancement fund is critical to the department as we strive to continue to provide opportunities for students and faculty.

RECOGNIZING OUR CORPORATE SPONSORS

Our corporate sponsors may opt to provide support for specific research areas, enabling faculty members to pursue a new research idea. Sponsorships are also available for this newsletter, the welcome back ice cream each fall and our graduate symposia. These symposia allow students to prepare a poster to describe their research and make

a presentation to the local engineering community. The activities of our student groups are also dependent on external financial support.

The **Firm of the Month** program recognizes corporate partners who have made an ongoing commitment to the department. It allows us to thank and promote our partners while educating our students about current engineering practice. Our new monitors in Fitts-Woolard Hall provide opportunities for firms to display information highlighting notable projects and other information. The Firm of the Month program provides participating firms with name recognition for recruiting and business opportunities, demonstrates to students the ways in which they can use their degrees, and provides information on employment opportunities. ■

2023 CORPORATE DONORS

The firms listed here have provided endowments or made contributions from August 2023 through the end of December 2023. Many on the list have supported multiple activities in the department. We extend our sincere appreciation.

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The department has a wide variety of programs that are made possible by private financial support. For more information on opportunities to help, please contact **Michael Auchter**, our director of philanthropy, at mrauchte@ncsu.edu.

DEPARTMENT ADVISORY BOARD

The following distinguished alumni and friends of the department currently serve on the CCEE Advisory Board:

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Don Curry
BSCE 1996
Curry Engineering

Glenda Gibson
BSCE 1987
Mott MacDonald

Skeet Gray
BSCEC 1983, MSCE 1993
Eagle Engineering Inc., *Retired*

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BSCE 1992, MSCE 1994
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Jonathan Holtvedt
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D.R. Horton

Joey Hopkins
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North Carolina Department of
Transportation

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We invite you to invest in the department's future. Your gift will help to propel CCEE to new levels of excellence. You can choose an annual, endowed or one-time gift. Cash can be sent via a check payable to the NC State Engineering Foundation directly to:

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For more information contact:
Michael Auchter
Director of Philanthropy
Phone: 919.515.1467
Email: mrauchte@ncsu.edu

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ANDREW ZICCARELLI
Structures, *Assistant Professor*



When reflecting on his wide-ranging 34-year career with CCEE, **Morton Barlaz**, former department head and Distinguished University Professor, feels a distinct sense of gratitude.

"I'm really grateful," he emphasized. "I've had an amazing career, and I've been able to accomplish a lot. I have been involved in really interesting research and worked with great students, colleagues and practitioners all over the world."

Barlaz retired from the department in December 2023, and it is difficult to put into words the impact that Barlaz has had on CCEE, whether as a researcher, a department head, a teacher or a mentor.

Barlaz, who earned a B.S. in chemical engineering from the University of Michigan and an M.S. and Ph.D. in civil and environmental engineering from the University of Wisconsin, first joined CCEE in 1989 as an assistant professor after working in environmental engineering roles in the private and public sectors. He was promoted to professor in 2000, served as associate head from 1998-2006 and as head from 2010-22. He was appointed as a Distinguished University Professor in 2015.

As department head, Barlaz faced unprecedented challenges with grace and perseverance, such as the peak of the COVID pandemic and the department's move from Mann Hall on main campus to Fitts-Woolard Hall on Centennial Campus. Barlaz helped grow the department to more than 50 faculty members.

Downey Brill, who served as department head from 1998-2005, said his first impression of Barlaz was that he was bright and very capable.

"There are certain people you can always count on, and he's one of those people," Brill said. "He put an emphasis on quality, improving the staff and enhancing the graduate program. Some of the most important things are things that go on in the background — some extremely challenging and tough issues — and he's attacked them with the right values and right attitude. He excelled at dealing with the department being a human institution."

Professor **Brina Montoya** remembers when she joined the department in 2012, she immediately recognized Barlaz as a strong mentor who would be an important part of her career.

"He's always been passionate about the success of junior faculty and of each individual," Montoya said. "He has a calm demeanor and is very honest — he doesn't mince words and is thoughtful with what he says. He has a really strong sense of good judgment and an ability to understand different situations. ... If I need to solve a problem, he's the first one I think about asking."

Throughout his time as a professor and department head, Barlaz continued to be one of the top researchers in solid-waste engineering and landfills. He has authored more than 160 peer-reviewed publications and made hundreds of presentations all over the world. He has been involved in research on various aspects of solid waste since 1983, including research on biological refuse decomposition, methane production and the biodegradation of hazardous wastes in landfills. His research forms the basis for much of the work done to assess the impact of landfills on methane emissions inventories. Barlaz is also recognized for his research on the application of life-cycle analysis to evaluate environmental emissions associated with alternate solid waste management strategies. Most recently, he has been working on the processes that contribute to heat accumulation in landfills and on the release of per- and polyfluoroalkyl substances (PFAS) from landfills.

Barlaz has won numerous awards for his contributions to research, including a National Science Foundation Presidential Faculty Fellowship, the Perry L. McCarty Association of Environmental Engineering & Science Professors Founder's Award and the American Academy of Environmental Engineers and Scientists Gordon Maskew Fair Award. He is a Fellow of the American Association for the Advancement of Science, the American Society of Civil Engineers and the Association of Environmental Engineering & Science Professors.

Brown and Caldwell Vice President and Chief Engineer-Southeastern Business Unit **Bill Eleazer** (MSCE 1995) said Barlaz was a "really, really good teacher — and an even better researcher.

"It's hard not to love the guy. He's intense, but he's got his head screwed on straight, and he's well balanced."

"Dr. Barlaz has had a commendable work ethic, diligently pursuing his research in solid waste management," said **Asmita Narode** (Ph.D. 2023), who was mentored by Barlaz and is now a research environmental engineer at RTI. "His passion for the subject was infectious, leaving a lasting impact on my own career path."

Barlaz imparted his knowledge onto his many students, through both his courses on solid waste management and water chemistry and his mentorship of undergraduate and graduate students.

"Dr. Barlaz was my favorite teacher and mentor of all time," said **Sierra Schupp** (BSENE 2018, MSENE 2020), who now works as a solid waste-environmental engineer at HDR. "He was instrumental in guiding me to my career today, and I couldn't be more grateful for his guidance throughout the years.

"Beyond his technical abilities, Dr. Barlaz was caring and supportive. He encouraged students to be their best selves, treated everyone with respect, and I saw firsthand how he looked out for my classmates on an individual basis, even related to personal matters. I would not be half the engineer I am today without having Dr. Barlaz as my advisor. He has made a lasting, positive impact on the solid waste industry and those who are part of it."

James Levis (MSCE 2008, Ph.D. 2013), former CCEE research assistant professor, said Barlaz "was an amazing mentor and excellent teacher."

"While he obviously had the technical knowledge and experience necessary to be an exceptional faculty mentor and teacher, he also showed an enthusiasm for the material he taught. He was also the busiest person I knew, but he always made time to answer questions and provide advice."

Many also have fond memories spent with Barlaz outside of the classrooms and labs. Barlaz, an avid outdoors enthusiast and whitewater paddling aficionado, has led an annual weekend camping and rafting trip for more than a decade.

"Over the past five years, I've had the privilege of joining these outings, gaining a glimpse into his passion for adventure," Narode said. "On the river, the thrill of navigating rapids mirrored the energy he brought to his work."

As a professor emeritus, Barlaz will still be active in the department conducting research, but plans to spend more time exploring the outdoors.

"I plan to paddle as much as my knees, shoulders and wife will tolerate." ■

FORMER HEAD MORT BARLAZ RETIRES AFTER 34 YEARS WITH DEPARTMENT



In Memoriam



Robert (Bob) Borden



Vernon Matzen



Stephanie Vereen

Robert (Bob) Borden

Borden, a CCEE emeritus professor, passed away on Nov. 2, 2023, at the age of 67. Borden earned his bachelor's and master's degrees in civil and environmental engineering from the University of Virginia and a Ph.D. in environmental engineering from Rice University. He joined NC State as an assistant professor in 1986 and rose to the rank of professor before retiring in 2013.

During his 27 years at NC State, he taught courses in hydraulics, hydrology and groundwater contaminant transport, as well as senior design courses in water resources and environmental engineering. He served as primary advisor and mentor to 51 master's and 14 doctoral students. The primary focus of his research was on the fate, transport and remediation of organic and inorganic pollutants in the subsurface. This included laboratory studies to better understand the governing chemical and biological processes, fieldwork to document these processes under in-situ conditions and model development to mathematically describe the interactions of physical, chemical and biological processes on the natural and enhanced degradation of a wide variety of pollutants.

Results of Borden's work have been shared with the scientific and professional community through journal articles, book chapters and symposium proceedings, as well as hundreds of conference presentations, short courses and webinars. To accelerate transfer of current research to the user community, he founded ENVIRO.wiki and served as the initial editor-in-chief. Borden received multiple awards for his research and extension activities including the 2013 NC State Alumni Association Outstanding Extension and Outreach Award and the 2012 Brown and Caldwell Lifetime Achievement award for contributions toward the science and practice of subsurface remediation. The technologies that Borden developed have cleaned up thousands of contaminated hazardous waste sites around the world and continue to be the foremost technologies for groundwater remediation.

Vernon Matzen

Matzen, a CCEE emeritus professor, passed away on Dec. 7, 2023, at the age of 80. Earning his bachelor of science in civil engineering at University of Colorado Boulder, his master of science in civil engineering from Purdue University, and a Ph.D. in structural engineering from the University of California, Berkeley, he went on to join the CCEE faculty in 1977. At NC State he spent 13 years as director of the Center for Nuclear Power Plant Structures, Equipment and Piping and seven years as assistant department head and director of Graduate Programs. He was also involved in the International Association of Structural Mechanics in Reactor Technology (IASMiRT), an organization dedicated to safety in nuclear power reactors.

Matzen's research and professional interests are in the areas of piping behavior and design, rocking and sliding of unanchored structures and internet-based control and observation of laboratory experiments. He is an Alumni Distinguished Professor of Undergraduate Education.

He retired from NC State in 2014. Matzen loved teaching and devoted much of his life to CCEE, the university and IASMiRT.

Stephanie Vereen

Vereen, an industry advisory board member and CCEE alumna who earned her master's in civil engineering in 2002 and Ph.D. in civil engineering in 2013, passed away on Dec. 15, 2023, at the age of 46. She served as a part-time assistant professor at Kennesaw State University in Marietta, Georgia. She was also the founder and principal of Vereen Construction Services, which specializes in startup, close-out, procurement and constructibility consulting services.

After receiving her master's degree from NC State in 2002, she worked for CDM Constructors Inc. (now CDM Smith) on infrastructure projects such as water/wastewater, landfills and sewer rehabilitation. She returned to NC State in 2009 to complete her Ph.D. in civil engineering, before becoming an assistant professor at the University of Alabama.

Vereen was passionate about the civil engineering profession and all aspects of infrastructure and serving the public. In her professorial role, she sought to encourage students and inform them of the realm of possibilities, locally, nationally and globally, in the civil and construction engineering profession. ■

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