Dr. Kara Peterman’s research group celebrates the successful defense of Dr. Abbas Joorabchian.
Dear students, alumni, and friends,

This Spring 2021 edition of THE BRIDGE, our CEE Departmental newsletter, highlights a few of the students, staff, alumni, and faculty that make the UMass Amherst Department of Civil and Environmental Engineering such a meaningful and uplifting place to work and learn, even during this “remote” phase of life we have all experienced.

I have now been Department Head for 1.5 years, and it certainly has not been quite what I expected! One year ago on March 13, 2020, due to the COVID-19 pandemic, we sent our students home for spring break and the remainder of the semester, pivoting in one week to fully remote instruction. I continue to be impressed by the creativity and resiliency of our faculty, staff, and students to carry on with effective teaching, learning, research, and service despite the challenges of the pandemic; thank you for your dedication, skill and resourcefulness. I also want to thank our dedicated alumni for your continued support of all we do in CEE.

We are fortunate that all of our CEE faculty and staff have been able to continue regular, albeit remote, employment. I am mindful of the unexpected and significant challenges of combining working from home with caring for children and other family members, and again express my thanks to everyone. I also want to express my empathy and sympathy to all who experienced illness or loss of loved ones due to the pandemic. The spring equinox, decreasing COVID-19 infections, and increasing vaccinated population give me great hope and optimism for the future, including a fall 2021 semester experience that includes extensive “routine” in-person interactions for everyone.

CEE personnel updates include continued excellent performance from all of our amazing staff (Judy Pierce, Jodi Ozdarsky, Amy Feliciano, Donna Asher, Doreen Fifield, Sherrie Webb-Yagodzinski and Mark Gauthier). I am especially grateful for the on-campus work of Sherrie and Mark in supporting safe and secure laboratory research and face-to-face laboratory course experiences during fall 2020 and spring 2021. We are delighted to have three new faculty join us. Lecturer and Postdoctoral Pathways Fellow Dr. Jessica Boakye (Structural Engineering and Mechanics) started in September 2020, Assistant Professor Dr. Mariana Lopes (Environmental and Water Resources Engineering) arrived in January 2021, and Associate Professor Dr. Zachary Westgate (Geotechnical Engineering) will formally join in September 2021. You will also learn that as of September 2020, Dr. David Reckhow, now emeritus professor, officially “retired” after 35 years on the CEE faculty, but, he actually “transitioned” to the role of research professor, continuing his active engagement in sponsored research, graduate student advising, and mentoring of faculty; thank you Dave for all your past and continuing contributions to UMass!

In this newsletter you will also read about engagement in issues addressing diversity, equity, and inclusion in society, a topic that CEE, the College of Engineering and UMass are committed to addressing. Dr. Scott Civjan is chairing a new CEE DEI Committee to help focus attention and action within CEE while alumni and students actively engage DEI challenges through journal articles and webinars. Notable examples include an AGC sponsored presentation on racism in the construction industry by alumnus Kenneth Canty and colleagues, a graduate seminar on engineering social justice, and a seminar on women in construction (also AGC). Through such activities and by embedding attention to DEI throughout our curriculum, we strive to be collectively enlightened and to better prepare our students to positively impact social justice as they engineer our future infrastructure to sustainably meet societal needs.

Sincerely,

Dr. John E. Tobisano
Dr. Scott A. Civjan, PE, Professor, Structural Engineering and Mechanics

Professor Scott Civjan has been a faculty member in the Civil and Environmental Engineering (CEE) Department since 1998. He was drawn to UMass by the unique opportunity to develop structural testing capabilities and bring new research directions to the graduate program in Structural Engineering and Mechanics (SEM). The CEE department has since seen the dedication of Gunness Structural Laboratory in 1999 and the greatly expanded capabilities provided by the construction of the Robert B. Brack Structural Testing Facility in 2012. “It has been really fulfilling over the years to see the dedication of the SEM students and faculty working toward the continuous development of new research areas and testing capabilities, and the stability of the graduate program over the past 20 years. I think that we have been able to do this while still being excited about teaching and maintaining quality of the undergraduate program. It’s just been a great group of people to work with” says Civjan.

Civjan is probably most known to students for teaching design-based courses, though he has also taught the Introduction to CEE, Capstone Seminar, Strength of Materials classes. He draws on his consulting experience at Black and Veatch designing power plant structures prior to graduate school, but more importantly the feedback from friends and alumni (often friends as well) who do their best to keep him up to date on the issues and constraints of current design practice. “The students who go through our program, both at the undergraduate and graduate level, need to be well prepared to start on their careers and curious enough to learn the rest as they go. I think we do a good job of giving students that background.

He has also worked with researchers to analyze full bridge and building structures to evaluate new design concepts and criteria. Verifying structural performance through field monitoring has also been an integral part of his research.

An area that has kept his attention the longest has been research on integral abutment bridges (IABs). IABs are preferred for the avoidance of bridge joints that can leak and lead to deterioration of bridges common in the Northeast. This is a bread and butter type design for short to moderate span structures, with wider application limited by understanding of the soil-structure interactions response. He and Dr. Breña have collaborated on a series of projects in Vt. and Mass. that have included long term monitoring of IABs coordinated with finite element modeling and studying different design concepts. Models calibrated to field data have been used to look at a wide variety of design questions and provide insight into best design practices.

Civjan has worked on other topics related to sustainable design. This includes investigating corrosion inhibiting admixtures, repair or strengthening of structures, and newer research in fire effects on materials. “I really enjoy the projects that combine field or lab work with analysis and have a direct purpose to improving how we design things and interact with the world.”

Civjan earned his doctorate and master’s from the University of Texas at Austin (1998, 1995) and his BSCE from Washington University in St. Louis in 1989. He is a PE in Massachusetts and Texas. He is very grateful to the many students, researchers, and colleagues he has had the pleasure of interacting with at UMass Amherst.
Dr. Daiheng Ni, Professor, Transportation

Professor Ni is an internationally renowned researcher in transportation engineering and an influential figure in traffic flow theory and simulation. He was a former member of the prestigious Committee on Traffic Flow Theory and Characteristics of Transportation Research Board (TRB) and current member of TRB Committee on Airfield and Airspace Capacity and Delay and TRB Joint Simulation Subcommittee. He also served as associate editor of Journal of Intelligent Transportation Systems, Taylor & Francis. He has secured 25 grants totaling $2.7 million including 16 grants totaling $1.46 million as principal investigator. His publication list incorporates two textbooks, totaling $2.7 million including 16 grants

Ni authored two textbooks. Published by Elsevier in 2015, Traffic Flow Theory took a unified perspective that provides readers with a panoramic view on traffic flow modeling ranging from macroscopic level as the most aggregated to picoscopic level as the most detailed representation of vehicular traffic with well-defined coupling between levels. The book has been adopted by 20 universities as textbook and another 24 institutions around the world as reference book.

Published by Springer in 2020, Signalized Intersections provides an addition to the few outdated options on the topic. This textbook introduces the basic principles of intersection signalization including need studies, signal phasing, sequencing, timing, as well as more advanced topics such as detectors, controllers, actuated control schemes, and signal coordination. The book covers a variety of topics critical to the setup and operation of intersections controlled by traffic signals. Ni imparts a basic understanding of how intersections work, what justifies intersection signalization, how to properly design phasing and timing plans for intersections, what is needed to run traffic-responsive signals, the workings of traffic controller cabinets, and how to set up signal coordination at multiple intersections—competencies essential to transportation professionals in charge of traffic operation at federal, state, and local levels.

Ni teaches courses on the graduate- and undergraduate-level, including CEE310 Transportation and CEE411/511 Traffic Engineering. In addition, he created and added three courses to the curriculum: CEE520 Traffic Flow Theory, CEE521 Transportation Simulation, and CEE522 Signalized Intersections.
“On August 28 of last year I went to bed as a tenured full professor and woke up the next morning as a research professor. To tell you how this happened we have to go back to the afternoon of May 18. I was quietly updating some of my CEE 680 Water Chemistry notes in preparation for the coming spring semester, and at the same time listening to a webinar on per and polyfluoroalkyl substances (PFAS), a perfect afternoon for a water nerd such as myself. At 2:30, an email came in from Provost McCarthy addressed to “UMass Amherst Faculty” saying something about a voluntary separation incentive program. I must have been at least a little bored, because I read it right away, and learned he was asking “senior” tenured professors like me to retire. He made the case that this would help the university weather its COVID-induced financial crisis. Well, I don’t think of myself as the type who makes big changes at the drop of a hat, so I was utterly astonished when I found myself saying, “yes, I’ll do it!”

In fact, it made a lot of sense. In my head, I was signaling my intent to leave the travel lane, and to steer toward a long off-ramp. As a 35-year veteran of the CEE faculty, I was happy to step aside, in the hope that it would make it easier for UMass to hire a young tenure-track faculty in the area of water quality and treatment. Yet, with a post-retirement appointment as Research Professor (thank you John and Sanjay!), I knew I could still direct my graduate advisees and manage my sponsored research projects. In addition, the Water and Energy Technology (WET) Center was reaching a certain level of maturity; secure and thriving in the capable hands of Patrick Wittbold and Chris Watt.

So what are my plans? First and foremost, I am working to launch my current crop of exceptional graduate students; including Aarthi, Max, Soon-Mi, Julie, Patrick (yes, he’s also doing a PhD), Kiron, Sophie, Nick, JQ, Laura, Janice, Rayan, and several more who I’m co-advising with other faculty. I’m very excited about some new sponsored projects on drinking water contaminants such as PFAS, haloacetonitriles, cyanotoxins, haloacetic acids, and more. Our EWRE program has a 60-year history of supporting water treatment practice; a tradition that is unmatched in the Northeast, if not in the US. I feel strongly that this needs to be sustained, especially as emerging contaminants threaten the nation’s water supply.

In my new role as an associate professor in CEE in the fall of this year, I am already involved in inter-departmental research supervision activities this semester, but will continue through summer with the Norwegian Geotechnical Institute (NGI) where he has spent the past two years working on their U.S. offshore wind activities. Zack is a UMass Amherst alumnus, having completed two BS degrees and a geotechnically-focused MS degree in the CEE department in 2005 in the area of sand-structure interface mechanics. Since then he has worked in the energy industry as a professionally-registered engineer, project manager, and engineering manager for contractors and consultant companies. During that time, he completed his doctorate in Civil and Resource Engineering at the University of Western Australia in the area of pipeline-seabed interaction, graduating in 2012, and relocated back to the United States. His research interests include experimental soil mechanics, site characterization, offshore foundation engineering, and pipeline/cable geotechnics. Zack will use his role at UMass to develop new technologies that advance the interface between geotechnical and structural engineering in support of transitioning the United States towards a renewable energy economy.

New Faculty

UMass alumna Jessica Boakye came to the Civil and Environmental Engineering (CEE) department in September 2020 from the University of Illinois, Urbana-Champaign, where she completed her MS and PhD in Civil Engineering. Her doctoral dissertation was on “Measuring the Societal Risk of Natural Hazards.” While at the University of Illinois, Urbana-Champaign, she was awarded multiple fellowships including the highly competitive Roy J. Carver fellowship to complete her dissertation research. She had previously earned her BS in Civil Engineering from the UMass CEE department. She was awarded a highly competitive NSF-Funded REU in 2013 at the University of California, San Diego, where she studied “Post-Buckling Response of Steel Plate Girders.” As a UMass undergrad, she was also in the Commonwealth Honors College and completed a study of “Seismic Design and Response Assessment of Skewed Bridges” as her honors thesis.

Mariana Lopes arrived at UMass Amherst’s CEE from the University of Colorado in January 2021, where she was a postdoctoral researcher. In her research she seeks to engineer platforms to enhance light transport and reactions for photon-driven water treatment. “This includes using nano-enabled technologies to enhance light-driven chemical trans-formations while optimizing hydraulics and optical paths of reactor designs,” she says. She works at the interface of basic science and industry to create innovative and green technologies applicable to today’s social and economic climate. She obtained her BS in Chemical Engineering from the University of Dayton and her MS and PhD in Environmental Engineering from Arizona State University.

Zack Westgate will be starting his new role as an associate professor in CEE in the fall of this year. He is already involved in inter-departmental research supervision activities this semester, but will continue through summer with the Norwegian Geotechnical Institute (NGI) where he has spent the past two years working on their U.S. offshore wind activities. Zack is a UMass Amherst alumnus, having completed two BS degrees and a geotechnical MS degree in the CEE department in 2005 in the area of sand-structure interface mechanics. Since then he has worked in the energy industry as a professionally-registered engineer, project manager, and engineering manager for contractors and consultant companies. During that time, he completed his doctorate in Civil and Resource Engineering at the University of Western Australia in the area of pipeline-seabed interaction, graduating in 2012, and relocated back to the United States. His research interests include experimental soil mechanics, site characterization, offshore foundation engineering, and pipeline/cable geotechnics. Zack will use his role at UMass to develop new technologies that advance the interface between geotechnical and structural engineering in support of transitioning the United States towards a renewable energy economy.
CxEE Diversity, Equity, and Inclusion Committee Activities

The CEE Diversity, Equity, and Inclusion (DEI) Committee in the CEE Department is working to assess and improve the department culture to promote DEI issues. Through these actions, we aim to create an inclusive, equitable, and respectful environment that maximizes academic and personal success for all members of our community. Committee members are Jessica Boakey, Eleni Christofa, Scott Civjan, Song Gao, Colin Gleason, Carlton Ho, Emily Kumpel, Mariana Lopes, and Nicholas Tooker.

Over the fall and spring semesters, the committee has developed a department DEI Mission Statement, statements recognizing the uneven effects of COVID-19 shutdowns, led a discussion on DEI at the winter CEE faculty retreat, added a DEI web page (https://cee.umass.edu/cee-diversity-equity-inclusion), and coordinated two graduate student and faculty seminar workshops related to micro-aggression training. Current activities include developing a student guide to provide equitable distribution of information on opportunities, a faculty guide with recommendations on equitable and inclusive advising of students, and “brainstorming” sessions to discuss implementing DEI topics into classes. The committee is looking at previous survey results on the DEI climate from the University and College, and requesting data from UMass on student application, acceptance, enrollment, and graduation, along with other statistics. These data and survey results will be used to prioritize future actions. The committee is working with the Workplace Learning and Development office to provide a CEE specific workshop for the spring.

The committee commends the efforts that the CEE community has put into DEI efforts. In the past semester the Association of General Contractors (AGC) student chapter has hosted several events specific to DEI, Professors Tooker, Brown, and Palmer (along with TA Elizabeth Lotter) were recognized for their efforts in the Dean’s Diversity Equity Inclusion Curriculum Challenge, and DEI specific seminars were held. These all highlight the ongoing efforts by the CEE community to pay attention to these important issues, and continue to improve the culture within the department and beyond.

If you have comments or concerns for the CEE DEI committee, please fill out the feed-back form at: https://docs.google.com/forms/d/e/1FAIpQLSdAawbzG-nrLVu6pmjnYvt5IeDF723TCLyHhrfTxDo_aC6Yg/viewform.

Confronting Racial Inequalities in the Water and Wastewater Industry

Current part-time CEE MS Environmental Engineering student Isabella Cobble ’19BSCE, Dr. Nicholas B. Tooker, PE, and several other colleagues authored an article on diversity, equity, and inclusion in the water and wastewater profession that was recently published in the Winter 2020 New England Water Environment Association (NEWEA) Journal.

The NEWEA abstract reads: As the nation further awakens to systemic racism, NEWEA members must actively identify opportunities to build a more inclusive environment for Black, Indigenous, and People of Color (BIPOC) in the water and wastewater industry. Diversity, not only of racial identity and ethnicity, but also gender, gender identity and expression, sexual orientation, socio-economic status, religious beliefs, age, and mental and physical ability, encompasses all that makes us unique (Eswaran 2019; Scott and Pozzi 2020). Systemic racism, which refers to systems that perpetuate racial injustices, occurs in fundamental, powerful structures in the United States, including communities, educational systems, and the workforce (Collins 2018). This paper looks broadly at systemic racism against BIPOC and its impacts within these three structures as they relate to the water and wastewater industry and suggests actions to dismantle the systems within them that perpetuate racial inequities. These suggested strategies are by no means comprehensive; they are provided to help empower NEWEA members and bring awareness to opportunities for building more inclusive environments in their respective communities, schools, and workplaces. While acknowledging and confronting white privilege and systemic racism can be difficult and complex, the industry cannot wait any longer to confront the nation’s history of racial injustice.

Isabella Cobble
EIT, Tighe & Bond
MS Student

Dr. Nicholas B. Tooker
Professor of Practice

Marina Fernandes, PE
Town Engineer, Milton, MA
’08MS

Stephen King, PE
Town Engineer, Danvers, MA
’03BSCE

Jennifer Lawrence, PhD
Tighe & Bond

environments foster the diversity of thought, perspective and experiences that allows an industry to excel (Eswaran 2019; Scott and Pozzi 2020).
This academic year, the Civil and Environmental Engineering Department organized its first virtual career fairs for internships and permanent jobs in transportation, environmental, water resources, geotechnical, and structural engineering opportunities, as well as civil engineering construction. In advance, students registered, set up their profiles, uploaded their resumes, and booked meeting time slots with select employers. On the day of the fair, they simply dressed up and logged in to participate in the pre-selected meetings with CEE alumni recruiters.

The CEE Career Fair is a biannual event. Our first fair was organized in 2003. A fall fair was added in 2006 due to the popularity of our spring fairs. Many companies participate in both the spring and the fall fair so they have access to all of our students to discuss summer positions, co-ops, permanent positions, and can make competitive offers or schedule interviews with them. Over the years, the CEE Career Fair has turned out to be an event where a majority of the participating companies have alumni from our program representing them. We give a special thanks to our coordinator, Jodi Ozdarski, who over the years has grown the fair from its initial 12 participating companies to now include as many as 56.

SAVE THE DATE:

FALL 2021 FAIR:
October 22, 2021

SPRING 2022 FAIR:
February 25, 2022

We thank you for your contribution!
Jason DeGray, PE, PTOE, Transportation Engineering Alumnus

Jason DeGray ’02MS PE, PTOE, an alumnus of the Civil and Environmental Engineering Department with more than 19 years of experience managing efforts and creating sustainable transportation systems, is currently the Boston office director of Toole Design Group, a company of approximately 200 planners, engineers, and landscape architects with 16 offices throughout the United States and Canada. DeGray leads the Boston office in undertaking projects that deliver quantified public safety benefits, enhance mobility alternatives, and foster community inclusion. He is a licensed professional engineer in all six New England states as well as in New York and Michigan and is also a certified Professional Traffic Operations Engineer.

DeGray’s responsibilities include managing efforts under MassDOT’s statewide, task-based design contracts, as well as on-call agreements with the cities of Boston, Cambridge, and Somerville, Mass.

Above: Union Square, Somerville, Mass.: Complete Streets Redesign.

One major focus of his work has been creating “Complete Streets Design” solutions for constrained urban and suburban corridors to better accommodate all modes of travel. Complete Streets is a transportation design approach in which streets are designed, operated, and maintained to permit safe, convenient, and easy travel for users of all ages and capabilities while using every conceivable form of transportation.

Many of DeGray’s projects – including the integration of separated bicycle facilities, accessible pedestrian infrastructure, and accommodating signalization strategies – have been on the cutting edge of Complete Streets design.

DeGray’s experience includes leading innovative projects under the City of Boston’s Vision Zero (a traffic-safety strategy aiming at zero fatalities) and Active Transportation programs. These are all complex design projects, such as another of his projects for the City of Providence, R.I., and its inclusive City Walk initiative, which is intended to be a model for the integration of micro-mobility devices.

As DeGray explains, “I take pride in developing implementable designs in complex multimodal environments, including in downtowns, village centers, rail and transit stations, and around schools.”

The Union Square Utility and Roadway Improvements Project in Somerville is a good example of one complex project led by DeGray. There he serves as Toole Design’s principle-in-charge for Somerville’s efforts to re-envision Union Square. This project will reinvigorate an evolving urban neighborhood to take advantage of the new Green Line Extension light rail transit connection, building on a 2.3-million-square-foot master development plan that promises to significantly densify the area.

As DeGray explains, “The project entails the reconstruction of three miles of corridor and complex intersections, the integration of multimodal transportation needs, and the enhancement of civic open space which seeks to ensure equitable access for the entire community. All told, this effort will serve as an example for successfully implementing a sustainable urban land use and transportation plan.”

Another good example of DeGray’s complex projects is the First/Ashley and William Street project in downtown Ann Arbor, Mich. Jason serves as engineering advisor for this project which aims to restore two-way travel operations on First Street and Ashley Street in downtown Ann Arbor to support improved safety, slower vehicle speeds, and more sensible development. In addition, the project has already witnessed the construction of a two way separated bicycle facility on First Street named one of America’s 10 best new bikeways of 2020 by the People for Bikes.

As DeGray says, “Toole Design’s role has been to conduct two design charrettes, discovery and design, to hear the needs of the neighborhoods, determine the feasibility of the design, review all the traffic data, and provide urban design for all the corridors and intersections within the study area.”

In addition to his work at Toole Design, beginning in 2016, DeGray also has many years of transportation engineering experience at Greenman-Pedersen, Inc., the BETA Group, and Vanasse Hangen Brustlin.

On a local level in the UMass area, DeGray has also been involved in the Route 9 Corridor Improvement Project in Hadley, as well as currently leading the Main Street Northampton Complete Streets Redesign.

DeGray is a strong advocate for Vision Zero, a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all. DeGray champions its principles in various forums, including his role as chair of the Institute of Transportation Engineer’s Advocacy Committee and as a contributor to the Strong Towns organization.

Above: Part of Vision Zero focuses on rapid implementation of signs and signals to help reverse the rise in pedestrian and bicyclist injuries and fatalities.

DeGray is the 2011 recipient of the New England Section of the Institute of Transportation Engineer (ITE)’s Emerging Professional Award and was also awarded UMass Student Chapter of ITE’s distinguished alumni aware in 2019. Outside of work, DeGray enjoys spending time with his wife and three children, supporting the Juvenile Diabetes Research Foundation, and coaching youth basketball.
Steven Poirier, PE, Geotechnical Engineering Alumnus

Steve Poirier’s experiences in the UMass Civil and Environmental Engineering (CEE) Department have helped him succeed in a career full of interesting projects. Steve earned his bachelor’s in 1998, his master’s in 2000, and his doctorate in 2005 from UMass, focusing on geotechnical engineering for his graduate studies. Upon completing his doctorate, he joined Geosyntec Consultants in their Acton, Mass. office. He is currently a principal at Geosyntec and is the department manager of the geo-environmental/geostructural group in the New England branch.

Steve was the project manager, lead designer, and engineer-of-record for remediation of the Sutton Brook Disposal Area Superfund site. The project included construction of a groundwater extraction system, 40-acres of geosynthetic landfill cap, 1,700-ft subsurface slurry barrier wall, and excavation and relocation of debris piles and impacted sediment in an on-site stream. The completed project received a regional Engineering News Record (ENR) award for Best Water/Environment Project and the national Associated General Contractors of America (AGC) Alliant Build America Award in the Environmental Enhancement category.

His UMass experiences have helped him successfully manage large, complex projects during his career at Geosyntec. Steve is a professional civil engineer in the Commonwealth of Massachusetts and the State of Florida and has been the lead designer and engineer-of-record for multiple geotechnical and remedial action construction and closure projects.

Steve believes that his experiences at UMass gave him the skills needed to lead these types of projects. “In addition to the depth of geotechnical knowledge I gained at UMass, I also acquired a breadth of knowledge in hydrogeology, environmental engineering, risk assessment, and construction, which prepared me to be able to manage the complex and exciting types of projects we specialize in at Geosyntec.”

Part of what originally attracted Steve to civil engineering, was the feeling of service that is implied in a civil engineer’s primary responsibility: to protect the health, safety, and welfare of the public. Steve believes in paying forward the time and effort that others have invested in him and his career. “I’m thankful for the amazing and selfless role models and mentors I’ve had during my time at UMass and Geosyntec, starting with my academic advisor Professor Don DeGroot, and hope that I can help others even a fraction of how much my mentors have helped me.”

Steve and his family are active in their local community, including a non-profit community arts program that provides inclusive, affordable, and high-quality performing programming in the local community and is directed by somebody Steve met while at UMass—his amazing wife Nicole.
Patrick Ray is an assistant professor of Environmental Engineering at the University of Cincinnati. He is a two-time Minuteman, graduating from UMass Amherst in 2001 with a bachelor’s in Civil and Environmental Engineering, and returning in 2013 for a postdoc with Professor Casey Brown in the Hydrosystems Research Group. In between, he stopped by Medford for a PhD at Tufts University. The subject of his graduate work was the water scarcity faced by cities of the arid Middle East, where he lived and worked for more than three years while finishing his dissertation and starting a family.

Patrick has helped to develop frameworks for water system resilience, and applied those frameworks worldwide to problems in hydropower, water supply, integrated urban water management, and the water-energy-food nexus. His principal professional accomplishment has been the development of a decision support framework for water system planning under climate change uncertainty for the World Bank. The framework was published in 2015 as the World Bank’s Decision Tree for Confronting Climate Uncertainty, and he shared in the World Bank’s 2015 Knowbel Prize for “Understanding the Impact of Climate Change and Other Risks on Hydropower.” The framework has been adopted by the World Bank and International Finance Corporation, and has served as a prototype for UNESCO in their Collaborative Risk Informed Decision Analysis (CRIDA) process, as well as the International Hydropower Association in their Hydropower Resilience Guidelines. He is a past chair of the Environmental and Water Resources Systems (EWRS) Committee of the American Society of Civil Engineers (ASCE), and was named the 2018 A. Ivan Johnson Outstanding Young Professional of the American Water Resources Association.

In order to be relevant to the developing nations where they are so gravely needed, Patrick believes that novel analytical methods must account for distributional equity, be economical with respect to both human and financial resources, and be accessible enough that they can be translated across culture and context. His research group at the University of Cincinnati consists mostly of students from those global regions where his development projects have been based.

In his work on these subjects he has found the linkages between the parallel fields of water quality and water-resource system analysis to be under-developed, meaning that questions of water quality have not factored prominently in resilience-enhancing exercises concentrating on “available water” or flooding. And of all global rivers of similar economic, human-health, and ecological significance, he has found the water resources (and water quality) of the Ohio River to be dangerously understudied, so he plans to dedicate a substantial portion of the next decade to improved understanding.

Patrick and his awesome wife have two elementary-school-aged boys, one of whom wants to be a ninja assassin when he grows up, and the other of whom wants to be a professional video game player. Both miss living in Amherst, and neither wants to be a water engineer.
**FACULTY ACCOMPLISHMENTS** AY 2020 – 2021

**CHENGBO AI**
American Association of State Highway and Transportation Officials (AASHTO) High-Value Research Projects Sweet Sixteen Award for a project completed for MassDOT titled: *Improving Pedestrian Infrastructure Inventory in Massachusetts Using Mobile LiDAR (Hou)*

**SANJAY ARWADE**
Fellow of the Engineering Mechanics Institute (EMI) of the American Society of Civil Engineers (ASCE)

Invited as a speaker for the formal launch of *New England for Offshore Wind* regional coalition

**SERGIO BREÑA**
Massachusetts Department of Transportation (MassDOT) Project: Identification of Best Practices to Incorporate into MassDOT Concrete Sidewalks (Peterman)

**CASEY BROWN**
National Science Foundation (NSF) Grant: NSF Convergence Accelerator Track D: America’s Water Risk: Water System Data Pooling for Climate Vulnerability Assessment and Warning System

National Science Foundation (NSF) Grant: NSF Partnership For Innovation: AdaptLab: Water System Analytics for Adaptation to Climate Change

**SIMOS GERASIMIDIS**
National Science Foundation (NSF) Grant: *Workshop on Metamaterials and Metastructures for Civil Infrastructure*

Grant funding from the Massachusetts Department of Transportation (MassDOT) and the New England Transportation Consortium (NETC) for *Improved Load Rating Procedures for Deteriorated Unstiffened Steel Beam Ends in New England* (Breña)

Massachusetts Department of Transportation (MassDOT) Grant: *Feasibility of 3D Printing Applications for Highway Infrastructure Construction and Maintenance* (Chen)

**COLIN GLEASON**
Funded by National Aeronautics and Space Administration (NASA) to develop a software system for estimating water discharge from nearly every river in the world (Taneja)

National Aeronautics and Space Administration (NASA) Grant to study changing glaciers, rivers, and human water management in Nepal (Andreadis, Brown and Stearns)

**MIKE KNODLER**
Mike Knodler, principal investigator and director of the UMass Transportation Center, which houses the UMass Traffic Safety Research Program (UMassSafe) announced that UMassSafe has been awarded four momentous new research projects related to traffic safety.

**EMILY KUMPEL**
2020-2021 Center for Research on Families (CRF) Research Fellow to study safe and sustainable access to water in low-income countries

Grant from the National Science Foundation (NSF) Civic Innovation Challenge Program to support pioneering tools for the inspection and monitoring of small water systems and to ensure their continuity of operations during and after emergencies (Brown, Reckhow)

**DAIHENG NI**
Water Quality Research Foundation (WQRF) Grant to compare the human, environmental, and economic impacts of various drinking-water treatment systems in smaller communities throughout the United States (Reckhow, Tobiason)

**CHUL PARK**
Authored the book titled: *Signalized Intersections* which was recently published in 2020 by Springer Publishing

**CHUN-HWAI TAI**
2020 Public Service Endowment Grant to run a Collaboration Between University and Municipality to Decrease Economic and Environmental Burden of Sludge Disposal with community partners in the Town of Athol and the Athol Wastewater Treatment Plant (WWTP)

**KARA PETERMAN**
2020 CEE Robert B. Brack Research Award

2021 McGuire Award for Junior Researchers (MAJR Medal) from the Structural Stability Research Council (SSRC)

2020-2021 UMass ADVANCE Faculty Fellow

2020-2021 Terry Peshia Early Career Faculty Award from the American Institute of Steel Construction (AISC)

**JOHN E. TOBIASON**
2020 Association of Environmental Engineering and Science Professors (AEESP) Fellow

**FACULTY PROMOTIONS**

CEE is pleased to announce the promotion of Dr. Song Gao and Dr. Carlton Ho, both to the position of Full Professor.

**Song Gao**
Professor

Dr. Gao studies transportation system optimization and econometric models of traveler behavior, with applications in smart and shared mobility, transportation planning, and sustainable transportation systems. She has earned her doctoral and master’s degrees from the Massachusetts Institute of Technology (MIT) and her bachelor’s from Tsinghua University in China. Among her many honors, she was a member of the winning team in the MacArthur Digital Media and Learning Competition and she received an honorable mention (second place) in the Dissertation Prize Competition of the Transportation Science and Logistics Society from the Institute for Operations Research and Management Science. She is an associate editor of Transportation Science and editorial board editor of Transportation Research Part B.

**Carl Ho**
Professor

Dr. Carlton Ho of the CEE department studies railroad geotechnics, behavior of large grain size materials (ballast, aggregate, gravel), soil dynamics, in situ testing, and hazard analysis. He earned his bachelor's, master's, and doctoral degrees from Stanford University. In addition to his experience at UMass, Ho has served on the visiting faculty for the Center for Education and Research in Soil Mechanics of the National Institute for Highways and Bridges of France, as a visiting professor at the University of Edinburgh, as a visiting professor at Tongji University, as an associate professor at Washington State University, and also as an assistant professor at Illinois Institute of Technology.
Environmental and Water Resources (EWRE)

Left: Doctoral candidate, Leah Wang, measures organic silicones for the synthesis of superhydrophobic hybrid organic-inorganic polymers that can be used as zero-permeability barriers.

Above: Doctoral candidate, Ian Graham, leads the EWRE team in collecting samples and documenting SARS-CoV-2 concentrations in wastewater.

Geotechnical (GEO)

Left: Doctoral candidate, Leah Wang, measures organic silicones for the synthesis of superhydrophobic hybrid organic-inorganic polymers that can be used as zero-permeability barriers.

Above: Students from UMass, Brown, UCLA, and UNC multitask while researching in subarctic Canada.

Transportation (TEP)

Above and right two photos: Renovations for the town of Amherst using the MassDOT Shared Streets and Spaces grant. Amherst was a featured site visit during the 2020 Moving Together Conference. The grant allowed the town to make more pedestrian and biker friendly changes, plus expand outdoor dining to help businesses during the COVID-19 pandemic. (Photo credits: Benjamin Breger, Amherst City Planner)

Structural Engineering and Mechanics (SEM)

Left and below: The main objective of this project is to identify best practices for the construction of concrete sidewalks that results in higher durability and lower maintenance and replacement costs. This collaborative project involves industry (contractors, concrete suppliers), academia (UMass Amherst) and MassDOT personnel.

Above: Students from UMass, Brown, UCLA, and UNC multitask while researching in subarctic Canada.
New Direction for the SEM Group in Fire Research

The SEM group is expanding their research capabilities into high temperature testing of materials. The testing uses portable heat units used to heat structural components.

A current project that uses this equipment is “Post-Fire Damage Inspection of Concrete Structures” funded by MassDOT. This project’s research team (Dr. Simos Gerasimidis, Dr. Scott Civjan, and master’s student Nick Menz) is investigating the effects of moderate fires on the remaining capacity of tunnel components. Some concretes in the research have sustained very high temperature with micro-cracking and discoloration, while others showed signs of explosive spalling at lower temperature. Visual indication of material degradation at specific temperatures can be very useful for post-fire inspectors.

Flexural testing of prestressed, precast sections of a wall panel after heating is providing insight into remaining capacity, and will be included in further testing. Concrete strength loss, relaxation of prestressing strands, loss of cross section, and other effects could affect the remaining member capacity. Identifying specific temperatures where these influence behavior and visual identifiers of temperature exposure are important to maintaining safety post-fire.

This ongoing research is providing insight into thermal deterioration of concrete and other materials, and specifying when thermal damage would compromise structural integrity. The project will provide guidance on post-fire inspections to MassDOT.
Hennessy is a second-year doctoral candidate in the Transportation Engineering program and is advised by Dr. Chengbo Ai. She graduated with a Bachelor of Science in civil engineering from The College of New Jersey in 2015, interning with the New Jersey Department of Transportation and Department of Environmental Protection during her time there. Alongside faculty, her undergraduate research efforts calibrated peak flow coefficients for New Jersey watersheds.

Upon graduating, Hennessy worked in industry as a transportation engineer while attending graduate school at night, obtaining professional licensure through her experience in consulting. In 2019 she was awarded a Master of Science in civil engineering from Rutgers University with a specialization in transportation engineering. Her research there considered a case study of bypass road feasibility with respect to traffic delays and long-term environmental impacts.

So far, Hennessy’s research at UMass has centered on a project exploring the spatial correlations between roadway lighting and non-motorist crashes. This research determined that transitional daylight periods like dawn and dusk represent the highest crash risk for non-motorists. This work was presented at the Transportation Research Board Annual Meeting in January 2021 and has been submitted for publication.

Her dissertation work seeks to assess pedestrian network connectivity through the lenses of accessibility and safety with the use of Mobile LiDAR. By comparing the effective connectivity of different pedestrian networks, this work seeks to provide awareness of some of the inequities present in our transportation systems and promote transportation solutions that can serve every member of the traveling public.

After graduation, Hennessy hopes to begin a career of public service in transportation engineering at the federal or state level. It is there that she aims to bridge some of the gaps between the state of the science and the practice of the industry.

Undergraduate Student Spotlight: Allison Davis

What do you value most from your UMass Amherst experience?

I value all of the opportunities I’ve been given. Each day seems to bring a new opportunity for me to grow. I’m thankful to have been hired as a grader for the past four semesters, to be a part of SWE and Engineering Peer Mentoring, to be involved in research, and for all of the career fairs that have led me to my full-time job after graduation.

What UMass Amherst student organizations are you involved with?

I have been a part of the Society of Women in Engineering (SWE) since my freshman year, and am currently serving as the Community Service Outreach Chair. I have also been a part of the Engineering Peer Mentors since sophomore year, where we help freshmen adjust to the College of Engineering and host events for the college.

What are your plans after graduation?

I have accepted a full-time position as a project engineer for The Whiting-Turner Contracting Company at their Baltimore location. I originally had not considered the construction field, but am very excited to take on this opportunity. I know each day will bring on a new, exciting challenge.

Are you involved in any research or experiential learning?

I am currently undergoing my second independent study with Dr. Kara Peterman. We are working to develop a simplified modeling approach to capture the impact of concrete slabs on cold-formed steel stud stress distributions. By the end of the semester, I hope to be a co-author on a published journal paper. I will also be presenting at the Massachusetts Undergrad Research Conference.

How has your experience in the UMass Amherst CEE been?

My entire college career has been full of unconditional support. I have found support in the clubs I’ve joined, the professors I’ve had, and the friends I’ve made. There has always been someone rooting me on throughout my entire college career, which has been so valuable to me. The CEE department has been a great network to be a part of, and I am very thankful for it.
STUDENT ACCOMPLISHMENTS AY2020 – 2021

CRAIG BRINKERHOFF
Paper accepted in Geophysical Research Letters journal: Lake Morphometry and River Network Controls on Evasion of Terrestrially Sourced Headwater CO2

Paper accepted in Water Resources Research journal: Constraining Remote River Discharge Estimation Using Reach-Scale Geomorphology

HERNAN CASTANEDA
Honorable Mention for Best Presentation Award at the Cold-Formed Steel Research Consortium Colloquium

KATERINA DELIALI
Selected to receive the Safer Sim UTC Student of the Year on behalf of UMass Amherst

FANI DERVENI
Honorable Mention for Best Presentation Award at the Cold-Formed Steel Research Consortium Colloquium

CHINEDUM ELUWA
Selected member of the American Geophysical Union Program Planning Committee for the Joint Hydrologic Sciences Meeting

IAN GRAHAM
2020 – 2022 UMass (BTP) Biotechnology Training Fellow. Focus: Using metagenomic analyses to investigate microbial community composition, activity and genetic potential, particularly with applications towards wastewater treatment and resource recovery

EMILY HENNESSEY
Dwight David Eisenhower Transportation Fellowship Program (DDETFP) from the United States Department of Transportation (USDOT)

QING HOU
American Association of State Highway and Transportation Officials (AASHTO) High-Value Research Projects Sweet Sixteen Award for a project completed for MassDOT titled: Improving Pedestrian Infrastructure Inventory in Massachusetts Using Mobile LiDAR (Ai)

EFTHYMIA (FAY) KOSTOPOULOU
2021 Women’s Transportation Seminar (WTS) - Rhode Island - Local Graduate Scholarship

BILL LYONS
Dwight David Eisenhower Transportation Fellowship Program (DDETFP) from the United States Department of Transportation (USDOT)

AMANDA CARNEIRO MARQUES
Edwin V. Sisson Doctoral Fellowship

ALYSSA RYAN
German Academic Exchange Service (DAAD) One-Year Grant for Doctoral Candidates Fellowship. Focus: the investigation of methods to achieve higher levels of motorway safety through the modeling of infrastructure, human behavior and survey data of German motorways. Advisor: Dr. Constantinos Antoniou, Chair of Transportation Systems Engineering at the Technical University of Munich in Munich, Germany

Northeastern ITE Student Paper of the Year: Small unmanned aerial systems for speed-sensing applications

Accepted to participate in the 2021 American Society of Civil Engineers (ASCE) Legislative Fly-In

CIELO SHARKUS
Northeast Climate Adaptation Science Center (NECASC) Assistantship for her proposed project: Engineering Justice: Social and Hazard Resilience in a Changing Climate

Grant from the Agents of Change program for Science Communication in Environmental Health

Presented: Social Vulnerability and Flood Risks in Massachusetts at the Technical Research Exhibition (TRE) of the National Society of Black Engineers (NSBE) 46th Annual Convention

Helping fight climate change through HOPE (Humans for the Opposition of Pollution and Emissions). Research focus: how flooding, drought, and wildfires impact water quality and quantity, and how this disproportionately affects low-income minorities and vulnerable populations

Cielo has two projects under review: Assessing Social Vulnerability and Hydrological Risk in Massachusetts and U.S. Riverine Metropolitan Areas are Driven by Local Hydrology and Shaped by Race

DONGFANG (LEAH) WANG