University *of* New Haven

TCoE Trends

Newsletter of the Tagliatela College of Engineering, University of New Haven **Fall 2019**

Tagliatela College of Engineering Makes a National Impact in Cybersecurity

The University of New Haven has received a $4 million National Science Foundation (NSF) grant — one of the largest federal grants in the University's history — to create Connecticut's first CyberCorps® Scholarship for Service (SFS) program, which will educate the next generation of professionals charged with protecting the nation from cyberattacks.

The SFS program is designed to recruit and train the next generation of cybersecurity professionals to meet the needs of federal, state, local, and tribal government organizations. The program provides scholarships for undergraduate and graduate students studying cybersecurity and computer science. Scholarship recipients will then pursue employment with a government entity in a cybersecurity-related position.

"This grant recognizes the national reputation of our undergraduate and graduate degree programs in cybersecurity and computer science and the potential value our graduates could bring to the federal government as well as state and local governments," says Ron Harichandran, Tagliatela College of Engineering dean and vice provost for research. "The SFS program will provide a steady supply of University of New Haven graduates to the government over the next several years."

Ibrahim "Abe" Baggili, Elder Family endowed chair of computer science and cybersecurity and founder and director of the University's Cyber Forensics Research and Education Group, says the government is looking to hire the best of the best in cybersecurity. "It is the biggest need they've identified in their workforce," says Dr. Baggili, the principal investigator for the grant. "They want people who have superior technical skills, and that's what our graduates provide."

"The University of New Haven has become a national and international leader in cybersecurity and forensics education, and our undergraduate, graduate, and faculty researchers have already uncovered major software weaknesses that affect billions of people," Dr. Baggili says. "This grant pushes us to the next level."

The University of New Haven's Cyber Forensics Research and Education Group has received international attention for, among other discoveries, uncovering vulnerabilities that were addressed in the messaging application WhatsApp, identifying vulnerabilities in a popular virtual reality application, and creating the Artifact Genome Project (AGP), which has been supported by the NSF and the Department of Homeland Security.

It's been a momentous time for the program as this spring the National Security Agency (NSA) and the Department of Homeland Security designated the University an Academic Center of Excellence in Cyber Operations, the only university in the state and one of just 21 universities in the nation to currently hold the distinction. And, in June, the NSF awarded the Tagliatela College a $300,000 grant so that the AGP can become an educational tool that can be used by cybersecurity and forensics programs at universities worldwide as well as by practitioners in the field.

As governmental agencies and companies of all kinds grapple with ways to deal with data breaches and other cybersecurity challenges, the cybersecurity field is experiencing robust growth. In fact, the world's leading researcher for the global cyber economy, Cybersecurity Ventures, predicts there will be 3.5 million job openings by 2021.

When looking to fill these positions — as well as internships designed to prepare students for these opportunities — industry leaders say they turn first to schools the NSA designated Academic Centers of Excellence in Cyber Operations.

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Meanwhile, undergraduate seniors in the Cyber Operations paths can apply to the highly competitive and rigorous Scholarship for Service program to become undergraduate SFS Scholars. They'll then pursue MS degrees as graduate scholars in computer science, cybersecurity and networks, or data science.

"This is a very competitive grant with the government paying for the entirety of the student's two-year master's degree program plus a generous $35,000 stipend as well as travel expenses to conferences," Dr. Baggili says. "It's really the Lamborghini of scholarships."

The SFS scholars, says Dr. Baggili, will be expected to do research and publish in highly regarded scholarly journals — hallmarks of the University's cybersecurity and networks program. They will intern with a federal, state, local, or tribal government organization in a cybersecurity position, and they'll take part in service-learning projects supporting law enforcement or government agencies, helping to solve crimes through digital forensics.

Dr. Harichandran, a co-PI on the grant, says that "In addition to instilling students with a deep technical understanding, the program will leverage the e-learning modules developed by the college to help students develop an entrepreneurial mind-set."

"Because they will work in government jobs that often are limited in resources, we will teach them to think like entrepreneurs on the job and to leverage their limited resources to build success, to not give up, and to find a creative way to solve problems," Dr. Baggili says.

The scholars will also participate in the University's hacking and cyber forensics collegiate teams that have placed highly in major national competitions, having beaten universities with cybersecurity programs that are two to five times larger.

"Having a competitive mind-set is imperative in a field where it is important to defeat or trace an adversary," Dr. Baggili says.

Dr. Baggili says faculty will also work to develop cybersecurity leaders who are strong team players and who recognize the need to create a more inclusive and diverse cyber operations workforce. To that end, Liberty Page, a co-PI on the grant and co-coordinator of the University's undergraduate program in cybersecurity and networks, will lead a session on diversity and inclusion, and the scholars will also take part in outreach initiatives including the University's NSA-funded GenCyber Agent Summer Academy that encourages young women and individuals from underrepresented populations to explore opportunities in the field.

"After completing their degrees, the scholars will be expected to work for federal, local, state, or tribal governments for the time that they were sponsored," Dr. Baggili says.

Biomedical Engineering Students Place Second in American Chemical Society New Haven Section's Fourth Annual Student Research Symposium

Brady Reynolds and Yaw Ofosu Ansong Jr. are doing medical research that could help ease the pain of the millions who suffer from shingles and could lead to groundbreaking protein-aided drug release using nitric oxide (NO).

The two biomedical engineering graduate students each took a second place award — Reynolds for his oral presentation on "Bioinspired and Non-invasive Pain Relief in Herpes Zoster Patients," and Ansong for his research poster on "Achieving On-Demand Release of Nitric Oxide via Bacteriorhodopsin" — at the American Chemical Society New Haven Section's Fourth Annual Student Research Symposium hosted by Yale University in the spring.

They competed against students from Yale University, Quinnipiac University, and Southern Connecticut University.

"In Biomedical Engineering research, a disease or health-related need always drives the work, which also almost always requires knowledge from many disciplines including biomaterials, tissue engineering, mechanical engineering, and chemistry in order to find solutions," says Kagya Amoako, assistant professor and program coordinator of the graduate program in biomedical engineering and director of the Biomaterials and Medical Device Innovation Laboratory. "Because of the jack-of-all-trades nature of the field, a biomedical engineer is able to wear many hats. I believe the many hats that our students had to don for their presentations impressed the Yale judges."

Ansong was a general physician in Ghana before deciding to pursue a biomedical engineering degree at the University of New Haven and a new career in research. He says observing "the fleeting nature of life, especially due to lack of money in Ghana," motivated him to want to "be involved in research that will improve life in developing countries."

His research, in collaboration with Dr. Amoako, focuses on NO which is "very useful in preventing clots and treating infections but can't achieve long-term storage." So Ansong is developing an approach that would "achieve an on-demand release of the NO gas through protein-aided release." This is significant, Dr. Amoako says, because NO is an endogenous free-radical gas that has so many possible positive health impacts — acting as an antimicrobial agent, a vasodilator, a smooth muscle relaxant, and a growth factor stimulant.

"It's exciting to be part of something that's going to change the future," Ansong says.

Ansong said it was initially hard to convince his family that he should leave medicine and pursue a degree in biomedical research and the American Chemical Society award made his family members even more supportive of his choice.

Reynolds and Dr. Amoako, meanwhile, developed an adhesive patch that infuses NO and "will permeate into the shingles rash site and give pain relief," Reynolds says. "I believe that there is a lot of promise for this design, as initial results have been great. There is a growing incidence rate of shingles in the United States with now no current effective way of managing the pain, demonstrating that our design is needed."

Dr. Amoako explains that the disease is associated with postherpetic neuralgia (PHN), chronic pain linked to the virus, which is felt at rash sites and severely affects the patients' daily lives. "Because current treatment methods are not providing the necessary long-term pain relief, and many lead to serious side-effects, we are developing a skin patch that releases a natural analgesic to combat PHN more efficiently and safely than current treatments," Dr. Amoako says.

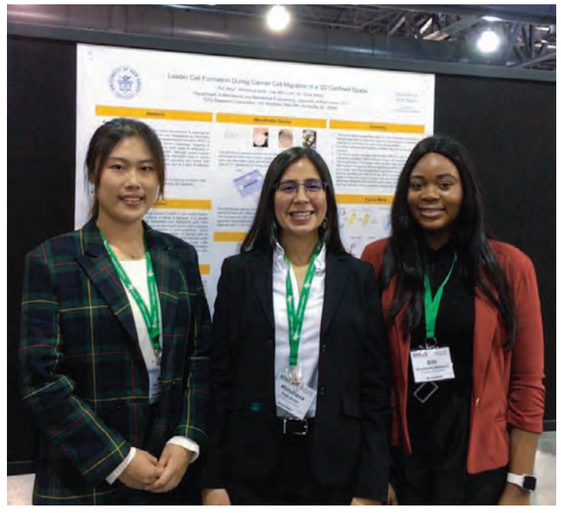
Reynolds says he enjoys doing biomedical engineering research at the University because it provides "a platform to develop technology that can better people's lives. It has always been my goal to help make the world a better and healthier place, and conducting research and developing new techniques is extremely important in making that happen."

Reynolds says he was proud the work was honored.

The University's biomedical engineering students' research has caught the attention of medical device companies throughout the country, Dr. Amoako says, adding, "One hundred percent of our first cohort of graduates are employed full time."

"The 'it' factor that gives our students the competitive edge in the job market is their research experiences and the research programs we strive to offer them," he says.

University's Biomedical Engineering Students Present Research at a Leading National Conference and Take Part in the Largest Conference in the World for Women in Engineering



It was a very busy fall for students in Dr. Shue Wang's Lab, an integrated bioengineering lab, where they are developing engineered tools using emerging microtechnologies and nanotechnologies to study single-cell and collective-cell behavior in tissue regeneration and cancer metastasis. In October, three biomedical engineering students — Onohome (Bibi) Akonure, Miroslava Avila, and Rui Yang presented their research at the Biomedical Engineering Society's (BMES) annual meeting in Philadelphia.

"Our research interests focus on developing engineering tools to solve biological problems," says Dr. Wang, assistant professor of biomedical and mechanical engineering. "As a research advisor, the best moment for me was seeing my students present their work at such a big conference to other researchers, including students from Johns Hopkins University and faculty members from Columbia University. I was very proud of our students who are doing great in their research."

Then, in November, five biomedical engineering graduate students — Akonure; Avila; Janaki Acharya; Vishwa Thakkar; Juilee Wani; and Sandra Yu-Ting Chiu, an MBA student, attended the Society of Women Engineer's (SWE) Annual Conference in Anaheim, California, the world's largest conference and career fair for women in engineering and technology where students are mentored and have a chance to network and take part in leadership development. "They really get inspired, learning how to live, learn, and lead as women engineers," Dr. Wang says.

"Attending the SWE conference and the BMES meeting were exciting and fortuitous experiences," says Akonure. At the BMES conference, she presented her research on tissue engineering and spoke with professors from Cornell University, Washington University in St. Louis, Boston University, Brown University, and Yale about her work.

"I was able to network and gain insights from faculty members experienced in the field of science and research that would aid in improving and saving lives," she says. "I shared what I was working on in the lab and received great advice from these experienced individuals, which will guide me in the next phase of my life."

At the BMES Conference, Akonure worked with professionals to sharpen her resume and, at a session on "Biomedical Engineering in Industry and Government," panelists who work in the field encouraged students to apply for jobs that interested them "even if we didn't meet 100 percent of the job description," Akonure says. "After the conference I started applying for jobs, but this time it was with a different mind-set."

She applied for an associate scientist position at Pfizer and was called for an interview that week. "The interview was focused on my role as a research assistant in Dr. Wang's lab," she says. "They were interested in getting to know my daily activities as a research student, my cell culturing skills, the challenges I faced while working in the lab and how I overcame them."

She was offered the job as an associate scientist and starts right after her graduation in December. "In the next 5 to 10 years, I see myself as a senior scientist contributing to the success of clinic al trials that would be used to save and improve lives," she says.

Avila says she too is driven by the dream of developing innovative projects "that can become the cure for diseases and so improve human lives" and that only increased after the BMES conference. "I had the opportunity to speak to faculty members and Ph.D. students from a couple dozen universities, some of the most prestigious in the country," Avila says. "What impressed me the most is that there are countless scientists working on projects that are the top in technology."

Dr. Wang says she is extremely grateful for Dean Harichandran's support of student research and the funding that allows students to attend conferences and present their work.

"Research is crucial for their professional development as the students develop new skills in terms of creating ways to test their experiments, collect data, accomplish results, and communicate with colleagues who could help their career development," Dr. Wang says, adding that the students raise the University's profile when they present their leading-edge research. They're currently at work on mesenchymal stem cell differentiation for bone tissue engineering, developing biosensing tools for biomarker detection, single cell analysis, and disease diagnostics and developing microfluidic devices to study cell migration during cancer metastasis.

Rui Yang called her time at the BMES 2019 annual meeting "unforgettable and exciting."

"I gained precious experience not only getting to know new technologies and current popular research directions, but it also gave me the opportunity to practice presenting my work to other people," Yang says. "I would like to thank the University of New Haven for allowing me to have such a wonderful opportunity to attend such a conference."

Tagliatela College of Engineering Faculty are Working to Transform Engineering Education

TCoE Faculty at the 2018 ASEE Annual Conference.

The Tagliatela College of Engineering faculty members have emerged as national leaders in a movement to transform engineering education.

They are asking fundamental questions about how engineering education is delivered and about how to foster an entrepreneurial mind-set in students, and they've developed novel ways to measure the effectiveness of programs created to develop that mind-set.

They are looking closely at this next generation of engineers and the relationship between their personality types and their specific topical interest within engineering. Working with education and English faculty, they have found that engineering students often have misconceptions about their own abilities to be strong communicators, and they've developed a technical communication program that works to change that perception and to strengthen students' writing and presentation skills.

Their research also explores ethics in engineering, the impact of scaffolding on student learning, and in a multidisciplinary study, they explored how they can build upon the successes of the first Cyber World offering in the University's Common Course.

In June, Dean Harichandran, eight Tagliatela College faculty members, University education and English professors, and one biology and environmental science lecturer presented research at the American Society of Engineering Education conference in Tampa.

"Many faculty in the Tagliatela College of Engineering are passionate about transforming engineering education," says Dean Harichandran. "In addition to developing and practicing innovative approaches to enhance student learning, they also engage in research to assess the effectiveness of new approaches. These activities are aligned with our goal of being student centered."

The titles of the papers presented at the conference were as follows:

- "Assessing the Growth in Entrepreneurial Mind-Set Acquired through Curricular and Extra-Curricular Components"
- "EML Indices to Assess Student Learning Through Integrated e-Learning Modules"
- "Relationship Between Personality Types and Topical Interests of Engineering Students, if Any: A Work in Progress"
- "Motivating Students for Learning Using Scaffolding and a Variety of Assignments and Activities"
- "An Exploratory Study of Engineering Students' Misconceptions about Technical Communication"
- "Assessing an Online Engineering Ethics Module from an Experiential Learning Perspective"
- "CyberWorld as a Theme for a University-Wide First-Year Common Course"

All these papers, and those presented in previous years, are available on the University's Digital Commons repository. The authors of the papers presented at the 2019 ASEE Annual Conference were: Dean Harichandran, Cheryl Li (associate professor of mechanical engineering), Nadiye Erdil (associate professor of industrial engineering), Maria-Isabel Carnasciali (associate professor of mechanical engineering), Jean Nocito-Gobel (professor of civil and environmental engineering), Goli Nossoni (associate professor of civil engineering), Gokhan Egilmez (associate professor of industrial engineering), Phil Viscomi (adjunct faculty member), Frank Breitinger (assistant professor of computer science), Judy Randi (professor of education), Kristen Przyborski (director of the Common Course), and Lauren Beck (assistant professor of English).

Four Questions with New Faculty in the Tagliatela College of Engineering

Vahid Behzadan is an assistant professor of computer science. He received a Ph.D. from Kansas State University in 2019. As a research assistant in Kansas State's Knowledge Discovery and Databases Lab, he was project leader for automated cyber threat intelligence collection and analysis with a focus on open-source intelligence.

Q. Can you tell us about the expertise you bring to the Tagliatela College of Engineering?

A. My background is quite diverse. I started working in cybersecurity from a really young age. I then completed a degree in communication systems engineering. During my graduate studies, I worked on a variety of research projects on cognitive radio systems, security of unmanned systems such as drones, security of distributed systems, and game theory for cyber and national security. I eventually completed my Ph.D. studies with a dissertation on the safety and security of artificial intelligence (AI).

Q. Can you share some details about your research work and what you'll be researching at the University?

A. My primary research interest lies in the intersection of AI and cyber-security. I am particularly interested in the security aspects of deep reinforcement learning algorithms, which are heavily inspired by natural mechanisms of intelligence and are the state of the art in AI research. I also work on the applications of AI and machine learning in cybersecurity, such as automated threat intelligence collection and analysis from open source media such as Twitter and intrusion prediction in critical infrastructure such as the power grid. I also collaborate with a number of colleagues on the safety aspects of advanced AI technologies, including "The Psycho-pathological Modeling of AI Safety Problems," which has been covered by the national and international news media.

Q. What do you look forward to most about teaching at the University of New Haven, and what drew you to the University?

A. Our University is at an exciting point in its evolution: the cybersecurity program is highly regarded at the national and international levels, and the new graduate program in data science is attracting talented students and future data scientists. I'm working to establish the Secure and Assured Intelligent Learning (SAIL) Lab at the University to foster and develop research and educational programs at the intersection of cybersecurity and data science. I'm also coaching the University's hacking team.

Q. What do you enjoy doing outside the classroom and the lab?

A. Playing old school rock and 80s metal music on my guitar is my favorite hobby. I'm also working toward my private pilot's license and I am an amateur astronomer.

Moin Bhuiyan is a visiting assistant professor of electrical and computer engineering. He received his Ph.D. in electrical engineering from the University of Windsor in Windsor, Canada. He comes to the University from Worcester Polytechnic Institute (WPI), where he was an assistant professor in the electrical and computer engineering department.

Q. Can you tell us about the expertise you bring to the Tagliatela College of Engineering and research you'll be working on with students?

A. At WPI, I developed and taught a graduate course titled Advanced Systems Architecture and was involved in research. I worked as a research scientist in the same department implementing thresholds on processed EMG signals to detect rest and active position of muscles and tried to mimic what is done in a myoelectric prosthesis controller so that the prosthesis is not activated at a low-level when it is at rest.

My research interests fall in the areas of digital systems, embedded systems design and synthesis, smart prosthetics, portable medical device development, smart and connected health, pattern recognition, image processing, machine learning methods, and their applications. I am interested in applying integrated science and engineering skills to problems in medicine and human health. One of the projects I will work on at the University of New Haven is an AI-empowered optimized control of a prosthetic hand using multiple cameras.

Q. What was one of the critical moments in your academic career so far?

A. After my Ph.D. degree, I started working as a postdoctoral fellow with my Ph.D. supervisor at the University of Windsor, working with a team to develop a portable pulmonary injuries diagnostic device for use by nurses, EMTs, and first responders. Our technology successfully passed the proof-of-concept stage, and a number of generations of prototypes have been built and tested.

Q. What do you look forward to most about teaching at the University of New Haven, and what drew you to the University?

A. The University of New Haven is a student-centered comprehensive university with an emphasis on excellence in engineering, liberal arts, and professional education. I am very excited to utilize my research and teaching experience here and to be part of its research program. I am genuinely interested in communicating my knowledge in electrical engineering in areas including programming, sensors and measurement, circuits, electronics, embedded systems, VLSI design, signals and systems, DSP, and computer networks.

Q. What do you enjoy doing outside the classroom and the lab?

A. I love gardening! I had a very small garden in Toronto in my backyard, and if I have a chance in the future to start gardening here, I would love to do it.

Adwoa Donyina is a visiting assistant professor of computer science. She received her Ph.D. in software engineering from the University of Leicester, in Leicester, England. Prior to arriving at the University, Dr. Donyina was an assistant professor of software engineering at Chapman University in Orange, California.

Q. Can you tell us about the expertise you bring to the Tagliatela College of Engineering?

A. I bring expertise in software engineering and in the scrum method. I'm a scrum master. I made sure I was focused on getting my certifications in scrum, which is something that is used in industry, and it is helpful for students to know particularly if they want to go work for companies such as Microsoft or IBM. I can show them why it's important and how to apply it. It's a type of agile methodology. In scrum, instead of sitting down at a table for a long meeting, your team can have a stand-up meeting, and you discuss what you worked on before, what you're doing now, and any problems you're having on a project. It's an informal discussion with your team emphasizing group work and communication. It's a way to get a project done from start to end in place of the more old-fashioned waterfall method (where you break down a project in linear sequential steps).

Q. What was one of the critical moments in your academic career so far?

A. The key moment was when I had the chance to present my work to the Queen of England. I went to the University of Leicester, and, after I finished my master's dissertation, it was recognized, and I received a high distinction. My dissertation was on a virtual teaching hospital system. I worked with the medical school, and I made an e-learning tool using artificial intelligence so medical students could practice the diagnostic thinking process and managing patients in simulations. The Queen was coming to the University because we'd renovated our library, and they selected only two projects to share with her, and the other one would be presented to her husband. When meeting the Queen there are many restrictions and protocols. I had to practice my curtsy. It was so interesting meeting her and having the chance to share my research with her. It was a very big moment.

Q. What do you look forward to most about teaching at the University of New Haven, and what drew you to the University?

A. The one thing that I like most about the University of New Haven is the fact that it is really diverse. The previous university where I worked wasn't as diverse. It definitely was a great university, but it didn't have that feel — that sense of belonging. Here I see such a mix of students, and I have a better connection and sense of belonging.

Q. What do you enjoy doing outside the classroom and the lab?

A. I have family in the area. I love spending time with them — going to a fair or exploring the state. This really feels like my new home.

Stephanie Gillespie is a lecturer in the Engineering and Applied Science Education Department. She received her Ph.D. in electrical and computer engineering from Georgia Institute of Technology, Atlanta. Prior to coming to the University, she taught courses in and facilitated the Engineering Projects in Community Service program at Arizona State University.

Q. Can you tell us about the expertise you bring to the Tagliatela College of Engineering?

A. I have always approached engineering as an interdisciplinary field with an emphasis on the connections to society. My undergraduate degree was in electrical engineering with an audio concentration, as I was fascinated by acoustics and the creation of music from a scientific perspective. My graduate research was an application of signal processing and machine learning to the health fields, specifically for detecting stress and depression in adults with aphasia, a communication disorder.

Q. What was one of the critical moments in your academic career so far?

A. I have always loved to give students real-world experiences, and this past summer I had the opportunity to take 11 students from my prior institution to Vietnam for an engineering study abroad program. The students had been working collaboratively with students from a local Vietnamese university, focusing on smart agriculture as a means of improving one of the largest occupations in Vietnam. When the students met together for the first

time in Vietnam, they tested their prototype and discovered just how many things they needed to consider before implementing a real solution, including the fact that most local Vietnamese farms don't have power outlets to run or test electronics in the middle of the fields!

Q. What do you look forward to most about your new role at the University of New Haven, and what drew you to the University?

A. While large research universities have their advantages, I am drawn to the unique opportunities of a smaller institution, to be more creative in the classroom with small class sizes, getting to know more of my students on a personal level, and developing working relationships across academic boundaries. I am also excited to be working closely with the Makerspace and hope not only to embed it into the courses I am teaching but also to help other faculty across the University identify ways to integrate it into their own classes and enhance the student experience.

Q. What do you enjoy doing outside the classroom and the lab?

A. As a new homeowner, most of my weekends have been filled with DIY tasks. I love that I am only a half-mile from the beach in West Haven and try to run along the water multiple times a week. I started training and competing in triathlons while in graduate school and have continued to be a casual competitor in the sport. I am looking forward to the hilly Connecticut roads to provide a scenic yet challenging workout after living in the flat desert for two years.

Sara Riazi, a visiting assistant professor of computer science, received her Ph.D. in computer and information science from the University of Oregon in May, where she was a graduate research fellow. Prior to that, she was a software engineer in Tehran, Iran.

Q. Can you tell us about the expertise you bring to the Tagliatela College of Engineering?

A. My research during my Ph.D. was mainly focused on big data computing, which is an essential topic with many industrial opportunities.

The prevalent use of IT technologies in everyday life results in producing a tremendous amount of data by businesses. Analyzing this massive data is essential to those businesses, which is causing rapid progress in the field of big data processing and increased market demand for experts in this area.

Traditional data analytics tools are not efficient for processing this massive data, and many exciting research questions must be answered to overcome existing obstacles. I am planning to offer courses in this area, including data mining and big data processing. My plan is to break big research questions that we are working on into small projects such that undergraduate and graduate students can get involved and gain more expertise in working with big data processing frameworks.

My current research focuses on the problem of link-prediction in very large graphs, which has applications in friend suggestions in social networks or anticipating the growth of a network for better managing the resources. This is an interesting but difficult problem for real-world networks with billions of nodes and edges.

Q. What was one of the critical moments in your academic career so far?

A. As a fresh university graduate, everyday teaching is actually a key moment for me for now.

Q. What do you look forward to most about teaching at the University of New Haven, and what drew you to the university?

A. When I decided to come here, I was excited to be an addition to the awesome faculty and staff at the University. I really enjoy the atmosphere here at the University of New Haven.

Q. What do you enjoy doing outside the classroom and the lab?

A. When time permits, I love to go hiking. However, my outside-of-the-classroom time is mostly devoted to preparing the lectures and material for my courses.

Theodora Saunders, director of system engineering education and executive in residence in the department of mechanical and industrial engineering, earned an MS in industrial engineering and electrical engineering from New Mexico State University and a certificate in System Engineering for Managers and Supervisors from MIT. She was Sikorsky Aircraft's chief system engineer for the U.S. Air Force Combat Rescue Helicopter, a $1.2 billion engineering manufacturing and development contract.

Q. Can you tell us about the expertise you bring to the Tagliatela College of Engineering?

A. My personal experience in both industry and academia has shaped my philosophy about engineering education. I believe teaching, mentoring, and practical learning are the three most critical and interdependent elements of the "engineering education" system. In order to keep up with increasing systems complexity, rapidly changing technological advancements, and industry demands, engineering education must be kept relevant, practical, and agile.

The existing Tagliatela College of Engineering Industrial Engineering program is already adapted to address industry needs, offering courses in lean manufacturing, healthcare process improvement, six sigma quality control, applied optimization, and data analytics. I want to build on the existing industrial engineering course framework by developing additional course offerings, while strengthening student enrollment. Within the existing course framework, I am working with the IE faculty to develop a distinct Systems Engineering Track in the IE master's program.

Q. What was one of the critical moments in your academic career so far?

A. I do not have any specific key moment … or I should say I have many such moments. There is no better feeling than to see your ex-students and interns becoming successful practicing engineers. Many of my students keep in touch with me, and it is really a pleasure to talk to them and see how they are doing. Of course, once a teacher, always a teacher, and as such I am always available for guidance and advice.

Q. What do you look forward to most about your new role at the University of New Haven?

A. I have been teaching at the University of New Haven for over 10 years now, and the people I have met, including students, faculty, and staff, are its biggest assets. Every semester, I look forward to meeting my new students. I would like to explore projects and research opportunities with industry, as well as with the local and state government at both the graduate and undergraduate levels in areas including systems engineering effectiveness, quantitative risk analysis, and systems thinking.

Q. What do you enjoy doing outside the classroom and the lab?

A. I am a proud grandmother of an almost two-year-old grandson, and my husband and I tremendously enjoy spending time with him. My other interests include reading — from literature to poetry to engineering books — and theater, music, swimming, and walking.

Marzieh Soltanolkottabi is a visiting assistant professor of industrial engineering. She received her Ph.D. in industrial engineering from Kansas State University, her M.S. in socioeconomic systems engineering, and her B.S. in industrial engineering from Isfahan University of Technology, Iran. Prior to receiving her Ph.D., she was a systems analyst at the International Systems Engineering and Automation Company in Isfahan, Iran.

Q. Can you tell us about the expertise you bring to the Tagliatela College of Engineering?

A. My background is in the applications of modeling and optimization techniques to complex systems. My primary area of research is applying optimization techniques to problems that arise in social and health systems. My research integrates approaches from the fields of operations research and game theory to solve critical problems such as modeling social responses to epidemic outbreaks, and optimization of resources in surgical settings.

Q. Can you share some details about your research work and about what you'll be researching at the University?

A. Currently I am working on applying game theory techniques on social networks to predict the spread of an epidemic. The main ideology behind this research is the fact that people react to epidemics by changing their social behavior such as being vaccinated or taking part in social distancing. This change of behavior can be described by means of game theory techniques since people decide whether to change their behavior or not based on the risk and the cost of infection and also the risk and the cost of changing their social behavior. My research is on finding an effective cost function that can describe this change of behavior and optimize the set of strategies in controlling the spread of infectious diseases based on the derived model.

Q. What do you look forward to most about teaching at the University of New Haven, and what drew you to the University?

A. Currently I am teaching courses in the industrial and systems engineering programs, and I hope to be able to help the students in these programs become more familiar with new technologies for analyzing and optimizing systems. I am also working on establishing a data science track in these programs. The University of New Haven is at an exciting period in its evolution, with a great opportunity for growth. I would like to be able to contribute to this growth by developing different programs and forming an impactful research group. Also, I enjoy the diverse and welcoming community of the University.

Q. What do you like doing outside the classroom and the lab?

A. I enjoy watercolor painting, poetry, and cooking.

In the Company of Stephen Hawking, James Clerk Maxwell, and Many of Modern Science's Leading Pioneers

The Proceedings of the Royal Society — two scientific journals that publish research on engineering mathematics and physical sciences and biology are among the most prestigious journals of science of all time.

As Said Mikki, assistant professor of electrical engineering, says, "some of the most fundamental contributions to modern physics and biology were published there."

"James Clerk Maxwell's electromagnetic theory of light was published there," he says. "Paul Dirac's quantum theory and Bragg's X-ray diffraction by crystals experiments were published there. Stephen Hawking and Roger Penrose's fundamental paper on spacetime singularities in cosmology came to light on the pages of this journal."

Now, Dr. Mikki joins this illustrious group. His paper "The Antenna Space-time System Theory of Wireless Communications" was published in April in *The Proceedings of the Royal Society*, the oldest scientific academy in continuous existence.

Dean Harichandran says, "Said's work is of a fundamental nature and his attempt to unify electromagnetic and communication theories is unique. The publication of his paper in *The Proceedings of the Royal Society* builds a strong reputation for him and the University of New Haven."

Dr. Mikki's paper provided a new way to unify two very different fields in electrical engineering—electromagnetics and communications. "I was able to show that a deep connection exists between the two," he says. "Electromagnetics is unique in its emphasis on spatial aspects — processes occurring in space — while communications focuses on time signals. However, both fields involve space and time, yet with different degrees of focus. So, I used a space-time formalism to link the two in a very general way."

His work could have a major impact on 5G wireless networks, which he says "are moving toward increased complexity in space. Therefore, there is a need to begin considering an integrated and unified approach to both electromagnetics and communication systems at both the research and educational levels."

This spring Dr. Mikki was also named a University Research Scholar. He will delve into numerous research projects this year while teaching an undergraduate course in analog communications and graduate courses in antenna theory and digital signal processing.

He plans to use the research scholar support to complete several grant proposals and explore new ideas in molecular communications, quantum communications, and electromagnetic machine learning. He will work with University of New Haven graduate students as well as graduate students and postdoctoral researchers from universities around the world. "I now rarely publish a paper with only professors as co-authors and prefer to work on student-driven research," he says.

Most recently, he mentored two University graduate students who completed their master's theses on integrating electromagnetics and communications.

It's work that continually energizes him. "I like multidisciplinary research and working on different and new ideas all the time," he says. "Each field has its own flavor and excitement. By linking ideas from many different domains, fresh insights can be attained."

Byungik Chang Named New Chair of Civil and Environmental Engineering

Byungik Chang says he's honored to be the new chair of the civil and environmental engineering department, working with a seasoned faculty who challenge students in rigorous, hands-on courses and who are deeply invested in their students' success.

"Two of our faculty members have more than 20 years' service at the University while three have 10-20 years' service in academia," Dr. Chang says. "Five of six are tenured and associate or full professors. Our faculty members have know-how and in-depth experience in academia."

Dr. Chang succeeds Gregory Broderick, professor of civil and environmental engineering. Dr. Broderick will continue to teach in the department. Dean Harichandran said he was grateful for the work of Dr. Broderick in shepherding the department over the past four years.

"Following up on his success in launching a very successful MS program in civil engineering, I am relying on Byungik's enthusiasm and energy to significantly revise the BS program in civil engineering so that our graduates are even better prepared to take on prominent roles in industry or pursue graduate studies," says Dean Harichandran.

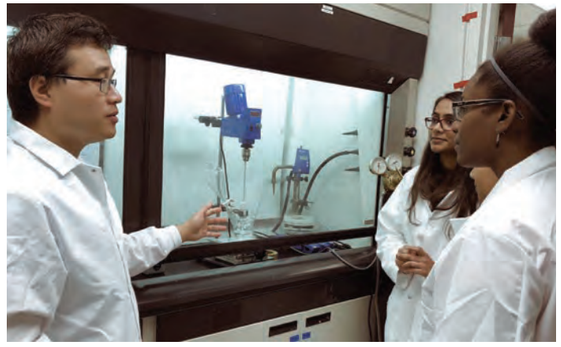
Dr. Chang says he plans to build on the department's success — with a graduate program that has grown from four students in its first year in 2017 to more than 40 today — and an undergraduate success rate of nearly 100 percent with students attaining jobs in the field or heading into graduate or Ph.D. programs. He says students are drawn to the program because of the strength of internships and courses featuring many hands-on learning and service-learning opportunities in the field.

He and faculty members are looking at current research on civil engineering, the job market, and changes in the industry to make certain the bachelor's and master's curricula continually reflect what is happening in industry. "Our students are trained on industry software, and they can also opt to minor in sustainability, which is a very hot topic, and they can attain LEED certification," Dr. Chang says.

Dr. Chang says he's particularly excited about launching a new Industry Based Mentorship Program where all students in the program can both serve as mentors and receive mentoring.

"Our faculty motto is CARE: Care for, Assist, Respect, and Energize students and each other," says Dr. Chang.

Professors Doing Groundbreaking Work are Named Jacob F. Buckman Chair and Professor



Dequan Xiao, associate professor, and Chong Qiu, assistant professor in chemistry, have been named the Jacob F. Buckman chair and Jacob F. Buckman professor in the Department of Chemistry and Chemical Engineering.

"I'm thrilled to recognize Dequan Xiao as the next Buckman Chair," Tagliatela College of Engineering Dean Harichandran says. "Dequan is renowned for his work in the emerging domain of computational chemistry. His unique expertise is sought after by scientists at Yale and elsewhere. As a result of his research accomplishments and student mentoring, he was recognized as a University Research Scholar. He also was instrumental in launching the new master's program in chemistry."

"Chong Qiu deserves to be recognized as the Buckman Professor," Harichandran says. "Within the short time he has been at the University, Chong has engaged seniors from many disciplines to build research equipment he needed. This year he was the University's inaugural recipient of a nearly $700,000 National Science Foundation Early Career Award for his groundbreaking research on aerosols in the atmosphere. With the Buckman Professorship I expect Chong to continue mentoring student research."

Dr. Xiao says he is honored to be named the Buckman Chair. "With the support of the Buckman Chair fund, our students will have the chance to conduct pioneering research in the exciting area of integrative materials discovery, combining theoretical, computational, and experimental chemistry methods to discover useful chemicals," Dr. Xiao says. "In my lab, students can design sustainable catalysts for producing green fuels, candidate molecular drugs for cancer therapy, and eco-friendly alternative polymers for plastics. In the past years, my students have shown excellent outcomes in this research area, publishing their work in high-profile journals, winning national conference poster awards, and securing dream jobs in the competitive job market."

He says he is grateful for the "the trust and recognition from my colleagues and the university on the value of my work in teaching and research to our students and the university. More important, I see the university's continuous commitment to excellence in teaching to our students through the stellar teaching and research activities led by the faculty."

Dr. Xiao will continue developing leading-edge curricula, engaging students in high-impact laboratory research and course projects, and "continuing outreach to prospective students through our productive work in research projects, publications, collaborations with peer institutions, and partnerships with related industries."

Dr. Qiu says he "was deeply honored to be named the Buckman Professor," which he says will allow him to devote even more time to work with students on research. "I know it affirms what I have been doing here at the university," he said. "This appointment also encourages me to continue the hard work. I am charged with several teaching, research, and service tasks with this position, and I plan to make every effort to accomplish these tasks. The Buckman Professorship offers me more research resources to work with more research students on exciting new projects."

When he was awarded the Early Career Award, the NSF praised Dr. Qiu's research on aerosols, which has the potential to shape understanding of the impact of air quality on climate change, weather forecasting, and his vision — building a complex, multitiered research program involving the University's undergraduate and graduate students as well as high school students from around the region.

Dr. Xiao and Dr. Qiu plan to host an annual Buckman Lecture, bringing in some of the world's leading practitioners and researchers working in new frontiers in chemistry and chemical engineering.

"Our ultimate goal is to fully prepare our students for future success in a career in or related to chemistry and chemical engineering," Dr. Xiao says. "We want this to inspire students to pursue innovative work in their own careers."

13 University Faculty Develop Their Skills in Making

The idea first came to Maria-Isabel Carnasciali in a workshop at the Remaking Education conference last fall. Dr. Carnasciali, associate professor of mechanical engineering and director of the University's Makerspace, was one of 250 educators, thought leaders, and business leaders from around the country at the event sponsored by the Olin College of Engineering and Emerson College.

"I was with a really energizing set of people who were open-minded about knowing that we have to do things differently in order to get education to the next level," she says.

In the workshop, faculty did a hands-on project assembling a makeshift robot out of many different supplies. "It was interesting to see faculty as students," she says. "It can take faculty members being in that scenario to think about how we are still learning. In a new environment, we have to learn."

When the conference organizers encouraged participants to apply for grants that could help to remake education, Dr. Carnasciali knew she wanted to create a similar experience for University of New Haven faculty members.

She applied for and won a $15,000 Grant for Remaking Education through Action Together (GREAT) for her project "Faculty as Students: Using Makerspaces to Remake Education." Dr. Carnasciali collaborated on the proposal with Margot Vigeant, professor of chemical engineering and faculty coordinator of the B-FAB Bucknell Fabrication Workshop at Bucknell University, and J.R. Logan, executive director of MakeHaven, a community makerspace in New Haven.

Last summer 13 faculty members from across the University were part of MakeHaven, a "not-for-profit membership-driven organization, and a gathering place and workshop for makers, creators, tinkerers, and dreamers" where people from the community can use 3-D printers, a CNC wood mill, a wood shop, a metal CNC, a sewing and crafts area, a laser cutter, and an electronics workbench.

The faculty members took part in a variety of workshops and worked with tools available in the current University Makerspace and in the Makerspace in the Bergami Center for Science, Technology, and Innovation slated to open in 2020.

"The faculty members who engaged and took advantage of the resources got many positive benefits, and I am already seeing how it will inform and impact what they teach and how they teach," Dr. Carnasciali says. "One of the best outcomes is that they are talking about it during meetings or even just with colleagues. I've had several faculty members reach out to me to explore the makerspace. I don't think that would have happened had it not been for this effort this summer."

"The main objective was to play, to get comfortable in the space, to poke around and try things out," she says.

"If we are going to incorporate the University Makerspace into the academic experience of students across all the disciplines, the faculty need to know what a makerspace enables them to do, so they know what they can ask students to do and scope their projects well," she says.

Faculty members who participated shared what they learned at Make-Haven's Open House earlier this fall. Kento Yasuhara, associate professor of criminal justice, said he liked the experience: "I will incorporate prototyping within a course using the Makerspace to teach students about learning, especially learning from failing, which many of our students struggle with," he says.

Mary Isbell, assistant professor of English and director of First-Year Writing and the Writing Center, says students often say they are too busy to do research projects, and she found she had to push herself to take part in the Makerspace grant because she too is very busy.

Embarking on a woodworking project and having access to so many Makespace tools and to experts who could teach her to use them and knowing she had a date to share what she created gave her the incentive to dive into her project. "My takeaway as an instructor is that students are most likely to get involved in the Makerspace if there is an actual course they are enrolled in, with requirements of a final project, and that they need to have enough of an introduction to new technologies that they can experiment on their own and ask questions when they occur," she says. "I found the whole process very inspiring!"

Professor Nadiye O. Erdil Named President Elect of IISE's Operational Excellence Division

Nadiye O. Erdil, associate professor of industrial and systems engineering, has been named president elect of the Institute of Industrial and Systems Engineers' (IISE) Operational Excellence Division (formerly Lean Division) for 2019-2020.

After serving as president elect, Dr. Erdil will then serve a term as president. "For our discipline, this is the flagship society," Dr. Erdil says. "I'm very honored."

A former board member of the Institute's Lean Division, Dr. Erdil served at various roles in the annual conferences, including track chair, reviewer, and student paper competition committee member. As president elect, she'll help run all aspects of the Operational Excellence Division.

An expert on quality and improving process and productivity in manufacturing and health care delivery, Dr. Erdil's current research focuses on the use of statistical tools in unexplored areas such as using measurement system analysis to study medical errors linked to system design.

Prior to working in academia, Dr. Erdil was an engineer in the sheet-metal manufacturing and pipe-fabrication industries. She is the undergraduate coordinator of the Tagliatela College's industrial and systems engineering program, and she has conducted research on student motivation and its impact on learning and the development of technical communication skills and entrepreneurial thinking in engineering students.

Dr. Erdil says the IISE, recognized as the largest international professional organization for industrial and systems engineers, is a vital resource for education, training, and networking for academics, for those working in the industry, and for students.

"The society does a very good job building the bridge between students and industry," she says. "There are so many learning opportunities for students in terms of training that are offered and many opportunities for students to network with people in the industry. I look forward to serving as president elect."

Spotlight on: Gokhan Egilmez

Gokhan Egilmez loves traveling — to places around the world — and even the daily rides along a long ribbon of highway from home to work.

Driving gives him time to puzzle out research questions — about sustainability and climate change, building production simulation and optimization models to assist local companies in maximizing their financial and operational performance or about mining a massive data set to determine how to make Connecticut's roads safer, or how to identify the most predictive factors on students' happiness on campus.

A true industrial and systems engineer, he's all about efficiency. His calendar centers on three categories: Critical now, Opportunities now, and On the horizon.

"As I drive, I'm thinking," he says — about that calendar and his four different streams of research and the many projects within them, about upcoming publication deadlines, about mentoring graduate and undergraduate researchers, and about ways to innovate his teaching.

Dr. Egilmez is in his fourth year teaching in the Tagliatela College of Engineering where he was recently promoted to associate professor and given tenure. "The University of New Haven was a great fit from the start," he says.

"Dean Harichandran has been supportive of my research and teaching from my first day," Dr. Egilmez says. "He is transformative. He believes in research, and he believes in students actively engaging in research with faculty-mentored projects. I believe in that as well and have been fostering this with the ASOS Lab (founded in spring 2017 in the industrial and systems engineering program.) Research is so valuable to students. They face failure. They learn to work beyond it. They can take an interest and explore it."

Widely published with more than 50 articles in top-tier journals, Dr. Egilmez's research projects include the following:

- Studying the environmental, economic, and societal impacts of climate change and the impacts of industrial growth. "We're building computer models to estimate the environmental impacts of industrial growth, models that look closely at which industries are adopting renewable energy and which are not and what their impacts are," he says.
- Reviewing U.S. energy use Dr. Egilmez and his graduate students Bahadir Ezici and Mustafa Saber found that while the industrial use of renewable energy is increasing in the U.S., over 90 percent of the energy use is still from fossil fuels. "In Europe and in China they're putting so many strict regulations on fossil fuel consumption," he says. "In the U.S. we are lagging behind."
- Using data analytics to help reduce accidents on Connecticut's roads. He and two students, Mohammed Vohora and Lu Bai, are studying a "huge data set of more than a million road accidents to determine which are caused by driving-related factors and which are weather-related factors," Dr. Egilmez says. "Ultimately we want to help create better, safer roads and systems to reduce road casualties." The research will be part of a new Data Analytics course he created. "The course looks at how we can utilize machine learning and advanced statistical analysis to study complex problems in industry," he says.
- Developing computer optimization and simulation models to help large and small regional manufacturing and service organizations to better use their resources such as employees, machines, and equipment and improve productivity and profitability. For instance, he is currently consulting on a system simulation project at the Galliard Water Treatment Plant of the Regional Water Authority in New Haven and a manufacturing process improvement and layout design project at Inventec Performance Chemicals in Deep River.
- Innovating his teaching, focusing on project- and problem-based learning in his courses. In one course, students work directly with managers of factories, small businesses, and local nonprofit organizations to help them find ways to operate more efficiently and improve production. He is part of a team of Tagliatela College faculty researching ways to move engineering education forward.

Growing up in Istanbul, Turkey, Dr. Egilmez was a people person who loved art and liked figuring out how things worked. He chose to study industrial and systems engineering because "it's the place where machines and humans intersect, where the opportunities and problems come out."

He received a B.S. in industrial engineering and an M.S. in civil engineering and an M.S. and Ph.D. in industrial and systems engineering from Ohio University. Postdoctoral research work took him to the department of civil, environmental, and construction engineering at the University of Central Florida, and he was assistant professor of industrial and manufacturing engineering at North Dakota State University before arriving at the University of New Haven.

Dean Harichandran praised Dr. Egilmez's publication record and his work to encourage undergraduates and graduate students to pursue research.

Dr. Egilmez says he is honored to be part of a faculty that so values teaching and research.

"I personally care about taking accountability and ownership of the problems we have around us," he says. "As engineers, we have a responsibility to humanity to design products even better. We can create systems that are more environmentally friendly — that use less energy and use renewable energy. Improving the efficiency of systems — that triggers my passion."

University Board of Governors Member Mike Ambrose Elected to Connecticut Academy of Science and Engineering

The University of New Haven alumnus and longtime champion of the Tagliatela College of Engineering says he will work to solve engineering-related challenges in Connecticut.

Michael Ambrose `84, a member of the University's Board of Governors, was elected to the Connecticut Academy of Science and Engineering (CASE), whose members include the state's leading experts in science, engineering, and technology.

He called being named to the Academy and attending the induction a "humbling experience."

"So many technical leaders and giants were in attendance, including some that I knew and very much respected," he said. "It is also a testament to the University of New Haven, along with the many mentors I have had throughout my career."

Ambrose says he looks forward to helping the state promote engineering and the sciences and playing a role in solving tough engineering-related challenges in Connecticut.

As vice president of engineering and technology at Sikorsky Aircraft, Ambrose oversees the work of more than 3,000 engineers. Sikorsky is innovating the next generation of aircraft and services, developing and proposing entirely new platforms based on their coaxial rotor technology, and working in the field of autonomous flight.

He says he enjoys the challenge of leading a large organization and "preparing our company for the future of vertical lift."

Ambrose's 35-year career at Sikorsky began after he graduated from the University in 1984. He has been a chief systems engineer for the UH-60M Black Hawk, was part of the original design team for the S-92 aircraft in 2000, and was on the S-92 development team that was awarded the American Helicopter Society's 2000 Gruppo Agusta International Fellowship Award. That same year, he earned his MS from the MIT.

During his career at Sikorsky, he has also held leadership positions in manufacturing operations, programs, and new business, before moving back to engineering in 2010.

In September, Ambrose was elected as a member of the Board of Directors of RBC Bearings, Inc. where Michael J. Hartnett, Ph.D., `69 is chairman, president, and CEO. University President Steve Kaplan also serves on the Board.

Dean Harichandran, who was elected to CASE in 2014, called Ambrose a great friend of the College. Ambrose was the recipient of the 2016 Tagliatela College of Engineering Distinguished Lifetime Alumni Award.

"I am grateful for our partnership with the University of New Haven and the role that it plays in our present and future," Ambrose said.

To learn more about the University of New Haven, please contact:

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