

# CLEMSON

## BIOENGINEERING

*Educating Thinkers, Leaders and Entrepreneurs*



**BIOE** NEWS

Spring 2022



## Biomedical Engineers Seeking & Encouraging Equity Now

Collaborate with students and professors from across the nation  
Schools Represented: Texas A&M Univ., Univ. of Maryland, Ohio State Univ., Johns Hopkins Univ., UC-San Diego, and Clemson Univ.

### **Our Goals:**

- Address the needs of BME students and post-docs surrounding diversity, inclusion, equity, representation and creating a growth mindset
- Foster inter-collegiate collaboration between students, faculty, staff, and community members
- Cultivate networking opportunities for organization members
- Facilitate dialogue between the BME community and applicable professional organizations
- Empower students to influence BMES' policies, priorities and activities

### **Do these goals resonate with you? Join BE SEEN!**

- Help us to encourage equity in BME & promote a more inclusive environment through:
  - Community Outreach & Engagement, Mentoring & Networking, & Sharing Our Stories
  - Contribute to membership recruitment, social media, video editing, website design, and/or event planning

Email us @ [be.seen.org@gmail.com](mailto:be.seen.org@gmail.com)

Join and learn more about our work today!



[https://join.slack.com/t/bmesdeiinitiative/shared\\_invite/zt-whxtu94z-EuSnSQmyWzXXKMa6WSYhQ](https://join.slack.com/t/bmesdeiinitiative/shared_invite/zt-whxtu94z-EuSnSQmyWzXXKMa6WSYhQ)

# CLEMSON

## BIOENGINEERING

*Educating Thinkers, Leaders and Entrepreneurs*

## Table Of Contents

02	Alumni Spotlight: Building Leadership Skills for Industry
06	New Research Underscores South Carolina's Growing Strength as a Biomedical Research Hub
08	Delphine Dean receives Randall M. La Cross Distinguished Leadership Award
09	Diego Nigoa, LaToya McDonald Named SREB Doctoral Scholars
10	Biomedical Engineers Seeking And Encouraging Equity Now
12	Dajonia Jackson representing BIOE at National Society of Black Engineers 44th Annual Convention
14	Faculty Spotlight: Jordon Gilmore '15 Assistant Professor
16	Martine LaBerge Received Dr. Charles Townes Individual Lifetime Achievement Award
18	BIOE Diversity and Inclusion Committee
26	Melissa McCullough, Bioengineering Employee – October 18, 2021
28	Martine LaBerge Receives South Carolina Life Sciences Hall of Fame Award
30	Emily Shook: From Intern to Employee
32	Three Clemson University Engineers Take Home InnoVision Awards
33	BIOE Ambassadors
34	BIOE at The Society of Professional Hispanic Engineers National Convention in Orlando
38	Jennifer Hogan, Coordinator of Professional Development
39	NIH Phase II SBIR award of \$1.85M to Company Cofounded by Naren Vyavahare
39	Alumni Perspective
40	2022 Bioengineering Awardees at The Departmental and College Levels!
41	Professor Jonathan Black Endowed Scholarship

Cover illustration — *Diversity*

Martine LaBerge, *Chair,*  
Department of Bioengineering

Jenny Bourne, *Editor*

Olga Reukova, *Cover illustration*  
and magazine design

# ALUMNI SPOTLIGHT: BUILDING LEADERSHIP SKILLS FOR INDUSTRY

Jaishankar Kutty, Vice President Of Intelligence & Innovation at RQM+



**The profound Clemson experience had honed my technical skills to a point where I could understand the mechanical, chemical and biological aspects of most problems at hand and respond appropriately.**

Some will tell you that a successful career is not about achievements, grandiose titles or salary, but it's all about job satisfaction, making a difference in people's lives and being happy with what it is you do daily. Well, I think it's all the above and then some of the intangibles. If you are like me, you likely don't really know what it is that you want to do in life. I am 40, and I really don't know the true purpose of my life. I guess I am just mindlessly shifting through life like a five-year-old. My experience, to date, has no punchline or central message or stories of profound struggle with a fairy tale ending.

Back in 2003, I pulled the wool over someone's eyes at Clemson and landed a seat in what I still consider the most hallowed bioengineering program. I arrived on the shore of this country keen on becoming a professor who would conduct research and teach concurrently and oblivious of all else. Dr. Ken Webb was kind enough to offer me a position in his lab, and it was he who taught me the ropes of research. This singular action has led to most good things in my life today. I owe my career to Dr. Webb, and I remain deeply indebted to him, now and forever.

I was a total novice in the area I was to eventually write my dissertation on. The start was rocky; I didn't have even a semblance of a results table at the end of my first year of research work, which involved nothing but multiple failed attempts at synthesizing a degradable polyurethane hydrogel to facilitate regenerative healing of the human vocal cord. An absolute low point was ten days spent trying to fix a broken mammoth of a vacuum pump in Dr. Vyavahare's lab. My lab mates, on the other hand, were going rather swimmingly and even contemplating when to defend their master's theses.

Here I was, a biomedical engineer with not much chemistry and material science knowledge, trying to find my feet in a world of polymer science/tissue engineering, with no real foundation to launch myself (from a research perspective). Now, I think it was tough. But in those days, I was committed to the cause. And having been brought up in a middle-class Indian family that valued education over everything else and having sintered in the cutthroat competition of what's arguably a cauldron of an education system that pressurizes a student to the hilt, I was set on figuring things out without ever considering giving up.

It wasn't easy: there was living in a distant land, far away from family, and trying to understand a foreign culture with no real friends in

addition to the rigors of trying to make things work in the lab, balancing course work and knowing that my advisor thought I was nothing but a slacker. Among all this, there was an unfortunate incident in the lab: I had raised the sash of a chemical hood during a distillation setup since the vacuum pump wasn't working right. Unfortunately, I connected the wrong end of the vacuum pump, which caused the setup to blow apart, and about a liter of acetone splashed directly into my eyes. Yes, I wasn't wearing protective goggles. I couldn't open my eyes for a day and a half since the acetone had dried and weakened the eyelids and eye muscles according to the Redfern Center. I was lucky it wasn't a basic chemical, which would've likely robbed me of my eyesight.

In terms of understanding aspects of the culture, here's an example. The first time the cops stopped me, I got out of the car and walked up towards the cop. I truly had no clue of what to do if a cop stopped me. Luckily, the kind cop explained to me that I should never ever do something like that as such an action could endanger my life if the cop perceived any danger. Evidently, there were plenty of learnings outside the lab/school, too. So, the first year was about understanding what it takes to be a researcher while learning to respect all aspects of the process and accompanying systems.

Come the second year, I was fortunate to meet the most amazing young lady, Aditee Kurane, I have ever come across. Pretty much from day one, she brought a sense of calmness to my haphazard existence and coincidentally, things started to pan out in the lab, too. Sometimes, you just need a lucky charm or pure lady luck as it was in my case. Today, Aditee and I are married, and we see a reflection of ourselves in our little kids. Anyway, research-wise, Dr. Webb and I course-corrected a bit with our choice of biomaterial, and things began looking up. I was also able to take on board some of the learnings from the previous year (mainly chemistry-related), and along with some weekly research planning and improved ability to think and plan on my feet, I gradually began finding my feet and things began to pan out in a better direction. Thinking of my graduate school experience at BIOE, I can assure you it has stood me in good stead for everything that was to follow in my professional career. The varied and hands-on academic and research experience is something unique to our program in Clemson.

My research involved an incredible amount of material synthesis/characterization, cell and molecular biology, histology, and

biomechanics. As an engineer, I was unfamiliar with all of this except biomechanics. I had to immerse myself in every one of these topics and build from the ground up. To many, pursuing a Ph.D. is an arduous commitment of many years, and I cannot tell you how many times I heard my peers say, "I just want to get out of here and find a job that actually pays me." Well, think about it, why would someone pay you or even invest in you unless you have something unique with the promise of being value-added over time? As I prepared to defend my dissertation, the only thing that was a certainty was the amount of learning that lay ahead of me. At this point, my aspirations had switched to pursuing an R&D position in industry. As an international, there are numerous pressures associated with visa status and other such considerations that had diverted my attention from academia to industry.

My early days in the medical device industry were interesting and just as replete as my student days with learnings and new experiences. Being an international, entirely dependent on a company that would sponsor my visa, I was fortunate enough to land a job with St. Jude Medical (now Abbott Medical) as one of the very first engineers on a transcatheter heart valve project. At the time, it was a mere idea on paper, and I was fortunate to be able to contribute in varied areas like valve- and delivery-system-design, preclinical animal model development, histological evaluations, first-in-human trials, physician trainings and such. This was truly facilitated by the varied Clemson experience, which equipped me to tackle varied challenges with expertise and dexterity! For example, not many in the industry know how to interpret an NMR/FTIR spectrum and a histological slide with equal competence. Some of us from Clemson BIOE are truly the lucky few. In fact, that's where BIOE differentiates itself from other leading programs in the country. I can confidently say that the profound Clemson experience had honed my technical skills to a point where I could understand the mechanical, chemical and biological aspects of most problems at hand and respond appropriately.



Here's something of note: I have worked with many engineers and scientists from some of the topmost universities in the country; without exaggeration, none of them (and I truly mean none) had the combined hands-on surgery, biomaterials, biomechanics, histology, cell and molecular biology experience that I had. In fact, one of my patents in industry is based on the histological techniques I learned at Clemson. The fact that the BIOE program lays so much emphasis on the hands-on aspects of the broad-spectrum curriculum has very often come to my rescue in many ways.

**Please don't be blinkered by the sheen of grades; prioritize learning over all else (even the urge to "get out of here").**

In academia, although one collaborates with multiple researchers, one tends to be almost wholly responsible for funding, research outcomes and publications. Industry tends to be a little different. One truly needs to be a team player who is capable of influencing others to buy into one's ideas and to run with them. People skills and influencing are very significant if one is to be successful. In some ways, it's like grant writing, but it happens more in real time, where you are not only trying to make a mark in the new workplace but also trying to gain traction on your ideas within the confines of a large project all at once. A Ph.D. tag can be both a boon and a curse in industry. People have many preconceived notions about nerdy doctors of philosophy, and sometimes as a newbie it can be an uphill task to convince others of the merits of your ideas. Sometimes, a good idea can suffer from a "not invented here" attitude across the various groups in a workplace, and it's important to recognize the landscape and be nimble enough to navigate. I've been burnt a few times in trying to push for what I thought was a game changer. However, the learnings from those instances fuel me onward and forward.

Now, if I were to go back to school or if I had the opportunity to improve how I approached courses as a student, I'd focus a bit more on advanced biostatistics and regulatory/quality system-related items in school. These things are key in industry (which is not R&D only) and will stand you in good stead as you make the transition from academia to industry. Here's a rule of thumb I wish I had followed: If a course scares most people, be sure to take it. Please don't be blinkered by the sheen of grades; prioritize learning over all else (even the urge to "get out of here"). This is an opportunity to fill your toolbox with unique and nuanced tools, which not everybody may choose to acquire. Remember, the sharper and more advanced your tools are, the more chances you may have to make a difference for both yourself and society at large.

I never became a professor as I had wanted to be, but the learnings over time that I had thought of as "all else" when I initially landed in the U.S. have enabled me to make a decent life and successfully pay my bills today. It's too early in my career to talk of achievements (in part because there are none), it's more about what I have been lucky enough to successfully navigate.

**The fact that the BIOE program lays so much emphasis on the hands-on aspects of the broad-spectrum curriculum has very often come to my rescue in many ways.**



# New research underscores South Carolina's growing strength as a biomedical research hub

Clemson News

South Carolina is strengthening its position as a hub for high-impact biomedical research with a new multi-million-dollar project that undergirds the long-standing partnership between Clemson University and the Medical University of South Carolina (MUSC) and loops in crucial support from the National Institute of Dental and Craniofacial Research (NIDCR) at the National Institutes of Health (NIH).

Researchers will study temporomandibular joint (TMJ) function, how the TMJ functions in different craniofacial developmental disorders that seem to put the joint at risk for degeneration and how the joint responds to surgical correction of these disorders, researchers said. The TMJ makes it possible to move the lower jaw to eat and talk. Understanding the stresses on the TMJ before temporomandibular joint disease (TMD) occurs will unlock the mechanisms that put certain individuals at risk for TMD.

The focus of the research aligns with the recommendations made by an ad hoc committee on temporomandibular disorders that was formed under the auspices of the National Academies of Sciences, Engineering, and Medicine's Health and Medicine Division.

Four of the researchers involved in the new project are connected to the Clemson-MUSC Bioengineering Program. As part of the program, Clemson bioengineering faculty and students are based at MUSC's Charleston campus where they collaborate closely with MUSC researchers and clinicians.

The new project, funded by a \$3.18-million U01 grant from NIDCR, has two principal investigators. Hai Yao serves as the Ernest R. Norville Endowed Chair and professor of bioengineering at Clemson, professor of oral health sciences at MUSC, the associate department chair for the Clemson-MUSC Bioengineering Program and a member of the national temporomandibular disorder ad hoc committee. Janice Lee is the clinical director of the NIDCR and chief of the Craniofacial Anomalies and Regeneration Section within the NIH intramural research program.

Yao said the project is possible only because of the synergy and complementary strengths of Clemson, MUSC and NIDCR. "Clemson and MUSC work together so seamlessly it's as if we are one university, and we both collaborate closely with NIDCR," he said. "This project is the latest example of how these strategic partnerships are making South Carolina a hub of biomedical research that is recognized globally. Through these partnerships, we are well positioned to address urgent healthcare needs identified by the NIDCR and the National Academy of Medicine."

Lee said the researchers are uniquely positioned for success. "The U01 is an extremely competitive grant that requires intra- and extramural collaboration utilizing the world-renowned resources at the NIH Clinical Center," Lee said. "It is extra special as this is a first for NIDCR intramural as well. Temporomandibular joint disorders are debilitating conditions, and I am thrilled to be working with Hai Yao and his team to truly move the research forward. His team brings outstanding bioengineering technology to examine craniofacial



musculoskeletal function to the Clinical Center; our discoveries will be translated and, ideally, will initiate first-in-human therapies for TMD at the NIH."

Lee continued: "NIDCR is committed to working with world-class partners such as Clemson and MUSC to advance translational research into temporomandibular disorders. This project will help improve understanding of these disorders, thereby improving outcomes for patients."

This is particularly important to Lee as she is the oral and maxillofacial surgeon who will be providing the surgical treatments and is acutely aware of the impact that surgery can have on TMD, she said.

Özlem Yilmaz, chair of the Department of Oral Health Sciences at MUSC, said the new project presents an important venue to help patients debilitated with TMJ disorders and underpins South Carolina's leading position in temporomandibular disorders research. "New measurement tools and computational models will be tested on patients at the NIH Dental Clinic," Yilmaz said. "These novel technologies, stemming from more than a decade of teamwork bringing together bioengineers, oral surgeons and oral biologists at MUSC and Clemson, will push the boundary of the current temporomandibular disorders research."

Sarandeep Huja, dean of the College of Dental Medicine at MUSC, said the new project further solidifies MUSC's partnership with Clemson and NIDCR. "This partnership will help us innovate the future of oral health and wellness," Huja said. "We will not only be advancing knowledge of temporomandibular disorders but also expanding knowledge for the next generation of oral health providers and researchers. As a practicing

**NIDCR is committed to working with world-class partners such as Clemson and MUSC to advance translational research into temporomandibular disorders. This project will help improve understanding of these disorders, thereby improving outcomes for patients. *Janice Lee***

clinician and orthodontist, I frequently encounter patients with temporomandibular disorders, in the very type of patients that will be recruited in this study. It is critical we find evidence based treatments for these patients.”

“The vice presidents of research at Clemson and MUSC are crucial to the institutions’ partnership,” Yao said. Tanju Karanfil is vice president of research at Clemson, and Lori L. McMahon is vice president for research at MUSC. “We look forward to solidifying the strong foundation that Clemson and MUSC have built,” Karanfil and McMahon said in a joint statement. “These large, high-impact projects are advancing knowledge and creating a new generation of talent, while strengthening the state’s national and international reputation for biomedical research and education.”

Researchers are calling their project “Assessment of Temporomandibular Joint Morphology, Mechanics, and Mechanobiology in Class II and III Target and Surgical Phenotypes.” Part of what makes the project unique is the collaboration that maximizes the expertise of the investigators. “Dr. Lee and her craniofacial team at NIDCR will recruit the large number of patients that will be required for the research, characterize the patients and support their travel and treatment costs,” Yao said.

Clemson and MUSC will perform analysis of temporomandibular joint biomechanics and mechanobiology and put that information into context to better understand patients’ health status and the potential for future problems

Martine LaBerge, chair of Department of Bioengineering at Clemson, said the U01 grant that funds the new project is the first of its kind at Clemson. “This grant is a testament to the strength of the biomedical research enterprise that Clemson and MUSC are building in partnership with federal collaborators, especially the National Institutes of Health,” she said. “Dr. Yao’s leadership has been crucial to the partnership’s success, and it remains in good hands with him at the helm.”

The project is the latest major NIH grant led by Yao. He is also principal investigator on South Carolina Translational Research Improving Musculoskeletal Health (SC TRIMH), a Center for Biomedical Research Excellence that was founded with an \$11-million NIH grant in 2018. Researchers associated with the center have accounted for \$8 million in NIDCR awards over the past year.

Anand Gramopadhye, dean of the College of Engineering, Computing and Applied Sciences, said the success underscores the high quality of research that has come out of interdisciplinary partnerships such as the Clemson-MUSC Bioengineering Program. “Working together in collaboration with federal partners is elevating South Carolina’s position as a place for top-tier biomedical research and predoctoral and postdoctoral education,” he said. “Dr. Yao and his team have built a high-impact program and are continuing to climb. I offer them my whole-hearted congratulations.”

# Diego Nigoa, LaToya McDonald named SREB Doctoral Scholars



## Delphine Dean receives Randall M. La Cross Distinguished Leadership Award



The Governor’s School for Science + Mathematics (GSSM) presented its Fall 2021 Randall M. La Cross Distinguished Leadership Award to Delphine Dean, Ron and Jane Lindsay Family Innovation Professor, at the school’s 33rd Annual Research Colloquium. Tyler Harvey, lecturer, a GSSM Class of 2011 graduate and former student of Dean, presented the award.

**T**he Southern Regional Education Board selected Diego Nigoa, student of Delphine Dean, and LaToya McDonald, student of Hai Yao, as 2021-2022 SREB-State Doctoral Scholars. Nigoa studies point of care diagnostics, focusing on a nucleic acid biosensor for detection of SARS-CoV-2 with the goal of adapting the sensor for other nucleic acid tests, a portable testing device for Loop-mediated Amplification assays, and a lateral flow assay to detect SARS-CoV-2 antibodies in saliva. McDonald studies human factors research toward optimization of hospitalized patients’ post-surgery ostomy care to reduce readmittances.



# *Biomedical Engineers Seeking And Encouraging Equity Now*

**They offer opportunities and resources along with being surrounded by students who look like me, and this is what kept me in this major.**

My experiences in life have cultivated a deep passion and focus towards providing equitable healthcare for the communities I come from. For example, the 2020 annual meeting of the Biomedical Engineering Society, conducted virtually, afforded me the opportunity to meet Dr. Roland Kaunas, Associate Professor of Biomedical Engineering at University of Texas A&M, where he serves as director of the department's diversity, equity, and inclusion initiative.

We initially met to discuss graduate school opportunities, but our conversation turned to discussing the current state of America's healthcare system and its history of treatment of minorities. Kaunas asked me about my experience as a black male in biomedical engineering, and I told him about my involvement in PEER & WISE (COES programs dedicated to increasing diversity in science and engineering, Ed.) and how influential they have been in my success: They offer opportunities and resources along with being surrounded by students who look like me, and this is what kept me in this major. In our discussion, I remember saying to him that I wished there was an organization like PEER & WISE dedicated to addressing diversity, equity, and inclusion within our field. Towards the end of our conversation, Kaunas presented the idea of working together with Dorma Flemister, Ph.D. student at Ohio State University and student representative for the BMES Board of Directors, whom he met through the conference. She shares our passion and focus for creating a more diverse community within biomedical engineering.

One outcome of our collaboration is Biomedical Engineers Seeking and Encouraging Equity Now (BE SEEN), an organization committed to providing a space for biomedical engineering students to

have their voices heard. BE SEEN acts as a representative body that communicates issues affecting students, student bodies, professionals, departmental boards; further, it addresses larger organizational issues. Through BE SEEN, we endeavor to increase representation of underrepresented students in the field of biomedical engineering by creating a network where they can enhance connections and develop mentorial and professional relationships. In just over a year, we have grown to over 30 students from across the nation collaborating to promote interest in advanced degrees, especially for underrepresented students, by participating in recruitment efforts and community outreach programs.

In the past year, we have worked on organizational infrastructure and design programming to facilitate the program's growth nationally. In our second year, we will get these organizational programs fully up and running. Currently, we are working on creating videos and editorial pieces highlighting the work that minority students and faculty are doing in the field of biomedical engineering. In addition, we are designing a pilot mentoring program to help students navigate the graduate school application process. In tandem, we are building a website to provide a centralized platform where students, faculty and other professionals can connect. The site will offer access to resources such as fellowship/scholarship timelines, job opportunities and conference dates. Looking towards the future, we hope to grow the organization's infrastructure to include college chapters and corporate/institutional partnerships to enhance our efforts to increase interest in biomedical engineering among underrepresented students.

*Please see related information on the inside front cover.*

# *Dajonia Jackson*

## representing BIOE at National Society of Black Engineers 44th Annual Convention

According to the National Science Foundation, the United States is experiencing both a shortage in engineers as well as gender and racial disparity in engineering. Despite making up 51% of the U.S. population, women accounted for only 20.9% of all bachelor of engineering degrees awarded in 2016. In the same year, African Americans made up just 3.9% of all engineering degrees, with African American women only 1% of the total.

Higher education is making strides in addressing the lack of diversity in and the shortage of STEM professionals by investing in programs like the college's Women in Science and Engineering (WISE) and Programs for Educational Enrichment and Retention (PEER). PEER & WISE provide first year underrepresented and female-identifying students an upperclass mentor.

The National Society of Black Engineers (NSBE) creates a tremendous community to build resilience and equity for college students. According to the website, "NSBE is one of the largest student-governed organizations based in the United States. Founded in 1975, NSBE supports and promotes the aspirations of collegiate and pre-collegiate students and technical professionals in engineering and technology. With more than 600 chapters and more than 24,000 active members in the U.S. and abroad, NSBE's mission is 'to increase the number of culturally responsible black engineers who excel academically, succeed professionally and positively impact the community.'"

When I first came to Clemson, I was introduced to NSBE by my PEER mentor, Tre Butler. Tre explained college is more than an

opportunity to earn a degree; it is an opportunity to network and build relationships. NSBE is a great resource for networking and community and as a result, I have met countless mentors. These relationships have helped me through the challenges that come with earning a Clemson University engineering degree. Even more, Clemson's NSBE chapter became one of the organizations that made me feel a part of the Clemson Family.

I have been an active member of NSBE since my freshman year. It was the first student organization to make me feel comfortable enough to become more than just a member. I was elected to serve on the executive board as the membership chair and as a senator for three years. The Clemson chapter has taught me the importance of becoming a well-rounded engineer at a professional level. It exposed me to different resources on campus and taught me how to dress for success, build my resume and LinkedIn account, network with companies and so much more.

Throughout the year, NSBE creates professional events for students to participate in with a goal to send as many students as possible to the national convention. It is a remarkable opportunity for students to create professional contacts, gain exposure to a myriad of careers and find an internship or full-time job offer. Through my years of membership, I was able to attend two NSBE conferences, one national and one regional. According to the NSBE website, "The Annual Convention showcases black students and professionals who have a passion for STEM, who are high achievers in these fields and who are channeling their dedication to advance their communities and society at large. It will attract more than 10,000 aspiring and

**Tre explained college is more than an opportunity to earn a degree; it is an opportunity to network and build relationships.**



practicing engineers, educators and representatives of more than 200 academic institutions, government agencies, corporations and nonprofit organizations."

This year's 44th convention was held in Anaheim, California on March 23-28th. My goal to attend this convention as an ambassador of our NSBE chapter and department. I was absorb the energy of being surrounded by many of our nation's Black engineers and distribute it back out to the underrepresented students in our department. In the professional development workshops, hospitality suites and career fair, I want to create professional contacts with large biotech companies like Merck, Pfizer, Eli Lilly and Johnson & Johnson, companies that we don't have at our career fair.

The opportunity to attend this convention is very important not only to me but also to our bioengineering department and NSBE chapter. As the only bioengineering student attending from Clemson University, I wanted to showcase our mission: how Clemson has prepared me for professional careers in bioengineering and to be globally competitive. I want to give back by bringing important information and values of being a minority engineer to my peers. This opportunity will allow me to be a catalyst for success and share my experiences in hopes of inspiring other underrepresented engineers, especially in bioengineering. More importantly, my goal in attending this conference is to become a pioneer to help increase the national and international visibility of our bioengineering department.

**Clemson's NSBE chapter became one of the organizations that made me feel a part of the Clemson Family.**



# Faculty Spotlight

## Jordon Gilmore '15

### Assistant Professor

As I began my career as a faculty member in BIOE, one of my primary goals was to build a diverse, interdisciplinary team that tackled biomedical challenges at the interface of disciplines. This motivation began as a graduate student in the department, where I worked under Karen J.L. Burg, Ph.D. (now professor emeritus), who firmly believed that “innovation occurs at the interface of disciplines.” Fast-forwarding to this point in my faculty career, I am pleased with the progress toward my goal within the Sensors, Materials and Analytics for Regenerating Tissues lab I am privileged to lead. Our work focuses on building and integrating sensors and analyzing the data they generate across multiple applications. However, our work begins with a foundation in biomaterials, emphasizing fabrication and characterization of biomedical textiles.

The Advanced Mammalian Biomanufacturing Innovation Center (AMBIC), an NSF Industry-University Cooperative Research Center, recently funded our active collaboration with Sarah Harcum, Ph.D.'s group to focus on use of deep learning approaches to biomanufacturing optimization. This award provides support to study data-driven approaches to media formulation in biomanufacturing. Currently, the process for development of new recombinant-protein based drugs is excessively expensive due to the large number of experiments needed to validate new products. Our project aims to contribute to lower prescription drug costs by providing intelligent strategies for product development through machine learning and deep learning. Sarah Mbiki, a Ph.D. student in my lab, contributes much of the technical effort to this project and embodies the lab's interdisciplinary focus by combining her undergraduate training in computer science with bioengineering skillsets such as fed-batch cell culture. Mbiki's unique skills have drawn the attention of industry collaborators and future employers. She participated in a summer internship with Biogen and led efforts to secure a research seed grant from Genentech, which provided support for AMBIC before the effort won NSF funding.

In other research in my lab, we are developing intelligent wound dressings for chronic wound applications in collaboration with Prisma Health and MUSC Wound Care clinicians. Beginning with a biomedical textile-based design, our group has developed a triphasic wound dressing with advancements in moisture management, antibacterial efficacy and extended use time. This work has been supported through

multiple seed grants from the NIH COBRE SC TRIMH, Prisma Health Upstate and Clemson University School of Health Research. With ongoing intellectual property evaluation by the Clemson University Research Foundation, this project has the potential for clinical translation, especially with the help of clinical collaborator Joel Kidd of Oconee Memorial Wound Care and Hyperbaric Medicine Clinic in Seneca, S.C. This work was spearheaded by Elizabeth Gianino '21.

Our group is developing a biosensing platform to detect bacteria and point-of-care inflammatory biomarkers in nonhealing wounds. This technology, primarily developed by Craig Miller '21 features an electrochemical impedance spectroscopy approach that utilizes our novel solution-blow-spun conductive nanofiber composite electrode system to selectively capture target analytes. This work has been funded by the Clemson-MUSC Artificial Intelligence Pilot Program and is being evaluated in a small clinical trial with Teresa Kelechi of MUSC and Kidd. The clinical project focuses on the combination of our biosensor data with thermal imaging via deep learning to build automated, quantitative wound scoring. Miller also developed a synthetic biology-based whole cell sensor in collaboration with David Karig's lab to quantify quorum sensing signaling molecules in chronic wounds. This work, the subject of a recent SC INBRE Developmental Research Program award, focuses on application of these techniques to negative pressure wound therapy.

Our lab has several other projects incorporating sensing and clinical translation. I currently work with an interdisciplinary team from MUSC, Florida State, University of Michigan and Wayne State University to establish a framework to detect and characterize therapist empathy within treatment sessions using artificial intelligence and natural language processing. Multiple NIH proposals regarding this work have been submitted. Future work is a focus of the SC ADAPT-H proposal currently being developed by Bruce Gao in response to the NSF EPSCoR RII Track-I on research infrastructure improvement. This project will feature development of AI-enabled biomedical devices to improve personalized medicine across diagnosis, treatment and rehabilitation. Further, to support AI and biomedical device research capacity in South Carolina, I currently lead efforts to broaden participation in AI education.

In addition to research, I am passionate about technology translation

and entrepreneurship. In collaboration with my business partner, Jerome McClendon '15, I continue to develop AI and wearable sensing-based technologies through our company, Machine and Human Interaction LLC. In response to the COVID-19 pandemic, we have developed the COVID Wellness Nurse Mobile Application (now available on the Apple AppStore). This application is the subject of a Clemson University School of Health Research COVID Launch Seed Grant: We are evaluating the effect of viral load on symptom severity in positive COVID cases on campus and within the Clemson community. McClendon and I are actively working with Clemson to further commercialize this technology through established relationships and funding through a South Carolina Research Authority technology maturation grant and the support of Greenville's NEXT Innovation Center.

To support BIOE's mission to educate thinkers, leaders, and entrepreneurs, I continue to direct Call Me Doctor™ on campus. The program sponsors the Call Me Doctor Graduate Research Assistantship, which supports underrepresented Ph.D. students in the College of Science and College of Engineering, Computing, and Applied Sciences. To date, the assistantship has funded 12 Ph.D. scholars. BIOE students continue to be strongly represented within Call Me Doctor; our two current students are Kharimat Lora Alatis and Brenda Okereke. Call Me Doctor recently hosted students visiting Clemson as a part of our College's STEM ALL IN event. On Nov. 19, 2021, the virtual Call Me Doctor Summit, sponsored by an SC EPSCoR MADE IN SC Science Advocacy Network Grant, featured student, faculty and staff speakers on the graduate school experience and strategies for success.

I earned my bachelor's degree being from The Citadel in Charleston, S.C., and my ties there run deep. Currently, I am a member of the Electrical and Computer Engineering Advisory Board, and my frequent visits to Charleston help me support BIOE's continuing effort to interest Citadel undergraduates in graduate opportunities in BIOE. The CIT-CU Bioengineering 4+1 program sends students to our M.S. and M.Eng. programs. My efforts to recruit students is bolstered by a research-education collaboration with Ryan Integlia, an electrical and computer engineering faculty member at The Citadel. Integlia and I have created a multi-institutional project-based course that functions as a Creative Inquiry course at Clemson and an Independent Study at The Citadel. Students meet biweekly via Zoom to discuss joint projects in wearable sensing and artificial intelligence. Our goal is to develop this course into a formal technical elective available to

students from both institutions as a part of The Institute for Graduate Education (TIGE) agreement already established between Clemson and The Citadel.

I have certainly grown as a scholar and a person since arriving at BIOE as a graduate student in January 2011, and my family has grown as well. I share all of the amazing experiences thus far with my beautiful wife Kimberly and our three children, Gabrielle, Jameson and Kennedy (twins). In addition to always keeping me on my toes, my family keeps me grounded and focused on why I do what I do.

My time as a CU BIOE faculty member has been exciting and rewarding, and I am thankful for my #TeamBIOE family as well. I look forward to contributing much more to the department's mission and vision and to growing as a scholar and educator for years to come.



# Martine LaBerge received Dr. Charles Townes Individual Lifetime Achievement Award

College of Engineering, Computing and Applied Sciences



INNOVISION

Martine LaBerge of Clemson University received InnoVision's Dr. Charles Townes Individual Lifetime Achievement Award in a Nov. 9 virtual ceremony.

The Charles Townes award honors individuals who have exhibited a sustained commitment to the advancement of technology and the community through their technology-oriented and innovative contributions. "It's an individual award, but in reality it should be a team award because no one is ever alone on that stage, especially for

this prestigious award," LaBerge said. "I'm very honored because I'm following the best and the brightest in South Carolina." The award's namesake, the late Charles Townes, was a graduate of Greenville High School and Furman University and is the only person other than the Dalai Lama and Mother Teresa to win both a Nobel Prize and a Templeton Prize.

LaBerge joined Clemson University in 1990 and has served as chair of the bioengineering department for more than 19 years. Colleagues

**She leads with an infectious passion and energy  
that spills over into the rest of the department.**

*I.V. Hall, Vice President, Research & Development, Digital, Robotics & Capital Equipment, DePuy Synthes*

credit her with building the department into a powerhouse of translational research and education that creates the leaders and innovators who are crucial to South Carolina's life sciences industry.

Colleagues said LaBerge has devoted her career to advancing bioengineering technology and building communities of scholars, entrepreneurs and industry leaders to foster innovation. She has helped Clemson establish strategic partnerships with the likes of Arthrex, Prisma Health and the Medical University of South Carolina. LaBerge played a central role in establishing the Clemson University Biomedical Engineering Innovation Campus (CUBEInC). Her support was also instrumental in establishing two separate Centers of Biomedical Excellence at Clemson, both funded with multimillion-dollar grants from the National Institutes of Health.

LaBerge has held numerous leadership positions in professional organizations, including president of the Society of Biomaterials, member of the Biomedical Engineering Society Board of Directors and chair of the Council of Chairs of Bioengineering and Biomedical Engineering in the U.S. and Canada.

Several of LaBerge's colleagues and former students said she is highly deserving of the award. Steve Johnson, a previous recipient of the Charles Townes award and member of the bioengineering department's advisory board, said that when LaBerge joined Clemson as an assistant professor more than 30 years ago, she set out to make Clemson a leading bioengineering school.

"Since then, she has pursued that vision with determination, passion and a commitment to excel — to stand above what other schools would accept as just good enough," he said. "Since becoming chair of the department nearly 20 years ago, she has brought in the best

talent, created the most innovative programs and attracted the brightest students from across the country and the world."

I.V. Hall laid the foundation for his career by studying for his master's degree under LaBerge. He now serves as vice president, Research & Development, Digital, Robotics & Capital Equipment at DePuy Synthes. "She leads with an infectious passion and energy that spills over into the rest of the department," he said. "She cares for everybody. If she brings you into her network, she's not letting go."

Joey Wilson, who is now a consultant at EY-Parthenon in Munich, Germany, first met LaBerge when he was a high school student conducting research at Clemson. He later enrolled as a bioengineering student and left his mark on the University as student body president. He graduated in 2017 and continued his education as a Schwarzman Scholar in Beijing and as a Cambridge International Scholar in the United Kingdom. "Not only is Dr. LaBerge a strong force, super intelligent and super accomplished, but she is one of the most empathetic people as well," Wilson said. "Certainly, she fills a room with her presence, but she is really like a mother. She cares about how you are doing and is there to support you. She helped me along my path at Clemson, and I don't think I'd be here today where I'm sitting now without her support."

Anand Gramopadhye, dean of the College of Engineering, Computing and Applied Sciences, said that LaBerge is an exemplary leader and researcher. "She is extremely well known across the nation," he said. "Dr. LaBerge is the one who put Clemson's bioengineering department on the map. When history is written about this college and the bioengineering department, we will stand on the shoulders of Dr. LaBerge."

**Since becoming chair of the department nearly 20 years ago, she has brought in the best talent, created the most innovative programs and attracted the brightest students from across the country and the world.**

*Steve Johnson, previous recipient of the Dr. Charles Townes award*

# BIOE Diversity And Inclusion Committee

Committee members were asked to describe their motivation for committee service, their goals and an improvement they have seen. Angela Alexander-Bryant chairs the committee. Ed.

## Margarita Bruce

I wanted to serve on the Diversity and Inclusion committee because I would like others to view our department as an inclusive, understanding and supportive family. I would like to help create an environment for discussion with a sense of a safe space for hard conversations and learning. In addition, I would like students and staff to see a Latina on the committee, as Latinx are rarely seen in our university community; thus, as a model, more students/faculty/staff would be more confident in acknowledging their heritage whether Hispanic or others. An improvement in Diversity and Inclusion in Clemson University is the large amounts of events for underrepresented populations (URP), such as a Celebration for the Day of the Dead and Pride Events throughout Pride Month. In addition, the Bioengineering department is creating a webpage with many resources any student may use as a URP or an ally of URP.

**I would like to help create an environment for discussion with a sense of a safe space for hard conversations and learning.**

*Margarita Bruce*



## Sarah Harcum

Being on the Diversity and Inclusion committee goes with my lead role on the National Science Foundation (NSF)-funded CHOg2p project, where one of the goals is broadening participation in STEM. I hope to increase diversity awareness among the faculty and students in the department.

Our three-state, four-institution project is funded by the NSF to decrease the cost of medicines by improving the host organism used to manufacture them. The CHOg2p grant has sponsored students in Research Experiences for Undergraduates (REUs) at all four participating universities, of which Clemson is the lead. Through advertising at local and area schools, we have attracted significant pools of underrepresented minority (URM) and female student applicants. To date, we have hosted 30 REU students; 18 have been from URM groups, and 20 have been women. We also mentor four URM faculty, one at each of the respective universities. Everyone on the CHOg2p project has a clear understanding that broadening participation is an important goal in STEM.

**Being on the Diversity and Inclusion committee goes with my lead role on the National Science Foundation -funded CHOg2p project, where one of the goals is broadening participation in STEM.**

*Sarah Harcum*



*Angela Alexander-Bryant*

I have always had a passion for increasing representation of students from diverse backgrounds in STEM. Outside of academics and research, I have led efforts focused on increasing diversity in STEM as an undergraduate, graduate student and now as a faculty member. I recognize the gender and racial disparities that exist across many STEM fields, and as a woman in science and minority, I have always felt that it is my responsibility to lift as I climb.

I aim to increase enrollment and retention among students typically underrepresented in bioengineering on both the undergraduate and graduate level. To achieve this goal, I will collaborate with others to establish pipeline programs providing underrepresented students opportunities for exposure to bioengineering through outreach, courses and research. I also aim to work with students, staff and faculty to elevate a culture of inclusion in bioengineering, where all individuals across differing identities have a sense of belonging.

The department is making strides in many respects. We currently have four minorities and 10 women (one-third) among primary faculty/lecturers. On the graduate level, URM enrollment has more than doubled over the last five years, from 5.1-percent in 2017 to 12.9-percent in 2021. I am confident that URM graduate enrollment will continue to increase with the recent establishment of the Clemson-Claflin program, which serves as a pipeline program for Claflin students to take graduate courses to obtain graduate credit towards M.S. or Ph.D. degrees in BIOE beginning in their junior year. On the undergraduate level, URM enrollment has been stagnant. However, we are currently establishing the Diversity and Inclusion Student Advisory Council to receive feedback for generating new programming and policies based on our students' needs. I am eager to work together with our faculty, staff and students to continue to make progress.



**I recognize the gender and racial disparities that exist across many STEM fields, and as a woman in science and minority, I have always felt that it is my responsibility to lift as I climb.**

*Angela Alexander-Bryant*

*Delphine Dean*

Having our department be an inclusive community that embraces diversity is very important to me. In my more than 15 years at Clemson, I've seen a lot of improvements in the university and in the department to create a more inclusive environment. However, to make faster progress and address issues head on, we have to be intentional about making diversity and inclusion a priority for our department. I am excited to be a part of these efforts with my colleagues.

I'm looking forward to working with the student advisory board to hear what they think we should work on to make the department better. In addition, Alexander-Bryant (our awesome committee leader!) has already put in place some efforts that have had significant impact in a short time. For instance, she has led the department to participate in the Annual Biomedical Research Conference for Minority Students meeting, which has helped us to recruit graduate students. I hope the committee can work to institutionalize some of these initiatives so they continue long term.

Regarding other initiatives, at the university level, I'm on the Clemson TIGERS Advance Team as the codirector for the Pathfinders and Pathways programs, which are aimed at recruiting more postdoctoral fellows and faculty from underrepresented groups.



**On the Clemson TIGERS Advance Team, I am codirector for the Pathfinders and Pathways programs, which address recruiting more postdoctoral fellows and faculty from underrepresented groups.**

*Delphine Dean*

***Tyler Harvey***

As a first-generation college student from a rural area of South Carolina, I am keenly aware of the impact that access to educational opportunities and strong mentoring can have on the academic and career trajectories of students. One of my motivations for becoming a lecturer was to be able to serve as a mentor for students without traditional academic role models and work to help expand access to engagement in academia to everyone. This personal mission aligns very closely with the work of the committee and is what drew me to join in the first place.

Since joining the committee and working closely with students, I've learned a great deal about the barriers that veterans, students of color, LGBTQ+ students and those from lower socioeconomic backgrounds face when striving to feel included in STEM and academia as a whole. Since I primarily work with undergraduate students, one of my main goals while serving on this committee is to expand outreach and recruitment opportunities to create a more diverse student undergraduate population in bioengineering that more closely reflects the demographics of our state. I believe this diversity is important to achieve so that we can prepare engineers, scientists and physicians that reflect the populations that they serve. To this end, I have focused on developing outreach programs through the Creative Inquiry program and partnerships with the South Carolina Governor's School for Science and Mathematics and the Anderson Institute of Technology to increase access to Clemson bioengineering for K-12 students and teachers around South Carolina.



***Will Richardson***

I believe that people are made to collaborate and that our ultimate flourishing, joy and prosperity will parallel our degree of interdependence with each other. So, it's not surprising to me that nearly 90-percent of the ~150 biggest scientific breakthroughs in modern history arose from teams (not individuals). Sadly, our society's past and present have unjustly mistreated and marginalized many groups based on race, sex and other factors, resulting in systematically inequitable representation in our field and our department. I joined the Clemson BIOE Diversity and Inclusion Committee to help combat inequities and advance real collaboration. For me that has meant both listening more and speaking up more — listening more to individuals who have been marginalized and underrepresented to better educate myself on the issues, practices, policies affecting them most and speaking up more to individuals who look like me (i.e., white men) so that the work of restoring equity to our field is not unequally shouldered by those who have already been unjustly impacted by it.

One practical goal for me is to boost the number of faculty taking advantage of national funding streams available for assistantship support of postbaccalaureate researchers and graduate students and postdoctoral trainees from underrepresented groups and/or disadvantaged backgrounds. Excitingly, our team has recently received excellent scores on a major NIH grant proposal that focuses on exposing underrepresented BIOE undergraduates to research experiences with a goal of encouraging these scholars to pursue a Ph.D. or M.D./Ph.D. degrees and a subsequent research career integrating engineering and the physical sciences with medicine and biology.



**I believe this diversity is important to achieve so that we can prepare engineers, scientists, and physicians that reflect the populations that they serve.**

*Tyler Harvey*

**I believe that people are made to collaborate and that our ultimate flourishing joy, and prosperity will parallel our degree of interdependence with each other.**

*Will Richardson*

*Melinda Harman*

I joined the BIOE Diversity and Inclusion Committee in its inaugural year to help establish more inclusive policies in the department. I knew that making change would take time, and I believed that my experiences as an out LGBTQ faculty member in STEM would be helpful for gaining support from our faculty and staff and educating them about the ally role we were asking them to fill.

Incremental changes in policies at the departmental, college and University levels have not led to meaningful changes in basic diversity and inclusion metrics among our undergraduate or graduate student population. This conclusion is supported by student demographic data presented at our BIOE spring 2021 faculty retreat. I would like our diversity and inclusion activities to be more aligned with students' experiences. Their advocacy to their peers and potential recruits carries much more weight than policies alone and will help amplify the efforts of our committee.

There has been a groundswell of support for establishing more inclusive policies in the department, with fewer and fewer faculty members voting against proposed changes. Also, there is a growing proportion of faculty members who now recognize that providing an inclusive environment requires a broader approach than simply focusing on demographic metrics.

**There is a growing proportion of faculty members who now recognize that providing an inclusive environment requires a broader approach than simply focusing on demographic metrics.**

*Melinda Harman*

*Jordon Gilmore*

Diversity and inclusion are important to me personally because I have lived the experience of being in both the minority and the majority as a Black male in engineering. From the race/ethnicity perspective, I can identify with some of the barriers and challenges that are presented by lack of representation, inclusion and community. From the male perspective, I have witnessed the advantages of having diverse teams from a gender perspective and the disadvantages of not doing so. This committee is a natural fit for me and one that I am personally invested in.

I hope to contribute ideas to the group for the future success of the department across all components of diversity, equity and inclusion. We have a great team in BIOE, and diversity and interdisciplinarity are some of our greatest strengths. I hope to improve recruitment and retention of more underrepresented minority undergraduate and graduate students and to help foster an environment that makes us a national leader in this area. At the college and university level, I think the investment in the Call Me Doctor program has shown tremendous return. Already in BIOE we have had five underrepresented students supported by this program (I am one of those). These university level programs help faculty recruit high quality students while supporting the mission of Clemson's Diversity and Inclusion Division at the level of the department, college and university.

**Diversity and inclusion are important to me personally because I have lived the experience of being in both the minority and the majority as a Black male in engineering.**

*Jordon Gilmore*

# Melissa McCullough,

## *Bioengineering employee –*

### *October 18, 2021*

Inside Clemson

Bioengineering employee Melissa McCullough died on Monday, Oct. 18, 2021.

Clemson's Bioengineering department held a remembrance of Melissa McCullough on Dec. 1 from noon to 2 p.m. at the Watt Family Innovation Center. All were invited to help honor and remember McCullough's time at Clemson.

After McCullough's time in the military and later as an engineering contractor, she came to Clemson University as a lab manager and a Ph.D. student. For the past seven years, McCullough worked to prepare the next generation of engineers to be team leaders ready to engage in diverse, multiskilled team environments.

McCullough was awarded the 2017 Frank A. Burtner Award for Excellence in Advising for her work in mentoring and advising students, establishing Clemson Bionics (biology inspired engineering) and helping the Clemson LGBTQ+ community. In 2019, McCullough was among 60 U.S. service members and veterans named to the 11th class of Tillman Scholars.

McCullough's doctoral work focused on making healthcare more accessible for broad populations. Remembered for the enthusiasm and energy she brought to all her projects and for her teaching and training, McCullough worked tirelessly to train and educate up-and-coming engineers. She helped to set up and optimize the REDDI lab facilities to facilitate large COVID-19 testing loads.

The Employee Assistance Program (EAP) has many resources to support employees during this time. Counseling services, through the EAP provider Deer Oaks, are available 24/7 by calling 1-866-327-2400.

Students who need support should be referred to Counseling and Psychological Services (CAPS) at 864-656-2451.



# Martine LaBerge

## receives South Carolina Life Sciences Hall of Fame Award

Clemson News

Martine LaBerge of Clemson University is the newest recipient of the South Carolina Life Sciences Hall of Fame Award, the latest in a string of high honors recognizing her contributions to the bioengineering community in the state and beyond.

LaBerge, who joined Clemson in 1990, has served as chair of the Department of Bioengineering for 20 years. She is the Hall of Fame's third member, joining former South Carolina Secretary of State Bobby Hitt and Harris Pastides, who was University of South Carolina president from 2008-2019 and recently returned as interim president.

A crowd of family, friends and supporters joined LaBerge in Charleston on Wednesday to help her celebrate at SCBIO 2022—The Life Sciences Conference of South Carolina. "It is an honor to be mentioned alongside Secretary Hitt and President Pastides," LaBerge said. "While the award bears my name, it represents a group achievement. The life sciences industry has grown in this state and is continuing to expand. It takes a team to make that happen."

The life sciences industry has grown 1.7-percent annually since 2005 and has an annual impact exceeding \$25.7 billion, according to SCBIO. The state has more than 1,030 life sciences firms, and the industry accounts for more than 87,000 jobs, SCBIO reported. It has grown more than 42-percent in South Carolina since 2017.

James Chappell, executive director of SCBIO, said LaBerge's Hall of Fame Award is well earned.

"For more than 30 years, Dr. LaBerge has been building communities of innovators, entrepreneurs and leaders who have been crucial in advancing the life sciences industry in South Carolina," Chappell

said. "Under her stewardship, Clemson's bioengineering program is producing globally competitive graduates who are renowned for their professional and technical skills. The state is fortunate that she chose to establish her career here."

The Hall of Fame Award was initiated in 2018 to recognize individuals "for extraordinary and notable achievements over an extended period in developing, advancing and even transforming South Carolina's life sciences industry," according to SCBIO.

"Hall of Fame honorees must demonstrate business excellence and acumen, courageous thinking and action, vision and innovation, inspiring leadership, and community mindedness, while serving as an aspirational role model for those who follow."

LaBerge received her Ph.D. in biomedical engineering at the University of Montreal in Quebec and did postdoctoral work at the University of Waterloo in Ontario before joining Clemson as an assistant professor in 1990. She rose through the ranks, became interim department chair in 2002 and had the interim scrubbed from her title two years later.

LaBerge's colleagues credit her with advancing bioengineering technology and creating interdisciplinary partnerships of scholars, entrepreneurs and industry leaders to foster innovation. She has helped Clemson establish and strengthen strategic partnerships with the likes of Arthrex, Prisma Health and the Medical University of South Carolina.

As chair, LaBerge played a central role in establishing new bioengineering facilities, including the Clemson University Biomedical Engineering Innovation Campus (CUBEInC) in Greenville.

She also oversaw completion of a 29,000-square-foot annex that expanded the Rhodes Engineering Research Center on Clemson's main campus. Her support was instrumental in establishing two separate Centers of Biomedical Excellence at Clemson, both funded with multimillion-dollar grants from the National Institutes of Health.

LaBerge has held numerous leadership positions in professional organizations, including president of the Society of Biomaterials, member of the Biomedical Engineering Society Board of Directors and chair of the Council of Chairs of Bioengineering and Biomedical Engineering in the U.S. and Canada.

In the past four years, LaBerge's peers have honored her with multiple honors recognizing accomplishments throughout her career, including:

- InnoVision's Dr. Charles Townes Individual Lifetime Achievement Award
- Clemson University Commission on Women's Gender Equity Champion Award
- The Biomedical Engineering Society's Herbert Voigt Distinguished Service Award
- Southeastern Medical Device Association (SEMDA) Spotlight Award
- Fellow of the Biomedical Engineering Society

Anand Gramopadhye, dean of the College of Engineering, Computing and Applied Sciences, said LaBerge is an exemplary leader and highly deserving of her recognition.

"Dr. LaBerge leads by example with dedication, passion and enthusiasm," he said. "She works hard and inspires others to do the same, and her leadership has been key in making the Department of Bioengineering a distinguished hub of education and research that creates the innovators and leaders of the future. I offer her my wholehearted congratulations on all her success."



**While the award bears my name, it represents a group achievement. The life sciences industry has grown in this state and is continuing to expand. It takes a team to make that happen.**



# Emily Shook:

## *From Intern to Employee*



*Shook '19 is currently a manufacturing engineer at Arthrex. Ed.*

During my time at Clemson, I participated in undergraduate research in orthopedics, several creative inquiries, the study abroad program in Pamplona, Spain, and the Define program at MUSC, all through BIOE. Each experience was helpful in its own way. The professors in BIOE have done a great job giving students opportunities and resources to explore potential careers. Being presented with so many choices in college, I participated in multiple creative inquiries that

**It's incredibly rewarding seeing all your hard work come to life.**

**More concrete skills that have been valuable in manufacturing are statistics, materials processing and understanding of Process Failure Mode Effects Analysis and validations.**

allowed me to try out several different types of work to help narrow down my interests. I found my passion in devices and orthopedics, which led me to work under an orthopedic research lab. Studying abroad put me outside my comfort zone both through living in a different country as well as studying bioethics, which challenged me in ways that help me now in my role today. Through the Define Program, I learned firsthand through doctors and surgeons as I watched them operate and engaged in discussions about the devices they were using.

My senior year, I heard about a company that was planning to open a facility right down the road from Clemson. I quickly discovered it was Arthrex, an orthopedic medical device company. I started my career at Arthrex's Sandy Springs campus in the first class of summer interns. The best advice I can give when searching for a job is don't be afraid to put yourself out there! Making thoughtful connections with current employees is a great way to learn more about a company you're interested in. I really enjoyed the Define program and Senior Design and thought for sure I wanted to be in design, but once I started at Arthrex, I was exposed to an area I didn't really know about: manufacturing. Manufacturing and design work very closely together, and all the design work I learned at Clemson has been a great complement to my current job in manufacturing.

I began my internship with Arthrex right after graduation in May 2019. Being a part of a manufacturing plant startup has been such a unique experience. For the first couple of months, we worked out of a temporary office, preparing to move into the building and hit the ground running when we finally did. Having learned so much

and loving my summer interning, I decided to accept a full-time engineering position in September 2019. During my first year, I managed layout and installation activities for the Clean Room, developed strategies and validations for all sutures equipment, worked through engineering studies and managed insourcing of all suture products. If given the opportunity to work with a startup, I would say take it! You get to help with so many tasks and are exposed to many different areas of the company – it's incredibly rewarding seeing all your hard work come to life.

Much of my job includes working with multiple departments. Effective communication and flexibility are vital traits for success especially when building out a manufacturing facility from the ground up. Additionally, using problem solving skills with the right tools and processes to do so is important. More concrete skills that have been valuable in manufacturing are statistics, materials processing and understanding of Process Failure Mode Effects Analysis and validations. In my role now, I operate in multiple steps of the product creation lifecycle including manufacturing processes, workflows, machinery, testing and fixtures. I was recently promoted to Engineer II and am excited about my future at Arthrex. There are many potential paths for me whether I continue in sutures engineering or move into a leadership role. There are also options for lateral moves to Quality, Production or Validation.

I'm thankful for my years at Clemson and the foundation it gave me to be successful at Arthrex!



# Three Clemson University engineers take home InnoVision awards

College of Engineering, Computing and Applied Sciences

Two Clemson University bioengineers and an automotive engineer won awards from InnoVision, a nonprofit that is dedicated to the advancement of innovation and technology in South Carolina. It was the second consecutive year three faculty members from the College of Engineering, Computing and Applied Sciences took home awards, including the second consecutive win for the Clemson Composites Center. College faculty receiving InnoVision awards in 2021 included Martine LaBerge, Naren Vyavahare and Srikanth Pilla. They received their honors on Nov. 9 during a virtual ceremony.

The honorees and their awards were (listed in the order in which they were announced):  
Martine LaBerge, chair of the Department of Bioengineering; Dr. Charles Townes Individual Lifetime Achievement Award.

Elastrin, a company co-founded by Naren Vyavahare, the Hunter Endowed Chair of Bioengineering; Technology Development category.

Clemson Composites Center, founded and directed by Srikanth Pilla, the Jenkins Endowed Professor of Automotive Engineering.

Daniel Noneaker, the college's associate dean for research, said the awards underscored the strength of the research environment in the College. "These three awards help shine a light on the high level of talent we have in the College and reaffirms that we are a leader in innovation and entrepreneurship in South Carolina and beyond," he said. "I offer Dr. Vyavahare, Dr. Pilla and Dr. LaBerge my deepest congratulations on these well-deserved honors."

# BIOE Ambassadors

Janeen Putman, Undergraduate Student Services Manager

The Ambassador Team is a selection of the friendliest, most involved students in BIOE. These individuals lead and host tours for prospective students and their families by working with the College of Engineering, Computing, and Applied Sciences (CECAS). In addition to hosting tours, ambassadors attend various functions to promote BIOE, from CECAS recruiting events to educational programs. Many of these events target students in the Department of General Engineering, who are still deciding which engineering discipline they will major in. By becoming ambassadors, current students who are passionate about BIOE can give back and share that excitement and knowledge with other students.

Ambassadors have an abundance of bioengineering experience including research with Clemson faculty, participation in study abroad programs and experience in industry internships and co-ops. Additionally, our team members enjoy Greek life, club athletic teams and other academic and social organizations. When ambassador positions open, they are advertised, and candidates go through a rigorous selection process.

Typically, ambassadors serve for multiple semesters until graduation. Current ambassadors are listed on our departmental website. These Ambassadors are passionate about BIOE and are experts on the program. They love to share information about the department!

**These Ambassadors are passionate about BIOE and are experts on the program.**



# BIOE at the Society of Professional Hispanic Engineers National Convention in Orlando

This year, three students represented BIOE at the SHPE National Convention in Orlando. Andrea Vera Martinez, a graduate student in Jeremy Mercuri's lab, and undergraduates Nichole Alvarez and Jose Rentas described their experience. Jenny Bourne, Ed.

## What made you want to attend SHPE?

**Andrea Vera Martinez:** Not only is the SHPE National Convention a great opportunity for Hispanic engineers to network and converse with companies, it is also an awesome chance to talk about graduate education. As the graduate administrative assistant for the Office of Inclusive Excellence and Graduate Studies in CECAS, I was given the opportunity to attend SHPE as an exhibitor to answer questions and promote graduation education at Clemson. As a first-generation

student, I know how important it is to discuss the benefits of graduate education and that there are resources available to make it possible.

## Describe an experience that made a big impression on you.

**Nichole Alvarez:** Going to the SHPE National Convention was an amazing experience. It provided us with great networking opportunities and a chance to get to meet other students in the same position as we are. I got to talk to Johnson & Johnson, and what made the biggest impression on me was how willing and ready they were to help me meet my goal at the convention, which was getting an internship. I got to talk to a recruiter, and then he offered me an interview on the spot.



## Did SHPE change the way you do something, give you a different outlook or provide an experience you will share with your friends?

**Jose Rentas:** Going into the SHPE National Convention, I had both feelings of nervousness and excitement. I was hesitant about attending because I figured it would cater more to other fields of engineering. But as soon as I saw the list of companies attending, I knew I had to go, and it was one of the best decisions I've made. I was surprised to see eye-catching names like Johnson & Johnson and Abbott that were all looking to hire bioengineers within the Hispanic community of SHPE.

At the convention, I was able to speak with many representatives who were willing to answer all my questions about possible internships and job opportunities within their respective companies. Doing so made me realize just how important networking is. Simply putting your name out there can make all the difference. One of my favorite interactions was with a fellow Puerto Rican who was currently pursuing his Ph.D. in biomedical engineering! We bonded over our culture, and he explained to me his research involving the physical properties of the extracellular matrix in mediating microvascular remodeling. It was so inspiring to see someone who shared a similar background pursuing the same goals. Overall, the convention exceeded my expectations, and I'm looking forward to attending again in the years to come!

## Have SHPE and your Clemson experience helped you develop leadership skills?

**Andrea Vera Martinez:** As a graduate administrative assistant, I am offered opportunities like attending the SHPE and SWE conferences to network and form connections. These opportunities and many others, like hosting the college podcast, have led me to improve my leadership skills. I am now more confident about being active within the department and at least try any opportunity that comes my way.



**Jose Rentas:** As part of the chapter's eboard here at Clemson University, I've enhanced my leadership skills as the SHPE Jr. Chair, where I plan events in collaboration with junior chapters. I am currently planning one of our biggest events, "Noche de Ciencias," which will introduce many underrepresented elementary school students to STEM in the form of fun science projects. Experiences like these have allowed me to foster servant leadership within SHPE and the Clemson community.

**Nichole Alvarez:** As a student at Clemson, I am offered opportunities like attending the SHPE conference; this conference allowed me to network and connect with important companies and people. This as well as being a PEER mentor have allowed me to develop my leadership skills on a deeper level. I am thankful for these experiences, which have allowed me to become a more confident individual.



## SUMMER EXPERIENCES FOR COLLEGE AND HIGH SCHOOL STUDENTS

# Summer research camp for high school students

Since 2006, Alexey Vertegel has directed BIOE's Building a Better You program, a summer camp for high school students. Students enjoy hands-on research experiences such as stem cell culture, microbial colony counting, pig heart surgery, vascular implants activity and bioinstrumentation lab complemented by lectures, career development activities and telesurgeries performed by a surgeon using a Da Vinci robot at Prisma Health Greenville Memorial Hospital. The one-week camp is typically offered twice during the summer. According to Vertegel, "The camp is unique—the only summer biomedical engineering program for high school students in the entire country. We have students from various states and several international students every year. We enroll about 20 students per weekly camp."

---

**Our unique camp is the only summer biomedical engineering program for high school students in the entire country.**

*Alexey Vertegel*

# Pamplona Bioethics Summer Study Abroad

---

**The Pamplona program offers exceptional study abroad opportunity for future engineers, scientists, and health care professionals exploring bioethics.**

*John DesJardins*

According to John DesJardins, Hambricht Leadership Professor, "The Pamplona program offers exceptional study abroad opportunity for future engineers, scientists and health care professionals exploring bioethics." The five-week program at Pamplona Learning Spanish Institute offers two courses: 1) International Perspectives in Bioethics (3 hrs.), taught by international leaders in bioethics, includes tours of biomedical facilities; 2) Spanish Culture/International Studies (3 hrs.) offers immersive language and cultural lectures and numerous tours and day trips to local and regional sites. Students enroll for three credits in International Special Research Topics in Bioengineering (BIOE4610) and three credits in International Internship in Bioengineering (BIOE2100)."

# Summer Undergraduate Bioengineering Research in Japan

Faculty leader Jiro Nagatomi directs the program, which provides research experience for Clemson students in world-class bioengineering research labs at the University of Tokyo or Kansai University in Osaka under a formal agreement of academic exchange with these institutions. To maximize productivity and impact on the students' career goals, they conduct mentored research in labs that best match their interests and experience. Through mentoring by Nagatomi and the personnel of the host laboratory, students will learn to work with a team, understand how technological advances are made through research conducted by interdisciplinary teams of scientists, develop laboratory skills including recording data recording and keeping a lab notebook, build hypotheses and frame research questions, and communicate results in oral and written formats. Each student will be paired with a Japanese graduate research mentor/tutor, who will work side-by-side with the student in the lab and introduce the student to life outside the university. Nagatomi noted, "This mentored research experience provides students with 6 credits in BIOE 4600."

---

**This mentored research experience provides students with 6 credits in BIOE 4600.**

*Jiro Nagatomi*

# Jennifer Hogan,

## Coordinator of Professional Development

*Hogan is tireless in helping match students with their desired postgraduate positions. Ed.*

### ***What does your office do?***

The office is responsible for connecting students with industry, whether it is to find an internship, co-op or full-time job. We also provide students with options in career paths and ways they can put their training and experience to use after graduation. There are many jobs students do not realize they are suited for, like data analysis and business consulting.

### ***What do students do after graduation?***

Most students go into industry, graduate school or medical school. Graduate school is the choice of the largest percentage of our students with bachelor's degrees.

### ***Would you name some industry partners that recruit our students?***

BD, Medtronic, Epic, Deloitte, Poly-Med, KLS Martin, Charter Medical and Boston Scientific, to name a few.

### ***What Initiatives and or programs are in place to assist students with career exploration and postgraduate opportunities?***

One is the career website we created for our students; in addition to tips on resumes and cover letters, the site provides industry-based links, company directories, best practices and a password-protected page of job postings. However, our most valuable tool is our vast alumni network. Students may request contact information when applying for an opportunity or exploring a career path. Through our professional development series, Lunch & Learn, company representatives recruit for positions, present research and talk about their own career journeys. Students may network with presenters over a meal the department serves.



**I see students grow and be the innovators who contribute to the future of healthcare.**

Other programs are departmental postings on social media and our new departmental newsletter, BIOE Bulletin. These keep students informed of career and networking events!

### ***What is the best part of your job?***

The most rewarding part of my job is seeing the students succeed in obtaining a position in industry or gaining acceptance into

postgraduate opportunities. I see students grow and be the innovators who contribute to the future of healthcare.

## NIH Phase II SBIR award of \$1.85M to company cofounded by Naren Vyavahare

Vyavahare, CTO of Annoviant, said the Phase II seed funding will be used to develop a pediatric pulmonary valve conduit for congenital heart disease. Professor and Hunter Endowed Chair, Vyavahare directs the NIH COBRE SC BioCRAFT, which is now in Phase 3 funding.



## Alumni Perspective

As a hiring manager in the Orthopedics industry, I have found the Clemson Bioengineering candidates are more prepared to hit the ground running compared to some candidates from other programs. Both from my personal experience and communication with other peers in the field, Clemson BIOE candidates are a great value for our industry.

Jennifer Woodell-May, Ph.D.

Zimmer Biomet

Regenerative Medicine/Tissue Engineering/Cell Therapy

# 2022 Bioengineering Awardees at the Departmental and College Levels!

## Undergraduate Award Winners

**S. W. Shalaby Outstanding Bioengineering Sophomore Award** — Vaishnavi Kanduri

**Larry S. Bowman Outstanding Bioengineering Junior Award** — Aniela Nozka

**Poly-Med Outstanding Bioengineering Senior Award** — Ashley Babinchak

**Barry W. Sauer Outstanding Bioengineering Undergraduate Researcher Award** — Carleigh Coffin

**Jonathan Black Undergraduate Leadership in Bioengineering Award** — Trina Pham and Izabella Kamieniecki

**C. William Hall Undergraduate Departmental Honors Award** — Alex Tedeschi

**R. Larry Dooley Entrepreneurship Award** — Claudia Sisk and Kathleen Fallon

**Eugene M. Langan III Service Award** — Noah Ashley and Sophia Hennessy

**Gilman Scholarship** — Sebastian Saenz

**Melissa McCullough Diversity Undergraduate Champion Award** — Skylar G. Landreneau

## Graduate Award Winners

**Austin T. Moore Leadership Award** — Toni Warnick

**Outstanding Graduate Bioengineering Teaching Assistant Award** — Adam Baker and Marketa Marcanikova

**Page Morton Hunter Bioengineering Graduate Researcher Award** — Kelsey Watts

**R. Larry Dooley Entrepreneurship Award** — Alexandra Smith

**Eugene M. Langan III Service Award** — Kharimat Lora Alatise

**Melissa McCullough Diversity Graduate Champion Award** — Manuel Gutierrez

## College of Engineering, Computing and Applied Sciences Award Winner

**J. Wesley Davis Leadership Award** — Ashley Babinchak

# Professor Jonathan Black Endowed Scholarship

Announcing the “Professor Jonathan Black Leadership Endowed Scholarship Endowment” in legacy of Professor Black’s passion for education and leadership. Thank you to his wife, Toni L. Black, and children Matthew, Christina and David.



Clemson University  
Department of Bioengineering  
301 Rhodes Research Center  
Clemson, SC 29634



## *M.S. in Medical Device Reprocessing*

Offered as an online degree by  
**the Department of Bioengineering**  
in collaboration with  
**the Department of Industrial Engineering**



### *Overview:*

The Master of Science in medical device reprocessing, designed by industry experts, educates students from across the STEM disciplines to optimize and validate biomedical technologies supporting safe reuse of medical devices and healthcare products.

- The first advanced engineering degree program in medical device reprocessing in the U.S.
- “**GreenMD**” signifies the medical device industry’s aim to achieve sustainability in production and use of healthcare products.

Reprocessing is a regulated practice that involves cleaning, disinfection and sterilization of both reusable and approved single-use medical devices. Specialists must know advanced technologies and specialized process control systems for handling contaminated medical devices and rendering the reprocessed devices safe for reuse.

### *Program Goals:*

Enhance the readiness of globally engaged students to be innovative industry leaders in sustainable biomedical technology through training in modern reprocessing and sterilization technologies, quality science and human factors in healthcare

### *Program Outcome:*

- Earn a graduate M.S. non-thesis degree online
- Complete experiential learning through an industry internship (BIOE 8900) or mentored medical device reprocessing research (BIOE 8510)

