MEM PRODUCING FEMALE LEADERS AT A SUPER RATE

The Master of Engineering Management Program has a student population that is 61 percent women, five times the national average.

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Welcome back, everyone. After a full year and a half of teaching, working and studying (remotely for many), the university community has fully returned to campus for the fall semester. It is terrific to see Fitts-Woolard Hall full of people and buzzing with energy. I want to thank everyone for following the COVID-19 procedures and working together to keep each other safe.

While I am thanking everyone, I would also like to thank those who participated in this year’s Day of Giving. As you may know, your generosity led to NC State raising $58 million from more than 14,000 gifts, setting a national record for dollars raised during a university giving day. ISE engaged in a friendly competition with fellow engineering departments, trying to receive the most gifts and win a more significant share of the $15,000 in prize money from Dean Louis Martin-Vega. With 221 gifts (totaling $70,460 with an estimated $3,124.50 in Dean’s Prize Money), we finished a close second to Civil Engineering (234 gifts).

We also competed against Civil and Mechanical Engineering to see which would receive 150 gifts first. While Civil Engineering reached its 150 gifts first, all three departments made their challenge, receiving extra funds from our departmental advisory boards. Again, thank you for your generosity and support.

The pandemic has undoubtedly created challenges for faculty, staff, students and alumni alike. So it is the ISE Department’s turn to give back. Over the summer, we introduced our new Alumni Resources Program. You, our alumni, can find many free sources to help you advance your career or network with fellow alumni, faculty and students. This program includes our 1100+ member private ISE Alumni LinkedIn Group, NC State online library access, ISE job board, and more. We anticipate adding more to it over the coming months. Discover more about the program on page 9.

I will wrap this up with a final thank you. I believe I speak for everyone in the community when I say “Thank you” to Gayle Lanier for her leadership and guidance as ISE’s advisory board chair this past academic year. I want to welcome our newest advisory board chair, Stuart Nisbet. But, I will let him tell you a little about himself in his article, Advisory Board Chair Notes, on page 29. And finally, I also want to send well wishes to everyone in the ISE community as we continue to face the challenges that the pandemic brings.

Julie Swann
What is the single most important experience or understanding you gained in the ISE department? Leveraging your team’s strengths to execute goals. I learned this from one of my very first ISE classes with our group projects and it’s a lesson I hold true today not just in the teams I lead, but also with my peers in projects we are driving to completion. I understand my strengths and what I bring to the table and leverage those of my team members to achieve common goals.

What is the most pressing issue facing human society that engineers should be working harder to solve? The digital divide still exists. It is not just in lower income areas, but also with older generations. With so many solutions and services migrating to digital platforms, it is forcing a less technical savvy population to a divide that did not exist. I would like to see more emphasis put on addressing this digital divide with learning for those that are not as comfortable with electronics, the internet, etc. along with support and funding for those that desire access but are unable to obtain digital or electronic platforms (phones, computers, etc.).

What would you like to accomplish in your career? What are you most proud of so far? I would like to continue to support the increase of diversity within engineering. I am a firm believer in diversity of thought and the more diverse the background of the team, the more creative you can be at problem solving. I am proud to be in a position that not only supports this initiative, but also in a position that allows me to speak on the great careers in engineering to encourage more underrepresented groups to engage in STEM fields.

If you were not in the engineering field, what would you likely be doing? I would probably be in human resources or teaching. I enjoy developing and coaching people. I also enjoy teaching people new skills and encouraging and stretching people to their full potential. In both HR and teaching, it would afford me the opportunity to do this.

What advice do you have for current ISE students? It’s important to get industry experience coupled with your classroom learning. The experience is invaluable and allows you to link coursework and real-life application. It also is important in those internships and coops, that you establish and maintain connections and start building your professional network. Professional organizations like National Society of Black Engineers (NSBE) and Institute of Industrial and Systems Engineering (IISE) are great assets to provide opportunities for relevant job experience as well as your network.
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All good educators share common qualities like intellect, innovation and passion. But perhaps the quality that separates the great from the good is the ability to care. Style and method can change, but without caring, students will never reach their fullest potential. Paul Cohen, Edgar S. Woolard Distinguished Professor, has made caring the focal point of his forty-year career in higher education. That commitment has earned him the Albert G. Holzman Distinguished Educator Award.

Cohen's contributions to education and constant focus on providing the best possible educational experience are the hallmark of his career. “The most important thing is to care about students as a person,” he reflected. “Once you recognize this, the way you prepare, teach and treat students fall into place.” For Cohen, it is rewarding to see students grasp critical concepts and grow, knowing that the professor provided the background to be successful.

Providing the best possible experience requires a commitment to change. “I think it is important to continue to innovate, adapt, and change the content one is teaching over time as the needs of the students change,” said Julie Swann, ISE department head. Cohen has continually introduced new and contemporary topics into his classes, developed new courses and added multiple interdisciplinary components. He believes that it is essential to prepare for lifelong learning and to grow professionally.

“There is much to be learned outside the classroom while in school, and this learning certainly continues past graduation,” Cohen stated.

Cohen served as the ISE department head from 2007 until 2017, where he spearheaded the focus on providing students with an excellent educational experience. “Even after stepping down from that role, he has continued to be involved in education, research, and outreach,” reflected Swann. Cohen pioneered the modernization of a traditional Industrial Engineering area by bringing IT tools into “planning and control” instruction and developed new tools and methods for manufacturing applications in engineering. “His
enthusiasm for engineering has been contagious for everyone he contacts,” explained professor emeritus Richard Wysk.

Cohen embodies what an engineering professor should be. “When I look at the list of past winners, many are good friends who I respect greatly, and I am humbled,” Cohen said. “To be honored for something you love doing, contributing to the education of students, our next generation of professionals is a wonderful recognition and a tribute to my many mentors who shaped my career and its values.” Winning this prestigious award enhances the department’s reputation for high-quality education in the eyes of industrial engineers worldwide. “We are so proud that Dr. Cohen has been selected for this distinguished educator award, which shows the national and international reputation that he has as an educator of both undergraduate and graduate students,” Swann remarked.

Recently, Cohen also received the Institute of Industrial and Systems Engineering Manufacturing & Design Division’s Outstanding Service Award, recognizing his leadership and contributions to the manufacturing public and community, further showing his dedication and care to the industrial engineering field.

Albert G. Holzman Distinguished Educator Award

The Albert G. Holzman Distinguished Educator Award is one of IISE’s most prestigious awards recognizing educators who contributed significantly to the profession through teaching, research and publication, extension, innovation, and administration. “His contributions to industrial engineering span all of the areas required to be a most distinguished educator,” explained Wysk. His door is always open for students and colleagues, whether they have questions or need to discuss ideas. “He has extended himself for students in all of his classes and has even helped students with other classes that he is not teaching,” Wysk recalled.

OUTSTANDING TEACHER WINS OUTSTANDING AWARD

While it may seem backward to some, ISE professor Binil Starly enjoys teaching because he enjoys learning. The ability to teach a variety of courses allows him to Better understand new and emerging technology areas. Starly’s passion for learning, teaching, and enhancing education has earned him an NC State Outstanding Teaching Award, a prestigious award recognizing excellence in teaching at all levels.

Passion, Starly believes, is the core of what makes a teacher good. “Show passion for the subject. Students perceive the passion with which a teacher teaches a particular subject and the thoughtfulness placed into the lecture content, exercises, and feedback provided,” he said. ISE emeritus professor Richard Wysk, whose book on computer-aided manufacturing Starly read as an undergraduate, shares the innovative methods Starly uses to involve students in class activities – particularly when content can be dry and boring. “Use of class discussion, Think-pair-share activity, use of sketches, even a cookie tasting exercise highlight ways in which students can better engage with course material,” he recalled. “His use of 10-minute videos to complement his in-class lecture was available even before the pandemic. It is a practice adopted by many other ISE faculty.”

Showing passion for the subject enables students to enjoy the learning process and ensures that the material is constantly improved. “I see my classes that I teach as a product that I deliver,” Starly explained. Like with any good product, he goes through iterations and processes to continuously refine courses year after year. “He is truly a Renaissance Man that looks to the future for the next wave of exciting opportunities to produce products,” said Wysk.

Earning an Outstanding Teaching Award is no small accomplishment. In fact, it has been 20 years since the University has honored an ISE faculty member with this award. “I always knew that winning the University Teaching award was hard,” Starly recalled. “It feels great to represent our department among the outstanding teaching faculty ranks.”

“A strong indicator of Dr. Starly’s teaching effectiveness is that he was voted by the ISE students as the Anderson Outstanding Faculty as soon as he became eligible for the award,” Wysk recalled.

Starly wants to thank his parents and his wife for their continuous support, without which he could not have made a positive impact on his students. “I also want to thank the ISE department and the College of Engineering for continuously supporting my teaching effort,” he said. Taking every opportunity to continue teaching, he hopes that winning this award serves as an inspiration for ISE’s junior faculty to excel in engineering education delivery.

Warwick Arden, Executive Vice Chancellor and Provost extends his warmest congratulations for Starly’s excellence as a teacher and mentor. “Your commitment to the success of your students is an embodiment of NC State’s mission and vision,” he praised. For his efforts, Starly will become a member of the Academy of Outstanding Teachers for the duration of his faculty appointment at NC State.
With two national championships under her belt in 2021, junior swimmer Kylee Alons was named a Second Team CoSIDA Academic All-America selection on their At-Large Team. Along with her many athletic accomplishments, Alons has completed her junior year with a 3.80 GPA in her industrial engineering major.

Since she arrived from Fort Collins, CO, Alons has been an All-ACC and CSCAA Scholar All-American team member three times. This past academic year, she won a pair of NCAA titles in the 200-yard and 400-yard medley relays, with her butterfly leg in the 400-yard race helping to set a new NCAA and US Open record. She was a 2021 All-American in seven events at the NCAA Championships, including all three of her individual events. She also reached the finals of all three of her races at the 2021 ACC Championships. Alons was the ACC champion in the 50-yard freestyle this past season, and she did not lose a single individual race during 2020-21 dual action.

Joining Alons on the CoSIDA Academic All-America Team are fellow swimmer Sophie Hansson (3.83 GPA, Business Management) and fellow swimmer and engineer Eric Knowles (4.0 GPA, Materials Science Engineering).
Some people are planners. Others go with the flow. Some play it safe. Others are risk-takers. When it comes to ISE professor Xiaolei Fang, he prefers the best of all worlds — he always has a plan but isn’t afraid to seize opportunities.

Fang planned to earn his undergraduate degree — Bachelor’s of Science in Mechanical Engineering at the University of Science and Technology Beijing (USTB) — and then join the workforce. But as he was finishing his degree, he seized one of those opportunities. “I was recommended for admission to be a postgraduate without exams when I was a senior,” Fang recalled. “I accepted the recommendation since it was exam-free, and I could expect a better job with a higher salary after completing graduate studies.”

So Fang continued studying at USTB, working with the top two steel production companies in China, monitoring the conditions of machines and diagnosing problems. “We had a great team that could build the whole condition monitoring system from head to toe,” Fang stated. While there, he contributed to the design and development of different modules of the condition system. This work included hardware design, software development, database and algorithm design and user interface improvement. Fang found a new, intense interest in creating data analytics methodologies within all of this work — an attraction so strong that he once again switched plans and pursued a new degree... at a new university... in a new country. He decided to enroll at Georgia Tech to complete a Master’s in Statistics and a Ph.D. in Industrial and Systems Engineering.

Along with the decision to change degrees, he also seized the opportunity to change his career path. “I decided to work in academia before I made the decision to pursue a Ph.D. degree,” remembered Fang.

“I found it was very interesting to use the knowledge I learned from class to develop new methods to solve challenging problems in real-world applications, especially when no solution is available for these problems or existing models do not work well.”

By choosing academia over industry, Fang could have the freedom to work on whatever interested him. However, the freedom that comes with academia is useless without the resources to back it up. To research what truly interested him, Fang would need a major university. That is when he discovered NC State. “The ISE department at NC State is one of the top in the nation,” Fang explained. “The department has a large number of excellent researchers and a wide range of focus areas, which provide plenty of collaboration opportunities. Also, Raleigh is one of the most livable cities with very attractive weather.”

With the support of the ISE Department, Fang’s research lies in the intersection of engineering, statistics, machine learning, artificial intelligence and optimization. It will help the manufacturing industry to reduce equipment failures and maintenance costs while improving product quality and equipment availability. His research, much like Fang himself, is ready to seize new opportunities with its potential applications across many industries, including manufacturing, healthcare, power and aviation.
Javad Taheri first joined the NC State ISE Department as a Ph.D. student. As he neared graduation, he had the opportunity to teach a course over the summer. “That summer, I realized how much I enjoyed teaching, and teaching became my life-long desired profession,” he recalled.

After graduating, Taheri took this revelation and ran with it, joining the department as a visiting assistant professor. After his time as a visiting scholar, he began working with Northern Telecom corporation (now Nortel). There, he served as a project manager but still maintained an adjunct professorship with the department. “During my career at Nortel, I had hired several of NCSU’s Master and Ph.D. students,” Taheri said. He also collaborated with the Integrated Manufacturing Systems Engineering Institute Program helping students in their co-op positions. He finished his career at Nortel as the director of Operations Research with early retirement.

Now that he was enjoying his retirement, Taheri attended one of professor Stephen Roberts’ classes. “He provided me with an opportunity to contribute to the course material and teach a few of the classes,” he said. Soon after, Taheri began teaching Introduction to Simulation and Computer-Based Modeling for Engineers. “Thanks to professor Roberts’ ingenuity, I obtained a 5/8 IPA grant from Durham VA Medical Center in 2009, and I became a full-time faculty member,” Taheri explained. He later joined professor Julie Ivy and contributed to her CDC Preparedness Project. “My greatest accomplishment has been translating the principles of industrial and systems engineering into practical solutions at Nortel, mostly in a very high tech manufacturing environment, and at the Durham VA Healthcare System.”

Taheri was an innovator in both the industrial engineering industry and in the classroom. “I would like to be remembered as someone who had a genuine interest in and cared deeply for his students,” he stated. He would like to thank the late professor John Canada, his first manager, his two committee co-chairs, professor Henry Nuttle and the late Raul Alvarez, his second career mentors, professors Ivy and Roberts and Kenneth Goldberg, at the Durham VA Medical Center.

During retirement, Taheri hopes to volunteer in the community, travel and read poetry. Of course, he hopes to continue his life-long passion for teaching by instructing one — maybe two — classes in the future.
Before joining NC State’s Materials Science and Engineering Department in 1992, Dan Leonard was a machinist with Edward Valves (now Flowserve). In September of 2008, Leonard moved from material science to the Industrial and Systems Engineering Department as the supervisor of ISE’s Manufacturing Processes Laboratory. This move allowed him to get back to his passion for machining.

As the caretaker of the Processes Lab, Leonard will be remembered for his guidance of countless students in safely completing their machining projects. From lab experiments, course projects, summer camps and open houses, he was the “go-to guy” when there was something to be done that involved the use of equipment and processes under the ISE roof. “Dan is the first face you think of when you think about the manufacturing department,” said ISE senior Nikki Gorrell. “He has given so many of us students invaluable skills by volunteering his time around complex machinery. I know that I will be forever grateful for his expertise.”

Leonard was not only known for his unwavering belief in safety but for having respect for all things as well. “Working with Dan was great - he was an instructor, mentor, colleague and friend to me,” recalled ISE alumnus and former Processes Lab Technician Tood Goldfarb. “He taught me the value of being safe, doing things the right way and treating our environment, tools and each other with respect. Thank you Dan!”

Long-time lab manager, Jason Low, recalls Leonard’s many learning moments both with students and himself. “Dan will always be remembered for keeping all of our lab equipment running smoothly and occupants safe, providing some of the best hands-on laboratory experiences one could ever imagine in an engineering program,” remembered Low. “But I will always have fond memories of getting to know Dan as a person and how much he cared for his environment and fellow man. May we all learn by his example.”

As Leonard moves into retirement and trades in his infamous closed-toe shoes for a more comfortable pair of sandals, he said he doesn’t have any plans. Still, we suspect that one will be able to find him with his wife, Paige, and an accompaniment of friends at the TraLi Pub in Morrisville, playing traditional Irish dance tunes on his iridescent blue Reso-Dude guitar.

One word that could be used to describe Steve Jackson and his career is multidisciplinary. Maybe not a term that is often used to describe someone, but it fits in this case. Jackson received all three of his degrees from NC State, and each in a different engineering discipline.

After graduating with a bachelor’s in civil engineering, Jackson spent several years as a designer at an aircraft ground support equipment manufacturing company, eventually rising to the department head position. While there, he implemented product-focused organization and encouraged closer cooperation between the design, production planning, and manufacturing teams. Jackson was later president of a computer-aided manufacturing software firm, leading its product development and administering its general company management.

But it was his passion for manufacturing systems that prompted his return to NC State, where he would earn his second engineering degree in integrated manufacturing systems. After that, he remained at the university as the director of graduate programs in the Integrated Manufacturing Systems Engineering Institute (IMSEI). It was the perfect fit since IMSEI is a multidisciplinary program that uses faculty, course offerings and laboratory facilities within the engineering, computer science, business, textiles and other departments. In 2001, Jackson earned his Ph.D. in his third engineering field, mechanical engineering.
ISE “SEEN”

It’s an exciting time to be part of ISE, and these photos prove it. Have you been seen?

US Secretary of Transportation Pete Buttigieg and Second Gentleman Doug Emhoff learn about the advanced manufacturing and 3D printing capabilities of the CAMAL lab.

NC State alumni who didn’t have the opportunity to attend an in-person graduation came together for a reception on the oval.

ISE alumnus Will Heath returns to the Pack as he joins The Ergonomics Center.

ISE alumnus Anton Ørskov Ipsen is back at the 2021 Olympic Games. Check out the wolf he threw after his event in 2016!

ISE and CCEE students enjoy ice cream and take a break at a joint ice cream social.

ISE alumnus Will Heath returns to the Pack as he joins The Ergonomics Center.

ISE alumnus Anton Ørskov Ipsen is back at the 2021 Olympic Games. Check out the wolf he threw after his event in 2016!

ISE and CCEE students enjoy ice cream and take a break at a joint ice cream social.
Ph.D. graduate Li Li having some fun with a “research partner” during his hooding ceremony at Fitts-Woolard Hall.

ISE’s Maria Mayorga talks with CBS 17 about the effectiveness of masks and COVID testing in schools.

US Secretary of Transportation Pete Buttigieg and Second Gentleman Doug Emhoff tour the ISE and CCEE Departments before heading over to textiles.

ISE graduate student Aman Kumar standing in front of “The Bean” in downtown Chicago.

@NCStateISE on Twitter
Do all engineers start loving STEM at a young age? From disassembling and reassembling models to excelling in math in science classes, it seems like all engineers begin here. However, Ph.D. student Karl Schuchard challenges this stereotype. For him, it all started with a love of nature.

“My parents encouraged my personal scientific exploration when I was growing up, and we did a lot of at-home experiments,” Schuchard recalled. Being free to explore nature served to fuel his curiosity, so in college, Schuchard participated in various nature research projects while studying political science and mathematics. One project was a two-year National Science Foundation research program in biology and mathematics. This collaboration gave Schuchard experience performing hands-on research with biologists. In return, he taught his fellow researchers how to mathematically model results. “Through this work, I learned the value of humbly stepping outside of my research domain to work on a cross-functional team,” he explained. “I knew that this was the type of research that I wanted to continue doing in graduate school.”

With support from his advisors in biology and mathematics, finding a path to follow in graduate school was easy. Industrial Engineering was a perfect fit because of its cross-functional and widely applicable field. “ISEs are systematic problem solvers, and I think we catch on fast and can apply ourselves in new ways constantly, all the while working with a huge cross-section of the population,” Schuchard stated. It complements what he learned during his undergraduate research flawlessly.

Just like discovering how ISE was the perfect degree, finding the ISE department at NC State was also a Goldilocks situation. “I was unsure of what area I wanted to pursue research in but knew that I wanted a larger ISE department that was solid in a wide breadth of disciplines so I could explore a bit,” Schuchard admitted. Some departments were too small, and others were too specialized. “But, when I came to NC State, it honestly felt like home,” he said. NC State held many research concentrations, experienced and relatable professors and offered an active larger community. Schuchard could continue making contributions to science, technology, and society while enjoying the natural splendor of North Carolina’s beaches, mountains, music, food, lakes, rivers and parks.

Never one to slow down, Schuchard stays active while finishing his Ph.D. “I’ve played golf since I was 5 and of course, being in North Carolina: every day is a challenge to keep my GPS pointed away from the range or squeezing in nine (or 18, don’t tell my advisor),” he exclaimed. Schuchard even finds ways to merge nature and engineering. “I really enjoy rock climbing in the Piedmont with my friends and girlfriend,” he said. Many routes are protected and require removable anchors into existing cracks or weaknesses in the rock. “It’s really a high-dimensional engineering problem that you get to physically experience, which is both physically and mentally challenging,” he explained.

Upon graduation, Schuchard will consider biomedical and pharmaceutical manufacturing, research and development, and quality science opportunities. “The Research Triangle Park is a great place to be for pursuing these positions, so I will be here for now.”
As alumni, faculty and staff members, and friends of ISE came together in support of their department, they helped drive NC State to a record-setting day. Overall, the University raised $58 million from more than 14,000 gifts, setting a national record for dollars raised during a college or university giving day, according to the consulting firm State of Wow. The previous record for the highest total funds raised during a single day was held by Purdue University when $42 million was raised in 2020.

Throughout the day, ISE engaged in a friendly competition, trying to receive the most gifts to win a greater share of $15,000 in prize money from Dean Louis Martin-Vega. The Department of Civil, Construction, and Environmental Engineering (CCEE) won, with 234 gifts, closely followed by ISE with 221 (totaling $70,460 with an estimated $3,124.50 in Dean’s Prize Money) and the Department of Mechanical and Aerospace Engineering (MAE) with 193.

ISE also competed against CCEE and MAE to see which would receive 150 gifts first. While CCEE reached its 150 gifts matching challenge first, all three departments made their challenge, receiving extra funds from their departmental advisory boards.

Day of Giving is a 24-hour fundraising campaign to raise money to support the University’s world-class research, develop new opportunities and improve existing programs for students. Now in its third year, NC State has seen a rise in giving every year since 2019. Remarkably, the 2021 record-setting total comes just six months after the 2020 Day of Giving, which was postponed to September due to the COVID-19 pandemic.

Competing against other colleges and units at NC State, the College won two of the hourly challenges — most gifts made from 12 – 1 a.m. and the “Show Us Your Wolfies” photo challenge — earning an extra $3,500. Despite spending a good portion of the day at the top of the leaderboard for total funds raised, the College was runner-up for both total funds and number of gifts.

ISE is grateful to everyone who participated in this year’s Day of Giving. The incredible support will have an impact for future industrial and systems engineers for generations to come.
Swann Named IISE Council Chair

Department head Julie Swann will be the 2022 Chair of the Institute of Industrial and Systems Engineers (IISE) Council of Industrial Engineering Academic Department Heads (CIEADH). Her election shows the dedication and commitment Swann has led to improving the industrial engineering field.

Beginning at the May 2021 IISE meeting, Swann will be the CIEADH Chair-elect for one year, where she will serve under this year’s CIEADH Chair, Sunderesh S. Heragu from Oklahoma State. After serving as the chair in 2022, Swann will be recognized as the Immediate past chair during her third year, starting in 2023.

What is CIEADH?

CIEADH is composed of the leaders of industrial engineering programs nationwide. As a part of the Institute of Industrial and Systems Engineers, CIEADH works to encourage interest in the industrial engineering field. They also discuss ways to improve industrial engineering education, curriculum, accreditation, student activities, research and faculty development.

FREE ALUMNI RESOURCES

The ISE Department has launched our Alumni Resources Program to provide you, our alumni, with FREE resources that will benefit you throughout your career.

These resources include:

- Private ISE Alumni LinkedIn Group (1150+ members)
- NC State Online Library Access
- ISE / OR Job Board
- Online Certifications and Professional Learning
- NC State Alumni Directory
- Alumni-Student Mentoring Program
- Ask the Pack Alumni to Alumni Program

Whether you are looking to gain a competitive edge in your career or interested in networking with ISE alumni, faculty and students, the Alumni Resources Program can help.

go.ncsu.edu/alumni-resources
Maria-Hunter Macie is a senior double majoring in industrial engineering and business administration. She performs undergraduate research under the mentorship of professor CS Nam. Together they study Brain to Brain Interfacing an emerging technology that allows information exchange directly between brains.

Mackie Joins ISE

Mackie enrolled in the ISE department and joined a research experience (REU) with Ph.D. student Zach Traylor under the supervision of professor Chang S. Nam. Nam leads the research at NC State's Brain-Computer Interface Lab, focusing on human-systems engineering.

Together, they studied Brain to Brain Interfacing (B2BI), an emerging technology that allows information exchange directly between brains using neuroimaging and neurostimulation methods. At that point, B2BI researchers lacked a uniform classification for B2BI systems. So the team set out to fix that. “From the research, we noticed a lack of classifications for experimental communication loops,” Mackie explained. “An interesting outcome of my semester was working with Mr. Traylor and Dr. Nam to create terminology to distinguish experiments where the feedback loop for communication used B2BI or other methods (such as a computer screen).” To speed up all future B2BI research, the team developed a system that put all B2BI systems into one of four classifications.

At the same time, Mackie applied what she had learned at the NC Undergraduate Research (NCUR) Conference and a featured article in ISE magazine. “I left the REU with new insight into how ISE could be applied to the world, a deeper understanding of graduate school and research paper writing,” said Mackie. “It was a really positive experience for me, and I would recommend it to anyone considering undergraduate research.”

When Mackie isn’t busy researching cutting-edge technology, she’s volunteering at a local nonprofit. “Pre-Covid-19 I spent those hours helping people learn how to use 3D printers, laser cutters, micro bits, and shop tools as well as mentoring a 14-person middle school FIRST FTC team - FTC 13883 the Razzle Dazzle of Fantazmagazzles,” Mackie explained. “With Covid-19 I have continued to work with Razzle Dazzle and have done a small amount of laser cutting support as well. I like to read and play lots of puzzle games.”

After graduation, Mackie hopes to get a job in supply chain that has a direct impact on the consumer. If her adaptable and diligent nature has shown anything, she should have no problem finding that perfect job too.
PHILANTHROPY AND SPONSORSHIP

Outside support through philanthropy and sponsorship allows us to enhance our programs. The ISE Enhancement Fund addresses one of the department’s greatest needs, discretionary support. These funds allow the department head to quickly respond to these opportunities and challenges.

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PROJECT OPPORTUNITIES

ISE’s senior design course is a chance to work with students who can analyze your proposal and provide valuable solutions.

Kanton Reynolds
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919.515.0605

CLASSROOM PRESENTATIONS AND LEARNING OPPORTUNITIES

You can interact with ISE students through class presentations, panels and lectures. This allows you to engage students in real-world problems and solutions.

Julie Swann
jswann@ncsu.edu
919.515.6423

SUMMER CAMP OPPORTUNITIES

You can interact with future ISE students through class presentations and hand-on exercises. This is a great way to expose students to what it’s like to be an industrial engineer.

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Julie Swann
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TOURS OF INDUSTRIAL FACILITIES

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The ISE Department works with a wide network of industry partners and our alumni. Above are nine ways in which ISE and the professional community are working together for mutual benefit.

Got your own idea? We are always eager to explore new and creative ways to team up with our alumni and industry friends.

Ready to go?

Register at go.ncsu.edu/PartnerWithISE
NC State’s Master of Engineering Management Program boasts a staggering 61 percent female population compared to the 12.1 percent women in engineering management nationally. Let’s meet two of its stars.

By Kierney Leonard
The number of women pursuing STEM-based and leadership careers has continued to trend upward over the last several decades. According to the Census Bureau, the ratio of women in STEM careers jumped from eight to 27 percent between 1970 and 2019. Taking this trend to the next level, NC State’s Master of Engineering Management (MEM) Program boasts a staggering 61 percent female population compared to the 12.1 percent women in engineering management nationally. Let’s meet two of NC State’s female leaders from MEM, Melissa Pressley and Delshad Zaker.
Young professional Melissa Pressley became one of the first two alumni of the MEM program, graduating over the summer. She originally graduated from NC State’s Industrial and Systems Engineering Program (ISE) in 2016, earning her Health Systems Engineering Certificate. This program inspired her to work in healthcare. Having built a solid foundation of technical skills through ISE, Pressley planned to grow her leadership skills and explore healthcare through graduate school.

With a long list of MEM concentrations to choose from, Pressley chose Health and Human Systems, which married her background in industrial engineering to her passion for healthcare. “I want to be able to do something where, at the end of a career or at the end of every day, there is something that I have been working on that is going to improve the lives of other people,” stated Pressley, who now works as a management engineer for Duke University Health Systems. She works on process improvements in healthcare delivery, which tackles patient issues, such as wait times for surgery. Pressley is now doing what she loves, but she had to work hard to make it in a historically male-dominated career.

Studying and working in STEM and business fields, she admitted there had been times when she was the only woman in the room. By seizing development opportunities and building relationships with female peers and teachers in the MEM program, Pressley built the confidence to say, “Yes, I’m the only one here, but that doesn’t mean my voice matters any less or that my opinion is any less valid.” She furthered, “I have earned my seat at this table, now it’s time for me to take advantage of it.”
Coming from Tehran, Iran, where she began her journey earning an undergraduate degree in Industrial Engineering, Delshad Zaker now calls NC State home. In 2017, Zaker worked for an engineering consultant company called Middle East Water and Environment as an industrial engineer before continuing her education. With her background in engineering and a passion for leading, Zaker felt that the MEM program at NC State best fit her career aspirations.

The diverse courses, accelerated timeline, networking and leadership development opportunities attracted her to study engineering management at NC State. Currently halfway through the program’s on-campus curriculum, Zaker plans to work in manufacturing or healthcare once she graduates in 2022. The global pandemic sparked her interest in healthcare, and her creativity contributed to her desire to pursue manufacturing. Regardless of which career path she chooses, Zaker feels prepared to lead.

Growing up, she has always had the instinct to lead. Despite leadership positions being male-dominated, she hopes more women step up.

Since graduating with her bachelor’s degree from Islamic Azad University in 2016, Delshad Zaker has worked for Middle East Water and Environment. She plans to use her MEM degree to advance her career in the manufacturing or healthcare fields.

‘I think it is very important that we work in this field more and [take on leadership positions]. We have to for the next generation. [Men need to know] they can count on us like themselves,’ Zaker explained. She encourages women to join programs like engineering management to find their place as leaders in society.
How much is a billion? How tiny is an atom? These seem like simple questions, but people of all ages struggle to conceptualize extreme sizes and scales. However, sizes, scales and powers of 10 (10x) are fundamental subjects in STEM. When ISE assistant professor Karen Chen heard of this challenge, she knew that VR could help bring the hard to visualize items into view. The National Science Foundation (NSF) has awarded Chen and her team a $1.3 million research grant, allowing them to use virtual reality to improve students’ understanding of the extremes of scale in STEM.

“Conceptualizing extreme scales and sizes have been a well-documented challenge in the education literature,” Chen explained. However, the subject is a crucial one to understand in STEM fields. “Given many STEM fields have to deal with entities and ideas at the extremes of scale, it is critical for students to develop accurate conceptions of scales that exist well beyond their everyday experience of the world,” Chen stated. An inaccurate understanding of size and scale can make it hard to apply concepts in the real world, and
CREATING A VIRTUAL ENVIRONMENT TO COMPARE EXTREME SIZES

not understanding subjects can also become a barrier to STEM for students.

As a solution, the team will create “Scale Worlds,” a new immersive virtual environment showing scientific entities of different sizes. Students can enter one of 31 distinct environments and see incredibly small and unbelievably large objects in relation to their bodies, like the difference between molecules and cells or the sun and the moon. This project allows students to make realistic comparisons and understand the concept of sizes, scales and powers of 10, which are impossible to make in everyday life. “Since VR enables us to visualize practically anything we could render using a computer, we thought it would be a great approach to help students conceptualize extreme scales,” Chen said.

Chen is working with faculty from the College of Education and College of Design. “I am very excited about this collaboration with experts outside of the engineering field,” she stated, “Scale Worlds is truly a transdisciplinary research project.” How much is a billion? and how small is an atom? will be much easier questions to answer, thanks to Karen Chen and her team.
AWARDS and HONORS

JEFF HOYLE, Director of Ergonomic Services at the Ergocenter, received an Outstanding Extension Award from NC State’s Office of Outreach and Engagement. He earned this award for his leadership in the field of ergonomics and his passion, dedication, and drive to educate and assist others in making the workplace safer. Hoyle also received the Creativeness in Ergonomics Practitioner of the Year Award at the Applied Ergonomics Conference for his achievements in the creative application of ergonomics.

KAREN CHEN, assistant professor, received the Young Investigator of the Year Award from the Applied Ergonomics Conference. She won this award because of the outstanding contributions she is making to the ergonomic field through her applied research.

KANTON REYNOLDS, Director of Undergraduate Programs, won the COE Award for Excellence from NC State. He received this award for improving efficiency and innovation both in the ISE department and at the University.

BINIL STARLY, James T. Ryan Distinguished Professor, received a 2021 SME Journal of Manufacturing Systems Reviewer of the Year Award from the North American Manufacturing Research Institution of SME. The award, given out since 2018, recognizes high-performing reviewers for their critical review and oversight.

ROHAN SHIRWAIKER, associate professor, received the 2021 Graduate of the Last Decade (GOLD) Award from the Penn State Industrial and Manufacturing Engineering Society in collaboration with the Harold and Inge Marcus Department of Industrial and Manufacturing Engineering. He received this award for demonstrating successful early career development and achievements.
Kate Moore, senior, and Kylee Alons, junior, were named to the All-ACC Swimming and Diving Academic Team by the Atlantic Coast Conference. The two ISE stars are no strangers to winning All-ACC academic honors as this is the third for each.

Kate Moore

XU XU, assistant professor, received an inaugural Goodnight Early Career Innovator Award from NC State’s Provost’s Office. He earned this award for his cutting-edge work in biomechanics, as well as his academic achievements and teaching excellence. Xu also won the 2021 C.A. Anderson Outstanding Faculty Award from the ISE Department. The winner of this award is determined by student voting.

CHANG “CS” NAM, professor, received Fellow Status from the Human Factors and Ergonomics Society (HFES). Fellow is the highest recognition bestowed by the HFES and given to recognize outstanding achievement, consistently superior professional performance, exceptional contributions, personal service to the Society, and other meritorious accomplishments.

OLA HARRYSSON, Fitts Distinguished Professor, received the International Freeform and Additive Manufacturing Excellence Award from the Solid Freeform Fabrication Symposium in August. The award is given out at the International Solid Freeform Fabrication Symposium and recognizes an outstanding researcher in the field of freeform/additive fabrication.

NATALIA SUMMERVILLE, lecturer, received a 2021 CEO Award of Excellence from SAS. Summerville was nominated by her peers for living out SAS’s values each day.
Advance Auto Parts
Sidney Allen, Rebecca Rowen, Rachel Sykes, Gabrielle Tonsay and Nathan Woelfel

Advance Auto Parts wanted to improve its marketing efforts towards its commercial customers and optimize its inventory management. The senior design team analyzed four years of customer data to determine any buying patterns. Once the data was cleaned, they discovered seasonal buying patterns across all matches. They placed the vast majority of the customers into eight pervading clusters, improving customer relations, decreasing inventory costs, and increasing revenue.

Biogen
Maks Bezruchkov, Quesinberry, Jackson Holt, Nicole David Rowland and Christine Wilkins

Biogen wanted to determine the feasibility of using an alternative supplier for critical filling line parts to save time and money in the event of a part failure. The student team researched local suppliers to find the one best-equipped to help determine the feasibility of part replication. Working with a new supplier, the team quantified and demonstrated how a new supplier could replicate the parts.

City of Raleigh - A
Rana Farawi, Connie Feinberg, Tess Garrison, Matthew McMillan and Samantha Nagle

The City of Raleigh added License Plate Recognition Software (LPR) to its parking enforcement operations. But, it lacked the procedures for the drivers of its LPR-equipped vehicles to maximize their LPR usage. The senior design team created dynamic routes to optimize parking enforcement around NC State University and Downtown Raleigh. The team also streamlined communications between the department and the LPR technology provider, Genetec, to significantly improve the enforcement process. Lastly, the team made recommendations on how to measure and incentivize driver performance.

City of Raleigh - B
Jessica Berlin, Hannah Koszegi, Katja Mansdoerfer and Connor Patterson

The City of Raleigh wanted to add new stations to its Citrix Cycle Bikeshare Program in two feasibility-studied areas, Five Points and Mission Valley. But, it lacked a tool to select locations for the new bike-sharing stations in those areas, which wastes time on the station siting process. The senior design team created a dynamic decision matrix that incorporates data from various sources to produce the optimal station locations in the predetermined areas. City planners can reuse this tool in the future to increase the process’s efficiency.

Manhattan Associates
Daniel Cockson, Emily Cooke, Rahul Dhawan, Matt Izzo, Anthony Szanfranski

Manhattan Associates wanted to improve client satisfaction and performance of its trucking supply chain division. They needed a tool that was compatible with its Profit Analyzer Tool and would reduce the time spent on cost model creation and maintenance process by 15 percent. Using Microsoft Excel, the student team built a template with five built-in VBA macros that automated the cost modeling process. They reduced the cost model initialization time by more than 50 hours and the monthly maintenance time by more than five hours per week. Their efforts led to a 25 percent time reduction and $50k in potential new client income.

NC State College of Veterinary Medicine
Ben Boyd, Sohil Doshi, Julia Peters and Toofan Salahuddin

The NC State College of Veterinary Medicine used time-consuming Google Forms to capture requests from their principal investigators. Also, the investigators could not duplicate, make minor changes and resubmit requests when they were completing a project again. Adding to the inefficiencies was a general lack of communication awareness of the Lab Animal Resources (LAR) website. After completing a thorough voice of customer assessment, the student team created a Vet Services Form Prefilled link that saves 30 minutes per submission. They added drop-down menus and redesigned the Forms page, which increased user-friendliness by 32%.
Maks Bezruchko, Jackson Holt, Nicole Quesinberry, David Rowland and Christine Wilkins

Biogen wanted to determine the feasibility of using an alternative supplier for critical filling line parts to save time and money in the event of a part failure. The student team researched local suppliers to find the one best-equipped to help determine the feasibility of part replication. Working with a new supplier, the team quantified and demonstrated how a new supplier could replicate the parts.

Warren Babb, Alissa Boggs, Jake Castelino, Sarah Gerkin and Rupen Singer

The Bosch Dish Care manufacturing facility in New Bern, NC, wanted to reduce its high vehicle traffic caused by material demands and delivery cycle times. The student team analyzed the current schedule and created a simulation model to determine the optimal program based on the decision matrix, which reduced each vehicle's time in the system.

Jessica Berlin, Hannah Koszegi, Katja Mansdoerfer and Connor Patterson

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Troy Bowman, Tiger Kaovilai, Andrew Martin, Ryan Winz and Tina Yang

John Deere wanted to improve its data collection and analysis process to determine safe lifting standards and protect workers from musculoskeletal injuries. The senior design team researched possible solutions and decided a web-based ergonomics assistance app was the best option. They also made recommendations for future improvements to the software and process itself.

Ben Boyd, Sohil Doshi, Julia Peters and Toofan Salahuddin

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Rachel Bricker, Catherine Chirichillo, Annemarie Marshall, Matthew McGovern and David Trombley

Pfizer’s instrument management and acquisition process in its Rocky Mount quality laboratory was disjointed and lacked a digital data management platform, wasting time and money and risking violating Good Manufacturing Practices. The senior design team recommended key data metrics based on Pfizer’s goals, proposed a data collection method to track these metrics and suggested an accessible visualization method for the data.
Georgia Burgess, Nicole Gorrell, Madelaine Hiriak, David Labrador and Jackson Proctor

Pfizer wanted to reduce the costs and eliminate the non-value-added time of its manual pH data collection process at its Rocky Mount facility. The student team developed programs to automate the data collection process and store the information in a centralized database. Additionally, they provided an SOP and rollout plan to ease the transition from a manual to an automated process.

Sidney Allen, Rebecca Rowen, Rachel Sykes, Gabrielle Tonsay and Nathan Woelfel

Advance Auto Parts wanted to improve its marketing efforts towards its commercial customers and optimize its inventory management. The senior design team analyzed four years of customer data to determine any buying patterns. Once the data was cleaned, they discovered seasonal buying patterns across all matches. They placed the vast majority of the customers into eight pervading clusters, improving customer relations, decreasing inventory costs, and increasing revenue.

Harrison Johnson, Chris Pennella, Steven Rehard and Taylor Seeling

As part of its 5-year automation plan, Vanguard Furniture wanted to add new machinery and design an ideal future state layout using lean methodologies. The senior design team conducted a root cause analysis to determine the shop areas most affected by waste. They then created a simulation model to support purchasing a new CNC router and validate machinery and shelving relocation. The model also gave valuable data on reducing non-value-added travel, improving worker utilization and increasing profits by adding the new machinery.

Ahmad Awamleh, Dennis Estevez and Karl Soliman

West Pharmaceuticals wanted to increase its production of components for distributing the COVID vaccine to meet the high demand. But, it needed to determine where additional resources would have the most significant impact on their production rates. The senior design team created current state value stream maps to identify bottlenecks in the top five running product lines. Based on their analysis, the team proposed solutions to balance the production lines and decrease non-value added time across the manufacturing process.
Before I introduce myself, I want to thank the outgoing advisory board chair, Gayle Lanier, for her long-standing service to the ISE department. I know I speak for everyone when I say, “Thank you, Gayle, for your continued service and dedication not only to ISE, but the College and University as well over these many years.”

Now, just a bit about me. My name is Stuart Nisbet, and I received my bachelor’s degree from NC State in computer science way back in 1987. Currently, I am the Chief Data Scientist at Cadient Talent. Before that, I had a 30+ year career at SAS, where I started in the computer graphics division. SAS allowed me to pursue my passion for data visualization and computer graphics which led me through many roles to finally become the Senior Vice President, Global Head of R&D. So, as a CompSci graduate with a focus on analytics, why have I been a member of the ISE advisory board for the last four years? Very simply, in my career, I have not seen any academic discipline have a more significant and broader impact on our world than ISE. But that’s enough about me. Let’s talk about our beloved ISE department.

Speaking on behalf of the ISE advisory board, I want to thank those who competed in this year’s Day of Giving. We put our money where our mouths are by joining the challenge to make 150 gifts to the department, and you certainly did not disappoint, finishing with a total of 221. Again, thank you for your generosity and support.

Like my predecessors, I encourage everyone interested in industrial and systems engineering at NC State to find a way to get connected. As part of the new Alumni Resources Program, the department created an excellent “how to volunteer” web page (https://www.ise.ncsu.edu/engagement/volunteer-alumni-engagement-nc-state-ise/) that explains all the non-monetary ways you can give back. The web page has an FAQ section that answers many of your questions about getting involved. If you find something that fits your interests, we warmly welcome your partnership.

GO PACK!

Stuart Nisbet, BSCSC 1987
The Edward P. Fitts Department of Industrial and Systems Engineering at NC State is grateful to our donors for their generous support. This list represents donations between July and December of 2020. While we make every effort to be accurate and thorough, it is possible to accidentally omit or misspell a name. Please contact 919.515.7237 with any additions or corrections.

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Join the ISE Department and fellow alumni during NC State’s 2021 Red and White Week for a dedication event for Fitts-Woolard Hall including speakers and tours of the building.

Join Us
Friday, Oct. 29, 2021 at 1 pm

Join Chancellor Randy Woodson, Dean Louis Martin-Vega, colleagues and friends for a dedication ceremony followed by tours of the building.

This fall, join your fellow Wolfpack industrial and system engineers for Red and White Week, Oct. 24-30. More than a traditional homecoming, it’s a week that captures everything our students, faculty, staff, alumni and friends hold dear about NC State. As a community, we’ll celebrate the dedication, resilience and generosity NC State alumni have shown to the University, especially to our department..

Homecoming is extra special this year for our alumni along with those from the Department of Civil, Construction, and Environmental Engineering and the Edward P. Fitts Department of Industrial and Systems Engineering — as we have settled into our new home in Fitts-Woolard Hall. The state-of-the-art building officially opened in August 2020 with generous support from alumni and friends of the University.

All College of Engineering alumni are invited to a special dedication, celebration and tours of this extraordinary, state-of-the-art space that emphasizes “engineering on display.”

Featured Events
This Red and White Week, start with an address from Chancellor Randy Woodson, stop by to see the new Fitts-Woolard Hall, and end your week cheering on the Pack at Carter-Finley Stadium.

- **Chancellor’s Address**, Monday, Oct. 25
- **Homecoming Parade**, Friday, Oct. 29
- **NC State vs. Louisville**, Saturday, Oct. 30
Just search for us using “NCStateISE”

Add the hashtag #NCStateISE to your posts so we can see the great things you are doing
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Throughout the semester students communicate with presentations, reports and emails or conference calls. You will receive the final project report, copies of any software files and physical prototypes. You’re also a stakeholder who has input in the student team’s evaluation.

Our process to submit your proposed projects is straightforward and simple. All you have to do is complete our Senior Design Sponsor Form and our Director of Undergraduate Programs, Kanton Reynolds, will take it from there.

To make it even simpler, we have provided guidelines on what to expect from your student team and what want to see from you, our sponsor. So explore some of our past senior design projects and we look forward to working with you soon.

Let’s get started!

go.ncsu.edu/ISESeniorDesign