Setting the Standard

2018 Annual Report

RowanUniversity

HENRY M. ROWAN
COLLEGE OF ENGINEERING

2018 Annual Report

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Message from the Dean

This was an exciting year of firsts at the Henry M. Rowan College of Engineering. At commencement, we graduated our largest-ever class, including our first cohort of biomedical engineers and our first cohort of Ph.D. students. These examples are only a few of the exciting developments we witnessed in 2018.

Success is not new to us. During the last five years, building on our College's award-winning and nationally ranked undergraduate program, we have doubled our enrollment, doubled our full-time faculty and tripled the size our academic and research facilities. True to our history, we have maintained an emphasis on small class sizes and low student-faculty ratios that are hallmarks of our college — all while building a modern and innovative research program, which this year secured the largest-ever research award in the College's history.

While there have been many changes as we welcomed new students and faculty, what remains the same is our commitment to our dear friend Mr. Henry M. Rowan — to continuously improve and to always push ourselves to do more and to do better.

As you read through this report, you will see that our academic and research programs evolved in a comprehensive way, supporting one another to create an environment that is dedicated to ensuring the highest-quality engineering education and to fostering the growth of a research mission fit for the 21st century. This report highlights how we have strengthened our legacy programs while strategically developing our new ones and showcases our rich history and some of the contributions we have made to our profession.

I invite you to read about how we have set the standard for what is to come.

Anthony Lowman, Ph.D.
Dean

Academic Programs **9** bachelor's degrees **6** master's degrees **5** doctoral specializations

$15K a year cost of attendance for the average in-state Rowan engineering student

83% graduation rate

$69,750 average starting salary

96% employment or graduate school placement

U.S. News & World Report

#23 2019 for undergraduate engineering program

#91 national public research university

Facts at a Glance

Building on Excellence

1,315 average SAT score for fall 2018

regular admit engineering students

1,607 total enrollment

undergraduate: 1,454 | graduate: 153

200+ partnerships for experiential engineering education opportunities

including an exclusive four-year cooperative education program with Lockheed Martin in combat systems engineering

$33 Million in research awards since **2013**

22:1 undergraduate student - faculty ratio

The South Jersey Technology Park at Rowan University hosts **20** tenant companies **4** medical device startup companies and a comprehensive virtual reality center

Setting the standard for graduate education and biomedical engineering

The Henry M. Rowan College of Engineering has enjoyed many firsts in its 22-year history and even more in 2018.

"This has been a standout year for our graduate program and our Biomedical Engineering Department," said Dr. Anthony Lowman, dean. "We are setting the standard for the future."

During Commencement in May 2018, the College proudly graduated its first cohort of Ph.D. students. Dr. Thomas Christiani and Dr. Paul Partyka completed their doctorates through the biomedical engineering program, while Dr. Muhammed Ridwan Murshed completed his through the mechanical engineering track.

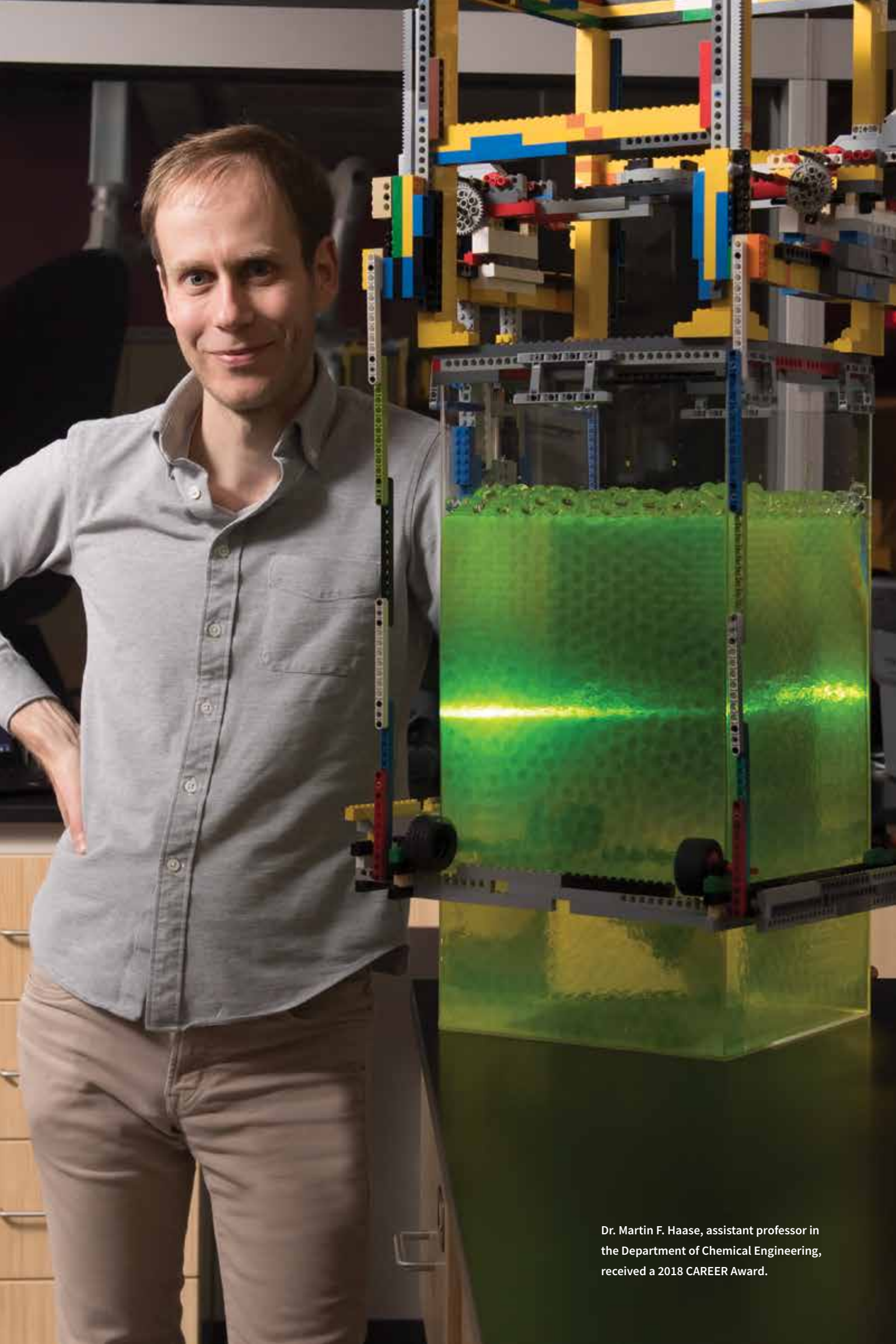
Dr. Peter Gallie, assistant professor in the Department of Biomedical Engineering, hooded Dr. Paul Partyka, one of the first biomedical engineering Ph.D. graduates, during the 2018 commencement ceremonies.

Christiani's work in tissue and biomaterials engineering focused on the repair of degenerative intervertable discs using novel biocompatible, stem-cell based, injectable gels. Murshed developed a novel metric for predicting the elastic response of various materials, which has the potential to improve the design of novel materials with specific mechanical properties. Partyka's work focused on the creation of implantable biocompatible scaffolds that control axon orientation within patterned blood vessels. This technology has a strong potential to aid in repairing central nervous system damage, primarily in patients with injured spinal cords. Moreover, Partyka became the College's first student also to complete his Doctor of Osteopathic Medicine degree at Rowan's School of Osteopathic Medicine.

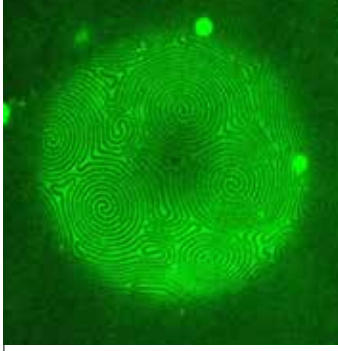
In addition to graduating its first cohort of Ph.D. students, the College graduated its first cohort of undergraduate biomedical engineers — only one short year from moving into their new space in Rowan's Engineering Hall.

"Biomedical's goal is to train the next generation of scientists and engineers in areas highly relevant to healthcare. Our hope is that we continue to make strides by mentoring students from the undergraduate level all the way to obtaining their doctoral degrees," said Dr. Mark Byrne, founding department head and professor in the Department of Biomedical Engineering.

The College welcomed 21 Ph.D. students and a new cohort of 45 undergraduate biomedical engineers in fall 2018.



Dr. Martin F. Haase, assistant professor in the Department of Chemical Engineering, received a 2018 CAREER Award.



Haase's work in *Science Advances* — Nanoparticles shaping into fingerprint-like patterns at the interface of liquid crystals.

Engineering "greener" alternatives for a sustainable future

The National Science Foundation (NSF) awarded Dr. Martin F. Haase a CAREER Award for developing green alternatives to replace wasteful and costly chemical processes. CAREER Awards are among the NSF's most prestigious recognitions in support of the early career-development activities of teacher-scholars who most effectively integrate research and education in their work.

Haase's research focuses on finding more cost-efficient, sustainable solutions that replace expensive chemical separations and minimize hazardous waste. To develop greener chemical processes, Haase investigates potential uses of bicontinuous interfacially jammed emulsions (bijels), a complex new form of liquid matter. Haase recently introduced Solvent Transfer Induced Phase Separation (STrIPS), as a simplified method for fabricating bijels. His CAREER award explores the use of STrIPS-bijels as liquid reaction media for green chemistry applications.

"Discovering STrIPS drastically simplifies bijel formation. With STrIPS, the strong application potentials of bijels in catalysis and separation membranes, battery materials and tissue engineering scaffolds become tangible," said Haase.

In addition, Haase has worked with local middle and high schools, developed new courses about colloid and interface science in the Department of Chemical Engineering at Rowan and included an online educational component that echoes his K-12 outreach initiatives.

"We already proved we can develop greener alternatives, and with this award we can be more focused on furthering our outreach to make an immense impact with underrepresented groups in engineering," said Haase.

Haase's most recent work, in collaboration with researchers from the University of Pennsylvania, was published in *Science Advances* (on Oct. 12, 2018). The article, "Shaping nanoparticle fingerprints at the interface of cholesteric droplets," discusses the team's discovery of a new method to assemble nanoparticles into periodic patterns using cholesteric liquid crystals, with future plans to potentially design solar cells, batteries or microelectronics.

Dr. Stephanie Farrell, professor and founding chair in the Department of Experiential Engineering and Education (ExEEd), and president of the American Society for Engineering Education (ASEE).

Dr. Stephanie Farrell's goal is to address the changing role of engineers and their importance in education and social spaces. Now, she is positioned better than ever to reach her goal.

Chairperson and professor in the College's Experiential Engineering Education (ExEEd) Department, Farrell assumed the presidency of the American Society for Engineering Education (ASEE) at the society's annual conference in Salt Lake City on June 27, 2018.

Addressing the changing role of engineers and engineering education

"ASEE has been an important part of my career and plays an essential role in shaping engineering and engineering technology education across the nation and, more and more, around the world," said Farrell. "In an era when educators are thinking carefully about how we properly teach the engineers who will tackle the challenges of the coming century, ASEE can be very influential."

Farrell organized ASEE's annual First-Year Engineering Experience (FYEE) conference in the summer of 2018. Hosted at the Henry M. Rowan College of Engineering, this national conference — which is dedicated to better understanding the complexities associated with educating first-year engineering students — featured keynote addresses from leading experts, workshops and technical sessions. Conference attendees were encouraged to share best practices and innovative ideas for improving the experience of freshman engineering students.

Farrell's role as ASEE president, along with the FYEE conference, illuminate both the College's growing research mission and its longstanding dedication to creating an exceptional undergraduate experience.

"ASEE-FYEE was a great success, and our growth as a College and University was instrumental in being selected to host this prominent annual event," said Farrell. "As ASEE president, it was a homecoming of sorts to be able to bring this event to our campus and program where the undergraduate experience is a top priority."

Strengthening arctic assets

The Army Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL) awarded $3.4 million to the Henry M. Rowan College of Engineering, the largest award ever received by the College and the largest award ever made to a researcher at Rowan University's main campus.

The award made in the fall of 2018 builds on the growing research initiatives at Rowan University and in the College, both of which are committed to developing a research program that is nimble, flexible and responsive to the needs of industry and government agencies.

"Through this program, we have strengthened our longstanding partnership with the Army Corp of Engineers," said Dr. Anthony Lowman, dean. "This award reflects the depth and breadth of Rowan Engineering, while providing research opportunities for graduate and undergraduate students."

Dr. Yusuf Mehta oversees the project. Mehta is a professor in the Department of Civil & Environmental Engineering and director of the College's Center for Research and Education in Advanced Transportation Engineering Systems (CREATES).

Dr. Yusuf Metha, professor in the Department of Civil & Environmental Engineering and director of Center for Research & Education in Advanced Transportation Engineering Systems (CREATES).

"We are very excited to conduct research in cutting-edge construction materials for the Army Corp of Engineers. Projects conducted under this award will support our nation's strategic infrastructure needs and will add to our discipline's greater body of knowledge," said Mehta.

Mehta and his team will focus on complementing and building on innovative and cost-effective methods the U.S. Department of Defense has been developing to support U.S. interests in the Arctic and other cold regions. Rowan's research team also includes Mehta; co-principal investigator Dr. Ayman Ali, CREATES manager; collaborators Drs. Doug Cleary, Will Riddell and Gilson Lomboy; civil and environmental faculty; post-doctorate associates; and undergraduate and graduate students.

Creating opportunities for Ph.D. fellowships

Funded by a $1.5 million U.S. Department of Education (USDoED) Graduate Assistance in Areas of National Need (GAANN) grant, the Henry M. Rowan College of Engineering at Rowan University is supporting a multidisciplinary Ph.D. fellowship program in Big Data Analytics, Machine Learning and Artificial Intelligence.

"Receiving this grant illustrates the quality of our research program, the expertise of our dedicated and innovative faculty and their commitment to providing access for underserved student populations," said Dr. Beena Sukumaran, vice president for research at Rowan University. "These awards will provide funding for students with a demonstrated financial need, which aligns with Rowan University's commitment to enhance access to education."

The program will begin in spring 2019, welcoming students with bachelor's or master's degrees in engineering or related science, technology and mathematics disciplines who want to conduct advanced, multidisciplinary research.

This program implements an inclusive and sustainable education training plan designed to develop the next generation of doctorally prepared engineers," said the fellowship program leader Dr. Nidhal C. Bouaynaya, professor in the Department of Electrical & Computer Engineering and associate dean for Research and Graduate Studies. "Engineers who complete this program will be equipped with the aptitude, experience and skills to meet the challenges and opportunities arising from artificial intelligence."

Fellows in this program will develop competencies in data science and machine learning, entreprenuership, multi-audience communication and professional conduct, while also initiating a discipline-specific and data-driven research project. Projects will include cheminformatics for advanced energy, intelligent transportation systems, data analytics in digital immersive environments, aviation safety research, radiomics and fundamental problems in machine learning. This program will provide a variety of immersive experiences, including internships at collaborative federal and industry laboratories.

Graduating as a national standout

Capping an academic career filled with successes, Department of Biomedical Engineering 2018 summa cum laude graduate Kelsey DeFrates earned a prestigious award from the National Science Foundation (NSF) to complete her doctoral studies.

DeFrates, who also graduated with a Thomas N. Bantivoglio Honors Concentration, already had demonstrated the academic ability to land her a seat in her choice of schools. Thanks to the NSF, she also now has the necessary financial resources.

The NSF awarded the Aububon, New Jersey, native a Graduate Research Fellowship (GRF), which comes with three years of support — a $34,000 annual stipend and a $12,000 cost-of-education allowance to the graduate institution.

One of the most-coveted awards in science, technology, engineering and mathematics, the highly competitive NSF GRF — more than 15,000 applicants apply for 2,000 fellowships each year — will open doors for DeFrates as she finishes graduate school and begins her professional life. The NSF awards these grants to individuals who demonstrate the ability to achieve as a researcher and considers these awards investments in the country's future. The NSF believes GRF recipients have the highest potential to create impact on the nation's economy and/or advance in-demand technologies.

With the help of the NSF GRF, DeFrates chose to study biomedical engineering at the University of California, Berkeley.

Kelsey DeFrates, a 2018 National Science Foundation recipient and Biomedical Engineering Department summa cum laude graduate.

Dr. Ratneshwar (Ratan) Jha, new department head in the Department of Mechanical Engineering.

Building on excellence with new leadership

Dr. Ratneshwar (Ratan) Jha has joined the Henry M. Rowan College of Engineering, as the new department head for Mechanical Engineering.

"As we continue to grow as a College and University, we are acting boldly. We are continuing to diversify our portfolio — one hire at a time. The addition of this new leadership speaks volumes to our mission and shows we are indeed building on excellence," said Anthony Lowman, dean.

Jha comes to the College from Mississippi State University (MSU). During his time at MSU, he served as professor and graduate program coordinator in the Department of Aerospace Engineering and also as the director of the Raspet Flight Research Laboratory/Advanced Composites Institute. Prior to his service at MSU, Jha served for 13 years on the faculty of Clarkson University's Mechanical & Aeronautical Engineering Department. He also worked at Hindustan Aeronautics Limited (India) on combat aircraft design.

Additionally, Jha is a fellow of the American Society of Mechanical Engineers (ASME) and associate fellow of the American Institute of Aeronautics and Astronautics (AIAA). He is also a member of AIAA Adaptive Structures Technical Committee (TC), a founding member of ASME Nondestructive Structural Monitoring TC and an editorial board member for the *International Journal of Aerospace Engineering*. During the course of his career, Jha has received more than $8 million in research grants and contracts from NASA, the National Science Foundation, Air Force Office of Scientific Research, the Boeing Company and many others.

Jha earned a Ph.D. in mechanical engineering from Arizona State University, an M.S. in aerospace engineering from Georgia Institute of Technology, and a B.S. in aeronautical engineering from the Indian Institute of Technology.

Dr. Sarah Bauer, an assistant professor in the Department of Civil & Environmental Engineering.

For two decades, the Henry M. Rowan College of Engineering has encouraged and promoted gender diversity and equality in engineering professions through the Attracting Women into Engineering (AWE) program.

"The program reaches over 100 middle-school-aged girls annually, bringing them to Rowan's campus to explore engineering through hands-on projects and demonstrations. This applied approach to learning, a hallmark of Rowan Engineering, introduces AWE participants to various engineering disciplines and careers and provides an opportunity to connect with like-minded peers and current engineering undergraduates as mentors and advisors," said Melanie Basantis, director of the Office of Engineering Outreach.

Recognizing women in engineering through AWE

This year marks the program's 20th anniversary and the return of program alumnae Dr. Sarah Bauer. Bauer experienced the AWE program first-hand during middle school. She then went on to complete her bachelor's degree in civil and environmental engineering at the Henry M. Rowan College of Engineering and a Ph.D. at the University of Virginia. In the fall of 2018, she returned to the College as an assistant professor in the Civil & Environmental Engineering Department.

"Our mission is to cultivate young girls' interest in engineering by sparking and igniting their imagination," said Dr. Kauser Jahan, AWE program founder, department head & professor in the College's Civil & Environmental Engineering Department. "Sarah Bauer is a testament to AWE's success and the value of its mission — to inspire young women to aspire to careers in engineering."

As an AWE program participant, Bauer was able to meet and study with a number of the College's faculty. Bauer noted, "Before AWE, I didn't know anything about engineering, but it completely inspired me to pursue an engineering career."

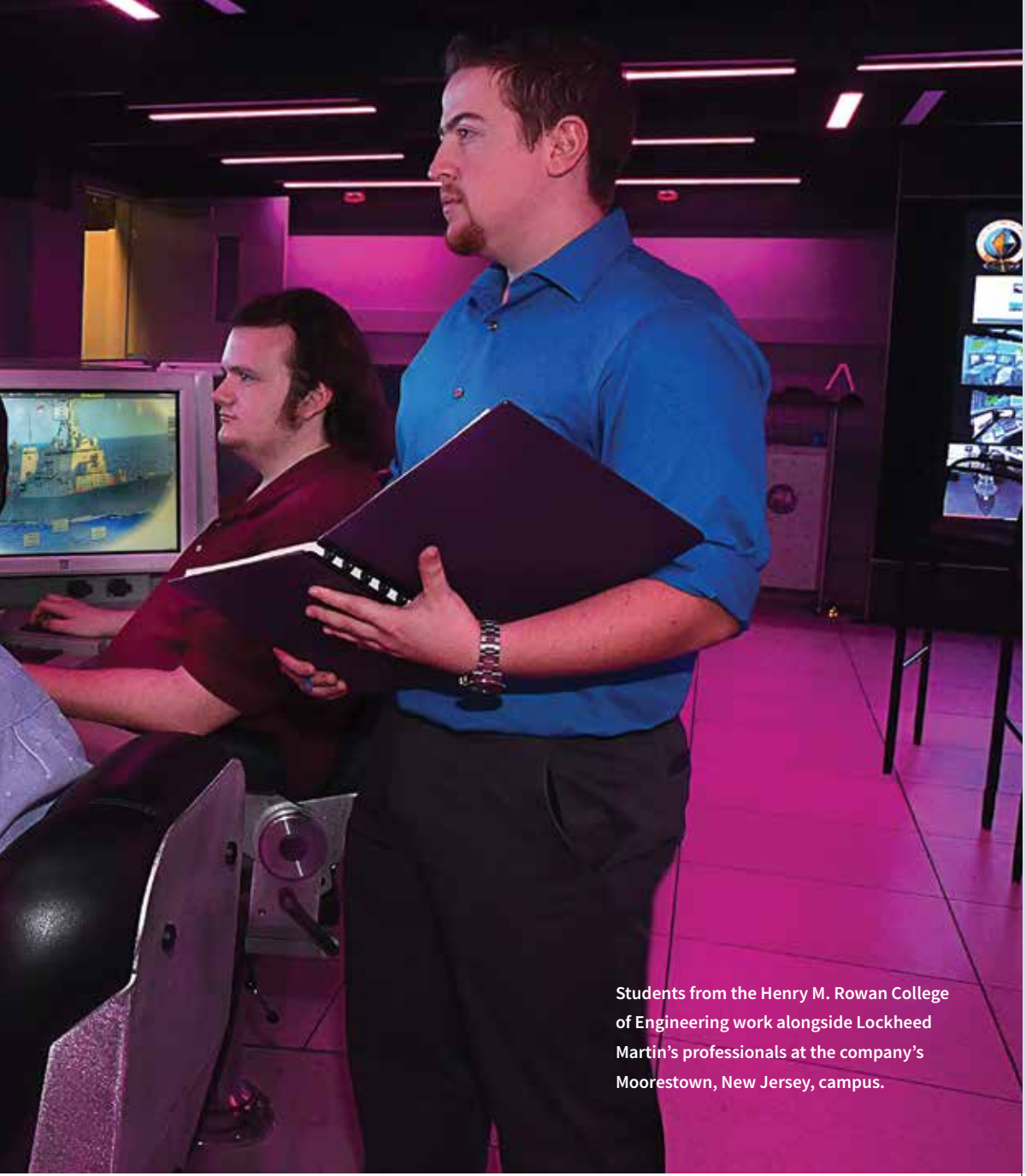
Now, in her current position and as a part of the College's faculty, Bauer helps to coordinate the hands-on activities and special events that expose young women to the diverse careers available in engineering.

Opening doors to careers in industry

The Henry M. Rowan College of Engineering and Lockheed Martin have partnered for more than a decade to support the needs of students, meet the demands of industry and strengthen the regional economy. In 2018, the award-winning partnership continued to evolve, launching the first formal cooperative (co-op) education program in the College's history.

The combat systems co-op provides undergraduate students with an experiential opportunity to work with Lockheed Martin's professional workforce at its Moorestown, New Jersey, campus. In addition, students take a specific course sequence affording them an opportunity to graduate with a bachelor's degree in electrical and computer engineering and complete a certificate of undergraduate study (CUGS) in combat systems in just four years. Graduates of the program are empowered with both the relevant skills and credentials needed for transitioning into careers in the defense industry.

"Partnering with Rowan has been critical to our success as we meet our workforce needs in an extremely competitive environment," said Robert Regensburger, project specialist principal, New Jersey State Economic



Students from the Henry M. Rowan College of Engineering work alongside Lockheed Martin's professionals at the company's Moorestown, New Jersey, campus.

Development and Academia Programs for Lockheed Martin. "The leadership of the University has been helpful in removing barriers. The faculty were eager to collaborate, and the students are some of the brightest we have ever seen."

In addition, Lockheed Martin professionals have served as course instructors, bringing the perspectives of industry professionals into the classroom. As the program expands, the partnership will launch an additional co-op through Mechanical Engineering next year. During the last several years, Lockheed Martin has hired more Henry M. Rowan College of Engineering and Rowan University graduates than any other company. Lockheed Martin's emphasis on developing the regional workforce has yielded a range of collaborations with the College and University that have been recognized by the State of New Jersey.

In 2018, the State honored Rowan University and Lockheed Martin with its inaugural Innovative Partnership Award recognizing high-quality collaborations among higher education, business and industry.

INVEST IN THE future

Support Rowan University's Henry M. Rowan College of Engineering students by making a planned gift today. The following gift vehicles are some ways you may be able to meet your personal financial goals and leave a legacy of learning for future generations of Rowan students:

GIFTS ANYONE CAN MAKE

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Director of Major Gifts and Planned Giving
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petrella@rowan.edu

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What this country needs is not more
engineers, but more great engineers.

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COLLEGE OF ENGINEERING

Henry M. Rowan Hall
201 Mullica Hill Road • Glassboro, NJ 08028
tel: 856-256-5300 • fax: 856-256-5350
Email: engineering@rowan.edu
www.rowan.edu/engineering