HENRY M. ROWAN
COLLEGE
OF ENGINEERING

2025 HIGHLIGHTS

RowanUniversity

2025 HIGHLIGHTS

Dear Friends,

The 2025 Highlights Report of the Henry M. Rowan College of Engineering showcases a year of continued momentum, driven by distinctive experiential education, significant research growth, and strong, forward-looking industry partnerships that position our College for future success.

Experiential education remains the foundation of the Rowan Engineering identity. Our four-year Engineering Clinic model integrates hands-on, team-based problem solving into every semester of every program, ensuring students consistently apply theory to meaningful, open-ended challenges. Through clinics, co-ops, undergraduate research, and engagement in our centers and laboratories, students work on industry-sponsored projects, federally funded research, and entrepreneurial initiatives that mirror professional engineering environments. This intentional focus develops technical expertise, systems thinking, communication skills, and professional confidence, preparing students to contribute effectively from the moment they enter the profession.

Complementing this educational foundation, our research enterprise reached $19.7 million in expenditures this year, advancing innovation in advanced materials, biomedical engineering, artificial intelligence, transportation systems, digital engineering, sustainability, and resilient infrastructure. Faculty and students are translating discoveries into applications. In doing so, we are strengthening public infrastructure, advancing maternal health technologies, improving pharmaceutical manufacturing, and accelerating the development of next-generation manufacturing systems. This progress reflects the dedication and creativity of our faculty, whose scholarship continues to earn national recognition through competitive research awards, high-impact publications, and leadership in emerging engineering fields. The involvement of students in these efforts ensures that research and education remain closely linked.

These accomplishments are further strengthened by strategic industry collaborations. Corporate and government partners work alongside faculty and students to co-develop solutions, inform curricular innovation, sponsor clinics, and build workforce development pipelines. Our partnerships span regional manufacturers, federal agencies, and global technology leaders, reflecting a shared dedication to innovation and talent growth. Industry involvement at Rowan is integrated into our teaching, research, and innovation efforts, ensuring our programs stay aligned with emerging technologies and workforce needs.

With $6.28 million in philanthropic support and commitments this year, we continue to expand access to opportunity, invest in academic excellence, and advance the bold, practical vision that has defined Rowan Engineering since its founding.

The accomplishments highlighted in the pages that follow reflect the strength of the Rowan Engineering community, where experiential education, impactful research, and strong industry partnerships come together to prepare engineers ready to lead, innovate, and make a lasting impact.

Giuseppe R. Palmese, Ph.D.
Dean, Henry M. Rowan College of Engineering

The 2024–25 academic year saw continued growth within the Henry M. Rowan College of Engineering. More than **2,066** undergraduate, master's and doctoral students were enrolled in the college. The academic year closed with **504** new graduates from across all departments and degree levels.

UNDERGRADUATE	1626
Biomedical Engineering	128
Chemical Engineering	124
Civil Engineering	307
Construction Management	285
Electrical & Computer Engineering	335
Electrical Engineering Technology	10
Engineering Entrepreneurship	49
Surveying Engineering Technology	14
Mechanical Engineering	367
Mechanical Engineering Technology	7

MASTER'S	300
Biomedical Engineering	9
Chemical Engineering	31
Civil Engineering	74
Electrical & Computer Engineering	75
Engineering	4
Engineering Management	48
Mechanical Engineering	59

DOCTORAL	140
Biomedical Engineering	28
Chemical Engineering	20
Civil & Environmental Engineering	24
Electrical & Computer Engineering	22
Engineering	14
Engineering Education	13
Materials Science & Engineering	4
Mechanical Engineering	15

504
DEGREES AWARDED

2066
STUDENTS ENROLLED

26
DEGREE PROGRAMS

20%
INCREASE IN PHD CANDIDATES

DEPARTMENTS & DEGREES

	BS	MS	PhD	PhD/MD	PhD/DO
Biomedical Engineering (BME)					
Biomedical Engineering	✓	✓	✓	✓	✓
Civil & Environmental Engineering (CEE)					
Civil & Environmental Engineering	✓	✓	✓		
Chemical Engineering (ChE)					
Chemical Engineering	✓	✓	✓		
Electrical & Computer Engineering (ECE)					
Electrical & Computer Engineering	✓	✓	✓		
Systems Engineering		✓			
Experiential Education (ExEEd)					
Engineering Entrepreneurship	✓				
Engineering		✓			
Engineering Education			✓		
Mechanical Engineering (ME)					
Mechanical Engineering	✓	✓	✓		

DIVISIONS & DEGREES

	BA	Master's
Construction & Engineering Management		
Construction Management	✓	
Master of Engineering Management		✓

	BS
Engineering Technology	
Electrical Engineering Technology	✓
Mechanical Engineering Technology	✓
Surveying Engineering Technology	✓

2024–2025 GRADUATES

Bachelor's
366

Master's
118

Doctoral
20

Precision sound control through twisted structures

Chen Shen, Ph.D.
assistant professor
mechanical engineering

Controlling how sound waves propagate has long been a focus of research led by Chen Shen, Ph.D. New advances in this area have the potential to improve technologies ranging from sensing and communications to medical imaging and diagnostics.

In a recent study, Shen's team developed a novel "twisted" bilayer acoustic structure that introduces a new way to manipulate sound. The approach involves stacking two thin acoustic layers with different internal lattice patterns and rotating one layer relative to the other. While each layer independently guides sound in a predictable way, twisting them together produces entirely new acoustic behaviors not found in either layer alone.

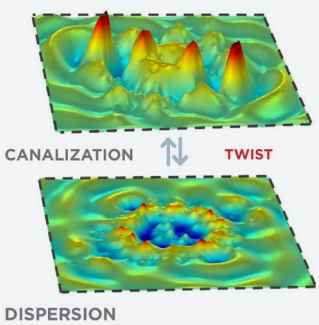
By adjusting the twist angle, the researchers demonstrated multiple sound-wave responses within a single structure, including tightly confined sound paths, highly directional transmission, and uniform radiation in all directions. At a specific "magic angle," sound waves became strongly focused and traveled with minimal loss, allowing for highly efficient energy transport.

The study also showed that sound control remained stable even when structural defects were introduced—a critical requirement for real-world applications. This robustness makes the approach particularly promising for non-destructive testing, where sound must be precisely directed, and for advanced acoustic sensors that demand high sensitivity and reliability.

Conducted in collaboration with Northeastern University, the research highlights a new strategy for engineering sound using twisted bilayer structures and expands the design possibilities for future acoustic devices.

Research detail:

Measured sound field patterns show the acoustic energy distribution can be tuned by rotating the twisted structures



Featured Faculty Publications (Peer-Reviewed)

BME
Enuka, A.; Keblawi, M.; Sedar, E.; Beachley, V.A
Continuous Manufacturing Approach for Aligned PVDF Nanofiber Yarns with Enhanced Mechanical and Piezoelectric Properties.
ACS Applied Polymer Materials 2025, 7 (9), 5429–5436.
DOI: 10.1021/acsapm.5c00069

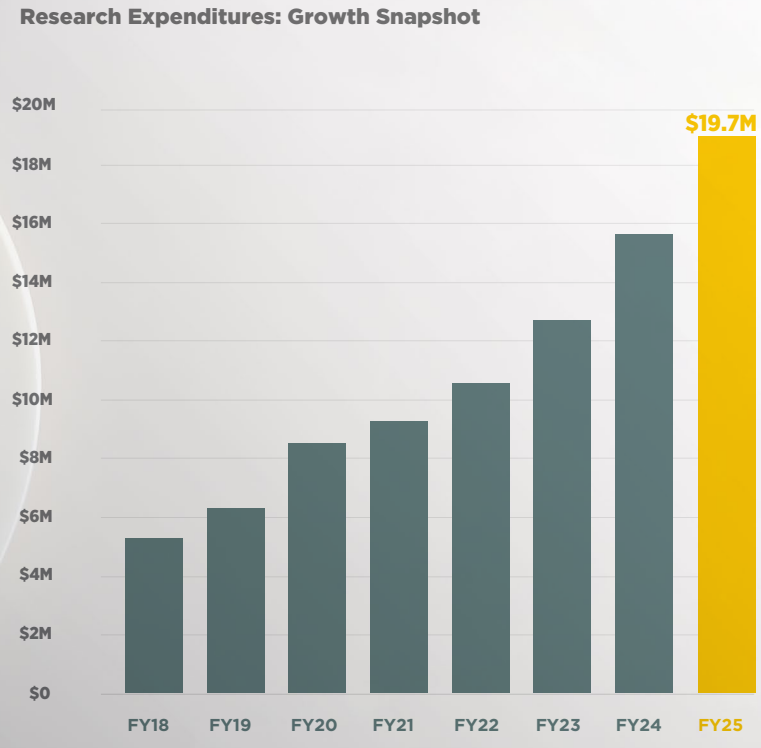
CEE
Ahmed; Mantawy, I.M.
Additive Construction of Low Embodied Carbon Concrete: Geopolymer Concrete.
Journal of Building Engineering 2025, 112984–112984.
DOI: 10.1016/j.jobe.2025.112984

CHE
Chauby, M. J.; Vivod, S. L.; Malakooti, S.; Palmese, G.R.
Carbon Aerogels from Furan-Based Polybenzoxazine Precursors.
Composites Part B: Engineering 2025, 112259.
DOI: 10.1016/j.compositesb.2025.112259.

ECE
Guo, W.; Liu, G.; Zhou, Z.; Wang, J.; Tang, Y.; Wang, M.
Robust Training in Multiagent Deep Reinforcement Learning against Optimal Adversary.
IEEE Transactions on Systems Man and Cybernetics Systems 2025, 1–12.
DOI:10.1109/tsmc.2025.3561276.

EXEED
Jackson A.G, Bodnar, C., Barrella, E., Cruz-Bohorquez, J.M., Kecskemtety, K. Development of a Categorical Scoring Codebook for Entrepreneurial Mindset (EM) Concept Maps.
Journal of STEM Education: Innovations and Research, 26(1), 2025, 16–31.
DOI: 10.63504/jstem.v26i1.2684

ME
Uddin, K. Z.; Heras, M.; Youssef, G.; Kiel, T.; Koohbor, B.
Multiscale Experimental Characterization of Nonlinear Mechanics and Auxeticity in Mechanical Metamaterials with Rotating Squares.
Composite Structures 2025, 357, 118931.
DOI: 10.1016/j.compstruct.2025.118931.



Dhritiman Bhattacharya

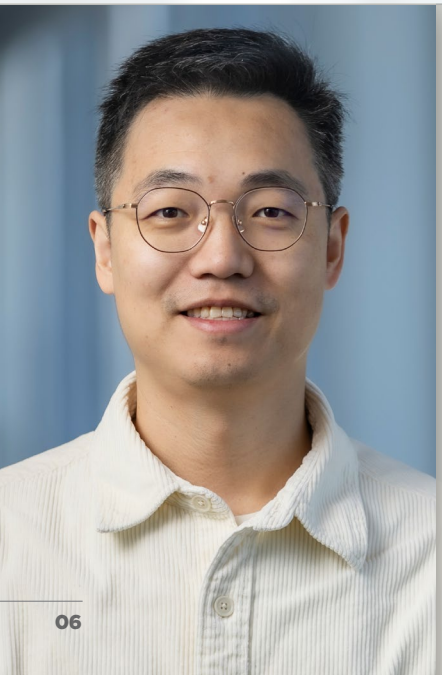
ASSISTANT PROFESSOR | PH.D., VIRGINIA COMMONWEALTH UNIVERSITY

Dr. Dhritiman Bhattacharya is an assistant professor of electrical and computer engineering at Rowan University. He earned a doctorate in mechanical and nuclear engineering from Virginia Commonwealth University and a bachelor's degree in electrical and electronic engineering from the Bangladesh University of Engineering and Technology. Prior to joining Rowan, Bhattacharya was a postdoctoral fellow in the Department of Physics at Georgetown University. His research centers on nanomagnetism and spintronics for energy-efficient memory and neuromorphic computing, spanning device design, materials synthesis, nanoscale fabrication and experimental characterization.

Sarah Wilson

ASSOCIATE PROFESSOR | PH.D., UNIVERSITY OF MASSACHUSETTS AMHERST

Dr. Sarah Wilson is an associate professor of experiential engineering education at Rowan University. She earned her bachelor's degree in chemical engineering from Rowan University and her doctorate from the University of Massachusetts Amherst. Guided by the principle that better systems require care for the people within them, Wilson's research focuses on improving mental health in engineering through data-driven and participatory approaches. She partners with students using qualitative and quantitative methods to co-create knowledge and design strategies that support well-being, belonging and professional growth. Wilson has co-developed internationally presented workshops on mental health in engineering, received the Ray W. Fahien Award from ASEE for innovation in chemical engineering education, and previously supported development of an NSF-funded Engineering Wellness Center at the University of Kentucky.



Cheng Zhang

ASSISTANT PROFESSOR | PH.D., UNIVERSITY OF DELAWARE

Dr. Cheng Zhang is an assistant professor of civil engineering at Rowan University. He joined Rowan in January 2025 after serving as a research associate in the joint Program in Atmospheric and Oceanic Sciences at Princeton University and the NOAA Geophysical Fluid Dynamics Laboratory. Zhang earned his doctorate in civil engineering from the University of Delaware's Center for Applied Coastal Research. His research focuses on coastal hazards and oceanography, with an emphasis on developing AI-enhanced deterministic and probabilistic tools to assess and reduce risks from natural hazards in coastal communities.

Teaching Faculty Spotlight
Dr. Rocio Chavela Guerra

For many Rowan engineering students, the first year sets the tone for everything that follows. Dr. Chavela Guerra plays a key role in shaping that experience through her leadership of the First-Year Engineering Clinic and the Engineering Learning Community.

As coordinator of the First-Year Engineering Clinic, Chavela Guerra oversees nearly 20 course sections, leading one of the largest coordinated teaching efforts in the Henry M. Rowan College of Engineering. She has guided a comprehensive redesign of the first-year curriculum to create a cohesive, student-centered experience that balances technical foundations with the development of teamwork, communication and academic success skills.

Chavela Guerra also directs the Engineering Learning Community, a residential program that connects first-year students with peer mentors, faculty and campus resources. Under her leadership, the program has expanded peer mentor training, increased regular student check-ins and introduced new community events designed to support belonging and well-being.

Through an approach grounded in inclusive, evidence-informed pedagogy, Chavela Guerra emphasizes collaboration, empathy and curiosity in engineering education. Her work continues to strengthen Rowan's first-year program as a national model for experiential learning, preparing students to approach engineering challenges with confidence, purpose and care.

> At the heart of our work is helping students build confidence and find community in their first year."
>
> – ROCÍO CHAVELA GUERRA, PH.D.

NSF CAREER Award Advances Nanoparticle Research in Maternal Health

Rachel Riley, Ph.D.
assistant professor
biomedical engineering

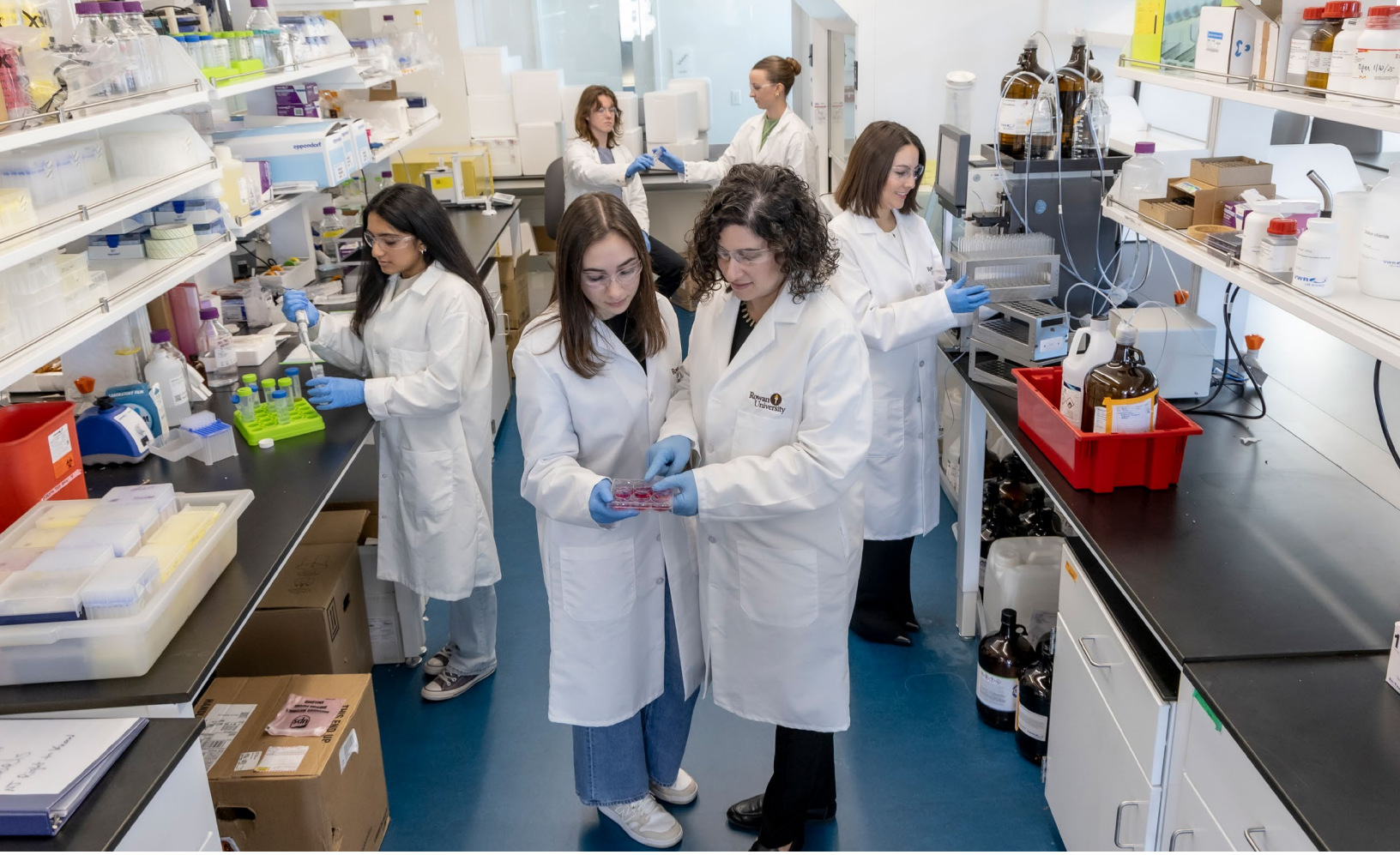
Despite remarkable advances in medicine, pregnancy related conditions such as preeclampsia remain poorly understood and inadequately treated. These hypertensive disorders affect thousands of birthing people in the United States each year, contributing to rising maternal and infant mortality and long-term health risks for parents and children alike. At the heart of this challenge is a lack of targeted therapies and a historic exclusion of pregnant patients from clinical research, creating critical knowledge gaps and limited treatment options.

Rachel Riley, Ph.D., an assistant professor in the Department of Biomedical Engineering at the Henry M. Rowan College of Engineering, is leading a multidisciplinary effort to change this landscape. With a prestigious five-year, $650,000 National Science Foundation Faculty Early Career Development (CAREER) Award, Riley is advancing nanoparticle-based research to deepen understanding of placental biology and to lay the groundwork for novel approaches to studying and ultimately treating pregnancy complications such as preeclampsia.

Riley's work centers on lipid nanoparticles (LNPs), tiny fat-based carriers capable of delivering therapeutic agents and genetic material with precision to specific tissues. While LNPs have gained prominence in vaccines and other diseases, Riley's team is creating new LNP technologies to probe placental development and to explore ways of addressing disease processes unique to pregnancy. The placenta, she explains, is unlike any other organ: it develops rapidly during gestation, orchestrating nutrient and oxygen exchange between parent and fetus, yet remains poorly understood at the molecular and cellular levels.

"This award enables us to study the placenta in ways we have not before," Riley says. "By combining engineering with biological inquiry, we can begin to unravel how placental function influences both short and long-term health outcomes for birthing people and their babies."

Central to this research is student involvement. Graduate students in Riley's IMPACT Lab are designing and testing new LNP formulations, while undergraduates are actively engaged in experimental work that bridges engineering design with biological evaluation. Riley's mentorship philosophy emphasizes student autonomy and ownership, empowering emerging researchers to shape their own scientific questions and to build the confidence needed for future careers in academia, industry, or medicine.



Two recent doctoral graduates, Samuel Hofbauer, now pursuing a medical degree at Cooper Medical School of Rowan University, and Rachel Young, co-founder of the maternal health startup HeraNano Therapeutics, helped advance much of the early research that paved the way for this award. Their contributions reflect the deep connection between fundamental research and translational impact, demonstrating how academic inquiry can fuel real-world innovation.

Beyond advancing scientific knowledge, Riley's NSF CAREER Award supports broader educational outreach and research integration. The project includes collaborations with the Rowan College of South Jersey to provide hands-on undergraduate research opportunities, the development of K–12 science modules to inspire future scientists, and the incorporation of research experiences directly into coursework.

As Riley and her team pursue this work, the goal is clear: to transform how pregnancy-related diseases are studied and, in time, to deliver new insights and treatments that improve health outcomes for families. The combination of cutting-edge engineering, student centered learning, and a commitment to addressing a pressing public health need positions this research at the forefront of maternal health innovation.

> By combining engineering with biological inquiry, we can begin to unravel how placental function influences both short- and long-term health outcomes for birthing people and their babies.

– RACHEL RILEY, PH.D.

HONORING ROWAN AI INNOVATOR

Nidhal C. Bouaynaya, Ph.D.

Nidhal C. Bouaynaya, Ph.D., Vice Chancellor for Artificial Intelligence and Professor of Electrical & Computer Engineering, was recognized among New Jersey's leading innovators at the 2025 Edison Patent Awards, the state's highest honor for technological achievement, for the patent "Method for Detecting Radiological Progression in Cancer Surveillance" (U.S. 12,198,334 B2). The patent was licensed by MRIMath LLC, and the technology has received FDA 510(k) clearance, helping shape the future of AI-assisted oncology care.

Her research focuses on building mathematically rigorous AI systems that are trustworthy, safe and adaptable, with applications spanning healthcare, imaging and autonomous technologies. The recognition reflects both the technical depth of her work and its real-world impact, advancing Rowan University's growing leadership in responsible, human-centered AI innovation.

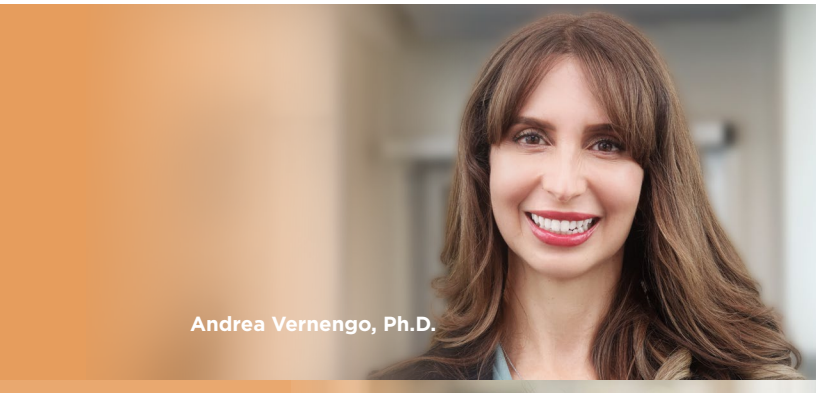
ROWAN FACULTY EARN NATIONAL FELLOWSHIP FOR ENTREPRENEURIAL EDUCATION

Engineering education is evolving to prepare graduates who can create meaningful economic and societal value. At Rowan University, Paromita Nath, Ph.D., assistant professor of mechanical engineering, and Andrea Vernengo, Ph.D., associate professor of chemical and biomedical engineering, have been named 2025 Engineering Unleashed Fellows by the Kern Entrepreneurial Engineering Network.

Selected among 29 faculty nationwide, Nath and Vernengo were recognized for integrating entrepreneurial mindset into engineering education. The fellowship, supported by the Kern Family Foundation, advances projects that strengthen curiosity, systems thinking and value creation in the classroom.

Nath's work emphasizes thoughtful problem scoping to help students engage in stakeholder aware design throughout the engineering process. Vernengo's initiative combines collaborative learning with structured reflection to help students recognize and apply their capacity for innovation.

Together, their efforts reinforce Rowan Engineering's commitment to preparing graduates ready to lead and innovate in a rapidly changing world.



Andrea Vernengo, Ph.D.

Paromita Nath, Ph.D.

GEPHARDT HONORED AS 2025 DELAWARE VALLEY ENGINEER OF THE YEAR

Engineering excellence extends beyond technical achievement to mentorship, service and societal impact. Zenaida Otero Gephardt, Ph.D., professor emerita of chemical engineering at Rowan University, was recognized as the 2025 Delaware Valley Engineer of the Year by the Engineers' Club of Philadelphia during Engineers Week in February 2025.

Jointly nominated by the Delaware Valley section of the American Institute of Chemical Engineers and the International Society for Pharmaceutical Engineering, the award honors professional excellence, civic engagement and contributions that enhance society.

Over a 38-year career at Rowan, Gephardt advanced research in engineering analytics and experimental design, applying data-driven methods to improve processes ranging from aquaculture nutrient extraction to food sterilization. She also served as director, assistant dean and longtime faculty mentor, shaping generations of engineers.

A recipient of numerous professional honors, including Rowan's Lindback Excellence in Teaching Award, Gephardt has long credited her students as a lasting source of inspiration.

As Delaware Valley Engineer of the Year, she served as a regional ambassador for the profession, advocating for engineering education and its role in improving quality of life.

Zenaida Otero Gephardt, Ph.D.

INDUSTRY COLLABORATIONS PREPARE STUDENTS FOR TOMORROW'S WORKFORCE

It used to be that academia drove what was next in technology but the direction of that knowledge transfer has been shifting over many years. "Today we're looking for industry to tell us where things are going," said Yolanda Mack, Ph.D., Associate Dean for Industry Partnerships and Workforce Development at the Henry M. Rowan College of Engineering.

2025 Industry Highlights:

200+
industry engagements

20
new co-ops launched

50
research partnerships

> It really motivates the students to know that they're working on a real problem the Navy has and that they might be able to provide a solution.
>
> – YOLANDA MACK, PH.D.

"To accommodate this shift, Rowan is looking at different ways to embed industry into our education and research so we're always lockstep with them," Mack said.

At Rowan Engineering, that alignment extends across education, research, and workforce development. Industry engagement is embedded within the four-year Engineering Clinic model, a growing co-op program, and a research enterprise that reached $19.7 million in expenditures this year. Together, these elements create an integrated ecosystem in which students and faculty collaborate with industry not only to solve immediate technical challenges but also to advance longer-term innovation.

Engineering Clinics remain a central mechanism for collaboration. Students work directly with corporate and government sponsors on active projects that mirror professional practice. Mack supervises a clinic advancing 3D-printing technology for the U.S. Navy, where students collaborate with a Navy technology leader, with the agency sponsoring the work. "It really motivates the students to know that they're working on a real problem the Navy has and that they might be able to provide a solution," Mack said.

Industry partnerships also play a vital role in shaping Rowan's research agenda. At the Advanced Materials & Manufacturing Institute (AMMI), companies and federal partners collaborate on advanced composites, cold spray technologies, and sustainable manufacturing processes. CREATES works with state and federal agencies to evaluate innovative asphalt materials and resilient infrastructure systems using the region's only university-based heavy vehicle simulator. The Digital Engineering Hub (DEHub) brings together manufacturers and technology leaders to advance digital twins, AI-enabled production systems, and intelligent manufacturing. Through MAVRC, industry partners support applied research in artificial intelligence and virtual reality, accelerating innovation in aviation safety, healthcare training, and defense systems.

These collaborations ensure that research and education remain tightly coupled. Students contribute to federally funded projects, industry-sponsored investigations, and translational initiatives that move discoveries from laboratory to application. In turn, industry gains access to advanced facilities, faculty expertise, and a pipeline of engineers trained in authentic, applied environments.

Industry engagement also informs curriculum evolution and workforce preparation. Advisory boards provide insight into emerging skill needs, while some companies directly contribute to course development. Lockheed Martin, for example, has helped develop a certificate program, which has proved an effective recruitment funnel for talent. Over the years, they have hired close to 500 Rowan students.

A fast-growing co-op program further strengthens this partnership model, placing students in credit-bearing roles across manufacturing facilities, construction firms, medical device companies, AI research labs, and defense contractors. The specially created "Engineering Futures Through Industry Partnerships" fund accelerates company support for internships, clinics and student competition teams. Mack works closely with students to prepare pitch packages when seeking industry funding, reinforcing professional and entrepreneurial skills.

An ex-Raytheon employee herself, Mack has seen how unprepared new graduates can feel entering industry. "Industry-academia partnerships help solve this challenge. They fast-track students into a career and it benefits companies because they have potential employees more ready to work in their industry," Mack said.

Weaving industry needs into academia is necessary to train students for the future of work, Mack said. These partnerships are especially important given the blistering pace of technological advances. "The traditional ways of checking back and forth between industry and universities will no longer work," Mack said, "industry and academia need to be more connected because things are just moving so fast."

Mechanical engineering graduate student Harrison VanDewater stands beneath a Henry Rowan quote at Engineering Hall.

FUTURE READY

Rowan University introduces new co-op program with **Inductotherm** and **Consarc** for hands-on learning

During his sophomore year in Rowan's electrical and computer engineering program, Ray Odgers landed a summer warehouse job at Inductotherm that would change his life.

He soon transferred from the warehouse to the test lab, where he tested electronic boards for quality assurance. During a 10-week summer internship heading into his senior year, Odgers learned how to design power supplies for Inductotherm, the world's leading manufacturer of induction systems used in a variety of green-energy thermal processing applications.

Eighteen years later, he's now associate director of electrical engineering at the company founded by Henry and Betty Rowan, the entrepreneurs whose 1992 gift led to the creation of Rowan's engineering college.

"For me," Odgers said, "it worked out very well."

For more than 30 years, Inductotherm and its sister company, Consarc, have trained and hired Rowan engineering students through summer jobs and internships. A subsidiary of Inductotherm Group, based in Rancocas, New Jersey, Inductotherm alone counts 33 Rowan alumni among its full time employees, including 23 who participated in its internship program.

Now, with the development of Inductotherm Group's co-op program with Rowan, students have exciting opportunities for hands-on experience that leads to career readiness, networking, resume-building and, perhaps, a full-time job with the company.

A CO-OP WITH TEETH

In January 2026, Inductotherm and Consarc launched their first university-level co-op program in partnership with the Henry M. Rowan College of Engineering. Participating students can gain paid, on-the-job engineering experience and academic credits.

The co-op program opened with five slots: three at Inductotherm and two at Consarc. Structured by Rowan faculty to complement the senior fall semester, the program requires students to take additional courses during the semester to earn their bachelor's degree within four years, distinguishing it from other universities' formats. The program also requires students to earn a specialized certificate of undergraduate study in either advanced manufacturing, mechatronics, power systems engineering or cybersecurity engineering.

"This partnership reflects both our future focus and our roots," said Giuseppe Palmese, dean of the Henry M. Rowan College of Engineering. "We are proud to build on the legacy established by Henry Rowan

by expanding our long-standing relationship with Inductotherm and Consarc. Together, we're creating meaningful pathways for students to gain hands-on experience and prepare to participate and lead in the future manufacturing industry."

Rick Hopkins, chief technical officer for Inductotherm Corp., said: "A co-op program allows students to trade theory for practice, allowing them to graduate with confidence, not just credentials."

GAINING WORTHWHILE EXPERIENCE

For years, most interns working at Inductotherm's Research and Development Department have come from Rowan, noted the department's director, Adam Westerland, who graduated from Rowan's electrical and computer engineering program in 2014. That relationship formed the foundation for the new co-op arrangement—one meant to foster innovation and develop the industry's future workforce.

Especially in research and development, Westerland said, "we're definitely looking for lifetime learners. We want someone who can apply the skills they learn from university to their work here."

That's because engineers design systems to suit the individual needs of each customer, Odgers explained. "We're always challenged with designing new things," Odgers added. "We're constantly developing new products."

Through the decades, Inductotherm has cultivated mentors among its employees, Westerland said—people who provide students with worthwhile projects that can potentially lead to full-time positions. Recent graduates who interned with Inductotherm said they appreciated the experience they gained.

Luke Wilkins landed a summer internship with the company after graduating from Rowan with a degree in electrical and computer engineering in May 2025. It was his first professional work experience. As an intern, he said, "I was able to spend a lot more time learning … and I was learning alongside the other interns."

The internship also allowed Wilkins to test out the company's culture. After finding he was a good fit, Wilkins accepted an offer to join full-time as an electrical engineering associate.

The co-op program is designed to pay dividends for the company, too, which needs creative, confident engineers who aren't afraid to go out in the field or into the shop, noted Keith Harrell, mechanical engineering manager for Consarc.

> "Together, we're creating meaningful pathways for students to gain hands-on experience and prepare to participate and lead in the future manufacturing industry"
>
> – GIUSEPPE R. PALMESE, PH.D.

"To me, it's a huge benefit when you can spend more time developing that person because hopefully the guidance you gave them will allow them to become a participating member of the company," said Harrell, who graduated from Rowan with a bachelor's degree in physics and a master's degree in engineering management. "We're a team here. We need to work together in order to get things done effectively."

A ROWAN MINDSET

The work ethic and fearless mindset that threads its way through the founder's company has also affected Rowan's students.

Harrison VanDewater, a mechanical engineering graduate student, reports to Inductotherm 16 hours a week and attends classes at Rowan three days a week. Inspired by the quotes from Henry Rowan that line the walls at work and at school, VanDewater said he's adopted a similar philosophy: If you're going to do something, do it right.

Asked about the entrepreneur's influence on his life, VanDewater found it difficult to sum up in words.

"It's hard to separate what his impact has been, because it's so broad," VanDewater said. "It's been my work and it's been my school for at least four years directly. I owe a lot to that."

THE HISTORY OF ROWAN ENGINEERING CLINICS

When the Henry M. Rowan College of Engineering was founded, its leaders made a bold decision: engineering clinics would be embedded into every semester of every program.

Among those architects was John Schmalzel, Ph.D., professor in the Department of Electrical and Computer Engineering. Drawing inspiration from the clinic model pioneered by Harvey Mudd and strengthened through close industry partnerships, Rowan adapted the concept into something distinctive and enduring.

Rowan's innovation was structural and intentional. Rather than offering a single capstone experience, the college integrated clinics across all four years. First-year students begin with class-wide projects. By their junior and senior years, clinics evolve into small-team, industry-sponsored and research driven projects that mirror professional engineering environments.

Faculty across departments, particularly in chemical engineering, secured long-term industry commitments that established consistent baseline funding for clinic projects. From the outset, the goal was clear.

"When we started this program, we really wanted to have our students ready to go out into industry and be productive on day one," Schmalzel said.

Over time, clinics expanded beyond industry partnerships to include grant- and contract-funded research. Students began engaging not only with corporate collaborators but also with government sponsored research initiatives. These research-based clinics lowered barriers to participation, helping students see themselves as researchers and, in many cases, sparking interest in graduate study.

Because junior and senior clinics span four consecutive semesters, students have time to immerse themselves in complex technical challenges. They move from unfamiliarity to expertise within a single academic year.

"When students join a junior or senior clinic project, they might not know anything about the topic area or the research process, but after one semester, they understand the problem and are actively contributing to it," Schmalzel said.

Entrepreneurship represents the third pillar of the clinic model, aligned with Henry Rowan's original charge to foster job creation and contribute to the economic growth of South Jersey. Clinics encourage venture-oriented projects supported through multiple funding mechanisms, including a college-backed venture fund.

> The opportunities with clinics sold me on Rowan as a prospective student and proved key to launching my career.
>
> – MICHAEL MUHLBAIER '04 (ECE)

Several students have launched companies rooted in their clinic work. Michael Muhlbaier '04 (ECE) founded DIGI-TAILS, which has sold the sequential LED taillight technology developed during his Rowan clinic project for more than two decades. Muhlbaier now serves as CEO of Alencon Systems, a manufacturer of power electronics for renewable energy projects.

"The opportunities with clinics sold me on Rowan as a prospective student and proved key to launching my career," Muhlbaier said.

Today, clinics anchor much of the core design curriculum across the college. They continue to evolve in response to emerging technologies, research priorities and industry needs.

"A large fraction of our clinics explore what I would call the bleeding edge of advanced technologies and involve students in absolute state-of-the-art content," Schmalzel said. "These clinics have been the lifeblood of engineering here at Rowan."

INDUSTRY IN ACTION

Across disciplines and industries, Rowan engineering students are stepping beyond the classroom to apply their knowledge in high-impact professional environments. From manufacturing floors and medical device labs to construction sites and national defense systems, these experiences demonstrate how hands-on industry engagement accelerates learning, sharpens technical expertise and clarifies career pathways.

Sarah Little

CLASS OF 2026
B.S. BIOMEDICAL ENGINEERING

ADVANCING INNOVATION IN MEDICAL PRODUCT DEVELOPMENT

Sarah Little chose biomedical engineering at Rowan University to merge medicine with innovation and prepare for a career in medical product development. Drawn to both the technical and entrepreneurial dimensions of engineering, she leveraged Rowan's flexible curriculum to complement her major with a business administration minor, building a foundation that bridges product design, strategy and market impact.

As an intern at Medline Industries, Little gained direct experience in product development engineering. Entrusted with meaningful responsibility, she contributed to three primary projects spanning multiple disciplines. Her work included SolidWorks prototyping, business case development and presentation, and test plan development for a 510(k) medical device. Through these efforts, she developed a versatile skill set that integrated design, regulatory awareness and commercial strategy.

Rowan's Engineering Clinic further strengthened her preparation. Working in a product development and research environment with medical device startup ReGelTec, she refined her technical abilities while practicing clear documentation, cross-functional collaboration and professional communication.

> **"My internship at Medline was an honest look in the mirror, reflecting my strengths, weaknesses and true passions. There is no better way to gain perspective than to dive headfirst into a real role, testing yourself and everything you have learned as a Rowan engineering student."**

Jayden Williams

CLASS OF 2027
B.S. CIVIL ENGINEERING

DESIGNING SAFER COMMUNITIES THROUGH CIVIL ENGINEERING

For Jayden Williams, civil engineering is more than a major. It is a calling shaped by a lived experience. Growing up in Ellicott City, Maryland, he witnessed two devastating floods that destroyed infrastructure and claimed lives. Those events sparked a question that would define his path: how can infrastructure be designed to better protect communities? At Rowan University, Williams found a program that matched his drive, combining rigorous academics with a strong national reputation and a collaborative engineering environment.

As a design engineering intern at Stonefield Engineering and Design, Williams contributed to land development projects for nationally recognized businesses, including Tractor Supply Company, McDonald's and Wawa. He assisted in developing detailed site plans that incorporated grading, utilities and soil erosion control systems, which were submitted to local municipalities for approval. His work directly supported flood mitigation, public safety and efficient site functionality.

Coursework in Engineering Graphics and Rowan's hands-on clinics prepared him to adapt quickly to industry-standard CAD platforms and collaborate effectively with multidisciplinary teams. In the field, he sharpened his attention to detail, recognizing that engineering decisions affect real clients and communities.

> **"Professional experience is essential for growth because it allows you to find new meaning in the work you produce and appreciate the journey to becoming a successful engineer."**

Alessandra D'Alessio

CLASS OF 2026
B.S. CHEMICAL ENGINEERING

FROM CLASSROOM TO CONTROL ROOM

A commitment to engineering innovation has defined Alessandra D'Alessio's undergraduate journey in chemical engineering at Rowan University. Drawn to the college's growing program and strong academic foundation, she entered the field eager to explore its possibilities and, by her junior year, confident she had chosen the right path. A clearer understanding of the role chemical engineers play in industry solidified her decision.

As a process controls intern at Johnson Matthey, D'Alessio works at the intersection of data, automation and plant safety. She extracts and analyzes data from refinery operational technology networks, enhances human-machine interface screens for plant operators and implements interlocks that strengthen the safety and reliability of chemical processes. Her contributions support the infrastructure that enables real-time process automation in complex industrial environments.

Coursework in Process Design and Controls, along with First-Year and Sophomore Engineering Clinics, prepared her to step confidently into this role. While classes introduced the theory behind automation systems, her internship revealed the physical and digital systems that bring those designs to life.

> **"Invaluable. I feel I have a head start compared to my peers. I learned the theory in class while simultaneously applying it to real chemical processes."**

Macy Jo Gregory

CLASS OF 2026
B.S. ELECTRICAL & COMPUTER ENGINEERING

ENGINEERING WITH PURPOSE

Hands-on industry experience has shaped Macy Gregory's path as an electrical and computer engineering student at Rowan University. Drawn to Rowan's close-knit learning environment and inspired by her own medical journey with Chiari malformation, Gregory pursued opportunities that would allow her to translate classroom theory into real-world impact.

As a hardware engineering intern at the Federal Aviation Administration William J. Hughes Technical Center, she designed a voltage testing device for the Runway Incursion Device project, strengthening her skills in printed circuit board design, 3D modeling and electronics troubleshooting. The following summer, she joined Impulse Dynamics as a product development intern, where she contributed to design verification testing in the implantable medical device field.

Through these experiences, Gregory deepened her technical expertise while gaining insight into the pace, collaboration and problem-solving required in industry.

> **"My industry experience as a Rowan engineering student has allowed me to demonstrate theoretical understanding through hands-on application and strengthen my abilities as an engineer."**

Jessica Mastriano

CLASS OF 2026
B.S. ENGINEERING
ENTREPRENEURSHIP

ENGINEERING VISION INTO CONSTRUCTION LEADERSHIP

Blending technical expertise with business strategy, Jessica Mastriano has shaped her undergraduate experience in engineering entrepreneurship around impact and innovation. Drawn to Rowan University's distinctive program, which integrates engineering fundamentals with entrepreneurship and leadership, Mastriano sought an education that would prepare her to think both analytically and strategically. Her confidence in that choice solidified after completing a summer internship where she saw firsthand how engineering decisions translate into visible, lasting results.

At Earle Asphalt Company, Mastriano worked alongside project and field engineers, gaining a comprehensive view of the civil construction industry. In the office, she reviewed construction plans, estimated quantities and mapped material needs. In the field, she observed construction sequencing, daily operations and real-time problem-solving, developing an appreciation for how planning evolves into execution on active job sites.

Her Junior and Senior Engineering Clinics provided a strong foundation in project management, communication and teamwork, skills she applied directly in industry. The experience ultimately led her to accept a full-time position with the company.

> **"My industry experience allowed me to connect classroom learning with real-world application, giving me clarity and confidence in my career path. It reinforced my passion for engineering by showing me the direct impact this work has in the field."**

Nicholas Hutchinson

CLASS OF 2026
B.S. MECHANICAL ENGINEERING

FROM CLINIC DESIGN TO NATIONAL DEFENSE SYSTEMS

Nicholas Hutchinson's path in mechanical engineering reflects Rowan University's blend of close mentorship and expansive opportunity. Initially uncertain about attending the same university as his twin sister, Hutchinson quickly recognized the value of Rowan's "small school feel and big school resources." Early design projects, including the mechanical arm and digital scale, confirmed his passion for applying engineering principles to tangible systems.

Through the Mechanical Engineering Department's co-op program, Hutchinson serves as a systems engineer at Lockheed Martin Rotary and Mission Systems, contributing to product development for the Aegis Combat System used on naval warships.

His academic and extracurricular experiences reinforced this trajectory. As team lead for Rowan's American Institute of Aeronautics and Astronautics Design/Build/Fly clinic team, he guided peers through aerodynamic modeling, computational fluid dynamics, finite element analysis and manufacturing, marking Rowan's first appearance at the national competition.

Rowan's project-based curriculum prepared Hutchinson to think critically, iterate designs and embrace the discipline of testing and refinement—skills central to both defense systems development and aerospace innovation.

> **"Working in industry alongside my academic studies has greatly increased my depth of learning and has provided new perspectives on how to grow as an engineer."**

ADVANCING THE CAUSE OF MATERIALS SCIENCE

$40M+
in External Funding Expended (6 Years)
Supporting convergent manufacturing, sustainable materials and defense research

300+
Undergraduates &
75+
Graduates Trained
Hands-on research through the government, industry and academic partnerships

40+
Industry and Government Partners
in the last six years

When the Advanced Materials & Manufacturing Institute (AMMI) at Rowan University launched in 2019, its primary goal was to further research and practical applications in the principles of materials science.

To accommodate the wide field, research at the institute falls under one of four technical initiatives: advanced composites; optics and photonics; clean and green energy; and sustainability. AMMI attracts the broader scientific community to its facility because of the depth of its expertise and the range of cutting-edge technologies and equipment. The Army Research Lab in Aberdeen Proving Ground, Maryland, has been a long-term partner. The institute offers fee-for-service work and companies might also rent lab facilities as needed.

AMMI has embraced a wide variety of initiatives, including the Glass Recirculation Program (GRP). The project gathers and systematically sorts glass waste and translates it into a number of applications, including landscaping for local communities. Glass Recirculation Program also facilitates research into glass, which ties in with Rowan's own campus in Glassboro, named after the historic industry that took root here. The initiative has recruited students from mechanical, chemical, electrical, and computer engineering, and environmental science. "It's a good example of how AMMI is able to bring people together to work on real-world problems," said Joseph Stanzione, Ph.D., director of AMMI and professor of chemical engineering in the Henry M. Rowan College of Engineering.

This ability to work on real-world partnerships through industry and government partnerships pays rich dividends for students. "One of the most valuable things students gain from these partnerships is communication skills. They have to learn to think critically and write and present data well and use these skills immediately upon graduation" Stanzione said. They also train on foundational equipment necessary for future jobs. One such equipment at AMMI is the cold spray unit—a high-speed particle accelerator with ultra high-speed videography. Research using this unit explores optimal spray coatings and informs physics models associated with solid state dynamics and behaviors.

Students use the cold spray facility during engineering clinics sponsored by industrial partners or federal grants. The engineering clinics serve as a microcosm for the real-world where students will work with people with different backgrounds and expertise, Stanzione said. In the cold spray facility students build new rigs, electronic hardware components, and software for Industry and government partners in turn "get a first-pass screening of our students so they can see a potential fit for talent in their facilities," he added.

> **AMMI brings people together to work on real-world problems**
>
> – JOSEPH STANZIONE, PH.D.

DRIVING RESEARCH IN TRANSPORTATION

Being the only academic institution in the Northeast with resources devoted to accelerated pavement testing using the heavy vehicle simulator and other aspects of highway construction, the Center for Research and Education in Advanced Transportation Engineering Systems (CREATES) at the Henry M. Rowan College of Engineering offers a host of services to industry and government.

These include routine fee-for-service options to test newly developed materials or access to specialty equipment. For example, industry partners have consulted with CREATES about new asphalt mixes with recycled materials, new binders, and quality control tests for roadways, said Yusuf Mehta, Ph.D., PE, director of CREATES.

The Rowan University Construction Materials Laboratory (RUCOM) is accredited by the American Association of State Highway and Transportation Officials (AASHTO), which gives it the industry credibility to conduct research and testing, Mehta said. CREATES also hosts advanced facilities such as the fully instrumented accelerated pavement testing facility (RUAPTF) and a heavy vehicle simulator. The simulator delivers accelerated loading that can recreate traffic conditions to understand how roads can wear out decades down the line.

Students are actively involved in helping CREATES meet its mission of researching innovative solutions to problems in transportation engineering. They access learning opportunities in the field by working in the advanced facilities through industry and government funding. Partnerships with industry also facilitate fellowships, which can directly fund student research. Companies find a new avenue to conduct research in advanced engineering facilities in addition to potentially accessing trained talent.

Partnerships extend to government agencies as well. One such, with the U.S. Army Corps of Engineers (USACE), involves research in the Arctic. The goal is to develop innovative construction technologies and materials that can help cold regions impacted by climate change.

To meet one of its goals of education and workforce development, CREATES hosts a National Summer Transportation Institute for New Jersey's high school students who want to explore careers in transportation engineering. The program includes field trips to relevant transportation agencies and curricula tailored to acquainting students with the sector.

CREATES has been setting the bar for research in transportation engineering ever since it launched in 2016, Mehta said. "The best part is that we touch on all aspects of transportation so the pipeline of talent we create and the breadth of our portfolio is immense. Whether it's through education and research, professional development, or outreach, we are committed to addressing the sector's needs and boost those through partnerships with both government and industry," Mehta added.

> "we touch on all aspects of transportation so the pipeline of talent we create and the breadth of our portfolio is immense."
>
> **– YUSUF MEHTA, PH.D.**

$70M+

CREATES research portfolio over the past decade, advancing infrastructure resilience and sustainable transportation systems

300% GROWTH

Increase in doctoral student enrollment over five years, reflecting rapid expansion in research capacity and graduate training

50+

Industry & Government Partners

Collaborations with local, state and federal agencies over the past decade, translating research into real-world impact

Caitlin Purdy, CREATES lab manager and part-time MSE doctoral student, works alongside civil engineering doctoral graduate Andrae Francois as they prepare a heated asphalt–aggregate mix for pavement materials research.

FIRST

of-Its-Kind Digital Engineering Center

Integrating industry, government and academia to advance digital engineering

Advanced

3D PRINTING

& Supercomputing Lab

Polymer and metal additive manufacturing integrated with high-performance computing

FIRST

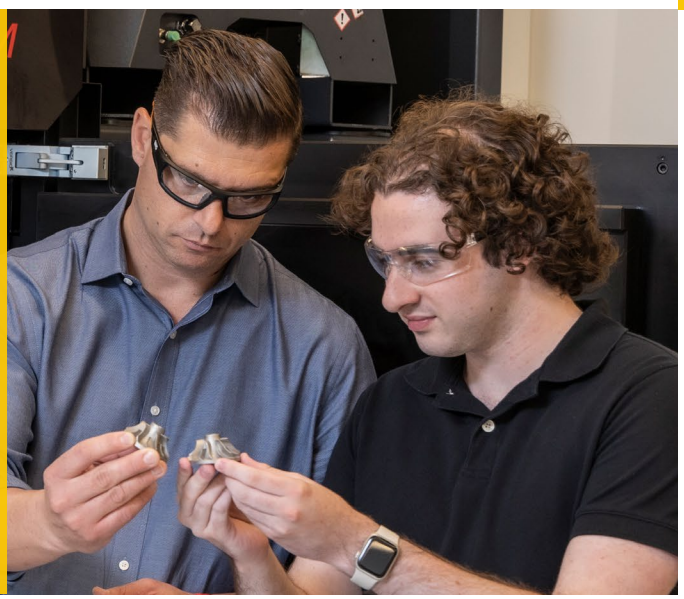
metal 3D-printer enabling born-qualified manufacturing

via closed-loop feedback control

CREATING NEXT-GENERATION PRODUCTS AND PROCESSES WITH DIGITAL ENGINEERING

Alexander Kinoian performs pre-processing steps for metal 3D printing, preparing materials and equipment to ensure precision and quality in the final build.

> **The work here is far beyond what a student sees in any course or traditional research lab.**
>
> **– ANTONIOS KONTSOS, PH.D.**



A collaborative robot with obstacle avoidance capability and a smart car with lane-assist functionality are products of digital engineering (DE), the study of data-driven computing and decision-making to optimize operations and products, which represents the application of the broader defined digital transformation in engineering.

To unleash DE's potential, the Digital Engineering Hub (DEHub) at Rowan, launched in August 2025, convenes industry and academia to evaluate and expand use cases. Antonios Kontsos, Ph.D., Henry M. Rowan Foundation Professor in the Department of Mechanical Engineering, serves as the center's inaugural director. A number of students and faculty from Rowan as well as other U.S. universities already use DEHub; interested industry partners have included Merck and Siemens.

The industry-academia collaborations in DEHub address the two primary roadblocks—complexity and adaptability—in the scaling of digital engineering applications.

Because of the complexity of industrial processes, what works in the lab might not easily scale in industry. Working with industry helps academia understand (and solve) complexities related to the management of distributed resources, assets and personnel, Kontsos said. Using this knowledge, DEHub researchers fine-tune their work to meet industry needs.

Second, to meet market demands more easily, factories must use the same equipment to manufacture different kinds of products, accommodating different processes.

DEHub helps industry tackle this challenge by modifying established processes using digital twins, defined as complete virtual representations of physical systems capable of predicting their behavior by leveraging data, computing as well as artificial intelligence. Keeping the end goal in mind, DE can impressively streamline the outcome of a process as it's happening while also forecasting its future development. "We can therefore optimize in real-time the use of the same system in a way that fits multiple goals on demand, which practically speaking was impossible before," Kontsos said.

DEHub is testing the principles of such adaptability and customization through a collaboration with DMG MORI, a manufacturer of precision machine tools. DEHub researchers work with the company's LASERTEC 30 SLM US, a cutting-edge metal additive manufacturing machine with an Internet of Things-type controller that enables the detection and correction of flaws in real time. "The revolutionary goal here is to develop knowledge that could be applied not only to this system but to similar manufacturing operations whether these are in the same factory or anywhere in the world," Kontsos said.

Specialty clinics underscore DEHub's industry-academia collaboration goals. This year, students are building an electric vehicle for a Formula One racing vehicle, an event targeting a related competition for the Society of Automotive Engineers. With a nod to the digital engineering principles of DEHub, the car's design is completely digital. In addition to a race-ready machine, the final deliverable includes a blueprint to help modify the vehicle to meet evolving needs.

The EV clinic is just one of the hands-on cutting-edge projects from DEHub. "The work here is far beyond what a student sees in any course or traditional research lab," Kontsos said.

WORKING AT THE INTERSECTION OF AI AND VIRTUAL REALITY

The field of artificial intelligence is advancing at a remarkable pace, and startups and established companies alike are racing to find skilled talent to keep up. They find it at Rowan University, especially among students at the Machine, Artificial Intelligence, and Virtual Reality Center (MAVRC), who research solutions at the intersection of AI and VR.

Industry partners seek out MAVRC because of the center's breadth of fundamental and applied research in these popular advanced technologies. It's why engineering startups like New Jersey-based Thunderbolt Solutions, Envision Innovative Solutions, Inc., IBIS Corp., and established corporations like Lockheed Martin and iWorks Corp. fund students at MAVRC, said director Nidhal C. Bouaynaya, Ph.D.

Bouaynaya, Associate Vice Chancellor for Artificial Intelligence and a professor in the Henry M. Rowan College of Engineering, pointed to iWorks Corporation's funding of doctoral student, Chris Angelini, and IBIS's sponsorship of doctoral student, Kyle Naddeo, as prime examples of companies looking to MAVRC for a pipeline of qualified talent.

As with other centers at Rowan College of Engineering, MAVRC hosts engineering clinics where students learn the ropes about AI and VR and participate in projects that deliver custom technology solutions for clients.

The range of projects taken on by the center's faculty and students has been impressive, funded by both industry and government programs such as Small Business Innovation Research (SBIR).

For example, an early government-funded project focused on using AI for aerial threat detection. Because there weren't enough datasets to train learning models at the time, the center used VR to generate synthetic data.

The symbiotic nature of the VR-AI relationship means AI can in turn be used in VR, Bouaynaya said. For example, the Dreamscape Learn Center, which is a University-level center, also under the leadership of Dr. Bouaynaya, delivers immersive, AI-enhanced VR education.

The MAVRC is working with the Cooper Medical School of Rowan University to deliver custom VR-driven education for the trauma center. Unlike other VR-related medical training, which is pretty much the same module for all students, the Dreamscape learning is custom for each student. "If you don't understand a concept or make a mistake in a procedure while learning, the AI agent within VR can change the learning depending on the user," Bouaynaya said. "It's about AI observing the environment and reacting accordingly so it's much more beneficial," she said. The possibilities for AI in VR-driven education extend beyond the Cooper use case—ranging from lessons for students of veterinary science to art history.

The center also offers training and educational programs, including international certifications, on the convergence of AI and VR for industry partners. Industry partners seeking to integrate these technologies into their operations turn to the center for partnership and collaboration, which underscores MAVRC's role as a bridge between research innovation and real-world impact, Bouaynaya said.

> "If you don't understand a concept or make a mistake in a procedure while learning, the AI agent within VR can change the learning depending on the user."
>
> – NIDHAL C. BOUAYNAYA, PH.D.

FAA

Partnership

A Decade of Collaboration

MAVRC has marked 10 years of sustained collaboration with the Federal Aviation Administration (FAA), advancing AI & VR solutions in aviation safety and human-machine decision support systems.

GOOGLE

Research Grant, 2025

Dr. Ying (Gina) Tang and Dr. Nidhal Bouaynaya received Google funding and mentorship to advance "Personalized Instruction and Need-aware Gaming (PING)," an AI-driven learning platform.

MAVRC

Graduate to Tech Founder

Kyle Naddeo, Ph.D. candidate, co-founder and CTO of Range Robotics, Inc.

Leeza Duller (left) and Garrett Williams (right), graduates of MAVRC under Dr. George Lecakes, review one of the immersive Anatomy and Physiology visualizations they developed within Rowan University's Dreamscape Learn facilities.

TRAINING THE NEXT GENERATION OF BUILDING MANAGEMENT PROFESSIONALS

The Rowan University Sustainability Facilities Center (SFC) helps the public and private sector conduct energy audits of hundreds of their facilities across New Jersey. The state's Department of Military Affairs (NJDMA) is a principal client, as is New Jersey American Water.

The NJDMA has a mandate to perform audits on its buildings, while New Jersey American Water has a mandate from the NJ Board of Public Utilities (BPU) to perform benchmarking of some of their facilities Rowan students therefore have a healthy crop of buildings to work with every year.

Small cohorts of Rowan students tackle the energy audits through engineering clinics. "The students, staff, and faculty from four engineering departments really add value to our offerings," said William Riddell, principal investigator for the Builder/ISR/Audit program at SFC and associate professor of civil and environmental engineering at Rowan. The multidisciplinary teams include mechanical, electrical, and civil engineers.

Clinics participants conduct comprehensive inventories of all energy usage in a building and develop thorough models that incorporate all elements such as HVAC components, lighting, plug loads and more. Inputting the energy expenses, teams conduct cost-benefit analyses to recommend potential energy savings methods. The Department of Military Affairs uses these recommendations to apply for funding that can be used to improve energy efficiency.

Recommendations can range in complexity, often requiring extensive modeling of problems. "It's not a trivial thing to even just track the energy use for all these different facilities," Riddell said.

The building audits for energy use and water consumption are part of just one engineering clinic the SFC offers. Work for this and other clinics in facilities management and Building Information Modeling (BIM) necessitates laser scans and condition assessments and learning tools like Autodesk Revit.

"The clinics are part of a great partnership because the institutions get things they need and the scope of work fits in nicely with the educational mission of Rowan," Riddell said. The hands-on and open-ended multidisciplinary clinics exercise students' learning in innovative ways, who learn to evaluate assigned facilities thoroughly, delivering custom recommendations.

The government-academia partnerships the SFC facilitates deliver real-world exposure to problems, which is valuable experience for professionals in sustainability, building information modeling and facilities management. "The diverse skills that we bring to these government-academia partnerships is one of the many real strengths of the center," Riddell said.

Engineering Better Medicines Through Crystallization Science

research detail:

Acetaminophen (Tylenol) alloys grown in Dr. Capellades' lab are doped with a purple additive that increases their solubility.

Crystals are part of everyday life. The salt on a table, the metal in cars, the semiconductors in computer chips and many common medications all share one trait: a highly organized internal structure. In pharmaceuticals, that structure can directly affect how a drug performs.

Gerard Capellades, Ph.D., assistant professor of chemical engineering in the Henry M. Rowan College of Engineering, studies crystallization in drug manufacturing. His research aims to improve how crystalline medications, including painkillers, antibiotics and antidepressants, are purified and produced.

After chemists synthesize a drug's active ingredient, unwanted byproducts remain. Crystallization, often achieved by lowering temperature, is one of the most efficient and cost-effective purification methods. Yet impurities can still become trapped within growing crystals, potentially altering their properties.

The Crystallization Science & Pharmaceutical Engineering (CSPE) lab, led by Dr. Capellades, investigates how these impurities incorporate into crystals and how they influence drug performance. The team also explores whether carefully selected additives, known as dopants, could intentionally modify crystal behavior, similar to techniques used in metallurgy for the design of alloys.

Using model compounds such as acetaminophen (the active ingredient in Tylenol), students introduce visible additives and study structural changes under a microscope. The group is also examining how the surrounding crystallization environment affects formation, work that could expand crystallization methods to larger, more complex drugs such as peptides and proteins antibodies.

"Crystallization is much more efficient than current purification methods for biologics," Capellades says, "but it becomes more challenging as molecules get larger."

Through this work, Rowan engineers are advancing safer, more precise pharmaceutical manufacturing processes.

Gerard Capellades, Ph.D.

Family Support and Engineering Belonging

Engineering programs are known for their rigor, but academic success is shaped by more than coursework alone. A growing body of research suggests that students' sense of belonging plays a critical role in persistence and achievement, particularly in demanding fields like engineering.

At Rowan University, Justin C. Major, Ph.D., assistant professor of experiential engineering education, is examining how family support influences engineering students' sense of belonging. Their research explores how encouragement, expectations and understanding from family members can shape students' confidence and commitment to their chosen field.

Through surveys and qualitative analysis, Major and their collaborators are investigating how different forms of support, whether emotional, financial or informational, affect students' academic experiences. The work pays particular attention to low-income students, helping identify barriers and opportunities for strengthening persistence.

Findings from the study aim to inform classroom practices and institutional strategies that foster inclusive learning environments. By understanding the broader support systems that influence student success, Rowan educators can better design programs that help students thrive.

Through this research, Rowan engineers are advancing not only technical innovation but also a deeper understanding of the human factors that shape the future engineering workforce.

Justin C. Major, Ph.D.

Islam Mantawy, Ph.D., front, leads student researchers in the Additive and Robotic Construction Laboratory (ARC-LAB) at Rowan University, where the team advances 3D printing technologies for construction. Pictured with Mantawy, from left, are Pranjal Tiwari, Aly Ahmed, Jenna Migliorino and Anthony Mackin.

Printing the Future of Infrastructure

As communities confront climate change, aging infrastructure and increasing disaster risk, engineers are rethinking how the built environment is designed and constructed. Additive manufacturing, commonly known as 3D printing, is emerging as a powerful tool to build faster, smarter and more resilient structures.

Islam Mantawy, Ph.D., P.E., assistant professor of civil and environmental engineering in the Henry M. Rowan College of Engineering, is leading this transformation. A structural engineer by training, Mantawy founded the Additive and Robotic Construction Laboratory (ARC-LAB) to advance large-scale 3D printing of concrete and metal systems.

His research focuses on creating lightweight, high-strength geometries that use sustainable materials while improving structural performance. In concrete, the team investigates optimized strength-to-weight ratios and enhanced environmental adaptability. In metal additive manufacturing, researchers develop high-performance components for seismic protection and hazard mitigation. The lab also explores multifunctional wall systems that could serve as rapidly deployable relief shelters after natural disasters, as well as 3D printing in extreme environments, including underwater construction.

Mantawy recently secured $1 million in federal funding, appropriated through the CJS bill and awarded by the National Institute of Standards and Technology, titled “Additive Construction and Manufacturing Equipment for Affordable and Resilient Housing Research and Workforce Development.” The investment will expand ARC-LAB’s footprint with large-format concrete 3D printers, accelerating research, strengthening academic-industry partnerships and advancing workforce development.

Graduate and undergraduate students play an integral role in ARC-LAB’s projects, gaining hands-on experience with robotic systems and next-generation materials.

Advancing Engineering Ethics Through Innovative Education

Engineering decisions can carry life-or-death consequences. From the Challenger disaster to modern infrastructure and technology systems, ethical judgment is as critical as technical skill.

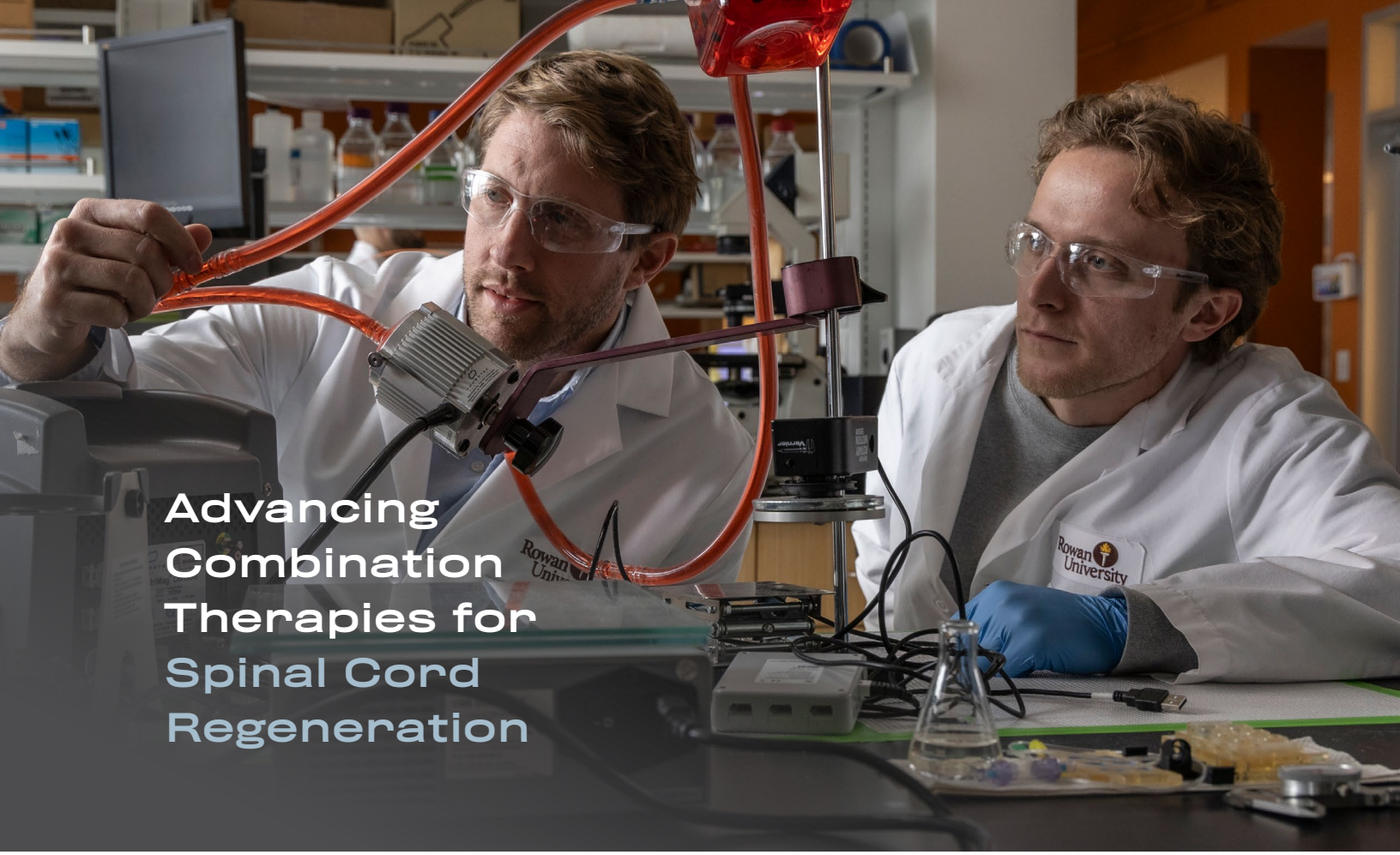
At Rowan University, Kevin Dahm, Ph.D., professor of chemical engineering, is advancing new approaches to teaching engineering ethics. With support from a $750,000 Phase II grant from the National Science Foundation—including $125,000 to Rowan—Dahm and collaborators at the University of Connecticut, University of Pittsburgh and New Jersey Institute of Technology are developing a national educational and assessment toolkit for engineering ethics.

Building on a successful Phase I project, the team gamified ethical dilemmas through interactive activities modeled on popular games. Students worked through complex, scenario-based decisions and reflected in writing on their reasoning. While student feedback was strong, traditional assessment tools failed to capture growth in ethical thinking.

Phase II focuses on developing a more sensitive evaluation method. Using qualitative coding and natural language analysis, researchers will track how students' reasoning evolves over a semester, measuring whether their decision-making becomes more holistic and globally informed.

The long-term goal is to create a widely adaptable ethics education kit for engineering programs nationwide. By strengthening how ethics is taught and assessed, Rowan engineers are preparing students to navigate high-stakes decisions with clarity, responsibility and care.

Kevin Dahm, Ph.D.



Advancing Combination Therapies for Spinal Cord Regeneration

Spinal cord injuries present one of the most complex challenges in regenerative medicine. Scar formation and chemical inhibitors within the central nervous system often prevent damaged nerve fibers from regrowing, limiting recovery options for patients.

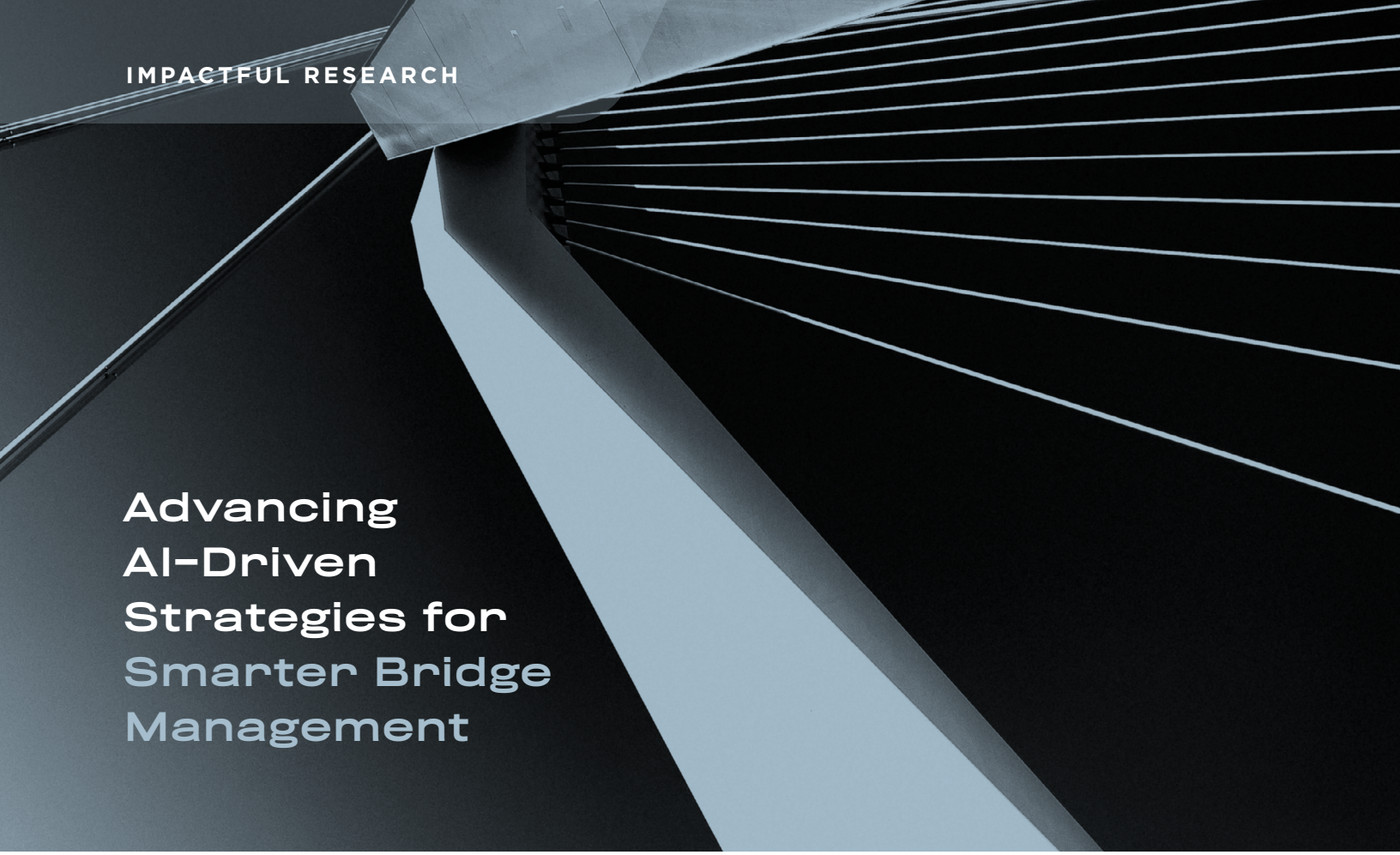
Louis S. Paone, Ph.D. and Peter A. Galie, Ph.D. in the Department of Biomedical Engineering in the Henry M. Rowan College of Engineering, are advancing a new strategy to address this barrier. Their research, published in Biomaterials introduces a multifunctional, injectable hydrogel designed to deliver multiple therapies at once.

The platform is built on hyaluronic acid, a naturally occurring molecule, engineered to carry bioactive compounds. The team modified the material to transport multiple therapeutic agents. The formulation tested in their work featured one therapeutic to block proteins that drive scar formation and another to guide nerve cells to regrow in the proper direction. Embedded within a temperature-sensitive gel that solidifies upon injection, the system enables minimally invasive delivery directly to the injury site.

Preclinical studies demonstrated sustained release of therapeutic agents and improved nerve fiber integration within weeks. Conducted in collaboration with Itzhak Fischer, Ph.D., and Ying Jin, Ph.D., at Drexel University College of Medicine, the work establishes a new approach to delivering drugs to the spinal cord.

While additional studies must be completed before clinical translation, this approach represents a promising step toward combination therapies that could improve recovery outcomes for individuals living with spinal cord injuries.

Peter A. Galie, Ph.D.



Advancing AI-Driven Strategies for Smarter Bridge Management

New Jersey's bridges carry millions of drivers each day, yet maintaining their safety requires constant vigilance, timely repairs and careful use of limited public funds. To help the state make smarter, data-driven decisions, Islam Mantawy, Ph.D., assistant professor in the Department of Civil & Environmental Engineering, secured a two-year, $700,000 grant from the New Jersey Department of Transportation to advance bridge asset management strategies.

Working alongside Nidhal C. Bouaynaya, Ph.D., associate vice chancellor for artificial intelligence and director of Rowan's Machine, Artificial Intelligence and Virtual Reality Center, Mantawy is developing artificial intelligence and machine learning tools that analyze inspection images, detect damage such as cracks and corrosion and forecast deterioration.

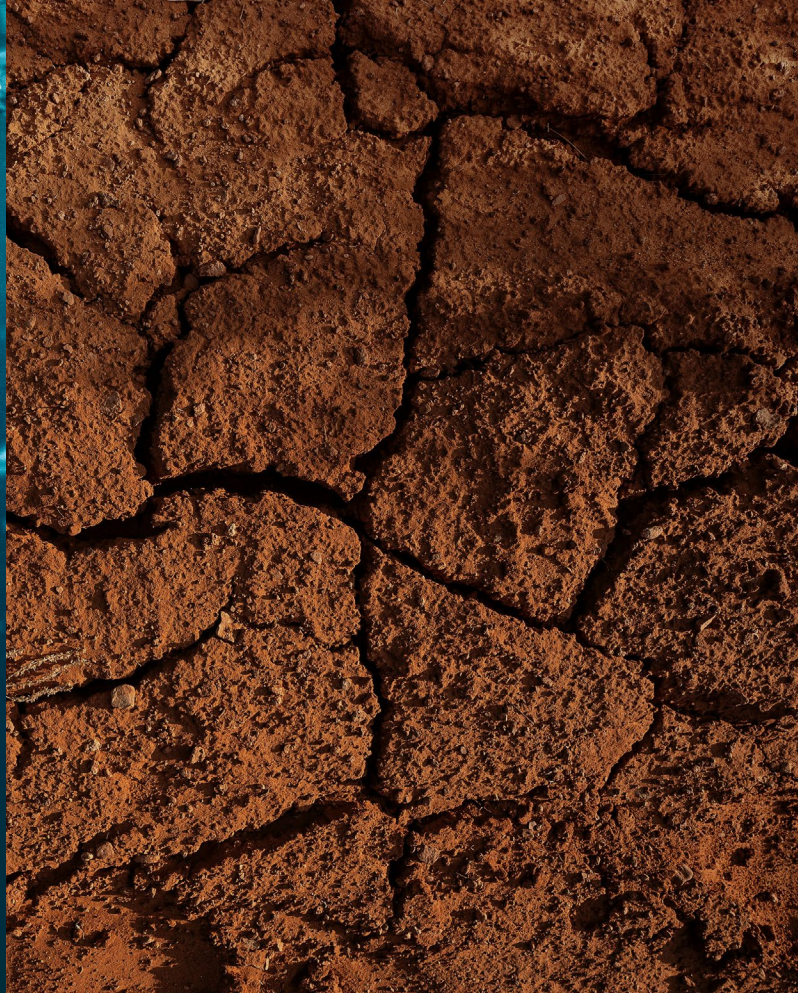
Adriana Trias Blanco, Ph.D., assistant professor in the department, contributes expertise in Light Detection and Ranging (LiDAR) technology, creating detailed digital maps of bridge structures that allow engineers to measure damage severity and track changes over time. Together, the team is also leveraging generative AI to automate documentation required under updated Federal Highway Administration National Bridge Inventory standards.

With more than 6,800 bridges statewide, this research will help agencies prioritize repairs, reduce administrative burden and extend infrastructure life cycles. By combining predictive modeling, advanced sensing and life cycle cost analysis, Rowan engineers are strengthening public safety while optimizing taxpayer investment.

Islam Mantawy, Ph.D.

Nidhal Carla Bouaynaya, Ph.D.

Adriana Trias Blanco, Ph.D.



Advancing Sustainable Solutions for Cleaner Water and Soil

Protecting air and water quality remains one of the most urgent environmental challenges of our time. As industrial activity increases and new contaminants emerge, engineers are developing smarter, more sustainable strategies to remove pollutants before they impact ecosystems and public health.

At Rowan University, Zhiming Zhang, Ph.D., assistant professor in the Department of Civil & Environmental Engineering, is advancing technologies designed to clean up contaminated water and soil. His research focuses on understanding how pollutants move through natural and engineered systems and how innovative treatment methods can capture or neutralize them more efficiently.

Zhang's work combines laboratory experimentation with environmental modeling to study the behavior of contaminants at the microscopic level. By examining how chemicals interact with soils, microbes, and filtration materials, his team is identifying ways to enhance removal processes while reducing energy use and secondary waste.

Students play a central role in the research, gaining hands-on experience with advanced instrumentation and environmental testing methods. Through interdisciplinary collaboration, they explore solutions that bridge chemistry, biology, materials science and environmental engineering.

The long-term goal is to develop scalable treatment strategies that municipalities and industry can adopt to safeguard water resources. By improving contaminant removal and advancing sustainable remediation practices, Rowan engineers are helping build cleaner, healthier communities.

Zhiming Zhang, Ph.D.

Advancing Digital Engineering & AI-Driven Manufacturing

As cyberphysical systems grow more complex and interconnected, industry faces an urgent challenge. How can manufacturers design, test and deploy smarter systems that adapt in real time while remaining secure, efficient and resilient? Researchers at Rowan University's Digital Engineering Hub are answering that question by integrating artificial intelligence with digital twins to accelerate innovation across sectors.

Directed by Antonios Kontsos, the first Henry M. Rowan Foundation Professor in the Department of Mechanical Engineering, DEHub brings together faculty, graduate students and undergraduates to transform how engineering systems and products are designed, manufactured, tested, deployed and maintained. Officially launched in August 2025, the fully renovated 1,800-square-foot facility serves as a nexus for digital design, advanced manufacturing and AI-driven decision-making.

At the core of DEHub is a state-of-the-art laser powder bed fusion metal 3D printer. The system is the first of its kind to be fully designed and assembled in the United States and is equipped with Internet of Things technology that enables real-time data exchange. This capability allows researchers to monitor builds as they occur, adjust parameters dynamically and improve material performance from the earliest stages of production.

Complementing this system is Rowan's first supercomputer with a dedicated streaming node, creating the first IoT-enabled high-performance computing platform on campus and the only one of its type in New Jersey and the tri-state region.

Together, these tools allow researchers to create digital twins, virtual replicas of physical systems that continuously update based on live data, enabling predictive analytics, process optimization and adaptive control.

The facility also houses an advanced mechanical testing laboratory featuring full-field metrology through digital image correlation combined with infrared thermography. Acoustic emission systems and high-speed data acquisition tools, supported through collaborations with global leaders in nondestructive evaluation, allow researchers to detect microstructural changes before failure occurs. A unique edge-fog-cloud infrastructure further supports secure, distributed decision-making architectures that operate both on-premises and through integrated high-performance computing environments.

For students, DEHub provides immersive, hands-on experience at the forefront of digital manufacturing. Undergraduate and doctoral researchers work side by side, developing algorithms, refining additive manufacturing processes and translating data into actionable engineering insight. These interdisciplinary collaborations equip students with technical depth and systems-level thinking demanded by today's workforce.

By converging artificial intelligence, advanced manufacturing and high-performance computing, DEHub is redefining how products are brought from concept to deployment. As the hub expands industry partnerships and research capacity, it positions Rowan Engineering to lead in the next generation of resilient, intelligent manufacturing systems.

Antonios Kontsos, Ph.D. (left) and undergraduate student Sam Menaker inspect a 3D printed metal component.

HeraNano Therapeutics: Targeting the Placenta to Transform Maternal Health

Rachel Riley, Ph.D. (right), and Rachel Young, Ph.D. (left)

Each year in the United States alone, 1 in 25 pregnancies experience severe preeclampsia, a life-threatening pregnancy complication with no FDA-approved therapeutic treatment. Clinicians are often forced to deliver infants prematurely to protect the mother, placing them at risk for prolonged NICU stays and lifelong health challenges. HeraNano Therapeutics, a Rowan University spin-out, is working to change that standard of care.

Founded in July 2024 and based in Camden, New Jersey, HeraNano Therapeutics was co-founded by Rowan biomedical engineer Rachel Riley, Ph.D., and Rachel Young, Ph.D., whose doctoral research laid the scientific foundation for the company. Backed by a $75,000 non-dilutive grant from the New Jersey Economic Development Authority's CSIT program, along with additional maternal health funding, the company is advancing a first-in-class nanomedicine designed to directly treat severe preeclampsia.

HeraNano is addressing preeclampsia by developing a lipid nanoparticle platform to deliver therapeutic nucleic acids to the placenta to elongate healthy pregnancy. These nanoparticles are engineered to treat underlying causes of preeclampsia and aim to minimize off-target effects to both the pregnant person and fetus. Ultimately, implementation of these lipid nanoparticles would support normal placenta function and reduce complications for both mothers and babies.

The company will license the technology from Rowan University for the proprietary lipid nanoparticle platform with scalability to expand into additional placental disorders and specific types of cancers. With an addressable market estimated at $6 billion in the United States, severe preeclampsia represents a large market opportunity that HeraNano is positioned to fill.

Beyond commercial potential, the impact is deeply human. Women's health, particularly conditions affecting pregnancy, has historically been underfunded and understudied. HeraNano's work seeks to close that gap by developing high precision therapies that prioritize maternal-fetal safety and equity in care.

As HeraNano prepares for its next stage of growth, including preclinical research and seed fundraising, the company represents the translational power of Rowan research. What began as doctoral research in a university lab is now advancing toward clinical application, with the potential to redefine how preeclampsia is treated worldwide.

Engineering Excellence
On and Off the Field

Balancing the demands of a rigorous engineering curriculum with the commitment required of being a student-athlete takes focus, discipline, and strong support systems. The Henry M. Rowan College of Engineering at Rowan University has 60 student-athletes that not only excel in the classroom but are maintaining athletic excellence. These student-athletes represent all of the College's disciplines and nearly every sport at Rowan.

For many students, success in both roles comes down to structure, consistency, and accountability. Mechanical engineering student and women's volleyball athlete Vanessa Hutchinson credits careful planning and open communication with professors and coaches for helping her stay organized and focused. Electrical and computer engineering major Gabriella Pagano, a three-season athlete in cross country and track, shares that the discipline developed through year-round training has strengthened her independence, time management, and ability to work toward long-term goals.

Together, these student-athletes show how the skills developed through collegiate athletics carry directly into engineering, preparing them to succeed in the classroom, in their careers, and beyond.

VANESSA HUTCHINSON
CLASS OF 2026
B.S. MECHANICAL ENGINEERING

"Balancing life as a Rowan Engineer and student athlete comes down to planning, focus and communication. I've built strong relationships with professors, classmates and coaches to keep expectations clear. By planning my weeks in advance and staying fully present, whether in practice or in class, I'm able to stay organized and perform at a high level in both roles."

GABRIELLA PAGANO
CLASS OF 2026
B.S. ELECTRICAL & COMPUTER ENGINEERING

"Being both a Rowan Engineer and a student athlete has taught me that success is built on structure, consistency, and accountability. The discipline required to train and compete year-round directly strengthens my ability to manage rigorous engineering coursework, and each role continuously reinforces the other."

Designing the Next Generation of Electric Race Vehicles

Hands-on engineering comes to life through Rowan University's Formula SAE team, a student-led effort within the Rowan SAE chapter and Rowan Motorsports club. Like its counterpart SAE Baja, Formula SAE is part of the Collegiate Design Series organized by the Society of Automotive Engineers, challenging students to design, build, and compete with a fully functional vehicle.

Rowan's Formula SAE team competes in the electric vehicle category, where students are designing and building an EV Formula-style race car inspired by professional open-wheel racing. The project requires the integration of mechanical design, electrical systems, controls, safety, and manufacturing, all within strict competition rules and performance standards.

The team includes approximately 40 undergraduate students from a wide range of engineering majors, working collaboratively to develop every aspect of the vehicle. Students gain experience in system-level thinking, problem solving, and interdisciplinary teamwork as they move from concept and simulation to fabrication, testing, and refinement.

The national Formula SAE competition takes place each June in Michigan. While the team's immediate goal is to successfully participate in its first year, Rowan Motorsports has set a long-term vision to field an entry annually and grow into a consistent contender, with aspirations for top-10 finishes and podium placements by 2030.

Through Formula SAE, Rowan engineering students are applying classroom knowledge to a real-world engineering challenge, building technical expertise while preparing for careers in automotive, electrification, and advanced manufacturing industries.

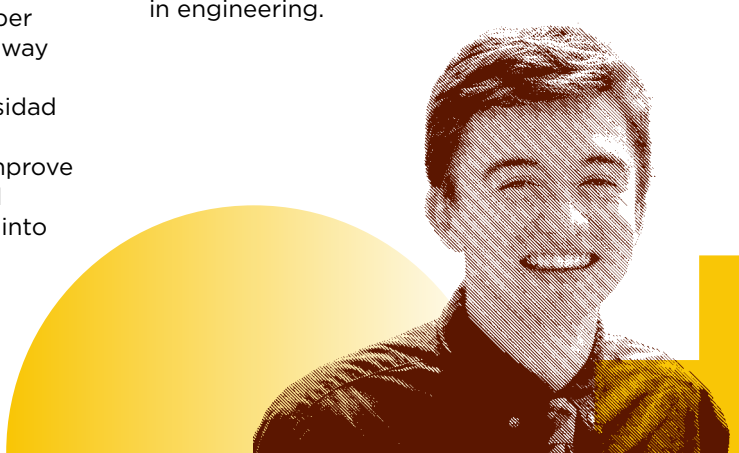
Rowan Graduate Earns Fulbright to Chile

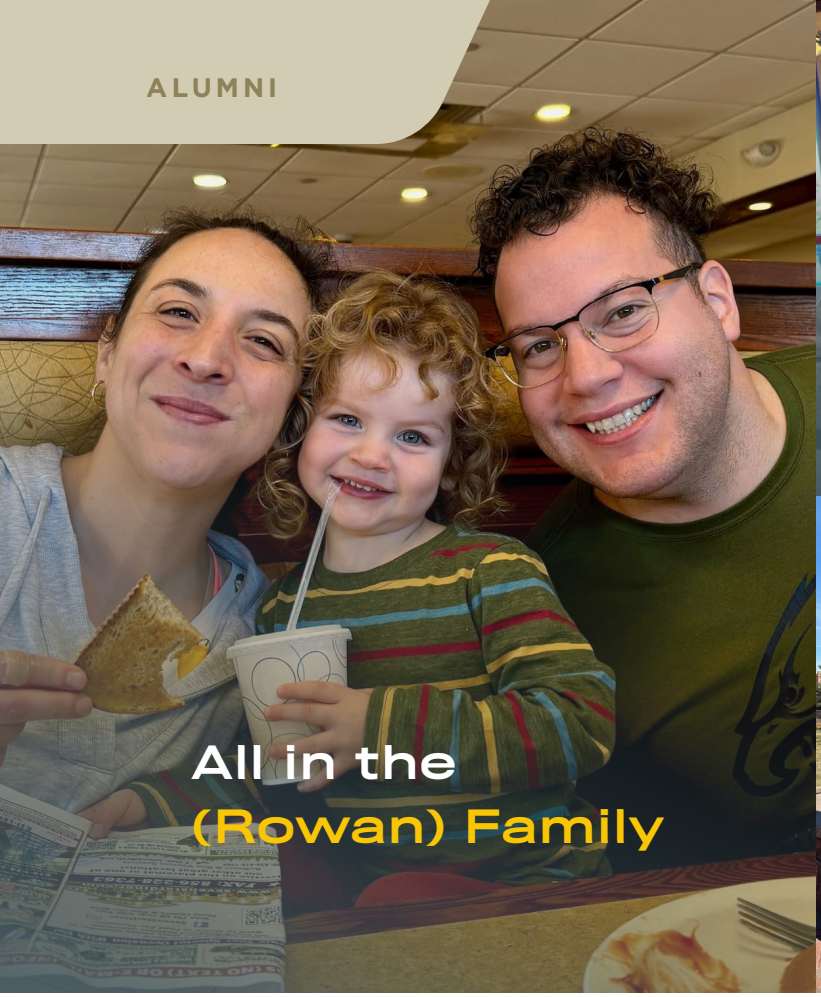
Global research experiences can broaden both technical expertise and cultural understanding. For Matthew Conway, that opportunity will take him to Chile as a 2025–2026 Fulbright Research Award recipient.

A 2025 Rowan University graduate and member of the John H. Martinson Honors College, Conway double majored in chemical engineering and Spanish. He will spend nine months at Universidad Católica del Norte in Coquimbo, working with aquaculture professor Joel Barraza Soto to improve treatment methods for wastewater generated by Atlantic salmon fisheries before discharge into local waterways.

Sponsored by the U.S. Department of State, the highly competitive Fulbright program supports international research and cultural exchange. Conway will postpone doctoral studies at the University of Wisconsin–Madison to pursue the award.

As an undergraduate, Conway earned the Goldwater Scholarship and multiple research honors while mentoring fellow students and serving as a campus leader. Through his Fulbright project, he hopes to deepen his research experience while gaining new global perspectives that will shape his future work in engineering.





All in the (Rowan) Family

Brighid Burgin Hoempler '12 and David Burgin '82, M '02 with family at Ponzio's Diner during a visit to Rowan's campus.

The daughter of a Rowan alum, Brighid Burgin Hoempler '12, remembers hearing about the university even as a child and loving it long before she enrolled. Dad, David Burgin, '82, M '02, the first in his family to attend college, is the manager, emergency preparedness, for PSEG, the nuclear power company.

The family lived in South Jersey and it was when Brighid attended a Rowan-hosted engineering summer camp as a sixth-grader that she fell in love with the field.

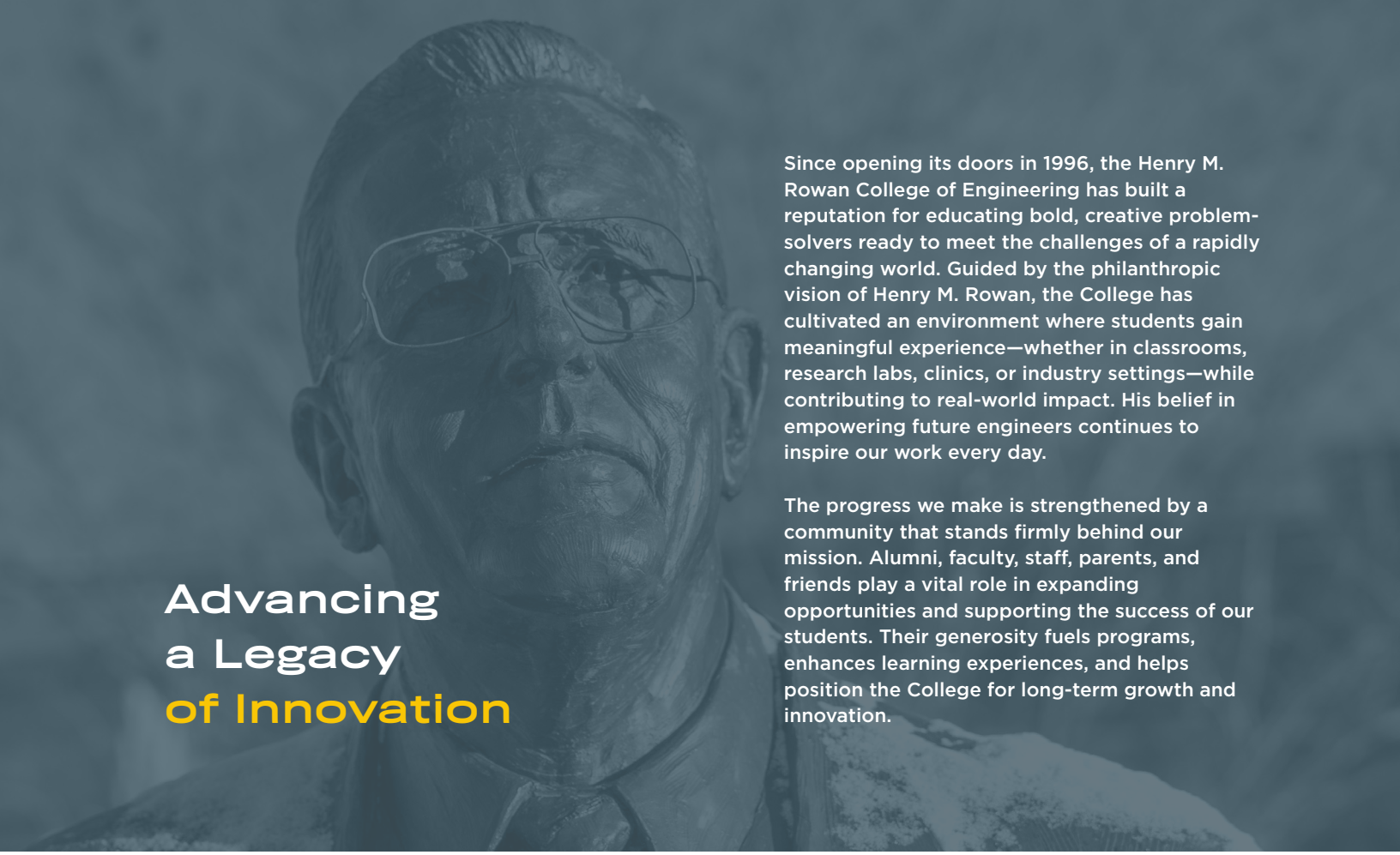
Brighid graduated in chemical engineering from the Henry M. Rowan College of Engineering and it was a Rowan alum who recruited her at Exxon Mobil. Coincidentally, the counselor that sparked Brighid's interest in that summer camp is a co-worker at Exxon Mobil.

Nominated as the Circle of Excellence 2025 award winner, both Brighid and David give Rowan high marks for excellence in education and affordability. David serves on the University Foundation Board and Brighid serves in leadership roles both on the University Foundation Board and on the College of Engineering Dean's Advisory Board. Eager to ensure access to education at Rowan, the family has set up the Burgin Leadership scholarship. Students from both the College of Engineering and the Ric Edelman College of Communication, Humanities & Social Science win the grant each year as the scholarship continues to grow.

Brighid credits Rowan with laying the foundation for a flourishing career. "The programs at Rowan are supportive and caring, the collaborative environment feels like family and they want to make you successful," Brighid says. To prove her point: Andrea Vernengo, Ph.D., associate professor, chemical engineering and biomedical engineering at the College of Engineering, was one of the bridesmaids at her wedding, as was Jaclyn Navara, a 2013 Rowan mechanical engineering graduate.

And today, Brighid is the Strategic Global Account Manager at Exxon Mobil.

Their story is a reminder that a Rowan education doesn't just shape careers; it builds a lifelong community that continues to grow across generations.



Advancing a Legacy of Innovation

Since opening its doors in 1996, the Henry M. Rowan College of Engineering has built a reputation for educating bold, creative problem-solvers ready to meet the challenges of a rapidly changing world. Guided by the philanthropic vision of Henry M. Rowan, the College has cultivated an environment where students gain meaningful experience—whether in classrooms, research labs, clinics, or industry settings—while contributing to real-world impact. His belief in empowering future engineers continues to inspire our work every day.

The progress we make is strengthened by a community that stands firmly behind our mission. Alumni, faculty, staff, parents, and friends play a vital role in expanding opportunities and supporting the success of our students. Their generosity fuels programs, enhances learning experiences, and helps position the College for long-term growth and innovation.

DONATION BREAKDOWN

Student Aid	$29,635
Endowment	$6,000,000
Current, Academic Divisions	$83,959
Current, Student Financial Aid	$170,005
Current Research	$1,000
Current, Other Restricted	$125
Grand Total	**$6,284,724**

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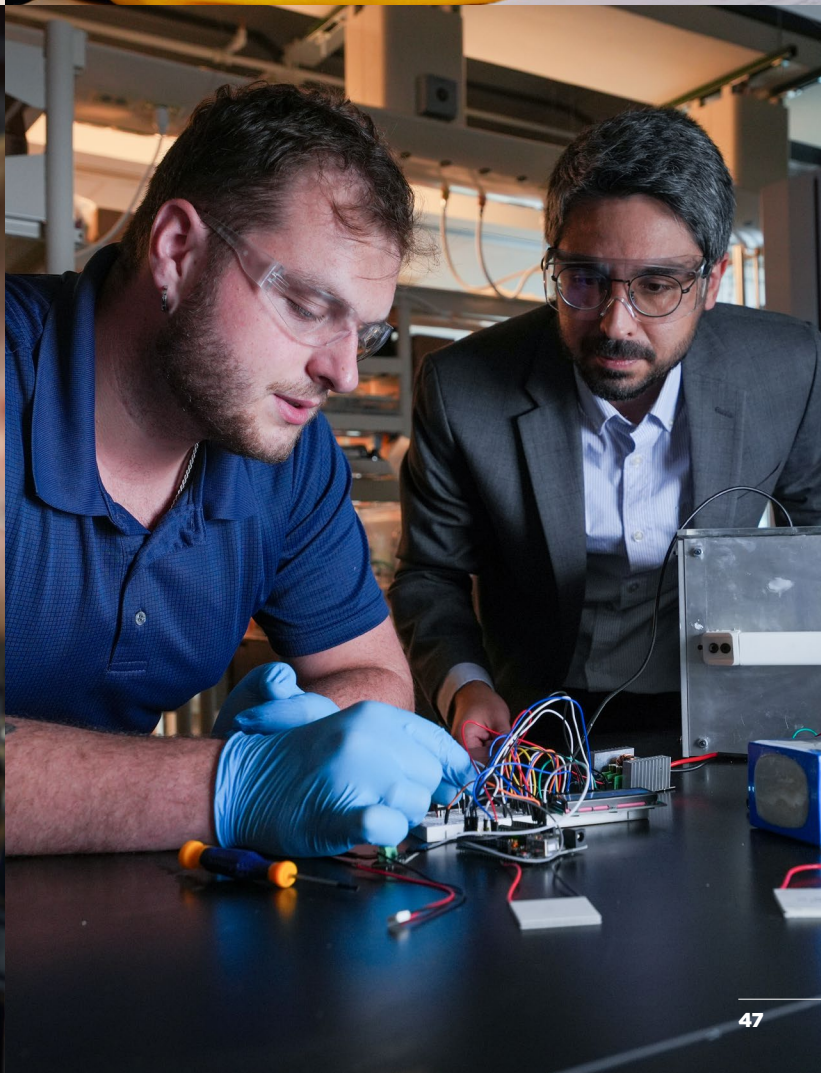

“Make a difference. Make this world a little better because you lived in it.”

– HENRY ROWAN

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