

2020 - 2021 Annual Review

VCU Engineering

Engineers Make It Real.



25TH

Anniversary



VCU

College of Engineering

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Read it online: egr.vcu.edu/magazine



As this annual report is being produced, we are marking more than a year of living with and responding to the COVID-19 pandemic that has changed our world, challenged our spirit and charged us to achieve more than we thought possible.

While many long for a return to life as it was, our engineering faculty, staff and students have found ways to thrive in a new normal. This year, we mark the 25th anniversary of our college and celebrate the opening of a magnificent Engineering Research Building.

Our Medicines for All Institute has joined the response by discovering ways to make COVID-19 treatment drugs less expensively and more efficiently. Our students' innovative spirit hasn't wavered despite adjusting to a different learning environment. One student team has produced a self-cleaning facemask that is already available for pre-sale.

From smart fabrics that change color in response to temperature, to robots programmable in the home, to improved medication delivery for pediatric patients, our faculty's research remained as strong as ever this year, inspired and driven by the growing needs of humankind.

Our growth as a college continues also. We welcomed a new Ph.D. program in computer science and celebrated consecutive years of top rankings for our biomedical engineering graduate program. Our teams led regional initiatives to improve access to technology education in areas considered tech "deserts" and to develop a cluster of advanced pharmaceutical manufacturing in the Richmond-Petersburg region.

Engineers are never happier than when they are solving problems. Clearly, 2020 provided ample opportunity for our teams to shine brightly. I have no doubt that you have experienced something similar. Wishing you a full and productive year ahead!

Go Rams!

Barbara D. Boyan, Ph.D.
NAE, NAI, EASA, FAIMBE, FAAS, FASBMR, FORS, FBSE, FITI
Alice T. and William H. Goodwin, Jr. Dean
VCU College of Engineering

RESEARCH HIGHLIGHTS

BIOMEDICAL ENGINEERING

Puetzer wins CAREER award and joins NIH consortium

Jennifer Puetzer, Ph.D., has received the prestigious National Science Foundation CAREER award. Puetzer is also a National Institutes of Health Interdisciplinary Rehabilitation Engineering Career Development Program scholar. The program was created by a consortium of nine leading institutions with engineering and physical therapy programs. Puetzer's CAREER award will support her investigation into how the mechanical cues that occur during development further drive cells to create bigger and stronger collagen fibers for tendon and ligament repair.

Understanding cell behavior in response to tissue mechanics

Christopher A. Lemmon, Ph.D., has received a three-year grant of about \$440,000 from the Biomechanics and Mechanobiology program in Civil, Mechanical and Manufacturing Innovation at the National Science Foundation to advance understanding of cell behavior in response to tissue mechanics in disease. Lemmon is investigating how cells respond to viscoelastic properties of soft tissues in the human body, which could shed light on cell behavior in illness such as cancer and fibrotic diseases.

Seeking to improve health for spinal cord injury patients

Carrie Peterson, Ph.D., is researching how to help individuals with spinal cord injury who use manual wheelchairs from childhood through adulthood. Peterson is generating computational simulations of musculoskeletal dynamics during wheelchair propulsion to quantify shoulder joint contact forces. She is part of a team that has received a \$2.5 million grant from the Eunice Kennedy Shriver National Institute of Child Health and Human Development at the National Institutes of Health.



CHEMICAL & LIFE SCIENCE ENGINEERING

Understanding virus variants

As scientists have been closely watching the emergence of troubling coronavirus variants, **Michael H. Peters, Ph.D.**, has been homing in on mutations related to the spike protein of the coronavirus. Investigating how different mutations appear to change the protein's configuration offers clues as to how the virus may be better able to evade the body's immune system. One mutation appears to give the protein a stronger ability to bind with cells in the body.

Coral cell culture research

Nastassja Lewinski, Ph.D., is working to advance in vitro testing capabilities for studying the effects of environmental changes that can lead to bleaching, disease and toxicity in reef-building corals. In a recent study, her group established a framework for the development of immortal coral cell cultures. She is also part of a multi-institutional, multi-disciplinary research team that has proposed a digital image processing approach to detect and visualize subtle motion in coral.

Seeking to improve air quality during pandemic

In collaboration with the Science Museum of Virginia, **Stephen Fong, Ph.D.**, is using real-time monitoring sensors in Richmond, Virginia, to study air pollution such as particulate matter, or tiny pieces of soot and other contamination. Next, the project will expand to include remote and airborne instrumentation. The coronavirus pandemic has raised the stakes, as a national study published in Science Advances in November 2020 has shown that areas with higher levels of particulate matter experience increased mortality rates from COVID-19.



COMPUTER SCIENCE

National Center of Academic Excellence in Cyber Research

The National Security Agency and the Department of Homeland Security named VCU a **National Center of Academic Excellence in Cyber Research**. With more than \$2 million in cyber research funding and hundreds of cybersecurity publications, VCU Engineering was instrumental in meeting the rigorous criteria for obtaining this designation. This recognition builds on VCU's earlier designation as a National Center of Academic Excellence in Cyber Defense Education.

Hip-hop paves the way to coding comprehension

David Shepherd, Ph.D., used hip-hop style musical patterns, rhythms and breaks to teach programming concepts remotely to a group of adult learners in a Northern Virginia technical training program. Shepherd's Code Beats program focuses on innovative technology experiences centered around coding-based music. By making computing fun, the project aims to broaden digital participation and prepare more people to gain skills for jobs that require a knowledge of basic coding.

Protecting wind and solar power grids

Milos Manic, Ph.D., FIEEE, FCCI, an expert in cybersecurity for critical infrastructure systems, is working to address threats to wind and solar power grids. These grids are much larger than traditional hydroelectric plants and offer adversaries an attack surface with multiple entry points. Manic and colleagues from the Idaho National Laboratory are developing data-driven detection of cyber and physical anomalies based on cutting-edge artificial intelligence such as physics-informed deep learning to safeguard these large, highly complex energy systems.



ELECTRICAL & COMPUTER ENGINEERING

Fixing complex faults in embedded systems

Work by **Carl Elks, Ph.D., Smitha Gautham, Ph.D. (Ph.D., '20) and Athira Varma Jayakumar (M.S., '20)** made the cover of IEEE Computer. Their article explains the difficulty of detecting software anomalies in embedded systems. The authors concluded that Embedded Trace (common on microprocessors) and runtime verification technology may be the answer to detecting these faults. The team characterized the effectiveness of various debugging protocols, and offered a case study on a VCU Smart-Sensor testbed.

5G communications system for smart warehouses

Ruixin Niu, Ph.D., is working to optimize communications systems for smart warehouses. He is the principal investigator on a project to design a distributed wireless system to enhance communications capabilities for smart warehouses' industrial internet of things devices. VCU's team, including **Niu and Yanxiao Zhao, Ph.D.**, is developing this technology with a \$500,000 subaward from the Virginia Tech Applied Research Corporation for a 5G smart warehouse project funded by the U.S. Department of Defense.

Using data to fight 'food deserts'

Sherif Abdelwahed, Ph.D., is leading a team that received a one-year pilot grant from the National Science Foundation to improve access to high-quality food throughout the Richmond region. The project uses sensor technologies, data analytics and community engagement to identify food deserts where fresh, nutritious food is in short supply. By designing systems to monitor localities' access to quality food, this research will help elected leaders and nonprofits allocate resources more effectively.



MECHANICAL & NUCLEAR ENGINEERING

Castano receives CAREER award

Carlos Castano, Ph.D., has received a prestigious National Science Foundation CAREER award to investigate a new method to modify the surface of metallic powders used for additive manufacturing. Castano is developing a method to deposit thin films on materials' core powders to form a coating or shell on each individual grain. The new core-shell structures are designed to give materials more homogeneous and controlled microstructures when used as powder feedstock for sintering-based manufacturing.

Understanding behavior of materials in extreme conditions

Gennady Miloshevsky, Ph.D., is VCU's principal investigator on a grant from the U.S. Defense Threat Reduction Agency to 18 major research institutions that are working to understand the behavior of materials in extreme conditions caused by weapons of mass destruction (WMD). He is conducting computational research on the behavior of satellite materials in WMDs outside Earth's atmosphere. He is also modeling photon-material interactions to analyze what happens when materials encounter high-intensity X-ray pulses, which are associated with exo-atmospheric explosions.

Tiny particles, big impact

Ibrahim Guven, Ph.D., has received funding from the U.S. Department of Defense's Office of Naval Research to model how rain, ice, sand, dust, volcanic ash, aerosols and other particles impact surfaces of hypersonic aircraft. This research is expected to lead to development of advanced materials for building vehicles traveling more than five times the speed of sound. Guven's team will develop a computational framework to streamline analysis of how multiple dynamic fractures spread.



IMAGINE A WORD AND... A DEVICE SPEAKS?



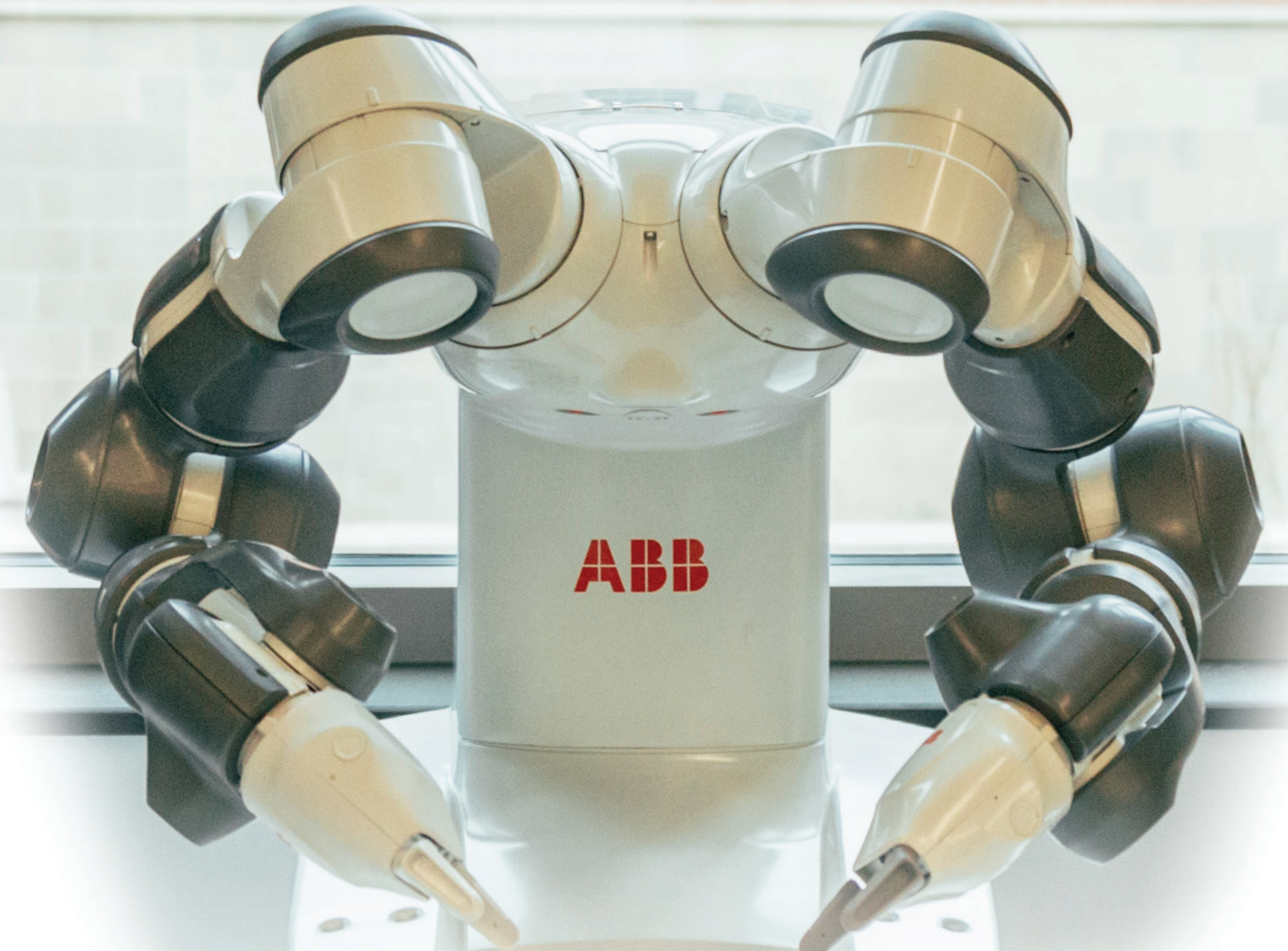
For people with a complete loss of speech, such as patients with late-stage ALS, roadblocks exist between the signals being fired in their brains and the ability to voice their thoughts in words.

VCU biomedical engineering professor **Dean Krusienski, Ph.D.**, is collaborating with computer science researchers at the University of Bremen in Germany to find a way to overcome those barriers.

New technology, in the form of a speech neuroprosthetic to help users produce intelligible speech based on brain signals in real time, could someday restore the power of communication to people with speech disorders.

Krusienski's project to develop a speech decoding and synthesis system using brain signals is being funded by a \$604,757, three-year grant from the National Science Foundation (NSF). As part of the NSF's Collaborative Research in Computational Neuroscience program, a companion project is being funded by Germany's Federal Ministry of Education and Research.

The efforts build on Krusienski's previous work in developing approaches to directly synthesize speech from brain activity.



MEET YUMI THE ROBOT ROBOT CODING FOR EVERYONE

From the Jetson's maid, Rosie, to Star Wars' R2-D2, images of robots are everywhere. But relatively few people have much direct interaction with robots. There are good reasons why.

"Robots can be super dangerous to be around. Unless they're programmed with sensors, they can't say, 'Hey, I'm about to smash into a person,'" said **David C. Shepherd, Ph.D.**, associate professor of computer science at VCU Engineering.

Robots with safety features are highly complex – programmable only by experts with years of training.

Shepherd has received \$750,000 from the National Science Foundation to make these robots programmable by their owners. His goal is to empower lab technicians, small-scale manufacturers, small business owners and others to program robots to do useful tasks.

He and his team are creating a new programming language that turns complicated strings of code into colorful blocks on a screen. With minimal training, a user will be able to assemble these blocks to communicate directly with the robot.

This will increase access to technology and drive down operating costs, Shepherd said. A robot comes out of the box knowing how to do specific tasks. To make it do another job, a specialized programmer has to be brought in to write new code.

"Every time you have to reprogram, it's almost as much as, or more than, the cost of the robot, and the robots aren't cheap," Shepherd said. "If you could just buy the robot once, then program it yourself, you could cut out the majority of those costs."

Cybersecurity for advanced manufacturing

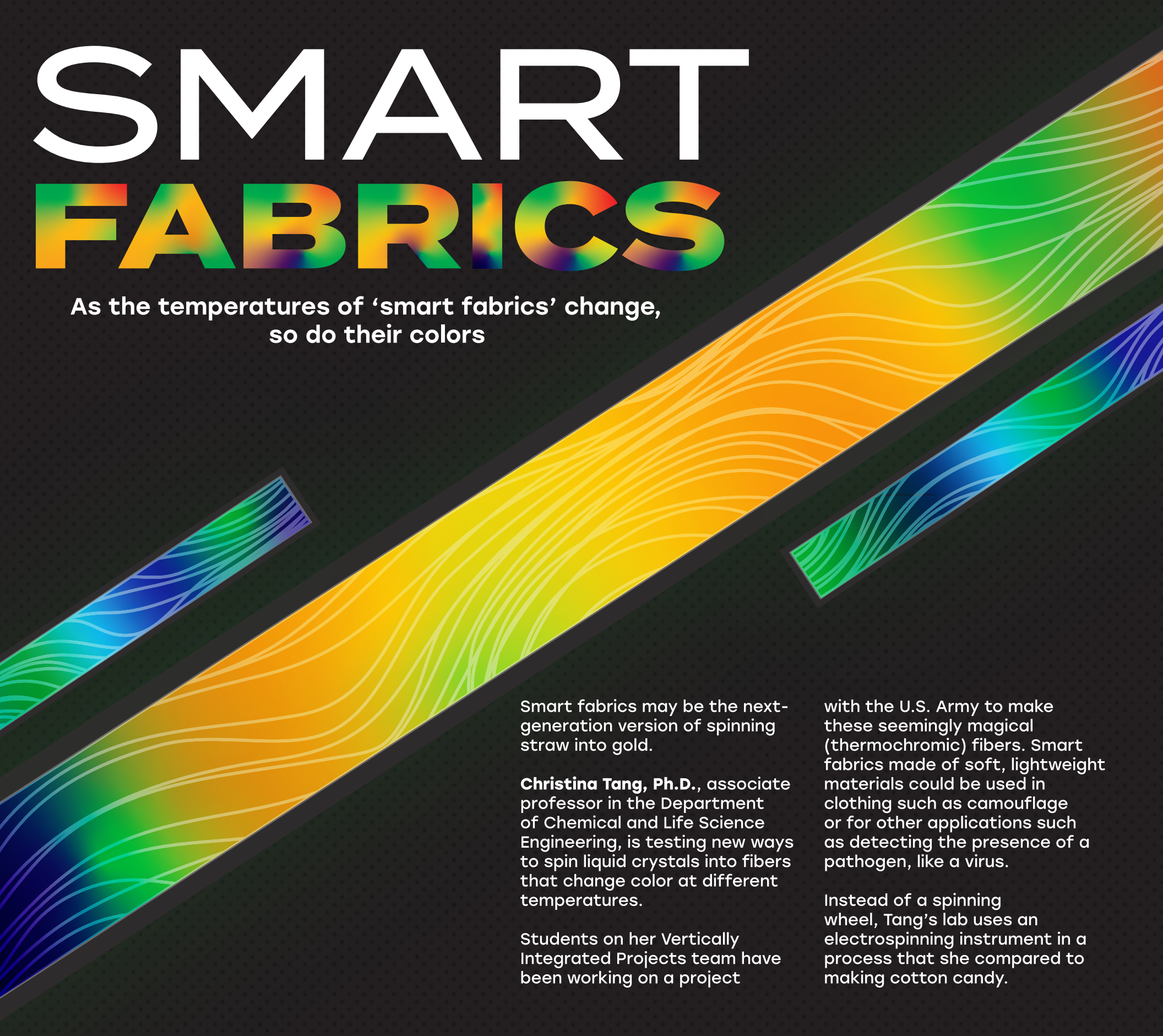
U.S. manufacturers are a prime target for cyber criminals and nation-state adversaries. VCU's Cybersecurity Center, directed by computer science professor **Milos Manic, Ph.D., FIEEE, FCCI**, is part of a \$111 million public-private partnership to make automation for advanced manufacturing more secure and energy efficient. This initiative is led by the University of Texas at San Antonio and funded by the U.S. Department of Energy. Under the partnership, Manic is spearheading VCU's development of new artificial intelligence and machine learning approaches to detecting vulnerabilities in complex systems.



Milos Manic, Ph.D., FIEEE, FCCI

SMART FABRICS

As the temperatures of 'smart fabrics' change, so do their colors



Smart fabrics may be the next-generation version of spinning straw into gold.

Christina Tang, Ph.D., associate professor in the Department of Chemical and Life Science Engineering, is testing new ways to spin liquid crystals into fibers that change color at different temperatures.

Students on her Vertically Integrated Projects team have been working on a project

with the U.S. Army to make these seemingly magical (thermochromic) fibers. Smart fabrics made of soft, lightweight materials could be used in clothing such as camouflage or for other applications such as detecting the presence of a pathogen, like a virus.

Instead of a spinning wheel, Tang's lab uses an electrospinning instrument in a process that she compared to making cotton candy.

An optical instrument for drug discovery

Sherif Abdelwahed, Ph.D., professor of electrical and computer engineering, is leading a team designing an electronic visualization system to confirm that a drug molecule is binding to the correct protein to be effective.

Abdelwahed and his team have received \$700,000 from Virginia Catalyst, an economic development nonprofit, to design the system.

Current experiments to determine if a drug is binding to the right protein take place outside native cellular environments. This requires fixing the target protein to a solid surface, which can alter the protein's shape and function.

The device photographs the binding process as it occurs within the cellular environment and uses electronic data analysis to validate results. The VCU team will develop the system structure to enable the device to be faster and more accurate than current binding tests.



Sherif Abdelwahed, Ph.D.

Improving inhaled pediatric medication

Delivering pediatric medications via the respiratory system offers several advantages. Pharmaceutical sprays and aerosols are non-invasive, act quickly and are generally easier to administer to children and infants than pills or injections.

Department of Mechanical and Nuclear Engineering faculty members are driving advances to improve inhaled therapies for children and infants.

Laleh Golshahi, Ph.D., an associate professor, leads a multidisciplinary team that received a \$1.6 million contract from the U.S. Food and Drug Administration to develop physical and computer-based models to evaluate the performance of generic and brand-name nasal spray medications used by children.

The research team is using data from children between the ages of two and 11 to develop a set of 3D-printed replicas of noses. They will use these models to profile nasal drug spray

absorption rates. FDA drug evaluators may be able to use the replicas and accompanying computational models to assess whether future generic nasal spray products are bioequivalent to brand-name products in children.

Worth Longest, Ph.D., the Louis S. and Ruth S. Harris Exceptional Scholar and Professor, is principal investigator on a project to improve how infants in respiratory distress receive lifesaving surfactant, a substance found in healthy lungs that keeps the tissue supple enough to expand and contract properly.

Longest has received \$500,000 from the Bill & Melinda Gates Foundation to conduct an in-depth analysis of noninvasive surfactant delivery programs by applying computer modeling and in vitro testing. This project is expected to expand global access to infant surfactant therapies, which could ultimately lead to better survival rates for infants in respiratory distress.



KEEPERS OF THE FLAME

“Once a Ram Engineer, always a Ram Engineer.” By serving VCU/VCU Engineering for more than 25 years, these eight members of the team have taken that idea to the next level.

Anil Chatterji, M.S.
Ding-Yu Fei, Ph.D.
Cai-Ting Fu
Roselyn Hobson Hargraves, Ph.D.
Lori A. Floyd-Miller, M.Ed.
R. Daniel Resler, Ph.D.
Jennifer C. Rivers, M.Ed.
Jennifer S. Wayne, Ph.D.



OUR FIRST QUARTER CENTURY

Before 1996, the Richmond metro region was the country's largest urban area without an undergraduate engineering program. Today, VCU Engineering is more than 6,500 alumni strong. The college, whose first courses were held in spare classrooms, now has five dedicated buildings, with additional facilities in Virginia's Bio+Tech Research Park. Technologies born in VCU Engineering labs are protected by 34 U.S. patents (and counting).

Happy 25th anniversary to the “engineering college that could” – and did.

BEFORE THE BEGINNING

The Richmond Professional Institute (RPI) began in 1917 and merged with the Medical College of Virginia to form VCU in 1968. After World War II, RPI developed drafting courses for students who wanted an alternative to a four-year engineering program. With state funding, RPI fleshed out its engineering technology program in 1957-58. Alumni of that program are among VCU Engineering's earliest trailblazers. We're proud to call them Ram Engineers.

THE START OF SOMETHING

BIG

There was always something different about VCU Engineering. Just ask members of the early graduating classes.

“VCU Engineering equipped me to think independently, and not be afraid to experiment. I am so grateful and lucky that I was part of it. Some of my family members joked, ‘VCU opened an engineering school for you,’ as I was a new immigrant and looking for electrical engineering programs in Virginia.” - **Shahab Siddiqui, Ph.D.**

“I was the only graduate of the biomedical engineering program in 2000 and the first undergraduate biomedical engineering major in Virginia. (Now) I am a dentist with my own practice. Engineering school really helped me with the discipline required for my studies in dental school. I visited two years ago and was amazed at how the school has progressed.” - **Mia (Pham) Sanchez de Lozada, D.D.S.**

“I mostly remember the excitement of starting something new. Being a part of VCU Engineering at that time felt like the start of a great endeavor and the feeling was palpable. The school started with a big vision and a lot of ambition and it has been wonderful seeing all of that pay off.” - **Robert Snodgrass, P.E.**

“For the first two years, all classes were held in other buildings around campus. Getting West Hall was incredible. Dr. Klenke really prepared me for life after school by exposing me to ideas that did not come so easily.” - **Robbie Staples, P.E., MCSE, MCSA**

“Clearly, the biggest difference between then and now is the growth and footprint VCU Engineering now has on the VCU campus. This is a testament to the strategic planning and execution the deans of the college have undertaken to really make VCU Engineering an attractive institution for students seeking to pursue lucrative career opportunities in the emerging economy.” - **Christopher Dosier, Ph.D., M.B.A.**

Turn the page to
see 25 years of VCU
Engineering milestones.

- VCU Engineering opens with cohort of 103 students
- **Henry A. McGee, Ph.D.**, is founding dean
- Foundation raises \$35 million for new building, scholarships and other costs
- Construction on West Hall begins

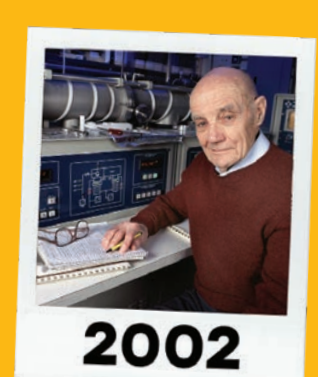
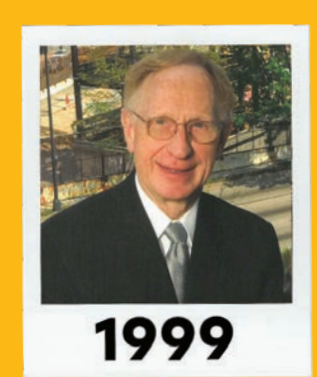
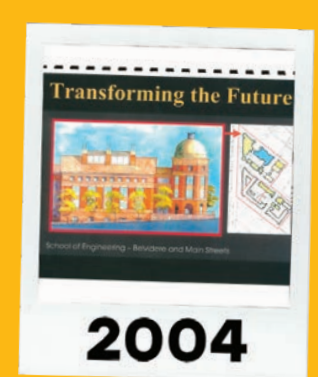


Photo credit: Allen Jones



2001
VCU's computer science program joins VCU Engineering

Affiliate professor of chemical engineering **John Fenn, Ph.D.**, receives Nobel Prize in Chemistry

Microelectronics center named for **C. Kenneth and Dianne Wright**

Board of Visitors approves new master site plan facilitating "second phase" of VCU Engineering with expanded facilities

- Construction on East Hall begins
- Undergraduate enrollment tops 1,000

Russell Jamison, Ph.D., becomes third dean

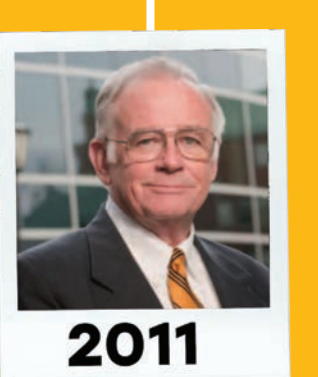
- Major gift from Qimonda accelerates East Hall construction
- First engineering career fair takes place

- East Hall dedicated April 9
- VCU Engineering partners with VCUarts and the School of Business to establish the da Vinci Center for Innovation in Product Design and Development

25 YEARS OF MILESTONES



Photo credit: Stephen Fong, Ph.D.



- Institute for Engineering and Medicine opens
- Nanomaterials Core Characterization facility is established

Students join four-school coalition to go to international synthetic engineering competition

Charles Jennett, Ph.D., becomes interim dean

2012
VCU Engineering establishes nation's only Ph.D. in mechanical and nuclear engineering

- **Barbara D. Boyan, Ph.D.**, becomes fifth dean
- Dean's Early Research Initiative and Dean's Undergraduate Research Initiative established

First RamHacks hackathon

VCU Engineering is first Virginia school to join the prestigious Vertically Integrated Projects consortium for long-term, multi-year, undergraduate research projects

The college expands to the VA Bio+Tech Research Park, a 34-acre life sciences community near VCU Medical Center that houses private companies, nonprofits and government labs

- VCU Engineering receives \$25 million grant from the Bill & Melinda Gates Foundation to establish Medicines for All Institute
- Wright Engineering Access Scholarship founded with major gift from C. Kenneth Wright

- Hyperloop at VCU is one of 20 elite student teams selected internationally for the final round of SpaceX's Hyperloop competition
- VCU Engineering hosts American Nuclear Society National Student Conference

- VCU Center for Pharmaceutical Engineering and Sciences opens
- VCU offers the nation's first Ph.D. program in pharmaceutical engineering

- Medicines for All Institute partners with industry on \$354 million government contract to onshore pharmaceutical manufacturing and prevent domestic medication shortages
- Engineering Research Building is completed

University leaders, elected officials and members of the community celebrate the new Engineering Research Building on Feb. 3. Because of the global COVID-19 pandemic, the ribbon-cutting is held virtually before a large audience on Zoom.

CUTTING THE RIBBON(S)

ENGINEERING RESEARCH BUILDING NOW OPEN

VCU Engineering held a different kind of ceremony to mark the official opening of its new Engineering Research Building.

To comply with restrictions on large gatherings because of the COVID-19 pandemic, a large audience of well-wishers gathered by Zoom Feb. 3 to see university officials, architects, builders and civic leaders, including former Virginia Governor Terry McAuliffe, share reflections and cut the ribbon. The festivities culminated with a virtual tour of the 133,000-square-foot, state-of-the-art research and workforce development hub.

"The ERB's design creates a vibrant, flexible home for expanded public-private partnerships in VCU Engineering research. Construction of the \$93 million building was funded by taxable bonds, which allows VCU Engineering to collaborate closely with industry to conduct translational research. This also supports the college's mission to train students in real-world engineering, often alongside industry professionals and their fellow students in majors such as art, business, science and medicine," said **Barbara D. Boyan, Ph.D.**, the Alice T. and William H. Goodwin, Jr. Dean of VCU Engineering.



Hundreds looked on via Zoom as university leaders, community stakeholders and the building's designers and builders cut the ribbon(s).



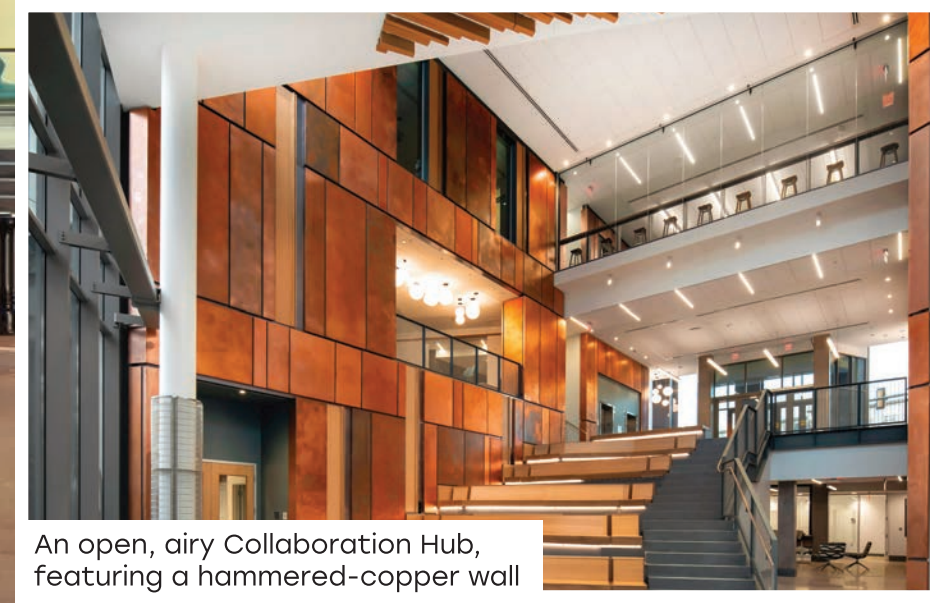
25 advanced wet and dry labs for biomedical engineering



Computer science research areas based on today's tech industry workspaces



9,000-square-foot Innovation Maker Facility for hands-on prototyping



An open, airy Collaboration Hub, featuring a hammered-copper wall



A fully wired Innovation Courtyard for working outdoors



MEDICINES FOR ALL INSTITUTE **QUICKLY PIVOTS TO** COVID-19 TREATMENTS

Within months of the coronavirus outbreak, the Global Health Division of the Medicines for All Institute (M4ALL) shifted to a new, urgent focus: addressing the cost and availability of promising COVID-19 treatments.

The Bill & Melinda Gates Foundation, which provided funding to establish the institute, identified a need to improve supply chain security for pyrrolotriazine. Pyrrolotriazine is a key ingredient to produce remdesivir, the first fully approved COVID-19 drug treatment in the U.S.

To improve the supply chain and prevent global shortages of Gilead Sciences' remdesivir, M4ALL developed a more efficient process to synthesize pyrrolotriazine from readily available raw materials. Their method doubled the product yield and used half as many steps.

In addition to remdesivir, the Gates Foundation sought M4ALL's expertise on an oral medication, molnupiravir, under evaluation to treat COVID-19. M4ALL has demonstrated multiple novel, efficient synthetic routes for the large-scale manufacture of molnupiravir.

The Federal Health Division side of the M4ALL Institute, along with startup Phlow Corp. and other partners, has been powering U.S. efforts to build up the national strategic stockpile of critical medicines and to jump-start the reshoring of pharmaceutical manufacturing. To combat shortages of essential medicines for children, Phlow and top children's hospitals across the nation have launched a Children's Hospital Coalition.

Innovation Spotlight:

TEKSTYLE

TekStyle, a startup run by students at VCU Engineering, is designing a new face mask that protects the wearer in two ways. In addition to forming a physical barrier against airborne pathogens, TekStyle's "Celsius" mask uses heat in an attempt to create a hostile environment for microorganisms and viruses like COVID-19.

Photo credit: McKenzie Piper



Comprehensive student research training in the lab

At every stage throughout a Ram Engineer's time at VCU Engineering, the college provides opportunities for gaining early research experience in real-world labs under mentorship from renowned faculty. In fact, this begins even while students are still in high school.

Dean's Early Research Initiative (DERI)

In the DERI program, high school juniors and seniors conduct university-level research projects with mentorship from faculty and graduate students. The 2020-21 cohort of 28 DERI fellows included 19 seniors who applied and were admitted into VCU Engineering.

Dean's Undergraduate Research Initiative (DURI)

Sophomores and juniors work with faculty, graduate student and postdoctoral mentors to design and execute a yearlong project through DURI.

Vertically Integrated Projects (VIP) consortium

A total of 19 multidisciplinary student teams worked on large-scale research projects in 2020-21 as part of the prestigious VIP consortium. VIP@VCU gives undergraduate students opportunities to work with graduate students and faculty on multiyear research projects.

NEWS

GO Virginia!

To boost talent to fill the demand for high-paying, private sector, technical jobs, VCU Engineering is leading a project to support growth in the emerging pharmaceutical manufacturing cluster in the Richmond-Petersburg region. In a separate initiative, the college is leading Tech-Talent Pathways, a project that will revitalize “tech-education deserts” by linking them to Virginia’s tech-education community. Both efforts have been supported by strategic planning grants from Growth and Opportunity for Virginia (GO Virginia), a state-funded initiative administered by the Virginia Department of Housing and Community Development.

Building diversity in STEM

The college received a \$100,000 grant from Bank of America as part of an ongoing partnership to facilitate data science education and support innovative technical-education pathways that provide access to diverse communities. Grant funds will be paired with mentoring and classroom support from the bank’s IT professionals and members of Richmond’s tech community.

Competitions go virtual

RamHacks and HealthHacks broke new ground by going virtual this past year. Competitors from the U.S., Mexico and Canada teamed up to create 44 innovative solutions to real problems at the seventh annual RamHacks. At the fifth annual HealthHacks, students created and presented their solutions to current needs in patient care and diagnostics.

Innovation-led development

Virginia governor Ralph Northam appointed VCU Engineering **Dean Barbara Boyan, Ph.D.**, to a new state authority to oversee innovation-led development. The Virginia Innovation Partnership Authority consolidates and integrates the commonwealth’s innovation, entrepreneurship, university research commercialization and emergency development programs under one body.

\$4M gift to scholarship fund

A major gift to the university from the C. Kenneth and Dianne Wright Foundation includes an additional \$4 million to support the Wright Engineering Access Scholarship, which provides need- and merit-based awards to VCU Engineering students. This scholarship has provided substantial financial support to more than 150 students since its inception in 2017.

A unified response

In February, the Richmond Times-Dispatch ran an op-ed on behalf of Virginia’s deans of engineering. In it, **Dean Barbara Boyan, Ph.D.**, reflected on innovators’ response to the COVID-19 pandemic. “This year took so much from all of us. One thing it restored was a renewed commitment to what drew us to our avocations in the first place: the desire to solve problems and create something beneficial that makes life better for everyone,” she wrote.

New director of World Nuclear Association

Sama Bilbao y León, Ph.D., VCU Engineering pioneer and longtime professor of mechanical and nuclear engineering, was appointed director general of the World Nuclear Association (WNA) in October. Headquartered in London, the WNA is the largest international organization that supports the global nuclear industry.

Undergraduate initiatives

VCU Engineering has launched two initiatives to give undergraduates a headstart in their education experience. Before classes begin, VCU Engineering will provide all incoming first-year students the opportunity to earn an “Introduction to Design Thinking” credential from the VCU da Vinci Center for Innovation. For all rising sophomores, the college is offering an annual Sophomore National Academy of Engineering (NAE) Challenge. During the weeklong event, students compete to overcome the biggest challenges facing humankind today.

Cody Woodson Computer Science Scholarship

The college established a scholarship in memory of **Cody Woodson**, a senior computer science student whose mentorship as a teaching assistant and tutor uplifted many. The new scholarship will help honor, and perpetuate, Woodson’s deep commitment to the teaching mission of the Department of Computer Science.

\$1M gift for international students

An anonymous \$1 million gift to VCU Engineering will enrich the experience of international students by providing funds for a range of cultural and educational activities to help them thrive in a new environment. A portion of the gift will fund monetary awards that individual international students may use for tuition and other expenses.

The following students received these awards: **Muhammad Abdullah, Johane H. Bracamonte Baran, Agnieszka Ciborowska, Loren Faith R. Dela Rosa, Sai M. Duduru, Smeet G. Ghelani, Mia Mohammad Imran, Lukasz Korycki, Mahmoud E. Moustafa, Vy Nguyen, Chidera M. Ntiwunka-Ifeanyi, Goodness Isioma Nwabueze, Rahnema Rahman, Lazaro A. Camero Ruiz, Almunther Sabha, Rezwan Mohammad Sayeed, Rajnikant V. Umretiya, Santiago Vargas Giraldo, Chathurika S. Wickramasinghe, Binyam Wodajo and Lakshmi Prasanna Yeduresapu.**

PEOPLE ARE TALKING ABOUT VCU ENGINEERING

Feel like you are seeing and hearing a lot about VCU Engineering these days? You are. VCU Engineering appeared in the media **385 times** in 2020 alone.

Stay in the know by checking out the college’s website regularly. And be sure to check out the running list of media mentions under “In the News” on the homepage.



The Department of Biomedical Engineering’s graduate program is again top-ranked, according to U.S. News & World Report.

FACULTY

Supriyo Bandyopadhyay, Ph.D.

- Elected: Jefferson Science Fellow
- 2020 IEEE Nanotechnology Pioneer Award
- Albert Nelson Marquis Lifetime Achievement Award

Barbara D. Boyan, Ph.D.

- Appointed: Virginia Innovation Partnership Authority
- Selected: Fellow, Orthopaedic Research Society
- 2020 Henry Farfan Award, North American Spine Society

Carlos Castano, Ph.D.

NSF CAREER Award

Lane Carasik, Ph.D.

- American Society of Mechanical Engineers Lewis F. Moody Award
- Jeffress Trust Award

Henry J. Donahue, Ph.D.

Selected: Fellow, Orthopaedic Research Society

James K. Ferri, Ph.D.

National Science Foundation for the Symposium on Imagining the Future of Undergraduate STEM Education Idea Competition Winner

Lukasz Kurgan, Ph.D.

First place, Critical Assessment of Protein Intrinsic Disorder Prediction (CAID)

Milos Manic, Ph.D.

- Elevated: Fellow, Institute of Electrical and Electronics Engineers
- Selected: Fellow, 2020-2022 Commonwealth Cyber Initiative

Medicines for All Institute

RVATech Outstanding Collaboration in Tech Award

Peter Pidcoe, Ph.D., D.P.T.

Selected: 2020 Fellow, National Academy of Inventors

Jennifer Puetzer, Ph.D.

- NSF CAREER Award
- National Institutes of Health Interdisciplinary Rehabilitation Engineering Career Development Program Scholar

Jessika Rojas, Ph.D.

2021 Frontiers of Materials Award, Minerals, Metals and Materials Society

Gary C. Tepper, Ph.D.

Elected: Fellow, International Association of Advanced Materials

Cang Ye, Ph.D.

Selected: Fellow, American Institute for Medical and Biological Engineering

STUDENTS, POSTDOCTORAL FELLOWS AND ALUMNI

Sudan Abdur-Rahman (B.S.'14)

2021 Black Engineer of the Year Award, Science Spectrum Trailblazer

Md Ahsanul Abeer, Ph.D. (Ph.D.'20)

VCU's 2020 Distinguished Dissertation Award

Lois Appiah

2021-22 Science, Math and Research for Transformation (SMART) Scholarship, U.S. Department of Defense

Madison Bates

Undergraduate Research Symposium Winner

Michael Berger

2020 VCU Engineering Outstanding Service Award

Michael Beiro (B.S.'18)

Richmond Inno 25 Under 25

Johane Bracamonte Baran

Inaugural 2020-21 James Truchard Scholarship, American Society of Mechanical Engineers

Evan Buettmann, Ph.D.

Translational Research Institute for Space Health (TRISH) Fellowship, Partner to the NASA Human Research Program

Sekai Clayton

2021-22 Science, Math and Research for Transformation (SMART) Scholarship, U.S. Department of Defense

Clint Cuffy

Association of Computing Machinery Fellowship

Roman Cutler, co-founder of ZigZag

People's Choice Award, Demo Day, VCU da Vinci Center for Innovation

Brooke Danielsson

- Young Scientist, 70th annual Lindau Nobel Laureate Meeting
- Koerner Family Foundation Award
- 2020 VCU Engineering Outstanding Service Award

Panth Doshi

Undergraduate Research Symposium Winner

Dhruv Fomra

Best Student Paper, Advanced Linear/Nonlinear, Tunable and Quantum Materials for Metasurfaces, Metamaterials and Plasmonics Conference

Sana Hosseini

2021 VCU Engineering Outstanding Graduate Research Assistant Award

Khushar Javed, M.S. (M.S.'20)

VCU's 2020 Outstanding Master's Thesis Award

Lindsay Jordan

Undergraduate Research Symposium Winner

Otto Juhl

2021 Alexander Mallory Clarke Outstanding Biomedical Engineering Graduate Student Award

Franck Kamga Gninzeko

Koerner Family Foundation Award

Akila Katuwawala

2020 VCU Engineering Outstanding Graduate Research Assistant Award

Dimitris Killinger

American Nuclear Society National Scholarship

Sabrina Kundu

Grace Hopper Celebration Scholarship

Emma Madrigal

2019-2020 Donald F. Othmer Sophomore Academic Excellence Award, American Institute of Chemical Engineers

Darshini (Samantha) Mahendran

Third place, 2021 American Medical Informatics Association Informatics Summit Student Paper Competition

Jennifer Mak (B.S.'19)

Graduate Research Fellowship Program, National Science Foundation

Ryan McGuire

American Nuclear Society 2020 Winter Meeting Poster Award

Steven Meas

Doctoral Foreign Study Award, Canadian Institutes of Health Research

Neil Mittal, M.D.

Koerner Family Foundation Award

Lise Mychaleckyj

2020-21 Boren Scholarship

Dane Neilson

Undergraduate Research Symposium Winner

Amy Olex

2021 Cutting Edge of Transplantation Conference Poster Award

Hana Pasandi

- 2020 Rising Stars in Electrical Engineering and Computer Science
- Honorable Mention, 2021 National Center for Women & Information Technology Collegiate Award

Lisa Patton (B.S.'20)

E. Eugene Carter Opportunity Award

Syed Ali Qasim

Best Student Paper, 20th Annual Digital Forensics Research Conference

Liza Roger, Ph.D.

2021 Early Career Training Program Award, Coral Bleaching Research Coordination Network

Elliot Roth (B.S.'15) and Surjan Singh (B.S.'17), of Spira Inc.
VCU Alumni Pitch Competition Winners

Gabrielle Strandquist (B.S.'19)

Graduate Research Fellowship Program, National Science Foundation

Wendy Jiang Scelia (B.S.'11)

VCU Alumni 10 Under 10 Award

Joshna Seelam (B.S.'18)

- Audience Choice Award, Luminate Accelerator Competition
- Richmond Inno 25 Under 25

Morgan Thomas

2020 Outstanding Graduate Teaching Assistant Award

Sierra Tutwiler

- American Nuclear Society National Scholarship
- John and Muriel Landis Scholarship

Andrew Ward

2021 VCU Engineering Outstanding Graduate Teaching Award

Fred Williams Jr. (B.S.'17)

2021 Black Engineer of the Year Award, Modern-Day Technology Leader

Zan Zhu

2021 VCU Engineering Outstanding Graduate Research Assistant Award

STAFF

Jenilee Stanley-Shanks

Top 40 Under 40, Style Weekly

Marketing and Communications Team

- 73rd Virginia Public Relations Society of America Awards, Award of Excellence (Capital Award) for 2018-19 Annual Report
- MarComm Awards, Platinum Award for 2019 Holiday Card
- MarComm Awards, Gold Award for 2019-20 Annual Report
- Hermes Creative Awards, Gold Award for ERB Grand Opening

THE NEW ENGINEERING RESEARCH BUILDING – AND THE TEAM THAT BUILT IT

The Engineering Research Building (*see story on page 14*), has received Leadership in Energy and Environmental Design (LEED) certification. LEED certification is a globally recognized symbol of sustainability, achievement and leadership in environmentally friendly architecture, awarded through the U.S. Green Building Council.

VIRTUAL

2021

CAPSTONE DESIGN EXPO



HELP A FUTURE ENGINEER HELP OTHERS



At the Capstone Design awards ceremony on April 30, department winners vied for the Dean's Choice award by presenting their projects via Zoom to an audience of more than 180. Awards for the Best Industrial Project and a People's Choice Award selected by audience poll – the first such award – were also announced. The event concluded with multiple tributes to **Bennett (Ben) Ward, Ph.D.**, who is retiring. He has directed every VCU Engineering Capstone Design program since 2016.

Dean's Choice Award

Remote Stethoscope
Team: Timothy Ahn, Niketh Vellanki, Viswas Vuppala, George Wesley

Best Industrial Project Award

Instant Ink ABB Robotic Palletizer
Team: Matthew Clark, Richard Hollingsworth, Jordan Thomas, Dwayne Thurston

People's Choice Award

FPGA-Based Amateur Rocket Flight Computer and Telemetry System
Team: Jack Bibb, Christopher Jones, Christopher Knappe

Department Awards

Biomedical Engineering:
Remote Stethoscope
Team: Timothy Ahn, Niketh Vellanki, Viswas Vuppala, George Wesley

Chemical and Life Science Engineering:
CHT Flammable Siloxane Waste Reduction
Team: Abdullah Alzafiri, Sravya Dhavala, Ratib Stwodah, Jordan Taylor

Computer Science:
Honey Bee Dance Language Translator App
Team: Paul Cochran, Christopher Flippen, Chelsea Greco, Vinit Patel

Electrical and Computer Engineering: **FPGA-Based Amateur Rocket Flight Computer and Telemetry System**
Team: Jack Bibb, Christopher Jones, Christopher Knappe

Mechanical and Nuclear Engineering: **Scale-up of a Liquid Metal Loop for Heat Transfer and Fluid Experiments to Support Advanced Energy Systems Deployment**
Team: Davis Bryars, Richard Easter, Graham Johnson, Umair Shallwani

Multidisciplinary:
Smart Chest Tube Insertion Device
Team: Joshua Asenuga, Emily Clement, Justin Freeman, Theodore Stevens, Antenyse Wade

When **Kiana Hutt** was a senior in high school, she thought about finding a career where she could make a difference in people's lives.

"I knew I wanted to design something like water filtration or artificial light systems – something that would help people in developing countries or areas of devastation," Hutt recalled. "I talked to my mom about it and she said, 'That sounds like mechanical engineering to me.'"

Around that time, Hutt's extended family in Puerto Rico felt the impact of Hurricane Maria. This further strengthened her resolve and fueled her connection to engineering.

Hutt, now a senior at VCU studying mechanical engineering, is the first student to be awarded a completion grant. This program was launched to help hardworking students like Hutt who need

assistance paying their tuition balances and might otherwise put their education on hold.

Balancing the demands of engineering while also working many hours at Domino's has been "a difficult journey, but so worth it," Hutt said.

"The completion grant pushes me closer to my degree and closer to my goal of working to provide safe water access in disaster areas," Hutt says. "Thank you for helping me get closer to my goal."

At a pie-a-professor event to commemorate Pi Day in March, VCU Engineering and Tau Beta Pi raised money for the Completion Grant fund to support students like Hutt. Your support can help make a difference.

Donate to the **Completion Grant Fund** today.



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Engineering**



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& Computer
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