



## CELL & MATRIX MECHANICS LAB

Christopher A. Lemmon, Ph.D., assistant professor in the Department of Biomedical Engineering, started the Cell and Matrix Mechanics Lab at VCU to:

- Explore extracellular matrix assembly and cellular function in tissues using microfabricated structures.
- Understand how this process can be applied to diseases such as cancer, diabetes and birth defects.

## Big Data & Machine Learning

## ALGORITHMS HELP FIGHT DISEASE

The Bioinformatics Lab of Tomasz Arodz, Ph.D., performs big data research at the intersection of computer science and life science problems:

- Work merges biology, computer science and statistics to focus on advancing algorithms for machine learning that can be applied to understanding the biological aspects of diseases.
- Researchers explore cells and tissues using laboratory techniques that generate huge amounts of heterogeneous data.

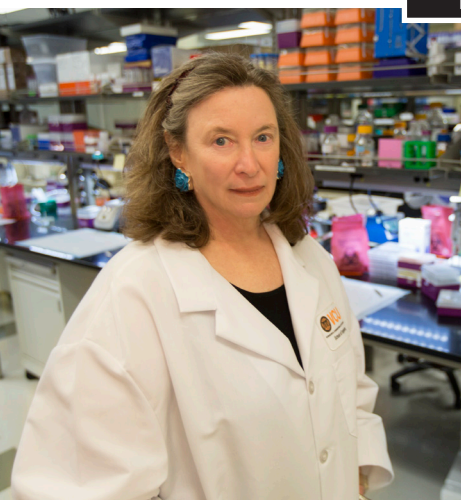


## Device Design & Development

## DEVICES GROW AS CHILDREN GROW

Under Dean Barbara D. Boyan, Ph.D., VCU has been designated as a collaborative partner of the Atlantic Pediatric Device Consortium (APDC), which develops devices to meet unfulfilled needs of young patients. Funded projects include a:

- Scoliosis brace that monitors proper usage while providing feedback, called smartBRACE.
- Vibrating cold pack proven to decrease the pain of IV access and numb injection sites, named Buzzy.



# VCU School of Engineering

VIRGINIA COMMONWEALTH UNIVERSITY

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## About VCU School of Engineering

Since its inception in 1996, the School of Engineering at Virginia Commonwealth University has brought innovative, real-world engineering education to Central Virginia. The School currently teaches 1,652 undergraduate and 265 graduate students. Driven to be the national model for innovation in engineering and research, the School offers B.S., M.S. and Ph.D. degrees in mechanical, nuclear, biomedical, electrical, computer and chemical and life science engineering, computer science and a hybrid mechanical and nuclear engineering doctoral program. Cross-disciplinary focus areas include: Sustainability and Energy Engineering, Micro and Nano Electronic Systems, Pharmaceutical Engineering, Mechanobiology and Regenerative Medicine, Security and Mining of Big Data, and Device Design and Development.

Interdisciplinary research opportunities are offered through the School's Nanomaterials Core Characterization Facility, the Institute for Engineering and Medicine, the C. Kenneth and Dianne Harris Wright Virginia Microelectronics Center, the Translational Research Innovation Projects Facility, the Dean's Undergraduate Research Initiative, and the da Vinci Center. To learn more, go to [www.egr.vcu.edu](http://www.egr.vcu.edu).



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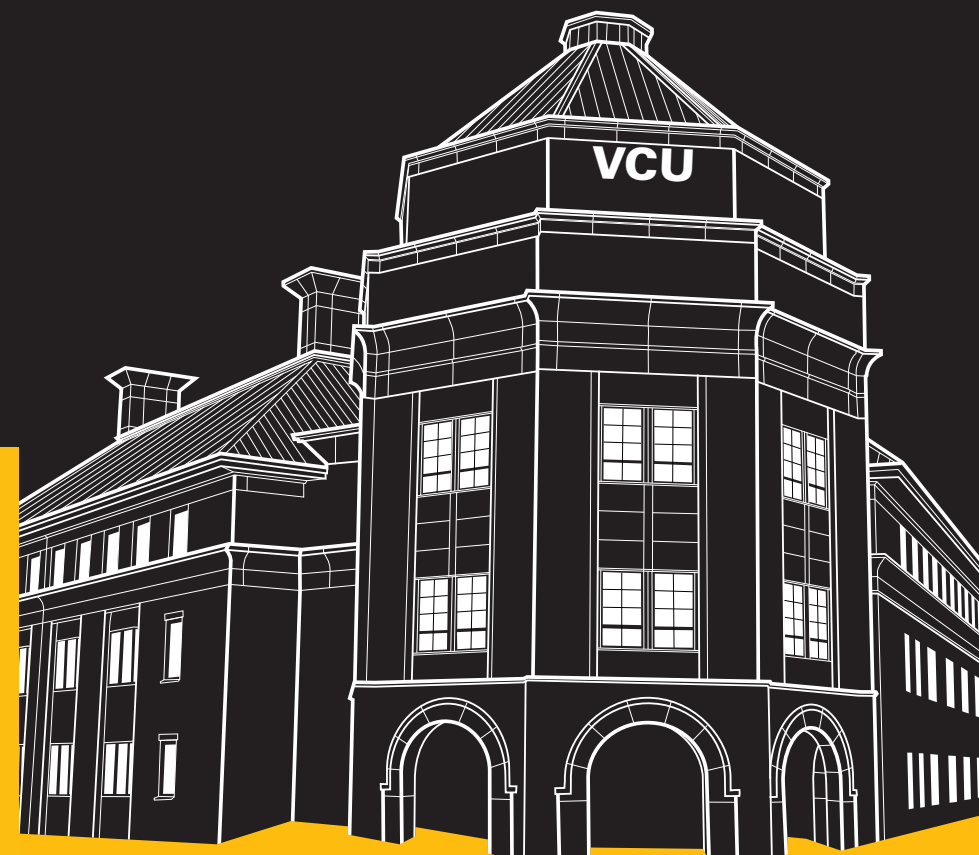
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engineering the future to

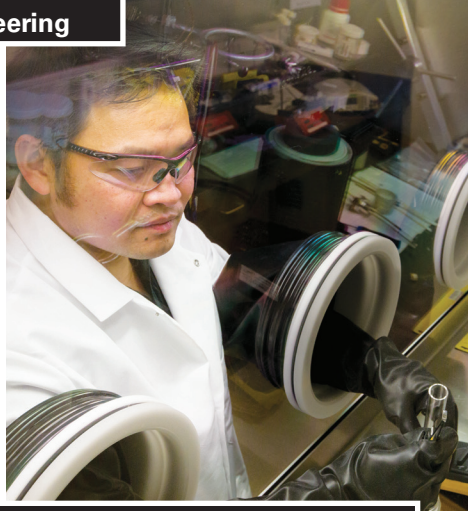
# Make it Real.



## RECYCLING NUCLEAR ENERGY

VCU is one of two institutes on the East Coast that conducts heavy research in this area. Supathorn Phongikaroon, Ph.D., is:

- Reducing nuclear waste while creating clean efficient energy solutions through his Recycling Energy Project.
- Operating at a high temperature to remove nuclear fissile products.
- Seeking long-term, waste-storage solutions and minimizing the volume of these high-level remains.

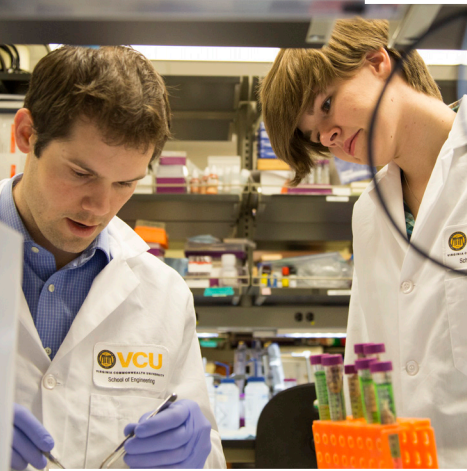


### Micro & Nano Electronic Systems

## RESEARCH & COLLABORATION

VCU believes in hands-on research opportunities for all students to improve the way we work and live:

- The Nanomaterials Core Characterization Facility gives access to over \$11 million in equipment and services.
- The Institute for Engineering and Medicine has 25,000 square feet of research space for technology and health care.
- The Virginia Microelectronics Center features a 7,500-square-foot cleanroom for fabrication and development of devices.

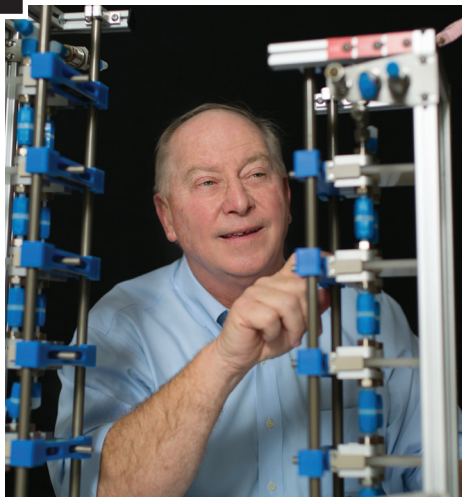


### Pharmaceutical Engineering

## AIDS DRUGS: EXPANDING ACCESS

Our researchers are bringing access to AIDS drugs for all in need through continuous flow reactor technology:

- Chair of the Chemical and Life Science Engineering Department, B. Frank Gupton, Ph.D., is combating the AIDS epidemic by providing affordable access to life-saving medication.
- Gupton, his team, and colleagues have developed a cost-effective way to manufacture several AIDS drugs through the Medicine for All Initiative.



### VCU School of Engineering

## LEADING THE NEXT GENERATION

VCU School of Engineering students and faculty are discovering new solutions to the challenges of today's world. Our key focus is hands-on interdisciplinary learning. Through internships and cooperative education experience, we help our students reach their ultimate potential as the next generation of engineers.



### Biomedical Engineering

## THE POWER TO BREATHE EASIER

Scarred lung tissue can seriously inhibit a patient's ability to breathe. Rebecca L. Heise, Ph.D., is exploring how the mechanical stretch of alveolar epithelial cells affects lung fibrosis. By figuring out the mechanotransduction pathway, the way in which cells convert mechanical stimulus into chemical activity, Heise aims to find new pharmaceutical options to treat this disease.



### Chemical & Life Science Engineering

## CLEANING UP CRUDE OIL SPILLS

A team of scientists led by Ram Gupta, Ph.D., associate dean for research, has proven soy lecithin to be a favorable option in cleaning environmentally harmful oil spills. Gupta discovered that the modification of soy lecithin's chemical structure is less toxic than current traditional liquid dispersants. With this safer dispersant, researchers are one step closer to saving the Earth's oceans.



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### Computer Science



## CYBERSECURITY

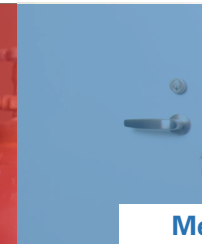
Cybersecurity is a leading global priority that VCU is prepared to meet with the Department of Computer Science's newly offered Certificate in Cybersecurity. Students who graduate with this highly sought after certificate will be capable of setting up antivirus software in careers as security managers or systems administrators.



### Electrical & Computer Engineering

## LEARNING IN THE LABORATORY

Robert H. Klenke, Ph.D., director of the Vertically Integrated Projects (VIP@VCU) Program, is making undergraduate students an integral part of faculty, graduate and postdoctoral research. VIP@VCU is a multi-year program that addresses large-scale projects with hands-on student teamwork. Fall 2015 projects include ideas from other engineering departments in conjunction with School of Arts faculty.



### Mechanical & Nuclear Engineering

## SMART MATERIALS LABORATORY

At the Smart Materials Laboratory, Karla Mossi, Ph.D., is researching the design, construction and characterization of composites while studying applications in energy harvesting, flow control and integrated sensing, and actuation. Current projects include monitoring intracranial pressure, the use of recycled aluminum cans for construction and synthetic jet actuators.

