NEWS/RESEARCH

Computer science professor named IEEE Fellow

Milos Manic, Ph.D., has been named an IEEE Fellow, class of 2021. Manic received this honor for his contributions to machine-learning-based cybersecurity for critical infrastructures. He has completed more than 40 research grants with federal agencies and industry, authored more than 200 refereed articles, holds several U.S. patents and won the 2018 R&D 100 Award for the Autonomic Intelligent Cyber Sensor. He was inducted to VCU's chapter of the National Academy of Inventors and is a Fellow of the Commonwealth Cyber Initiative as a specialist in AI and cybersecurity.

GROWTH

NOW OPEN:
the Engineering Research Building

VCU Engineering held a different kind of grand opening for its new Engineering Research Building. To comply with restrictions 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 cut the ribbon on the 133,000-square-foot research and workforce development hub.

The building facilitates expanded public-private partnerships in VCU Engineering research. Construction of the $93 million facility was funded by taxable bonds, which allows VCU Engineering to work closely with industry to conduct translational research. These collaborations support the college's mission to train students in real-world engineering, often alongside industry professionals. The Engineering Research Building also includes a 9,000-square-foot makerspace and a fully wired courtyard for working outdoors.

FROM THE CHAIR

Krzysztof "Krys" Cios, Ph.D., D.Sc., M.B.A.,

Professor and Chair
Department of Computer Science

VCU's Department of Computer Science continues to lead in research and education.

With substantial funding from federal agencies and industry, our faculty are publishing in top journals and conferences. Last year, we were named a National Center of Academic Excellence in Cyber Research.

We've seen dramatic increases in student enrollment, even during the pandemic. These gains have been particularly strong among women and underrepresented minority students.

Our data science, cybersecurity and software engineering specializations prepare computer science majors to add value immediately upon graduation. In addition, our online Fundamentals of Computing program offers digital fluency education to all VCU students, especially those with no computational background. Together, these programs help us deliver a strong workforce for the new economy.

VCU College of Engineering

48
ACTIVE RESEARCH GRANTS

22
INVENTION DISCLOSURES SINCE 2018

5
GRADUATE PROGRAMS

AREAS OF RESEARCH

- Cybersecurity
- Data science
- Digital forensics
- Bioinformatics
- Cryptography
- Natural language processing
- Machine learning
- Mobile and edge computing
- Quantum machine learning
- Robotics
- Software engineering
- Wireless networks

UNDERGRADUATE SPECIALIZATIONS

Cybersecurity
Data science
Software engineering

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21-0009

25TH
Anniversary

VCU College of Engineering

VCU named 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 (CAE) in Cyber Research. The CAE program promotes higher education and research in cyber defense to reduce vulnerability in the national information infrastructure.

With more than $2 million in cyber research funding and hundreds of cybersecurity publications, VCU Engineering's Department of Computer Science was instrumental in meeting the rigorous requirements to become a CAE for cyber research. The VCU Cybersecurity Center, established in 2018, was the key institutional entity in obtaining this distinction. The center is housed in VCU Engineering's computer science department, whose faculty members run labs dedicated to blockchain, resilience of critical infrastructures, wireless networking and mobile computing, malware and digital forensics. The college leads the university in cyber research funding.

This honor also reflects VCU's highly interdisciplinary approach to cybersecurity research, which includes its computer science, electrical and computer engineering, information systems and homeland security and emergency preparedness departments.

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.

Artist credit: Luis Quintanilla

"Code Beats"

Photo courtesy of Cassandra Willis
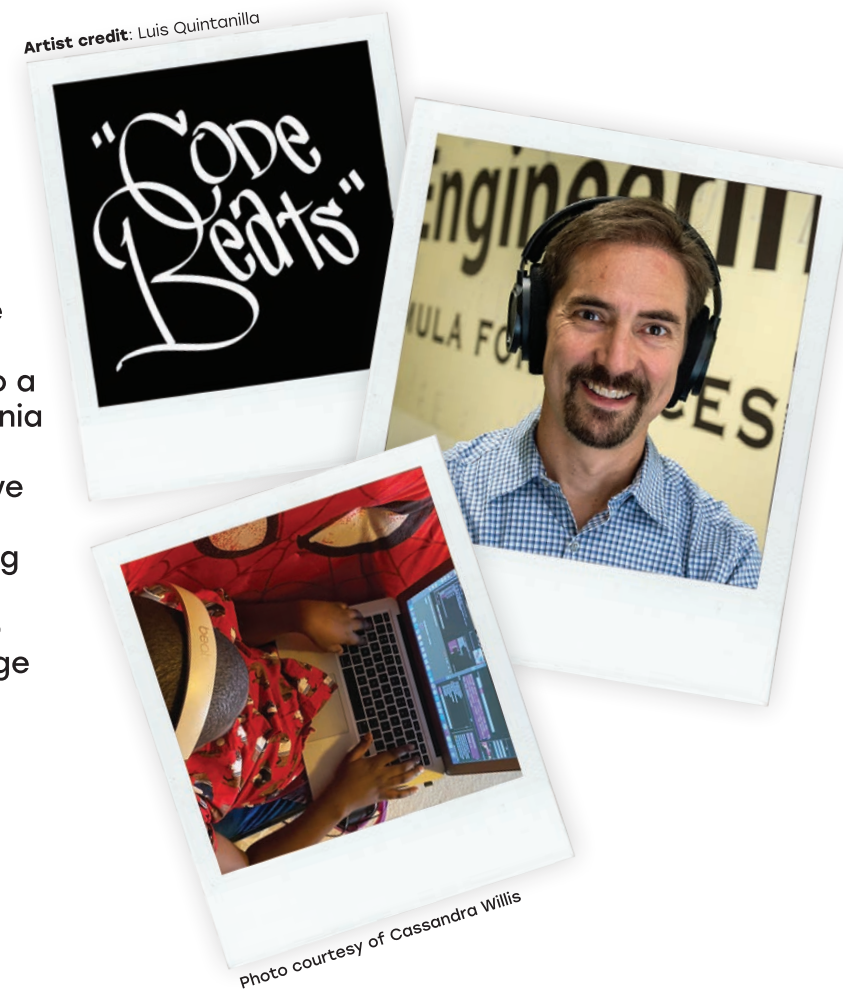
Protecting wind and solar power grids

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.

Doctoral student receives prestigious ACM fellowship

Doctoral student **Clint Cuffy** was one of 12 students selected internationally to receive a highly prestigious fellowship from the Association of Computing Machinery (ACM) in 2020. ACM's Computational and Data Science Fellowship, awarded by its Special Interest Group on High-Performance Computing, provides recipients $15,000 annually for study anywhere in the world.

Nominees for this year's fellowship spanned disciplines from biochemistry and behavioral science to engineering and geosciences, and represented large, mid-sized and small institutions around the world.

Cuffy's research focuses on natural language processing. He is developing deep learning models for literature-based discovery to automatically extract new knowledge across scientific literature. His adviser is **Bridget McInnes, Ph.D.**

Photo courtesy of Clint Cuffy

Enrollments and records in CS

VCU Engineering has seen significant increases in enrollment, retention and graduation rates overall. These gains are particularly strong among women and underrepresented minorities in computer science, whose enrollment numbers have increased by orders of magnitude. Between fall 2015 and fall 2020, enrollment in computer science went from 341 students to 588 students. Over the same period, the number of women enrolled in computer science more than doubled. African American enrollment tripled and Hispanic enrollment nearly quadrupled.

Doctoral student takes top honors at major cybersecurity conference

Doctoral student **Syed Ali Qasim** was lead author of a study that earned best student paper at the 20th annual Digital Forensics Research Conference, one of the world's top digital forensics conferences. The paper, titled "Control Logic Forensics Framework Using a Built-in Decompiler of Engineering Software in Industrial Control Systems," presents digital forensics methods to defend against attacks on critical U.S. infrastructure. Often these attacks come from malware and pose a serious threat to nuclear plants and power grid stations. Qasim's adviser is **Irfan Ahmed, Ph.D.**

Photo courtesy of Syed Ali Qasim

Meet Sahil Zubair (B.S.'15), AI engineer with Royal Bank of Canada

Sahil Zubair, a 2015 graduate of VCU Engineering's Department of Computer Science, has joined the Royal Bank of Canada (RBC) Capital Markets. Based in RBC's New York City office, Zubair writes programs that use machine learning techniques to execute trades on the stock market. He credits VCU Engineering's undergraduate research programs with helping him land the job. "I likely ended up at RBC because of a paper Dr. Cios [department chair] and I wrote when I was a senior," Zubair said. "I'm not kidding. When I interviewed, they had already read through the paper and asked me questions about it."

Photo courtesy of Sahil Zubair