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illuminator

a monthly publication of the batten college of engineering and technology

volume 2, issue 2

3 months. \$7 million. 8 projects.

By Keith Pierce

In the past three months alone, Batten College of Engineering and Technology faculty have been awarded nearly \$7M in grant funding. In FY 2018, college faculty received roughly \$10M in awards.

"We are quite purposeful in our efforts to go after what it takes to move our research goals forward, as well as to show the nation that engineering at ODU is making a meaningful impact," said

Stephanie Adams, dean of the Batten College of Engineering and Technology. "I'm especially pleased to see our early career faculty working hard to secure funding for their research and for our students."

From July 1, 2018, to Sept. 30, 2018, the following grants have been awarded to support research projects for the College:

1 Title: Automation Tools and Analytics Courses for the Naval Shipyards

Sponsor: Naval Sea Systems Command (NAVSEA)

Summary: A team of Batten College of Engineering and Technology faculty, along with members of Old Dominion University's Virginia Modeling, Analysis, and Simulation Center (VMASC), will develop courses in the areas of data analytics, predictive analytics, data modeling, data management,

enterprise architecture and Modeling and Simulation and teach professional training courses to NAVSEA staff at all four naval shipyards (Norfolk Naval Shipyard, Portsmouth Naval Shipyard, Pearl Harbor Naval Shipyard, and Puget Sound Naval Shipyard and Intermediate Maintenance Facility). The team will also automate some of the shipyards' analysis processes to move NAVSEA staff away from the tedium of data entry and make the processes more cost-effective.

"This project provides another opportunity to strengthen the ties between Old Dominion University and the Naval Shipyard," said Andy Collins, the project's principal investigator. "It's an honor to use our educational and analytical talents to help support the Navy, as well as local industry."

College of Engineering & Technology gains momentum with nearly \$7 million in new grant funding



Sailors assigned to the aircraft carrier USS Dwight D. Eisenhower (CVN 69) observe as the ship pulls into Norfolk Naval Shipyard in Portsmouth, Va. (U.S. Navy photo by Mass Communications Specialist 3rd Class Dartez C. Williams)

Principal Investigator: Andy Collins, Ph.D., assistant professor, Engineering Management & Systems Engineering.

Co-Principal Investigators: Mamadou Seck, Ph.D., assistant professor, Engineering Management and Systems Engineering and Jim Leathrum, Ph.D., associate professor, Modeling, Simulation and Visualization Engineering

TOTAL AWARD: \$2,056,385.00

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Batten College of Engineering
and Technology

2 Title: MRI Acquisition: A Reconfigurable Computing Infrastructure Enabling Interdisciplinary and Collaborative Research in Hampton Roads

Sponsor: National Science Foundation

Summary: This project acquires a reconfigurable computing system that will support a broad spectrum of research projects in an appropriately tailored computer environment using state-of-the-art technologies. It offers substantial computational power to support a number of critical research initiatives at the institution. The infrastructure, named DISCOVER, enables big data and high-performance computing research emphasizing three key thrusts: cybersecurity, resilience, and data-intensive science and engineering.

Principal Investigator: Hongyi "Michael" Wu, Ph.D., professor, Electrical and Computer Engineering/director of the Center for Cybersecurity Education & Research, (CCSER)

Co-Principal Investigators: Masha Sosonkina, Ph.D., professor, Modeling, Simulation & Visualization Engineering, Jingwei Huang, Ph.D., associate professor, Engineering Management and Systems Engineering and Khan Iftekharuddin, Ph.D., associate dean for research, Batten College of Engineering and Technology

TOTAL AWARD: \$1,504,396.00



Information Systems Technician 3rd Class Daniel Pastor, assigned to the Amphibious Assault Ship USS Wasp (LHD 1), observes a 3D printer during a 3D design and production course, part of the ODU FleetMaker program designed to teach service members how to design and print objects and parts that can be beneficial to the fleet. (U.S. Navy photo by MCO2 Rawad Madanat)

3 Title: Rapid Solutions Learning-Projects Program (RSLP)

Sponsor: Office of Naval Research (ONR)

Summary: Working in collaboration with a technical contact from the U.S. Navy, this project provides students and faculty opportunities to engage directly with Navy personnel at all levels – from junior enlisted to ONR science and technology advisors – to help solve problems identified by U.S. Navy commands in Hampton Roads. The program includes opportunities for students and faculty to visit naval installations and to board naval ships to examine real-time needs and priorities of the Navy.

Principal Investigator: Rafael Landaeta, Ph.D., associate dean for undergraduate studies, Batten College of Engineering and Technology.

Co-Principal Investigator: Anthony W. Dean, Ph.D., associate professor and assistant dean for research, Batten College of Engineering and Technology

TOTAL AWARD: \$1,295,000.00

4 Title: Opportunities in Manufacturing of Advanced Materials for Second Career Seeking Students

Sponsor: National Science Foundation

Summary: This project will fund groups of six to eight students seeking a second career in engineering, for a total of 60 scholarships. Focused on understanding the factors that affect the academic success of engineering students, a combination of interventions aim to improve self-efficacy beliefs and outcome expectations among second career students. Batten College of Engineering and Technology faculty will collaborate with researchers in ODU's Department of Psychology to study barriers, supports and resources that affect academic success, recruitment, retention and degree completion of engineering students.

Extending the methodology previously developed at ODU for understanding the differential experiences of groups of students as they transition along their career paths, the project will study the transition process for

second career seeking students as an educational psychology research problem, identifying the critical barriers and the key driving factors that facilitate a successful transition to a new career. When acted upon, this knowledge may lead to improvements in the success rate for second career seeking students in engineering programs at ODU and nationwide.

Principal Investigator: Oleksandr Kravchenko, Ph.D., assistant professor, Mechanical and Aerospace Engineering.

Co-Principal Investigators: Sebastian Bawab, Ph.D., professor and chair, Mechanical and Aerospace Engineering, Gene Hou, Ph.D., professor and Dipankar Ghosh, Ph.D., assistant professor, Mechanical and Aerospace Engineering and Konstantin Cigularov, Ph.D., associate professor, Department of Psychology, College of Sciences

TOTAL AWARD: \$1,000,000.00

5 Title: A Service-Learning Partnership to Enhance Engineering Education and Elementary Pre-service Teacher Education for Undergraduate Students

Sponsor: National Science Foundation

Summary: This project engages both engineering and education students in the delivery of lessons to elementary school students. Guided by the Next Generation Science Standards and Virginia Standards of Learning Engineering, students and pre-service teachers will develop lessons to enhance elementary students' understanding of engineering and computational thinking. Engineering students will help devise the engineering challenges that will drive the inquiry-based lessons, while education students will be primarily responsible for developing the lesson plans.

The research is expected to determine whether significant changes in engineering and science content knowledge can be achieved through collaborative partnerships between engineering and elementary education students. Success may result in a replicable instructional model that can be adopted by engineering and teacher preparation programs nationally.

Principal Investigator: Stacie Ringleb, Ph.D., associate professor, Mechanical and Aerospace Engineering.

Co-Principal Investigators: Pilar Pazos-Lago, Ph.D., associate professor, Engineering Management and Systems Engineering, Orlando Ayala, Ph.D., Mechanical Engineering Technology, Krishnanand Kaipa, Ph.D., assistant professor, Mechanical and Aerospace Engineering, Jennifer Kidd, Ph.D., senior lecturer, Teaching & Learning, Darden College of Education & Professional Studies and Kristie Gutierrez, Ph.D., assistant professor, Teaching & Learning, Darden College of Education & Professional Studies

TOTAL AWARD: \$599,993.00

6 Title: Secure Distributed Digital Manufacturing

Sponsor: Office of Naval Research

Summary: This project addresses the growing vulnerabilities associated with the rise in networked devices and data processing systems for digital manufacturing. Researchers aim to develop a practical and low-cost framework to enable secure distributed digital manufacturing by creating new solutions to fend off future cyber threats.

The overarching goal is to allow distributed entities to encrypt their digital manufacturing data in a way that the encrypted data are still computable and therefore able to be processed and aggregated into an integrated design and sent to the manufacturer to securely produce the final product.

Principal Investigator: Hongyi "Michael" Wu, Ph.D., professor, electrical and computer engineering/director of the Center for Cybersecurity Education & Research, (CCSER).

Co-Principal Investigators: Chunsheng Xin, Ph.D., professor, Electrical and Computer Engineering, Anthony W. Dean, Ph.D., associate professor and assistant dean for research, Batten College of Engineering and Technology

TOTAL AWARD: \$250,000.00

7 Title: Collaborative Research: Understanding the Role of Directional Porosity in Transport and Mechanical Properties of Hierarchical Sintered Metal Oxide Electrodes

Sponsor: National Science Foundation

Summary: Solid state batteries provide power for countless applications. Their manufacture and application have a

significant impact on the U.S. economy, health and prosperity. The electrodes in these batteries are conventionally made of composites where each material plays a role: an electroactive material stores and delivers energy, conductive additives carry electrons and polymer binders hold the components together and provide mechanical robustness. If instead, a single multifunctional material phase could be used as the electrode, the energy storage and power capacity of these battery materials would be greatly increased. Researchers will examine the properties of electrodes comprised of a single sintered porous thin film as the active material to potentially provide a new paradigm for multifunctional hierarchical materials, which would fundamentally change the way these materials are designed and processed.

This work will provide a framework for understanding electrochemically active and ion-conducting porous ceramics, which have application not only in batteries but also in other devices such as solid oxide fuel cells and electrochemical sensors.

Principal Investigator: Dipankar Ghosh, Ph.D., assistant professor, Mechanical and Aerospace Engineering

TOTAL AWARD: \$150,574.00

8 Title: Cybersecurity Acquisition Framework Base On Risk Management: Economic Perspectives

Sponsor: Office of Naval Research

Summary: This project will develop an economics-based risk management framework for cyber-aware acquisition which highlights the interdependencies and ripple effects of the failure of one system onto other systems through the synergy of their respective functions.

The project will examine methods in calculating the monetary value of cybersecurity risk and how one may fit with more traditional acquisition frameworks for both public and private organizations.

Principal Investigator: Arial Pinto, Ph.D., associate professor, Engineering Management and Systems Engineering.

Co-Principal Investigator: Adrian Gheorghe, Ph.D., professor, Engineering Management and Systems Engineering

TOTAL AWARD: \$119,719.00

The Mechanical & Aerospace Engineering Renaissance

By Keith Pierce

With record enrollment, new grants awarded to junior faculty and newly renovated lab space, the Department of Mechanical and Aerospace Engineering (MAE) at Old Dominion University is in the midst of a renaissance.

Already the largest department in the Batten College of Engineering and Technology, making up roughly 25% of the total college enrollment, the MAE department has nearly doubled in size in the past 10 years. This fall, MAE achieved a record enrollment, growing to a total headcount over 875 students total, the largest enrollment in the department's history.

"Engineering is a vast field, with a breadth of specializations that can seem overwhelming to new students," says Sebastian Bawab, Ph.D., professor and chair, Mechanical and Aerospace Engineering. "However, I believe with the way mechanical engineering has changed over the years, students are attracted by the great diversity in courses and career options just within mechanical and aerospace engineering."

Research awards are up as well, from \$1.1 million per year on the average for the past 5 years to more than \$1.9 million in 2018. This year alone, junior faculty members, Oleksandr Kravchenko, Dipankar Ghosh and Stacie Ringleb, have acquired more than \$1.7 million in research funding for the department.

continued on next page



Oleksandr Kravchenko



Stacie Ringleb



Dipankar Ghosh

Renaissance *cont'*

"It's not just the resources provided to the faculty, but also the mentoring and support junior faculty get that help them find the right balance, not only between teaching, research and service, but also with their personal life," Bawab said. "Motivated and knowledgeable faculty really help shape the department. I'm proud of them for their hard work in going after this funding with such passion."

The need to recruit such faculty, who are knowledgeable and passionate about the many new advances in the mechanical and aerospace engineering field, has never been greater, according to Bawab. The line between engineering disciplines, such as mechanical verses electrical and computer engineering, has become less defined since Old Dominion University began offering engineering in the 1960's, he says.

"Back then, for the most part, electrical engineers dealt with wires and mechanical engineers dealt with machinery. That's changed significantly over the years,"

Bawab said. "Mechanical engineering has gone from focusing on machines, like steam engines in the old days, to focusing on the design, construction and use of mechanical devices. This includes advanced manufacturing, robotics and machine intelligence."

The transformation and growth of mechanical and aerospace engineering has not only prompted a revamped curriculum, but it has also spurred new opportunities for engineering students, who reap the added benefit of Old Dominion University's location. Offering a robust network of regional and national partners, coupled being home to one of the world's largest military populations, including more than 20% of the entire US Navy, ODU engineering students enjoy a vast array of internship opportunities.

From the design and manufacturing of more common mechanical devices for the medical, energy and automated sectors, to the discovery and invention of new products in research and development



Sebastian Bawab

testing laboratories, mechanical and aerospace engineers are sought by virtually every industry and government agency.

"We consistently hear from employers actively looking to hire our students even before they graduate," Bawab explained. "As we keep our courses current and stay abreast of the latest technological advancements, we will continue to fare well when seeking funding for our research even in this competitive market."

RETIREMENT SPOTLIGHT:



Congratulations to **Deborah Kinney**, undergraduate student coordinator for the Department of Electrical and Computer Engineering (ECE). Kinney is retiring after 50 years of service - 19 of which have been in the Batten College of Engineering and Technology.

Kinney has also been awarded the title of Coordinator Emerita for Undergraduate Student Services effective Oct. 1, 2018.

Kinney's ODU affiliation began as an undergraduate student in 1968. After her freshman year, she put school on hold in order to raise a family. Upon her return as a single mother in 1985, she received a Work Study opportunity in the Office of Admissions.

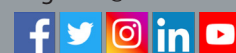
In 1986, while raising six children and taking one class at a time, Kinney accepted a full-time position as enrollment services specialist in the Office of International Admissions. Although not expected to directly interact with new students, she was often asked to assist them with various aspects of their new environment. This sparked her desire to pursue an advising-related job upon graduating in May 1999 with a B.A. in Economics. Within days of graduating, Kinney became the coordinator of

undergraduate student services in the Department of Electrical and Computer Engineering. For the past 17 years, she served twice-yearly as the announcer of the names of graduating engineering students at commencement ceremonies. She has been asked to return in Dec. 2018 and May 2019 to read the names of the upcoming graduating students whom she had the pleasure of advising.

The **illuminator** is a publication of the Batten College of Engineering & Technology

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