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If it walks like a lizard...

Bio-inspired robotics featured at first maker workshop for veterans

by Keith Pierce

Walking, flapping, swimming and running are things animals do every day. Most of us don't think about it. However, for decades those movements have served as an inspiration for engineers and scientists seeking to improve technology. In a recent workshop, military veterans had the opportunity to apply 3D printing techniques to building robots that mimic some of these animal movements.

"Nature offers examples of animals and insects with distinct morphological and biomechanical traits that enable them to reliably adapt and navigate in a wide range of unstructured terrains," says Krishnanand Kaipa, Ph.D., an assistant professor of Mechanical and Aerospace Engineering and the director of the Collaborative Robotics and Adaptive Machines Laboratory.

Bio-inspired robotics involves the design and production of materials and structures inspired by natural systems such as insects, birds, mammals and reptiles. Because of each animal's unique mechanical design, engineers and scientists have long believed that bio-inspired robotics offers the potential to enhance capabilities in manufacturing, health care, exploration, search and rescue, and more.

Made possible by a grant from the National Science Foundation (NSF), the goal of the workshop was to understand the impact of "making" for veterans pursuing STEM degrees. Maker education is hands-on learning that leverages the natural human instinct to create. Anthony Dean, assistant dean for research in the Batten College of Engineering and Technology, leads the NSF project.

"We're using these workshops to test the maker pedagogy and its potential for improving the effectiveness of learning for military veterans in STEM disciplines," says Dean, "The workshops provide an introduction to engineering subjects and include computer-aided design (CAD), rapid prototyping, 3D printing and bio-inspired robotics"

Navy veteran and incoming ODU freshman, Davis Takhvar, a native of San Luis Obispo, California, who plans to major in electrical engineering, attended the workshop.

"It was very fun," Takhvar said. "I built a robot that did not walk very well to be honest, but I learned that engineering is more than just one discipline – it's a combination of multiple skills from different fields that you need to utilize to complete a job."

Workshop instructors included Vukica Jovanovic, associate professor of Mechanical Engineering Technology; Otilia Popescu, assistant professor of Electrical Engineering Technology; Krishnanand Kaipa, assistant professor, Mechanical and Aerospace Engineering and Karina Arcaute, assistant professor, STEM Education and Professional Studies.



Workshop attendees, Juan Cortez (left) and Davis Takhvar, both Navy veterans, plan to continue their interest in robotics this fall as freshman majoring in mechanical engineering technology and electrical engineering, respectively.

"This workshop provided only a glimpse into the type of robotics offered at ODU," Kaipa said. "During the school year, students can explore many options in the growing field of robotics and move on to exciting interdisciplinary fields like soft robotics, biomimicry and autonomous robotics."

LEARN MORE:

- **EAGER: Understanding the Impact of Making on Veterans in Pursuing STEM Degrees**
(bit.ly/2Ln1lwV)
- **Biologically Inspired Robotics**
(bit.ly/2swCT5f)



Batten College of Engineering
and Technology

Batten College of Engineering and Technology receives \$2 million from NSF

Two separate grants will open the door for veterans and high-achieving low-income students in STEM

by Keith Pierce

Cybersecurity and STEM for veterans are the focus of two grants, totaling nearly \$2 million, awarded to the Batten College of Engineering and Technology at Old Dominion University by the National Science Foundation (NSF).

The grants are part of the NSF's Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) program, designed to encourage and enable low-income academically talented students with demonstrated financial need.

The first project, "Improving the Success of Low-Income Students in a Cybersecurity Program," targets students in the cybersecurity program and will fund up to 18 scholarships over a four-year period while providing students with academic support through mentoring and other program activities. Chunsheng Xin, professor and principal investigator, will lead a team of researchers that includes Wu He, associate professor in the Department of Information Technology and Decision Sciences; Brian Payne, Old Dominion's vice provost for Academic Affairs; Hongyi "Michael" Wu, director of the Center for Cybersecurity Education and Research; and Shana Pribesh, associate professor in the Department of Education Foundations & Leadership.

"The success of the project will substantially strengthen ODU's cybersecurity program," said Wu. "It will also attract top students and boost the student retention rate, leading to transformative changes in the state of cybersecurity workforce preparedness." U.S. Sens. Mark Warner and Tim Kaine,



Chunsheng Xin and Tony Dean

who announced the approval of the grant last month, said in a joint statement: "Ensuring students have the support they need to pursue careers in cybersecurity is critical to building our federal workforce and defending the nation's economic and national security. We are thrilled that ODU and the National Science Foundation are partnering to help make that a reality for more students."

The second project, "Pathway to Completion for Pursuing Engineering and Engineering Technology Degrees," aims to address the significant barriers and risk factors to degree completion of veteran students pursuing engineering and engineering technology programs. Tony Dean, associate professor and assistant dean for research, Batten College of Engineering and Technology, leads the project. Co-principal investigators include; Rafael Landaeta, associate professor and associate dean for undergraduate education; Vukica Jovanovic, assistant professor, Department of Engineering Technology and; Kim Sibson, undergraduate chief departmental advisor and programs manager for the Batten College of Engineering and Technology.

The project will fund approximately seventy \$5,000.00 scholarships over five years for veteran students pursuing

bachelor's degrees in engineering and engineering technology. According to Dean, the project also includes recruitment of veterans who have exhausted their GI Bill benefits but have not yet completed their STEM degree.

"We're home to one of the world's largest military populations and the largest naval base in the world. It just makes sense to have incentives and mechanisms in place to attract and retain veteran students," said Dean. "Through interventions and targeted support, we will address some of the barriers to degree completion for veteran students in STEM programs."

"Every bright and talented future engineer deserves a path lined with support and these grants are just the beginning," said Stephanie Adams, dean of the Batten College of Engineering and Technology. "By seizing every opportunity to go after funding that is aligned with our goals to provide such a pathway, particularly for underrepresented students, veterans and students from low-income backgrounds, we inspire innovation while helping to meet the increasingly high demand in STEM-related careers."

ODU to offer on-campus, online master's degree in cybersecurity

by Jon Cawley

The State Council of Higher Education for Virginia recently approved a new master's degree in cybersecurity at Old Dominion University. The degree will be offered on-campus and online and will prepare students for the 33,500 cybersecurity vacancies in the Commonwealth.

Graduates will develop competencies in the technical aspects of cybersecurity, with proficiency in emerging technologies. They will be prepared for high-level positions to secure the nation's cyber infrastructure and coordinate cyber operations teams.

"This graduate program reflects our commitment to providing educational opportunities that address very real issues in our region and the world," said President John R. Broderick, who spearheaded the hiring of seven new cybersecurity faculty over the past two years after creating the Center for Cybersecurity Education and Research in 2015.

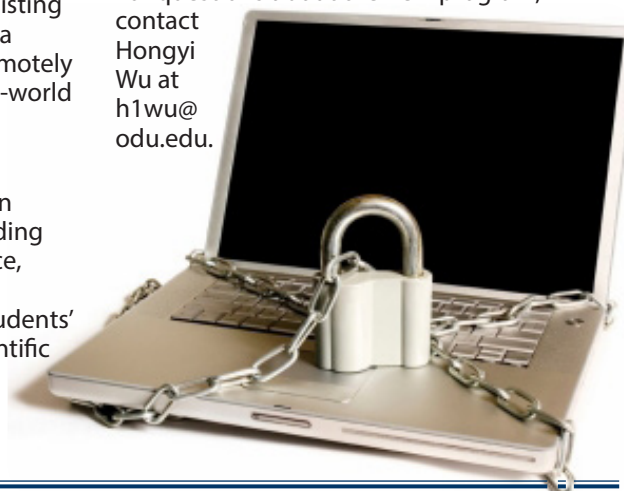
"What's perhaps most important about this program," he added, "is that our faculty members will be expanding the pipeline for a diverse group of cybersecurity professionals who will be in positions responsible for safeguarding our critical infrastructure."

President Broderick also oversaw investments in the creation of a state-of-the-art cybersecurity infrastructure, including a cybersecurity lab consisting of 24 dedicated workstations and a virtual lab. Online students can remotely connect to the lab to conduct real-world cybersecurity experiments.

"This setup will effectively enrich course projects by implementation and experimental activities, providing students with hands-on experience, which has been shown to be an important factor in stimulating students' interest and sharpening their scientific reasoning and problem-solving skills," said Austin Agho, provost and vice president for academic affairs.

"As the volume and sophistication of cyber attacks grow, there is a surging demand for a well-trained cybersecurity workforce to safeguard information relating to national security, health and financial records, and various sensitive business and personnel data," said Hongyi "Michael" Wu, Batten Endowed Chair of Cybersecurity and director of ODU's Center for Cybersecurity Education and Research.

For questions about the new program, contact Hongyi Wu at h1wu@odu.edu.



Save the Date

BATTEN COLLEGE OF

ENGINEERING & TECHNOLOGY

2018 State of the College

Thursday, August 23, 2018, 11:30 am

Stephanie G. Adams, Ph.D.
Dean

Batten Arts & Letters ~ 4401 Hampton Blvd, Norfolk, VA 23508 ~ Room 1012

Graduate assistant gives and receives

Two and half minutes with Aaron LaDue

Recent Masters of Civil Engineering graduate, Aaron LaDue, who served as leader of the dean's ambassador program for the Batten College of Engineering and Technology, talks about his ODU experience.

[Watch now: \(hit.ly/2J8IJ7b\)](https://hit.ly/2J8IJ7b)



ODU team takes third place in international aircraft design competition

By James Harkins

This spring, a team of students from the Old Dominion University Department of Mechanical and Aerospace Engineering, along with department professor Drew Landman, placed third in an international competition featuring 75 universities.

The March competition, hosted by the Society of Automotive Engineers (SAE) in Lakeland, Fla., challenged students to build a portable aircraft to fit within the confines of a small container.

The ODU team designed a radio-controlled plane that could be easily assembled and weighed roughly one pound. Small aircraft like these could propel the aerospace industry forward and serve as a basis for a new generation of aircraft used for rescue, military operations, inspections, construction, or many other purposes.

The aircraft was developed as a senior project by 12 students, who each contributed in unique ways to the project. They described the creative process as a lot of trial and error, with each test providing new insights on how they could improve the design. At one point, the wings of the plane were ripped off by 20-mile-per-hour winds, to which the team responded by reinforcing the spar to make it stronger.

"I gained a lot of hands-on experience because we had to build everything from scratch," said team member Christopher Vanostrand, a senior from Norfolk. Vanostrand emphasized how the project provided a valuable learning experience that could be applied outside the classroom.

During the competition, aircraft were judged on several criteria, including the weight of the plane, payload it can carry and a presentation by the creators. Another senior, George Altamirano, elaborated on the presentation, saying the team had to explain why they used certain materials and designed the plane in the way that they did.



(Seated left): Christopher VanOstrand, (standing, left to right) Andrew Waller, Brian Duvall, Evan Norfolk, Ramtin Hosseini, Emma Field, Nicholas Bryant, David Lima, Sean Fishgold, Daniel Guzman, Mitchell Heath, (Seated right): Dr. Drew Landman. (Team member not pictured): George Altamirano.

Getting into the competition was a hurdle in itself.

"It requires an SAE membership, entrance fee, aircraft inspection and technical report beforehand," Landman said. "The contest fills up very quickly, so signing up early is extremely important."

There were three classes of aircraft. The ODU students entered under the micro class, the smallest of the aircraft designs.

The introduction of drones and other types of unmanned aircraft has changed the landscape of the aerospace industry immensely in recent years. The competition is a result of that growth, demonstrating an ever-growing demand for smaller, lighter and cheaper unmanned aircraft.

The aircraft created by this team of students weighs under a pound, yet is able to carry three pounds. Its unique design allows the plane to fit in a very small box, which could allow for many more individuals or organizations to take advantage of its utility. Such technology may play an important role in the future of unmanned flight.

See more in this brief video:



www.ODU.edu/eng

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

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