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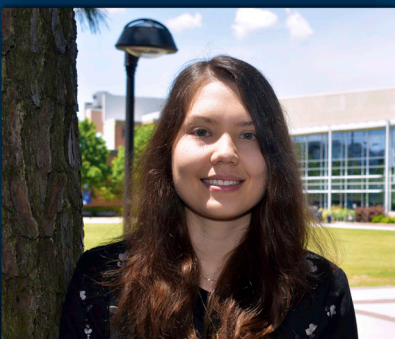
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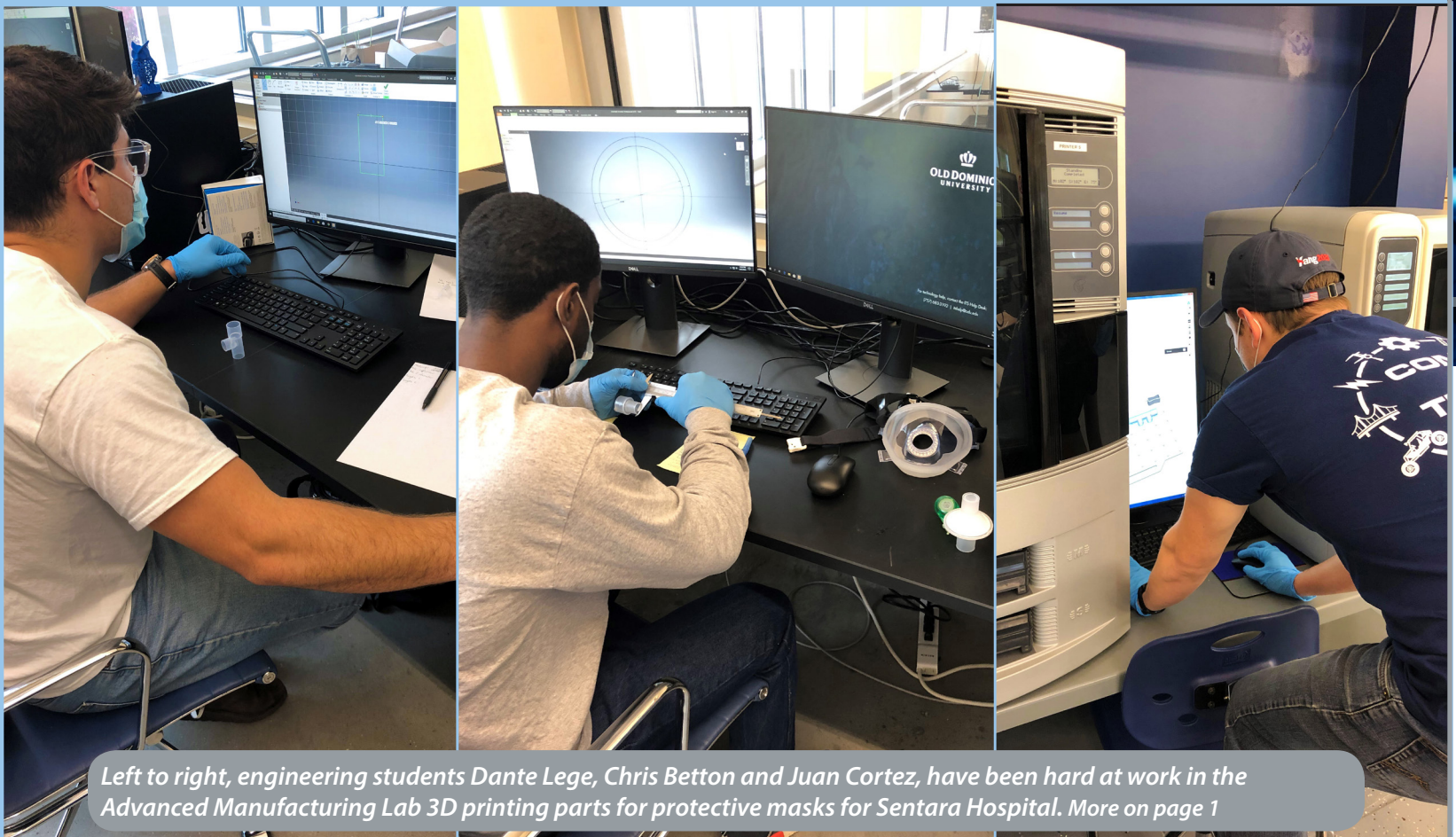
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Batten College of
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Left to right, engineering students Dante Lege, Chris Betton and Juan Cortez, have been hard at work in the Advanced Manufacturing Lab 3D printing parts for protective masks for Sentara Hospital. More on page 1

THREE CHEERS FOR THE ENGINEERS!

Answering the call for personal protective equipment (PPE)



Left, CMSE graduate student, Nahom Kidane and Univ. of Miami medical student Kathleen Kelly, (daughter of CHKD's Dr. Robert Kelly), display 3D-printed masks. Right, 3D-printed parts produced by engineers at VMASC who joined in the production effort. More on page 2

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COVID-19: filling a critical need

ODU engineering faculty and students answer the call for personal protection equipment

by Keith Pierce, APR

Across the country, health-care workers treating COVID-19 patients face a critical shortage of personal protection equipment. In response to the increasing demand, Old Dominion University President John R. Broderick was quick to offer much-needed support to local hospitals. Soon after, students and faculty across campus were putting their expertise to use by creating 3D-printed personal protective equipment.

Dr. Jordan Asher, Sentara's senior vice president and chief physician executive, called Ben Stuart, interim dean of the Batten College of Engineering and Technology at ODU, asking for help printing medical parts. Stuart enlisted the expertise of Sebastian Bawab, professor and chair, Department of Mechanical and Aerospace Engineering and Tony Dean, assistant dean for research in the College.

"I have a tremendous amount of confidence in our engineers," Stuart said. "I knew when they got the word, they would jump at the opportunity to put their expertise to work for this important cause."

Bawab and Dean went to work in the new Advanced Manufacturing Lab that Dean helped establish. The lab is equipped with several industrial 3D printers that print a wide variety of materials.

Justin Seemueller, a respiratory clinical specialist with Sentara, was asked to collaborate with the ODU team.

"Within a few hours, I was dropping off parts to Tony Dean," Seemueller said. Seemueller's idea was to combine a positive pressure face mask, normally used by patients, with a viral filter to turn them into a reusable protective mask capable of being sterilized easily.

"I asked Tony and the ODU team to make adapters for two main types; one that would double serve as a face shield, and another that would work for people who wear glasses," he said.

Enlisting the help of engineering students Juan Cortez, Chris Betton and Dante Lege, Dean and Bawab went to work on the prototype.

"Taking the parts Sentara sent us, we had to use a process called reverse engineering," Dean explained.

"That means carefully measuring and remodeling the parts on a computer, modifying the design to account for the material type



Left to right, engineering students Juan Cortez, Chris Betton and Dante Lege have been hard at work in the Advanced Manufacturing Lab 3D printing parts for protective masks for Sentara Hospital.

and process of 3D printing to get a functioning design that is further tested," Bawab added.

Within hours, Seemueller received a prototype hand-delivered by Dean.

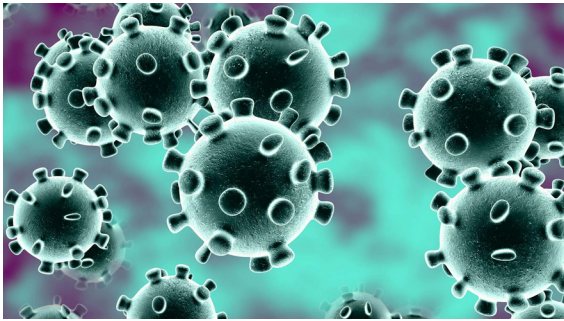
"We have all been extremely appreciative of the work and expertise offered by ODU," said Seemueller, who has tested each mask made with the 3D-printed adapters. "They even agreed to share the final design file and instructions so we can reach out to other 3D printing facilities to ramp up production."



Sentara respiratory therapists Sean Whiting and Brian Clarke model two masks made with adapters 3D-printed at Old Dominion University. Photo/Justin Seemueller


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COVID-19: filling a critical need, *cont'*



A collaborative effort led by Rick McKenzie, professor and chair of computational modeling and simulation engineering, has provided an open-source mask designed with a removable filter for health-care providers at the Children's Hospital of The King's Daughters (CHKD).

After a discussion about various designs with Associate Dean Rafael Landaeta, Orlando Ayala, associate professor of engineering technology, and students from the ODU Engineering Makerspace and Invention Center, McKenzie's team began 3D printing the masks.

"We printed several promising shapes from the internet and worked with CHKD to settle on a shape that we were able to combine with weatherproofing material as well as methods to seal the 3D printer material so that it could be airtight," McKenzie said. "The result is a comfortable mask intended to be used when N95s run out and can be reused by disinfecting with hydrogen peroxide."



With the help of Hector Garcia, senior project scientist at the Virginia Modeling, Analysis, and Simulation Center (VMASC); Nahom Kidane, ODU computational modeling and simulation graduate student; as well as University of Miami medical student, Kathleen Kelly, (the daughter of Dr. Robert Kelly who is home due to COVID-19), McKenzie hopes to print up to 100 masks. Medical student volunteers from Eastern Virginia

During a recent surgery, and within days of his initial request, Dr. Robert Kelly (left), chief of surgery at CHKD, was using a mask 3D-printed by ODU engineers with the help of VMASC and medical student volunteers from EVMS and the Univ. of Miami



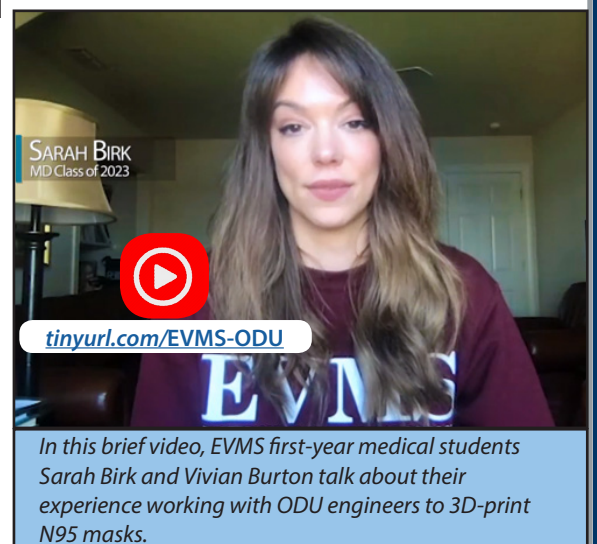
Left to right, Vivian Burton, EVMS medical student; Nahom Kidane CMSE grad student; Hector Garcia, senior project scientist at VMASC; Sam Stephenson EVMS medical student; and Sara Birk EVMS medical student.

"We have a wonderful partnership with the engineering department," said Dr. Robert Kelly, chief of surgery at CHKD.

"We've collaborated with them on several projects that have strengthened our abilities to measure treatment progress with our chest-wall deformity patients. We know their work is top-notch and weren't at all surprised by how impressed others were here at CHKD by the prototype ODU brought us."

Medical School (EVMS) also helped in the effort.

"To say we're grateful is an understatement," Dr. Kelly said. "Once again, ODU has come through for our local community in a time of great need,"



In this brief video, EVMS first-year medical students Sarah Birk and Vivian Burton talk about their experience working with ODU engineers to 3D-print N95 masks.

ASCE renames award in fallen engineer's honor

Source: ASCE News

The Outstanding Practitioner Advisor Award presented annually by ASCE's Committee on Student Members has been renamed to honor the late Richard H. Nettleton.

Nettleton, P.E., M.ASCE, a design and construction engineer for the Virginia Beach Public Utilities Department and a longtime ASCE member, was tragically and senselessly killed during the mass shooting incident at Virginia Beach Public Works Building Two, May 31, 2019.

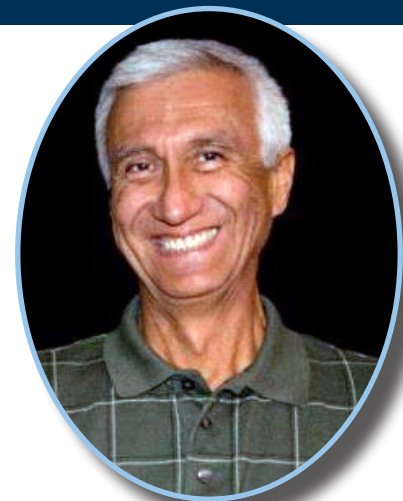
"We felt that renaming this award was a great way to recognize a gentleman who did a lot of great things," said Matt Swenty, ASCE chair of the Committee on Student Members.

Nettleton served as the practitioner advisor for the ASCE Student Chapter at Old Dominion University for 15 years, providing guidance and mentorship for generations of young engineers entering the field.

"The practitioner advisor really provides that connection for students to the industry and the real world," Swenty said.

"Those practitioner advisors, like Richard, serve such a critical role for our students and are very important to the health of our student chapters. And Richard did so for many years too. He did a great job."

Though Nettleton graduated from Old Dominion University with a Master's degree in Business Administration, he was an engineer with close ties to the Batten College of Engineering and Technology.



"Rich always had a level head and was a great problem solver," said Bruce Husselbee, P.E., director of engineering for Hampton Roads Sanitation District (HRSD), who is past chair of the ODU Civil and Environmental Engineering Visiting Council (CEEVC). "He had the ability to stay calm when others were frustrated. He was the 'adult in the room' when others needed guidance at stressful times."

Ph.D. student wins prestigious NSF Graduate Research Fellowship award

by Cecilia Ramirez

Megan Witherow, a Ph.D. student in Electrical and Computer Engineering has been awarded the competitive 2020 National Science Foundation (NSF) Graduate Research Fellowship.

Witherow's research focuses on improving intervention for children with Autism Spectrum Disorder (ASD). Her work aims to better understand the facial expressions and eye gaze of individuals with ASD to support the development, assessment and individualization of interventions for autism.

"My application to the National Science Foundation placed a strong emphasis on computer vision, signal and image processing, machine learning, deep learning, and modeling and simulation," she said. "I have been developing facial-expression analysis and modeling techniques targeted for children."

Witherow knew early on that majoring in engineering would allow her to make



a difference and pursue her passion in research, computers and intervention for autism.

"I have been impressed with Megan's excitement for learning and research," said Khan Iftekharuddin, associate dean for research and graduate programs for the Batten College of Engineering and Technology and director of the ODU Vision Lab. "Her motivation to excel in scholarship ever since she was a sophomore and wanted to work on a research project in my lab are commendable."

"I have worked with Dr. Iftekharuddin and our collaborators at Eastern Virginia

Medical School (EVMS) to design a new human-subjects study involving children and young adults with ASD," Witherow said. "The study is approved by the Institutional Review Boards at ODU and EVMS."

The National Science Foundation Graduate Research Fellowship is considered very prestigious in STEM education. It is highly competitive, with more than 13,000 applications from students at the nation's top universities this cycle. Of those applications, the NSF awarded fewer than 2,100 fellowships. The program provides up to three years of support for graduate education, including a \$34,000 annual stipend plus \$12,000 per year toward the cost of graduate work.

"I am excited to continue to build on my research experiences now with the support of the NSF Graduate Research Fellowship," Witherow said.

"We believe this award will motivate many of our graduate students to apply for this and other similar fellowship awards to pursue their education at a fine institution like ODU," Iftekharuddin added.

Virginia Bio partners with ODU's Center for Bioelectronics

by Hannah Kears

John Newby, chief executive officer from Virginia Bio, recently visited Old Dominion University's Frank Reidy Center for Bioelectronics. He spoke with faculty, staff and students about the Center's leadership in the field of bioelectronics and commitment to growing self-sustaining education, industry and government partnerships in Virginia.

Newby said Virginia Bio's new partnership with the Center for Bioelectronics will generate and bring great solutions to the Commonwealth to save lives, as well as spread the word about the innovative, life-changing research happening in Hampton Roads. Virginia Bio's mission is to generate growth in bioscience by providing sources of funding as well as excellent connections to academia and the industry.

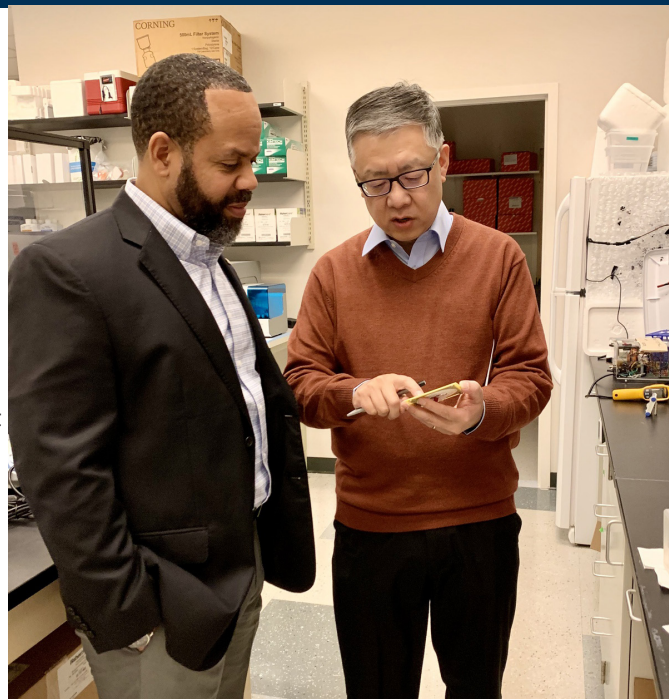
The ODU Center for Bioelectronics, headed by Executive Director Gymama Slaughter, is committed to cultivating interdisciplinary collaboration in efforts to address some of the world's greatest environmental and health challenges such as cancer, neurodegenerative disorders, diabetes, obesity, chronic wound healing and environmental decontamination.

Newby visited several research laboratories to discuss the broad impacts of the research conducted at the Center.

Stephen Beebe, one of the original cancer clinicians in the Center, and Siqi Guo, an associate research professor who focuses on immunoncology, offered their perspectives on the Center's cancer research portfolio, beyond the conversation's focus on cancer immunotherapy for breast and pancreatic cancer using nanosecond pulse electric fields (nsPEF). Andrei Pakhomov, leading principal investigator of the multi-university MURI project aimed at comprehensive understanding of nsPEF effects at the cellular and subcellular levels, and John Catravas, Sentara Endowed Chair of Bioelectronics and cardiopulmonary and vascular injury expert, discussed the health challenges associated with tumor cell removal, defibrillation, deep neural tissue stimulation, and the prevention and repair of endothelial cell barrier dysfunction associated with various diseases such as pulmonary edema and sepsis. Michael Kong, Batten Endowed Chair and professor of electrical and computer engineering and a leading cold plasma engineer, offered his perspective on the importance of healing chronic wounds and preventing bacterial film build up on wounds.

The ODU Center for Bioelectronics provides numerous opportunities and novel drug-free therapies to fight cancer, neurodegenerative disorders and cardiovascular disease. Novel diagnostics tools for early detection of cancer, diabetes and neurodegenerative disorders are being developed in the Center.

Left to right: Gymama Slaughter, executive director of the ODU Center for Bioelectronics, Iurii Semenov and Olga Pakhomova (research assistant professors in the Center) and Virginia Bio CEO John Newby.



Michael Kong, (right) Batten Endowed Chair and professor of electrical and computer engineering, discusses cold plasma as a wound-healing technology with Virginia Bio CEO John Newby.

"The new partnership between Virginia Bio and the ODU Center for Bioelectronics will help create collaborations between multiple universities in the Commonwealth to unleash the potential of the research to tackle health and environmental challenges," Slaughter said. "This strategic partnership will help shed light on the innovative research conducted at the ODU Center for Bioelectronics and bring about awareness of the value of the impacts of bioelectronics research."



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

- 👑 Ben Stuart, Ph.D., P.E., interim dean
- 👑 Cecilia Ramirez, director of communications and marketing

1105 Engineering Systems Building
Norfolk, VA 23529
(757) 683-3789 (office)
(757) 683-4898 (fax)
engineer@odu.edu

