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illuminator

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BOOSTING DOCTORS' ABILITY TO TELL TUMOR FROM HEALTHY BRAIN TISSUES

pg. 1



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Photo credit: Dreamstime.com

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PLUS: Students tour engineering firms in Germany

SO LONG, BUT NOT GOODBYE.



Pierce interviews Mary Sandy, director of the Virginia Space Grant Consortium, during April 2019 CubeSat launch at Wallops Island.
Photo by Otilia Popescu

Illuminator creator and editor bids farewell

Keith Pierce, director of communications and marketing for the Batten College of Engineering and Technology, is moving on to serve in the Office of Strategic Communication and Marketing as director of news and media relations for Old Dominion University.

Read more on page 2.



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Old Dominion University Vision Lab research featured in 2019
Coalition for Academic Scientific Computation brochure

Boosting doctors' ability to tell tumor from healthy brain tissues

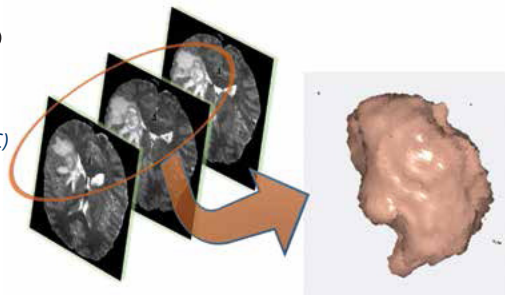
by Anne Johnson, lead writer
Coalition for Academic Scientific Computation (CASC)

Gliomas, the most common brain tumor in adults, tend to infiltrate healthy brain tissue rather than growing in a single mass. This makes them extremely difficult to remove surgically, and also complicates diagnosis, monitoring and prognosis.

Researchers led by Prof. Khan Iftekharuddin at Old Dominion University's (ODU) Vision Lab, along with clinical collaborators at Children's Hospital of Philadelphia, the University of California San Diego and the University of Iowa, want to give doctors a new weapon in the fight against gliomas. With funding from the National Institute of Biomedical Imaging and Bioengineering and the help of ODU's high performance computing resources, the team developed robust Brain Tumor Segmentation methods designed to help doctors see where tumor tissue ends and healthy brain tissue begins.

The researchers expose their computer program to large collections of brain magnetic resonance imaging (MRI) scans, training the system to find clues in the images that correlate with various health outcomes.

After this training, when the program is exposed to new brain images it uses sophisticated computational methods to see patterns and determine the tumor's shape. Complementing the work of



The above image shows how the program processes MRI images (left) to automatically generate an accurate volume segment of the brain tumor (right).

clinicians, the program then predicts the patient's prognosis.

"This work's immediate impact on radiotherapy planning and follow-up treatment is immense," said Iftekharuddin, who also serves as associate dean for research for the Batten College of Engineering and Technology at ODU. "This will enhance patients' eligibility for clinical trials and provide a large community of clinical researchers and end-users with methods for advanced image and machine learning analysis of a variety of brain tumors and related neuroimaging studies."

The ODU Segmentation system ranked #1 in an international competition of computer-assisted medical image assessment and patient survival prediction technologies organized by NIH and MICCAI. The researchers hope it can eventually act as a virtual assistant to help doctors diagnose gliomas and determine the best treatment approach and dose. **For more information visit:** <https://casc.org/>

VIDEO SPOTLIGHT: HALES



Old Dominion University's HALES Program (High Achieving Latinos in Engineering and Science) brought some of the best and brightest Latino students to campus for one week in June. ODU hosted students from Puerto Rico who attended lectures from leading experts in sciences and engineering and received behind-the-scenes tours of facilities such as Jefferson Lab and NASA Langley. ODU's goal is to inspire these students and encourage them to pursue careers in STEM fields. **See and hear more in this short video:**



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Message from the editor

Keep on Illuminating



Keith Pierce, APR

This is my last issue of the Illuminator. And though I have to say farewell much sooner than I had expected, this is not goodbye. I recently accepted a new role to serve as the University's new director of news and media relations.

Two years ago, I set out to profile some of the most brilliant people I have ever met. I saw right away that you had some of the University's most compelling stories, yet they were not being widely shared. That's why, despite how little I knew about engineering, I wanted to create a new outlet and I wanted to create it fast. Even coming up with the right name for this new publication was done without hesitation and, OK, without input. My bad. The good news is, because of you, we delivered the first issue of the *Illuminator* in just over one month after I arrived. Twenty-two issues and roughly 100 stories later, because you trusted me to share your stories in both print and video, we have an interactive publication with a distribution of more than 6,000. You helped make that happen.

This may be my last issue as editor of the *Illuminator*, but it does not end my desire, or my ability, to share the great stories in the Batten College of Engineering and Technology. I hope you continue to insist that your stories been seen and heard. But don't wait for someone else to tell them. Be a part of the storytelling process. Brainstorm, collaborate, produce and share. We're all the Batten College of Engineering and Technology, and we're all Old Dominion University. A great story in civil, electrical or mechanical engineering is also a great story in engineering technology, engineering management or modeling and simulation. Needless to say, any great engineering story is a great university story.

I must close with a special thanks to our former dean, Stephanie Adams, for taking a chance on me and to all of my colleagues in the dean's office. I also want to thank all department chairs and their faculty, as well as students, who helped bring great stories to life. To say that I will miss my engineering family is an understatement. However, you know where I am. If you don't bring me your stories, just remember that I know where you are as well!

- Keith Pierce, director of communications and marketing

Mod Sim gets a new name

Modeling, Simulation & Visualization Engineering (MSVE) is now Computational Modeling & Simulation Engineering (CMSE)

by Keith Pierce

As of July 1, 2019, the Department of Modeling, Simulation and Visualization Engineering (MSVE) is officially referred to as Computational Modeling and Simulation Engineering (CMSE). The change is designed to make the name more current.

Department Chair Frederic (Rick) D. McKenzie, says the name change does not change the major's curriculum.

"Modeling and Simulation Engineering is a discipline where students utilize basic science principles and concepts not primarily to create and analyze a physical, mechanical or electrical system but to create and analyze a model of that system, which require different skills and abilities," he said. "For example, comprehending and applying basic first principles in order to model complex processes by breaking the problems into simpler parts, utilizing appropriate modeling techniques, and then making those models dynamic to analyze and formulate solutions to the complex problems."

Old Dominion University was the first university in the nation to offer an undergraduate degree in modeling and simulation engineering and has one of the few U.S. graduate programs in this emerging discipline. ODU was also the first university in the country to offer a Ph.D. in modeling and simulation.

The curriculum and coursework required of students are consistent with a program of study in Computational Science and Engineering that focuses more on the processes involved in developing a model, different types of modeling methodologies where some involve artificial intelligence (AI) techniques, verification and validation, and visualization, as well as training and decision support.

According to McKenzie, the former department name did not recognize the computational component of the curricula.



He also noted that the new name more accurately reflects the activities of the department.

"Including the word computational in the name connotes both mathematics and software programming, which is what most of the courses in modeling and simulation are about," he explained. "The word, visualization is implied in the words modeling and simulation and therefore unnecessary in the name."

Modeling and simulation engineering students have access to state-of-the-art facilities featuring several instructional and research laboratories, a virtual reality theater, and a four-walled C.A.V.E. (Cave Automatic Virtual Environment). In addition, the department's academic programs are coupled with a strong research program conducted jointly with ODU's Virginia Modeling, Analysis and Simulation Center (VMASC), located nearby in Suffolk. Researchers at ODU work in cutting-edge areas such as medical and health care modeling and simulation, high-performance computing, cybersecurity, big data, virtual reality, educational gaming, transportation and unmanned aircraft systems.

"We are very pleased with the change," McKenzie said. "The new name more accurately reflects our national reputation and what we do in the department and it is certainly much easier to say."

9 engineering students. 9 days in Germany.

For engineering students, trip abroad offered an exclusive look at German engineering

by Keith Pierce

Before the ink was dry on their last spring final, nine Old Dominion University engineering students were in Munich, the capital of Bavaria in Germany, to learn about the role of engineering abroad. Though the trip included a visit to the Black Forest, the setting for the Grimm fairy tales, there was nothing grim about the nine days they spent exploring one of the leading nations for science and technology.

From touring Old Town Munich to admire architectural wonders like the Old Town Hall and St. Peter's Church to visiting the Deutsches Museum of Munich, the world's largest museum of science and technology with about 28,000 exhibited objects from 50 fields, the trip was packed with activity.

"Traveling to Germany was rewarding, educational and life-changing," said Abbie Dean, a rising senior majoring in civil and environmental engineering. "I was able to immerse myself in the culture of Germany while learning more about engineering from a new perspective. I was inspired by the various companies and the opportunity to network with engineers abroad."

The multidisciplinary engineering students experienced behind-the-scenes tours of factories, including BMW, Audi, Siemens and Busch Vacuum Pumps and Systems. During their Busch tour in Mulburg, Germany, managing directors Sami and Kaya Busch answered questions about working and studying in Germany.

"We learned a lot about the differences between the American and German education systems and the way people work there," said Dean, who interned at Busch as a freshman. "For example, I didn't know that enrollment at a university in Germany costs virtually nothing. It was also exciting to see such a large German family business like Busch."

The students, along with former Batten College of Engineering and Technology

Dean Stephanie Adams, Associate Dean Rafael Landaeta and Assistant Dean Carol Considine, also toured Transsolar Klima Engineering, an international climate firm known for creating spaces adapted to their environments.

"Transsolar Klima was one of our favorite corporate engineering visits," Considine said. "The students were amazed by the company's use of designs that are integrated into the surrounding environment to allow for human connections to the natural environment. This reduces energy demands for heating and cooling. It was very interesting for all of us."

The group also interacted with students and faculty at the Technical University of Munich and visited historical sites such as Dachau, the site of Germany's first Nazi concentration camp. Created for political prisoners, the camp served as a model for subsequent concentration camps. "I would say that visiting Dachau gave me a greater appreciation for the survivors of the Holocaust and how we must honor those who died in concentration camps by never forgetting their stories," Dean said.

Landaeta said the college will continue leveraging study-abroad opportunities.

"Offering engineering students the opportunity to experience how engineering design and operations are performed in other countries is a critical educational



Students visited the Royal Gardens-Hofgarten in Munich. From left: Ryan Snoddy, Carol Considine, Cameron Strickland, Mark Patton, Devon Moore, Kinnicko Robinson, Brandon Schultheis, Logyn Mills, Stephanie Adams, Abbie Dean, Britney Theargood, Rafael Landaeta.

service of our college," he said. "Our students met engineering students, engineers, engineering managers and owners of engineering firms."

"I honestly believe it was the best time of my life," said Mark Patton, a rising senior majoring in modeling and simulation engineering. "Getting to see how engineers work in another country and experiencing new cultural norms, such as having to pay for bathrooms and beer being cheaper than water, was interesting. All of that, plus making many new friends, has led to an experience I will remember for years to come."



The group receiving a tour of Busch Vacuum Pumps and Systems in Mulburg, Germany by managing directors Sami and Kaya Busch.

STUDENT SPOTLIGHT: GAYANE GRIGORYAN

EMSE student presents cybersecurity research in Kazakhstan

Ph.D. student uses game-theory analysis in cybersecurity research

Story and video by Keith Pierce

Gayane Grigoryan, a Ph.D. Engineering Management student, is a Fulbright Scholar (alumna) from Armenia. As a former Edmund S. Muskie Intern, she received an all-expense-paid trip to attend the inaugural Edmund Muskie Alumni Conference held in Kazakhstan's newly-renamed capital Nur-Sultan (formerly Astana) this past spring.

"Having the chance to meet so many bright and talented people, who all work in different areas, was a wonderful opportunity," she said. "It's always motivating to have the opportunity to share about your field."

The Edmund S. Muskie Internship Program is a summer internship program for current Fulbright students funded by the U.S. Department of State to provide emerging leaders from Eastern Europe, the Caucasus, and Central Asia the opportunity to gain real-world experience by complementing and enriching their graduate studies in the United States. The gathering in Kazakhstan was a first for the program alumni.

Supported by the United States Department of State and the U.S. Embassy in Kazakhstan, the focus of the two-day conference was to build networks for alumni of the Muskie Internship Program. Roughly half of the 77 participants had the opportunity to share their area of study. Grigoryan presented research related to internet addiction and cooperative game theory, by focusing on the human aspect of the security and analyzing what types of coalitions will form, the joint actions groups take, and the resulting collective benefits or detriments.

"My presentation was about cyber security human behavior analysis and included a game-theory modeling approach," she said. "I'm very interested in how governments and organizations can provide more secure environments for employees, their organization or even their nation. We can use cooperative game theory to predict possible actions of employees, or people in general, in certain situations."

In addition to city tours, cultural activities, and student presentations, participants heard from various speakers including the newly-appointed U.S. Ambassador to Kazakhstan, William H. Moser.

"We really believe you are representative of the future of your countries in your various fields," Moser said in his opening remarks. "We believe that our exchange programs, and just the experience of going to the United States, are so powerful that you will have an experience that will ground an influence on your life and we hope that you'll become our lasting friends."

"[Muskie] Alumni are a great source of ideas. They are so eager to change and do something, initiate something; thus, it also drives us towards thinking what else we could do," said Anastasia Futrell, a senior program officer for the Cultural Vistas Exchange Visitor and Grant Programs, a non-profit organization that helps implement exchange programs.

Named after the late Senator from Maine and preeminent U.S. environmental leader, the Edmund S. Muskie Internship Program was established by Congress in 1992



Grigoryan at Muskie Alumni Conference held in Kazakhstan

following the dissolution of the Soviet Union to help ensure that countries in the region continued healthy economic and democratic growth. The program is designed to strengthen connections between the United States and 12 other countries — Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. Click on the above video to hear more from Grigoryan herself.

tinyurl.com/ODUGrigoryan

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

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