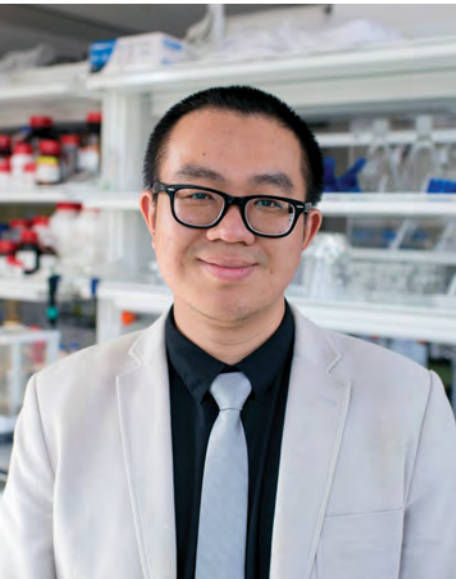


THE GEORGE WASHINGTON UNIVERSITY SYNERGY

SCHOOL OF
ENGINEERING
& APPLIED SCIENCE



ENGINEERING *AT*
THE INTERSECTIONS

Introducing Dean John Lach



In this issue of *Synergy* magazine, the GW School of Engineering and Applied Science (SEAS) is delighted to introduce the school's new dean, Dr. John Lach.

Dr. Lach began his role as dean of SEAS last August, at the beginning of the 2019-2020 academic year. He joined SEAS from the University of Virginia, where he served most recently as the director of cross-cutting initiatives at the university's School of Engineering and Applied Science and as a professor of electrical and computer engineering in the Charles L. Brown Department of Electrical and Computer Engineering. He previously served as the chair of the department.

Throughout his 19-year career at the University of Virginia, Dr. Lach worked extensively with departments, schools, and initiatives to foster cross-disciplinary collaboration, and he has a long-standing interest in promoting partnerships between engineers and others in the academic, business, and research communities. "I see the future of engineering as being something that's more integrated with other disciplines," he states.

This key interest of Dr. Lach's extends back through his own education, particularly his undergraduate education at Stanford University, where he studied in the Science, Technology, and Society program. It was there that he developed a keen understanding of the fact that engineering is practiced most effectively when it integrates and synthesizes multiple disciplines and perspectives.

After studying at Stanford, Dr. Lach went on to UCLA, where he received his Master of Science and PhD degrees in electrical engineering. Over the course of his career, he developed a research focus on wireless technologies in health, working primarily in cyber-physical systems, embedded sensor systems, smart and connected health, and body sensor networks. At the University of Virginia, he worked with faculty across several schools to innovate wireless sensor technologies for health and wellness applications, becoming one of the founders of the field of Smart and Connected Health.

Dr. Lach brings to GW this same interest in integrating engineering with other disciplines, and he looks forward to developing more opportunities for collaboration between SEAS and other GW schools and partners. We invite you to read about his plans in our feature article, "SEAS: Engineering at the Intersections."

Contents



SYNERGY

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8

COVER STORY: **Engineering at the Intersections**

Dean John Lach Outlines a Strategic Plan for the School

2

SEAS DEPARTMENTS

12

STUDENT PROFILE: Allegra Farrar

13

FACULTY PROFILE: Tom Mazzuchi

14

NEWS

18

FACULTY

22

STUDENTS

24

ALUMNI

28

CLASS NOTES

31

VOLUNTEERS

PROFILE

Chair: Murray Loew
202-994-3740

www.bme.seas.gwu.edu

Undergraduate students: 196

Graduate students: 63

Annual research expenditures: \$3.1 million

FACULTY

Igor Efimov, **PROFESSOR AND FELLOW OF HRS, AHA, AND AIMBE**

Emilia Entcheva, **PROFESSOR AND FELLOW OF AIMBE**

Matthew Kay, **PROFESSOR**

David Lee, **ASSOCIATE PROFESSOR OF THE PRACTICE**

Zhenyu Li, **ASSOCIATE PROFESSOR**

Murray Loew, **PROFESSOR AND FELLOW OF IEEE, SPIE, AND AIMBE**

Luyao Lu, **ASSISTANT PROFESSOR**

Anne-Laure Papa, **ASSISTANT PROFESSOR**

Chung Hyuk Park, **ASSOCIATE PROFESSOR**

Kate Schunke, **ASSISTANT RESEARCH PROFESSOR**

Jason Zara, **PROFESSOR**

Vesna Zderic, **PROFESSOR**

RESEARCH AREAS**BIOMEDICAL IMAGING**

Efimov, Entcheva, Kay, Li, Loew, Lu, Zara, Zderic

CARDIOVASCULAR ENGINEERING

Efimov, Entcheva, Kay, Schunke

CELL AND TISSUE ENGINEERING

Entcheva, Lee, Papa

MEDICAL INSTRUMENTATION

Efimov, Entcheva, Li, Lu, Zara, Zderic

ROBOTICS AND AUTOMATION

Entcheva, Li, Park

THERAPEUTICS AND DIAGNOSTICS

Papa



A Promising Therapy

Cancer metastasis, the process of cancer spreading to different parts of the body, is much-feared because it can make cancer 'incurable.' For a cancer patient at high risk of metastasis, time is often a critical issue in the treatment options that the doctor and patient consider to slow down the cancer spread and prolong the patient's life.

Dr. Anne-Laure Papa and her team are focusing their efforts on developing innovative solutions to target this spread, called "metastatic dissemination." Her lab concentrates on cell-based diagnostics and therapeutics for cancer, and in her current research she is looking at the potential for using platelets to slow cancer metastasis and buy patients more time.

Cancer spreads in a body when the cancer cells escape the primary tumor and travel in the blood stream to distant tissues. Dr. Papa explains that while the blood stream is not a natural environment for cancer cells, platelets in the blood stream help them survive by cushioning them from the shear stress in the blood vessels and by shielding them from recognition by the body's immune cells.

Given the role of platelets in protecting cancer cells, Dr. Papa and her colleagues decided to modify the platelets by inactivating them, so that even though they would still interact with cancer cells, they would not protect them anymore. The team published their results last year in a paper in *Science Translational Medicine*, demonstrating that the modified platelet therapy they are developing slowed the metastatic dissemination in mice.

"It was extremely encouraging," she recalls. "If a patient is not responding to chemotherapy, having a window of time where spread could still be controlled would be invaluable. More potent therapy started at this time could control the disease at the cancer's primary site."

Dr. Papa believes that more research should be done in the area of metastatic dissemination, and she and her team are continuing the promising work they have begun.

"Some people are developing interesting strategies in this area, but I think what makes our work unique is that we are trying to design a solution based on a natural interaction in the blood stream between circulating tumor cells and the platelets," she explains.

Material Progress

Dr. Tianshu Li's ultimate research goal can be stated quite simply: to understand materials and develop better materials. The research itself, however, is anything but simple.

Dr. Li uses computational modeling to try to understand the behaviors of materials, and his current research explores primarily two interest areas: anti-icing materials and sensing materials for infrared imaging.

Anti-icing technologies are important to the transportation industry for both safety and economic reasons, whether for airplanes, ships, or cars and trucks. Existing technologies tend to be very costly and have significant side effects, such as corroding roads. To find better solutions, Dr. Li is looking to nature.

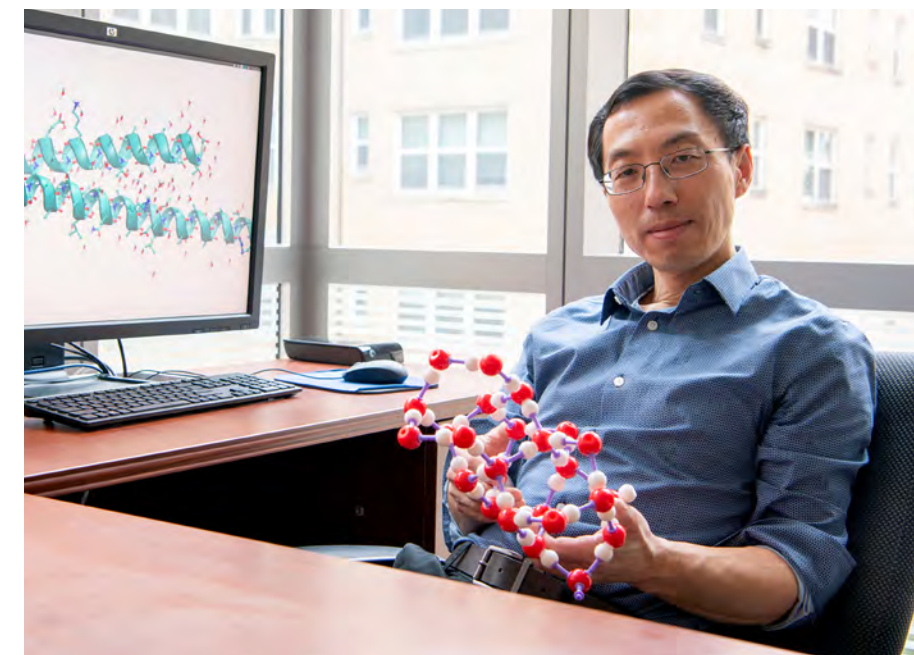
"It turns out that nature has already developed an efficient anti-icing strategy that we can learn from," he remarks. "Fish can survive in very cold environments. Their bodies have developed a special anti-freeze protein that prevents ice from growing, and the nice thing about the anti-freeze proteins is that you don't need a lot of them to do their job."

Dr. Li wants to develop a material that mimics the function of the proteins and is much cheaper than current technologies, so he is leading a multi-disciplinary team of other researchers who hope to study the issue from the molecular to the microscopic level.

He also is a member of a new MURI (Multidisciplinary University Research Initiative) grant team, led by the University of Arkansas, to develop a new material for infrared imaging. While this Department of Defense-funded research focuses on military applications, it also has a number of civilian applications, such as improving geological surveys, chemical sensing, and self-driving cars.

The infrared imaging industry currently is dominated by a semiconductor compound that is expensive and not high-quality. Dr. Li hopes to develop a new material called silicon germanium tin alloy (SGTA), which has better performance than the existing compound and is significantly cheaper. One of the sensing applications that uses the semiconductor compound is lidar, a survey method that measures the distance of an object by illuminating a laser toward the object and measuring the feedback—the wavelength of the laser—to make 3D representations of the object. Shifting the material in the sensors from the semiconductor compound to SGTA could bring the cost of the sensors down dramatically.

Dr. Li hopes that the team's work will fundamentally change the understanding of SGTA and its possible applications. "We call it a disruptive technology. It will completely revolutionize the infrared imaging field," he claims.

**PROFILE**

Chair: Majid Manzari
202-994-4901

www.cee.seas.gwu.edu

Undergraduate students: 91

Graduate students: 40

Annual research expenditures: \$2.6 Million

FACULTY

Arzhang Angoshtari, **ASSISTANT PROFESSOR**

Sameh Badie, **PROFESSOR**

Leila Farhadi, **ASSOCIATE PROFESSOR**

Samer Hamdar, **ASSOCIATE PROFESSOR**

Tianshu Li, **ASSOCIATE PROFESSOR**

Xitong Liu, **ASSISTANT PROFESSOR**

Majid Manzari, **PROFESSOR**

Rumana Riffat, **PROFESSOR**

Kim Roddis, **PROFESSOR**

Danmeng Shuai, **ASSOCIATE PROFESSOR**

Pedro Silva, **PROFESSOR**

RESEARCH AREAS**ENVIRONMENTAL AND WATER RESOURCES ENGINEERING**

Farhadi, Liu, Riffat, Shuai

MATERIALS

Li, Liu

MECHANICS

Angoshtari, Manzari

STRUCTURAL/GEOTECHNICAL/EARTHQUAKE ENGINEERING

Badie, Manzari, Roddis, Silva

TRANSPORTATION SAFETY ENGINEERING

Hamdar

PROFILE

Chair: Robert Pless
202-994-7181

www.cs.seas.gwu.edu

Undergraduate students: 267

Graduate students: 448

Annual research expenditures: \$4.1 million

FACULTY

Adam Aviv, **ASSOCIATE PROFESSOR**

Aylin Caliskan, **ASSISTANT PROFESSOR**

Xiuzhen "Susan" Cheng, **PROFESSOR**

Hyeong-Ah Choi, **PROFESSOR**

Mona Diab, **PROFESSOR**

James Hahn, **PROFESSOR**

Rachelle Heller, **PROFESSOR EMERITUS**

Lance Hoffman, **DISTINGUISHED RESEARCH PROFESSOR**

AND FELLOW OF ACM

Bhagirath Narahari, **PROFESSOR**

Gabriel Parmer, **ASSOCIATE PROFESSOR**

Robert Pless, **PROFESSOR**

Rahul Simha, **PROFESSOR**

Poorvi Vora, **PROFESSOR**

Timothy Wood, **ASSOCIATE PROFESSOR**

Arkady Yerukhimovich, **ASSISTANT PROFESSOR**

Abdou Youssef, **PROFESSOR**

RESEARCH AREAS**ALGORITHMS AND THEORY**

Cheng, Choi, Yerukhimovich, Youssef

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Caliskan, Cheng, Diab, Pless

BIOINFORMATICS AND BIOMEDICAL COMPUTING

Cheng, Hahn, Simha

COMPUTER SECURITY AND INFORMATION ASSURANCE

Aviv, Cheng, Choi, Hoffman, Narahari, Simha, Vora, Yerukhimovich

DIGITAL MEDIA

Hahn, Heller, Pless, Vora, Youssef

NETWORKING AND MOBILE COMPUTING

Cheng, Choi, Narahari, Simha

PERVASIVE COMPUTING AND EMBEDDED SYSTEMS

Cheng, Narahari, Simha

SEARCH AND DATA MINING

Pless, Youssef

SOFTWARE ENGINEERING AND SYSTEMS

Narahari, Parmer, Wood

**Asking the Right Questions**

When Dr. Adam Aviv dons his professional hat, he is first and foremost a computer scientist, but he sometimes also must think as a social scientist.

Dr. Aviv, who joined GW this year from his previous position at the US Naval Academy, is a cybersecurity expert. He is interested in protecting users' privacy and making computing systems secure, and he is perhaps best known for his work on mobile authentication.

He divides his research across a number of interesting areas within cybersecurity but has been concentrating more of his efforts recently on human factors in cybersecurity. Specifically, he wants to find answers to questions such as, "How do users understand systems from a security and privacy perspective, and how do their choices and actions affect the security of those systems and their own privacy?"

"I'm fascinated by how the user can both improve the security of a system but also make everything terrible, how the best intentions of the system designers can fail miserably because of a single user's actions," says Dr. Aviv. "People will always be people, so how do you design around human actions?"

One of the behaviors he would like to better understand is how users authenticate on their mobile devices, which includes what PINs or Android patterns users select to unlock their smartphones. He recently received a National Science Foundation CAREER award to study this behavior—and how it might change over time as people move between devices and have opportunities to update their devices—and how to encourage users to select more secure authentication.

In one recent study, Dr. Aviv compared user selection of six- and four-digit PINs used to unlock smartphones. "It turns out that it doesn't seem to be a huge advantage for a person to use a six-digit PIN over a four-digit PIN. What's interesting is that because attackers get only a certain number of attempts to break into a phone, the security benefits of using a six-digit PIN actually may make things worse for users. We are unsure why, but it may have to do with people having less imagination for six-digit PINs," he explains.

Dr. Aviv's interest in how people make choices with respect to security and privacy adds depth to his cybersecurity research portfolio. "The challenge is to measure how people make choices," he says. "In some part, you have to be a social scientist, and in another part you have to go into the engineering task of designing and building that experiment technologically so that people can participate in it. It's one thing to ask how people choose passwords; it's another thing to create a study to collect data that's meaningful."

Fresh Data

"Freshness" of data is a vital need in all modern systems that depend on wireless communications. From environmental and health monitoring to smart grid, from transportation systems to social media, users need the data to be as close to real-time as possible.

In modern wireless communication networks, engineers have the difficult task of maximizing the flow of fresh data while also making the systems as energy efficient as possible. Dr. Omur Ozel thinks energy harvesting is a very promising way to support this task.

"It's now a key technology for energy efficient, sustainable, and green systems that make up the Internet of Things," he notes.

Most traditional systems use devices that are battery powered and, therefore, are limited due to finite lifetime and maintenance needs. Energy harvesting systems—which capture energy from external sources such as solar power or thermal energy and store it for future use—can alleviate the problem, as the devices have unlimited but rather intermittent life.

In a typical application scenario, multiple sensors could be distributed in an area taking measurements from the environment, performing computations and sending their syntheses to a fusion center through a static access point or a mobile drone that is connected to the cloud. If a particular sensor senses a drastic change in the property it is measuring, it would perform computations and send them to the cloud. Otherwise—to incur less energy—it would not. It is critical to maintain data freshness at the fusion center under hard energy limitations on the device side.

Researchers must understand the time dynamics of energy to develop schedules for sensing, computing, and transmission tasks and to determine when the devices in a network "sleep" and "wake up." With the emergence of new computing capabilities in devices, it is now possible to run learning and analytics tasks in devices powered by energy harvesting. The challenge then is to maintain data freshness while allocating time for different tasks and for determining their associated energy needs.

Dr. Ozel is working with his students and collaborators on this puzzle. He is using a new metric called Age of Information (AoI) to understand the fundamental performance limits of such systems and devise provable results that provide insights into their core data freshness issues.

"We use the AoI metric to analyze the data freshness requirements of new-generation communication systems under dynamic energy constraints. This research pursuit will unveil novel data freshness principles of such systems and will pave the way for the modern engineering practice of energy self-sufficient, intermittently connected networks of the future," he argues.

**PROFILE**

Chair: Suresh Subramaniam
202-994-6083

www.ece.seas.gwu.edu

Undergraduate students: 84

Graduate students: 328

Annual research expenditures: \$4.9 million

FACULTY

Gina Adam, **ASSISTANT PROFESSOR**

Shahrokh Ahmadi, **TEACHING PROFESSOR**

Amir Aslani, **ASSISTANT PROFESSOR OF THE PRACTICE**

Lawrence Bennett, **RESEARCH PROFESSOR AND**

FELLOW OF APS

Payman Dehghanian, **ASSISTANT PROFESSOR**

Milos Doroslovacki, **ASSOCIATE PROFESSOR**

Tarek El-Ghazawi, **PROFESSOR AND FELLOW OF IEEE**

Kie-Bum Eom, **PROFESSOR**

Robert Harrington, **PROFESSOR AND FELLOW OF IEEE**

Hermann Helgert, **PROFESSOR**

Howie Huang, **PROFESSOR**

Mahdi Imani, **ASSISTANT PROFESSOR**

Can Korman, **PROFESSOR**

John Lach, **PROFESSOR**

Tian Lan, **ASSOCIATE PROFESSOR**

Roger Lang, **PROFESSOR AND FELLOW OF IEEE**

Ahmed Louri, **PROFESSOR AND FELLOW OF IEEE**

David Nagel, **RESEARCH PROFESSOR**

Omur Ozel, **ASSISTANT PROFESSOR**

Volker Sorger, **ASSOCIATE PROFESSOR**

Suresh Subramaniam, **PROFESSOR AND FELLOW OF IEEE**

Guru Venkataramani, **PROFESSOR**

Mona Zaghoul, **PROFESSOR AND FELLOW OF IEEE**

RESEARCH AREAS**APPLIED ELECTROMAGNETICS**

Bennett, Korman, Lang, Sorger

COMMUNICATIONS AND NETWORKS

Doroslovacki, Helgert, Lach, Lan, Ozel, Subramaniam

COMPUTER ARCHITECTURE AND HIGH-PERFORMANCE COMPUTING

El-Ghazawi, Huang, Louri, Venkataramani

ELECTRIC POWER AND ENERGY

Dehghanian, Harrington

MEMS/NEMS, ELECTRONICS, AND PHOTONICS

Adam, Ahmadi, Korman, Louri, Nagel, Sorger, Zaghoul

SIGNAL AND IMAGE PROCESSING, SYSTEMS, AND CONTROLS

Doroslovacki, Eom, Harrington, Imani, Lach, Ozel

PROFILE

Chair: Thomas Mazzuchi
202-994-2353

www.emse.seas.gwu.edu

Undergraduate students: 92

Graduate students: 1040

Annual research expenditures: \$1.5 million

FACULTY

Hernan Abeledo, **ASSOCIATE PROFESSOR**
Joseph Barbera, **ASSOCIATE PROFESSOR**
David Broniatowski, **ASSOCIATE PROFESSOR**
Jonathan Deason, **PROFESSOR**
Royce Francis, **ASSOCIATE PROFESSOR**
Erica Gralla, **ASSOCIATE PROFESSOR**
John Helveston, **ASSISTANT PROFESSOR**
Thomas Mazzuchi, **PROFESSOR**
Joost Reyes Santos, **ASSOCIATE PROFESSOR**
Shahram Sarkani, **PROFESSOR**
Ekundayo Shittu, **ASSOCIATE PROFESSOR**
Zoe Szajnfarber, **PROFESSOR**
J. Rene van Dorp, **PROFESSOR**

RESEARCH AREAS

CRISIS, EMERGENCY, AND RISK MANAGEMENT
Barbera, Broniatowski, Gralla, Santos, van Dorp

ECONOMICS, FINANCE, AND COST ENGINEERING
Helveston, Santos, Shittu, van Dorp

ENGINEERING AND TECHNOLOGY MANAGEMENT
Deason, Helveston, Sarkani, Shittu, Szajnfarber

ENVIRONMENTAL AND ENERGY MANAGEMENT
Deason, Francis, Helveston, Shittu

KNOWLEDGE AND INFORMATION MANAGEMENT
Broniatowski

OPERATIONS RESEARCH
Abeledo, Gralla, Mazzuchi, Sarkani, Shittu, van Dorp

SYSTEMS ENGINEERING
Broniatowski, Gralla, Mazzuchi, Santos, Sarkani, Shittu, Szajnfarber, van Dorp

**Beyond Environmental Regulation**

Dr. Jonathan Deason was a very young man when the environmental movement began in the 1970s, and he has been a part of it ever since. “I’ve grown up with it,” he reflects.

At SEAS since 1996, he has continued his efforts on behalf of the world’s environment, working to build the school’s environmental and energy management program, and more recently co-leading GW’s Environmental and Energy Management Institute (EEMI) with Research Professor Joseph Cascio.

The EEMI was chartered by GW’s Office of the Vice President for Research in 2015 to conduct research, education, and service activities related to the implementation of national and international environmental and energy management standards. Referring to the institute’s mix of activities, Dr. Deason observes, “It really brings people together. It’s synergy; the whole is larger than the sum of the parts.”

Although the institute is still young, Dr. Deason is proud of its achievements on all fronts. On the research side, the EEMI has racked up an impressive number of awarded research grants, with nearly half of its proposals receiving funding. The institute also offers several graduate certificate programs and has held 15 professional short courses and 12 symposia since it was chartered.

An important focus of the EEMI is to fill a niche role in the broader environmental movement by influencing environmental self-governance, especially in the private sector. Institute faculty, for example, work to encourage and induce corporations and other organizations to voluntarily adopt the International Organization for Standardization’s 14000 Environmental Management Series and 50000 Energy Management Series standards.

“We want companies and other organizations to do more than minimally complying with government regulations, so we’re heavy into environmental self-governance and changing corporate cultures,” Dr. Deason explains. “It’s been really quite good. A lot of companies have been trying to do what they think is right.”

Simultaneously, Dr. Deason and his colleagues also are taking advantage of their Washington, DC, location, working with government agencies, the non-governmental organization community, and the consulting industry to try to influence environmental policy. “In terms of the nexus between technology and public policy, we clearly are among the leaders, and I think we have a special role because we are here in DC,” he asserts.

At the Leading Edge

Dr. Lijie Grace Zhang is used to being at the leading edge of research. She recalls, for example, presenting a paper on 3D printing of blood vessels to her peers at an academic conference in 2015. No one in the audience asked a question about her research, because they had never heard of it. Now, five years later, many researchers in the biomedical engineering field are working on this issue.

Dr. Zhang’s primary research focus is 3D and 4D bio-printing and nano-technologies to aid tissue and organ regeneration. “Our long term goal is to repair damaged tissue or even organs,” she says.

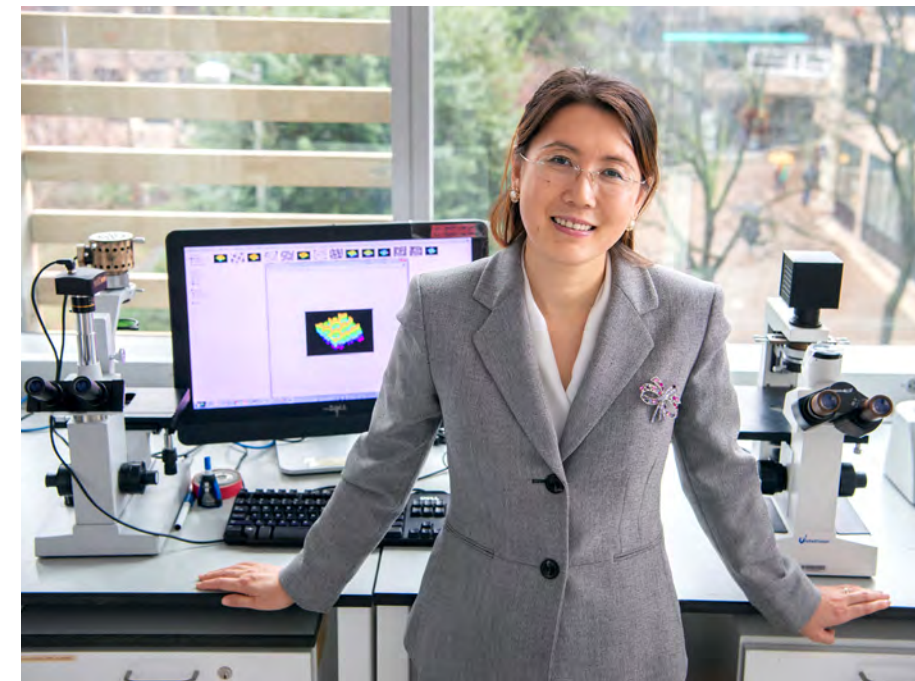
Specifically, her team uses bio-printing and nano-materials to fabricate vascularized cardiac tissue for heart regeneration and neuro-guidance conduits to repair the spinal cord after injury. She hopes her methods and ideas will help overcome some of the limitations that current approaches to complex tissue and organ regeneration have. For example, transplants are widely used to replace damaged tissues and organs, but there simply are not enough tissue and organ donors, and donor transplants often have attendant complications.

Bio-printing artificial tissues and organs would help eliminate this shortage and the complications of transplants, but traditional bio-printing techniques also have their own challenges. Dr. Zhang’s team, however, improves on these traditional bio-printing techniques by using nano-materials and advanced 3D and 4D printing techniques to create complex tissues. With these materials and techniques, her team attempts to mimic the nano-features of native tissue in the human body, thereby improving the tissue’s performance of its functions.

“We want to see how to create a really functional tissue or organ. For example, we can create the shape of the heart but how do we make it functional?” states Dr. Zhang.

To try to answer that question, her lab is pioneering 4D bio-printing by trying to create a novel smart biomaterial suitable for printing and biocompatible with cells. 4D printing creates a three-dimensional object but adds the dimension of transformation over time, which allows researchers to create a type of programmable matter that can grow and change over time, as tissue and organs need to do to function properly in the human body.

Her team is still gathering data for heart tissue and neuro-guidance conduits, but they have multiple patent applications so far and many possibilities for future commercialization. Dr. Zhang attributes their success to their innovative thinking and to collaborative colleagues and university support. “Our support at the department and school level is excellent,” she remarks. “And our research staff is excellent and efficient. This is critical, because they don’t slow down the speed of our research.”

**PROFILE**

Chair: Michael Plesniak
202-994-6749

www.mae.seas.gwu.edu

Undergraduate students: 192

Graduate students: 114

Annual research expenditures: \$5 million

FACULTY

Elias Balaras, **PROFESSOR**
Lorena Barba, **PROFESSOR**
Philippe Bardet, **PROFESSOR**
Kartik Bulusu, **ASSOCIATE RESEARCH PROFESSOR**
Ken Chong, **RESEARCH PROFESSOR AND FELLOW OF ASME, AAM AND SEM**
Andrew Cutler, **PROFESSOR**
David Dolling, **PROFESSOR AND FELLOW OF AIAA AND ROYAL AERONAUTICAL SOCIETY (UK)**
Charles Garris, **PROFESSOR AND FELLOW OF ASME**
Stephen Hsu, **PROFESSOR AND FELLOW OF ASME**
M. Ashraf Imam, **RESEARCH PROFESSOR AND FELLOW OF ASM INTERNATIONAL**
Michael Keidar, **A. JAMES CLARK PROFESSOR OF ENGINEERING AND FELLOW OF APS**
Saniya LeBlanc, **ASSOCIATE PROFESSOR**
James Lee, **PROFESSOR AND FELLOW OF ASME**
Taeyoung Lee, **PROFESSOR**
Megan Leftwich, **ASSOCIATE PROFESSOR**
Yongsheng Leng, **PROFESSOR**
Michael Plesniak, **PROFESSOR AND FELLOW OF ASME, AIAA, AAAS, AIMBE AND APS**
Kausik Sarkar, **PROFESSOR AND FELLOW OF ASME, ASA, AIMBE AND APS**
Yin-Lin Shen, **PROFESSOR**
Murray Snyder, **PROFESSOR**
Santiago Solares, **PROFESSOR**
Peng Wei, **ASSISTANT PROFESSOR**
Lijie “Grace” Zhang, **PROFESSOR AND FELLOW OF AIMBE**

RESEARCH AREAS

AEROSPACE ENGINEERING
Cutler, Dolling, Garris, Keidar, T. Lee, Plesniak, Wei

BIOMEDICAL ENGINEERING
Balaras, Bulusu, Keidar, J. Lee, Leftwich, Plesniak, Sarkar, Zhang

DESIGN AND MANUFACTURING OF MECHANICAL AND AEROSPACE SYSTEMS
Garris, Leng, Shen

FLUID MECHANICS, THERMAL SCIENCE, AND ENERGY
Balaras, Barba, Bardet, Bulusu, Cutler, Dolling, Garris, Hsu, Keidar, LeBlanc, Leftwich, Plesniak, Sarkar, Snyder

MECHATRONICS, ROBOTICS, AND CONTROLS
J. Lee, T. Lee, Wei

SOLID MECHANICS AND MATERIALS SCIENCE
Chong, Hsu, Imam, LeBlanc, J. Lee, Leng, Solares, Zhang

SEAS: ENGINEERING AT THE INTERSECTIONS

Dean John Lach Outlines A Strategic Plan for the School



I began as the new dean of SEAS in August of last year, and I spent much of my first semester just listening, to SEAS faculty, staff, students, and alumni, and to others throughout the GW community. I asked as many of you as I have met what you love about SEAS. I also asked you what you see as the school's most exciting opportunities for the future and what things we could do better.

The faculty, staff, and I have been building a strategic plan for SEAS based on what I've learned from these conversations, and based on the school's existing strengths and the changing landscape of 21st century engineering. I'm happy to share an outline of the plan here in *Synergy*, and I hope this introduction will give us—you and I—the chance to start a conversation and share ideas about the school's future.

Building a Strong Foundation

A well run school: SEAS is in extremely good shape. I give my predecessor, Dr. David Dolling, and his team a lot of credit for creating a strong foundation for SEAS. When I was interviewing, I was being prudent and looking for the school's problems and for the red flags, and I just couldn't find any of them. Then I got here and I realized, no, this is a really well run school. We have a great community of faculty, staff, students, and alumni, and we have a world-class facility.

I'm also happy to add that we had an ABET accreditation visit last fall, which the school passed with flying colors. The ABET team's exit report showered praise on the school's programs, noting many strengths, including the New Student Getaway, the unique experiential and internship opportunities we offer, the personal touch of our programs, the input students have in shaping our programs, our facilities, and the wonderfully large percentage of women in our undergraduate programs. I've been through many ABET reviews in my career, and I've never seen such a glowing exit report!

A strong community: Most of the strengths that the ABET reviewers recognized are fed by our strong SEAS community. It all begins with us and the way we work together. In fact, as I spoke to people last semester, what I heard from everyone was their deep commitment to, and an appreciation for, that strong sense of community we have here at SEAS. Our community reflects well on us and creates so many opportunities for us to engage profitably with each other and with the world outside SEAS.

With this foundation in place, the question for SEAS now becomes, what's next? What are the opportunities ahead of us?

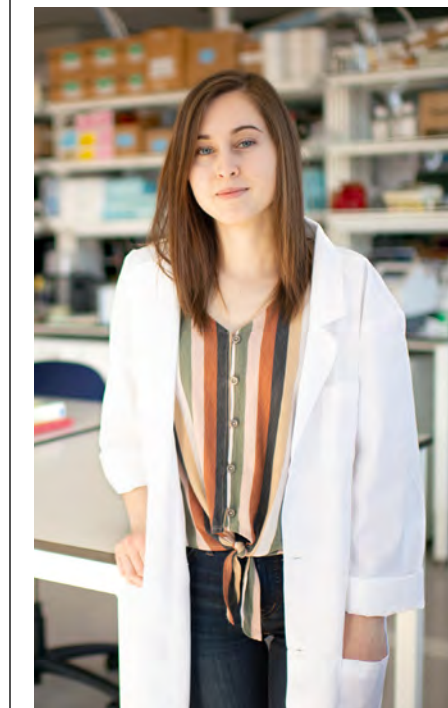
Using Differentiators to Create Opportunities

Diversity, equity and inclusion: SEAS is a diverse community with a commitment to equity and inclusion. For example, 40 percent of our undergraduate students are women; that is almost twice the national average and is 10th in the country for

undergraduate engineering schools. SEAS has worked to create an environment that promotes gender diversity, but we're also really thinking about how we can build on the strength of gender diversity at the undergraduate level to achieve broader diversity and true equity and inclusion in all of its forms for SEAS students, faculty, and staff.

If we are successful in doing so, SEAS will be positioned to become a leader in diversity, equity, and inclusion in the field of engineering in general, not just in academia but also in industry. We still see attrition of women and underrepresented minorities in many high tech fields, and I would like to see SEAS partner with companies, government agencies, and other universities to help them make their own cultures more inclusive and equitable. That kind of broader impact could be really transformative for the field of engineering.

"Engineering and": The landscape for engineering and computer science is changing, and engineering schools will need to change, too, in order to attract and graduate the professionals the private and public sectors need. There is a long list of excellent engineering schools out there: what will make the best and brightest want to come to GW?



SEAS students participate in an assessment trip to Rajasthan, India, through the GW chapter of Engineers Without Borders

Of course, I started to answer this question by asking our current best and brightest why they chose to come to GW. Most started their answers with "DC," followed by their interest in engineering as it relates to those things that Washington, DC, is most well-known for, including public policy, international affairs, human health, environmental preservation, social justice, and other areas.

This led us to develop what we call an "engineering and" approach to education. "Engineering and" means a number of things in practice, but the idea is that we provide a range of opportunities for our students to integrate into their education those experiences and perspectives that are traditionally outside of the engineering curriculum. It means that we provide an outward-facing engineering education that engages with the university, with all that Washington, DC, has to offer, and with the wider world.

For example, did you know that approximately 25 percent of SEAS undergraduate students participate in study abroad and still graduate in four years? That's very unusual for an engineering school, and it reflects our community and its engagement with the world. Study abroad experiences give students the chance to learn how to communicate and work with people from cultures different from their own. That's a valuable skill, and we are exploring how to help even more SEAS students study abroad. We're also exploring



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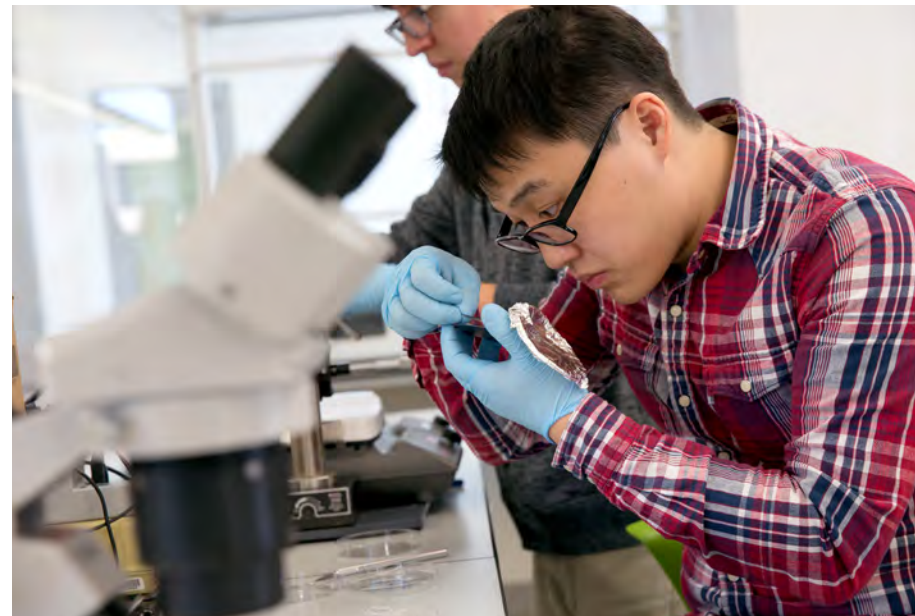
Washington, DC, is part of our identity and the experiences we provide for SEAS students

how to bring the world to students on campus through partnerships with foreign embassies and GW's world-class Elliott School of International Affairs.

In addition, we will adapt our curricula and will encourage our students to get involved in extra-curricular activities that help develop their communication and leadership skills. Technical depth is and always will be a must for all engineers and computer scientists, but company executives are telling us that they need employees who have mastered communication and leadership skills, too.

I had a conversation recently with one of our graduating seniors who epitomizes the concept of "engineering *and*." She wants to be a transportation engineer and is in our civil engineering program. She realized if she truly is going to become a leader in transportation engineering, she needs to understand public policy, urban planning, and social justice, in addition to the technical concepts she is learning in civil engineering. She was able to find courses in those areas and then petition to have them count toward her degree. She's interviewing for jobs now, and employers are recognizing how valuable her broad education is.

What I took away from that conversation is that we have the opportunity to be the engineering school that gives students a really strong technical education, but also exposure to other disciplines and experiences that will position them to be leaders when they get out into the world. Combining technical expertise with knowledge of public policy, law, health,



SEAS faculty and students conduct interdisciplinary research that focuses on societal impact

international affairs, and/or business will help our graduates differentiate themselves from graduates of other engineering schools, thereby distinguishing SEAS in higher education. Surely, part of why Amazon decided to build its second headquarters right outside Washington, DC, is that they understand that the future of their company depends as much on public policy and international affairs as it does on their core technologies. As such, they will be interested in hiring "engineering *and*" GW graduates to lead them into the future.

Our unique location: What also will differentiate SEAS is our ability to capitalize on all that our location in Washington, DC, affords us. I know that you, as alumni, recognize the benefits of attending college or graduate school in an urban setting, but we also want more employers and prospective students to see the advantages that Washington, DC, gives our students. That means internships with government agencies, with non-governmental organizations, and with the high tech companies that line the Dulles and Rockville Corridors; it means research experiences with federal labs; and it means the chance to speak and interact with public figures and public policy experts.

Engineering at the Intersections

A pre-eminent engineering school: Our engagement with the wider GW community, the Washington, DC, metropolitan area, and regions and countries beyond is important not only for our students but for our faculty, too—and critical for our research. In recent years, SEAS research has grown tremendously, and our faculty are justifiably proud of this success. We are looking to grow it even more and establish SEAS as a pre-eminent engineering school. I believe our future lies at the intersection of cutting-edge research interests, where innovative and interdisciplinary teams can focus on societal impact.

I have spent my entire career—from my undergraduate education to my own research and teaching as a faculty member—at the intersections of disciplines, because I believe that the most interesting problems lie at these intersections and that the solutions to society's grand challenges require the integration and synthesis of multiple disciplines and perspectives.

At the University of Virginia (UVA), where I served for 19 years as a professor of electrical and computer engineering and also as a department chair and director of cross-cutting initiatives, I put this belief



Research continues to grow at SEAS, led in part by National Science Foundation CAREER Award winners such as Saniya LeBlanc (left), Leila Farhadi (center), and Ekundayo Shittu (right)

into practice. I forged collaborations with faculty in UVA's Medical School, Nursing School, and Psychology Department to innovate wireless sensor technologies for health and wellness applications, becoming one of the founders of the field of Smart and Connected Health. Through these trans-disciplinary collaborative projects, my students and I learned to navigate not only the technical challenges of innovating such sensor systems but also the "engineering *and*" context—human factors, clinical practice, health policy, economics, etc.—in which these systems must operate.

Cross collaboration: We are doing that here at SEAS, too, but we plan to do so even more fruitfully by focusing our entire school's energies and resources on strategic areas of cross-collaboration. We can and will do this by building more cross-campus and external partnerships. GW and Washington, DC, offer such fertile ground for this. With potential partners in public policy and international affairs, law and business, medicine and health, and other disciplines, we can explore and find solutions to some of society's grand challenges and position SEAS for pre-eminence.

We are on the path to doing that already. At the end of the fall semester, we held our

first ever school-wide research retreat. We went out to the Mount Vernon campus for the day, and a number of SEAS faculty members presented ideas for cross-collaborative research initiatives in which to invest. We're in the cultivation and winnowing process now and will be making significant investments soon.

We will work with external partners, too, such as corporations, government agencies, non-governmental organizations, and foundations that want to support this mission. One example of a partnership and project already underway is the Institute for Data, Democracy, and Politics (IDDP) funded by a \$5 million investment from the John S. and James L. Knight Foundation. This new research institute at GW will be a hub for tracking the spread of distorted information online and will work to educate national policymakers and journalists on strategies to grapple with the threat to democracy posed by digital propaganda and deception. Some of our researchers in artificial intelligence, machine learning, and data analytics will join researchers in political communication, media studies, law, physics, and international affairs in this effort. The IDDP also will collaborate with external partners Poynter Institute and PolitiFact.

This is "engineering *and*" and it is an example of how GW and SEAS are poised to tackle a societal grand challenge.

Retaining our character: All of these opportunities I've outlined also will bring challenges. As we move forward, I'm dedicated to making sure that SEAS will retain its character and strengths, foremost among them our strong sense of community and our focus on excellence in all that we do.

I always tell the faculty and staff that my job is to help them do their job; and for the students, my job is to help make sure their experiences are everything they should be at a great institution like GW. I look forward to doing that and to helping SEAS grow as a community toward our goal of being a preeminent engineering school that prepares engineering leaders for the mid-21st century.

I also look forward to meeting more and more of you in the coming months and years and to hearing about your ideas and aspirations for SEAS. I've learned so much from so many of you already, and if you have ideas for SEAS and how we can take things to the next level, I'd like to hear from you.

Approximately 40 percent of our undergraduate students are women, which is almost twice the national average for an engineering school



Allegra Farrar

Keeping **A PROMISE**

When Allegra Farrar was admitted to GW four years ago, she originally planned to study in the Columbian College of Arts and Sciences. During the summer orientation program, however, she discovered that SEAS offers a mechanical engineering degree with an aerospace option—and that changed everything.

“I called my mother and said, ‘I gotta get into the engineering school,’” she recalls. “I called the admissions office and said, ‘Please, I promise to be a student worth investing in if you invest in me and allow me to follow my dreams.’”

GW gave Allegra the chance, and she has made the most of it. “I remember thinking, ‘This is your chance, don’t mess anything up. Make the most of it.’ I’m pretty sure I have,” she pronounces.

By anyone’s account, Allegra *bas* made the most of it. She has sought out opportunities, taken risks, worked diligently, and excelled. Her achievements begin in the classroom, where she has performed exceptionally well, earning the 2020 SEAS Distinguished Scholar Award.

In part because of her academic promise, Allegra was selected as a Clark Engineering Scholar her freshman year. Through the program, she’s benefited from a number of opportunities, including study abroad, research experiences, internships, and learning from mentors and fellow Clark Scholars.

She credits the program with helping her understand how important internships are and with introducing her to other student leaders. “I wanted to be part of a group of peers who want to be leaders in engineering,” Allegra says.

Allegra honed her research and engineering skills in a number of internships and research positions, beginning with summer positions at MIT Lincoln Laboratory after her freshman and sophomore years.



“I really wanted to learn how things orbit,” she says. “They put me on a NASA program to simulate an orbit from Earth to the Psyche Asteroid, and my mentor pushed me to stretch and work through the task, which has been pivotal in me being able to perform research.”

During the summer following her junior year, Allegra worked at an internship with Northrop Grumman, where she conducted telemetry data analysis for the James Webb Space Telescope program. She also did research throughout her junior and senior years in Dr. Taeyoung Lee’s Flight Dynamics and Controls Laboratory, where she worked on integrating proximity sensors into the control system of a drone.

On campus, she has found engineering leadership opportunities as a teaching assistant for Dr. Lee’s orbital mechanics and spacecraft dynamics course, as a volunteer in the SEAS student-run Atoms to Astronauts after-school education program, and as a team leader for the GW chapter of the American Institute for Aeronautics and Astronautics’ Design, Fly, Build competition.

In addition to all of this, Allegra also has won a number of awards, most recently the Universities Space Research Association’s Distinguished Scholar Award, and the Walter and Christine Darden Scholar Award.

Looking ahead, Allegra plans to pursue a PhD in aerospace engineering at MIT. She hasn’t yet decided whether she wants to stay in academia or move into industry following her PhD, but she is very certain of what she wants to do along the way.

“I know for the next little girl like myself, I want to get involved with or initiate a program to help students develop their goals and dreams. There have been people who have given me such knowledge, encouragement, and opportunities, so I want to do that for someone else.”

Tom Mazzuchi

The Heart of **A TEACHER**



If you’ve graduated with a systems engineering degree from GW in the last 30 years, the chances are good that you know Dr. Tom Mazzuchi, a professor of systems engineering and the long-serving chair of the Department of Engineering Management and Systems Engineering. If you studied in another SEAS department, you still might remember the gregarious Dr. Mazzuchi.

Dr. Mazzuchi’s roots at SEAS go deep. He first came to GW as a master’s student, receiving his master’s degree in 1979 followed by his doctoral degree in 1982. He left after graduating, came back as a visiting professor in the mid-1980s, and returned for good in 1991 as an associate professor of operations research.

Over the years, he has held academic positions from graduate research assistant to interim dean, but the role he loves most is that of teacher and mentor. And it shows.

“My philosophy,” he says, “is to make my courses challenging but to try to be available to help people as much as possible. I’m not the easiest professor, but I’m the easiest professor to work with.”

Word spreads, of course, and students know that Dr. Mazzuchi is someone they can trust. He maintains an open door policy and tells students that he has a “Las Vegas philosophy.” “Whatever people discuss in here, stays in here,” he says. “I try to be trustworthy and give them the best advice I can.”

That advice often includes a directive to learn from mistakes. “Everyone has problems, but you can get over the problem and bounce back. Just learn from it,” he counsels.

In addition to providing counsel, he has gone to great lengths at times to help students bounce back. He recalls hospital visits, student dinners, and even providing a

place in his and his wife’s home for students who went through a rough patch and needed time away from campus. He is a parent himself and understands that parents appreciate their sons and daughters getting the support they need.

What he most enjoys about mentoring is watching students grow up. “I enjoy it because I get to watch them go from children to adults. And we still keep in touch,” he notes. “When I travel to different cities, I look up [my former students] who now live in those cities.”

Dr. Mazzuchi doesn’t mentor only undergraduates. He also makes a point to mentor both his on-campus and off-campus doctoral students. His off-campus students are generally older and require less mentoring, but he enjoys advising them as they work to formulate their dissertation study and publication. He works more closely with his on-campus students and gets to know them on a more personal level, due in part to their proximity.

Dr. Mazzuchi is understandably gratified by his work with students, but he is proud of other efforts and achievements, too.

“I was proud of being the interim dean from 1997 to 2000 and getting the school back on track. I’m also proud of rebuilding this department with good young people, of starting the undergraduate program in systems engineering and watching it grow and be successful, and I’m proud of helping to grow the off-campus program and seeing how successful it’s become, too. But all the things I did that I’m proud of, I didn’t do on my own. I did them with some really good colleagues,” he concludes.

News



SEAS Graduate Programs Rankings Skyrocket

Two recent *U.S. News & World Report* rankings brought great news for GW's graduate engineering programs and online engineering masters programs, showing a fast climb up the rankings for both program types over the last four years.

In January, *U.S. News* released its 2020 Best Online Graduate Engineering Programs rankings, with GW's online masters programs ranked #15, climbing from #55 four years ago. In March, the media company released its 2021 Best Graduate Engineering Programs rankings, showing GW's graduate engineering programs rising 25 spots in four years, now ranked #67.

"What is so significant about this news," said SEAS Dean John Lach, "is that it reflects the very real trajectory of the school in recent years. First and foremost, it shows that the investments GW and SEAS have made in our faculty hiring, staff support, and facilities are paying off in very noticeable ways, and that our reputation is beginning to catch up to our successes in both education and research."

The graduate engineering programs rankings measure research activity, faculty resources, program quality assessments by peers and others, and student selectivity. "Among the factors driving the spike in GW's ranking are research expenditures, the ratio of PhD students to faculty, and the improvement in GW's reputation among its peers," said Can Korman, associate dean for research and graduate studies at SEAS.

Research expenditures per faculty member have doubled at SEAS over the past five years, and the school's PhD student-to-faculty ratio is unusually high for a school not in the top 50 ranking. In fact, SEAS is

ranked 23rd in the country and tied with the University of Illinois, Urbana-Champaign on that factor.

Speaking specifically to the online programs ranking, Dr. Shahram Sarkani, the director of SEAS online programs, said that he believes student satisfaction is the primary factor in the large jump in those rankings. "Satisfaction from our students is high, and we make sure to always improve," he maintained. "We run a curriculum that is useful and relevant; people perceive this and they send their colleagues to us."

Currently more than 1,000 students are enrolled in the online programs, which include Master of Science programs in electrical engineering, engineering management, systems engineering, and cybersecurity policy and compliance.

In contrast to most online offerings, including impersonal MOOCs (Massive Open Online Courses) that serve tens of thousands of students and have little to no interaction with a faculty member, the GW courses emphasize interaction with faculty.

"We still use the approach of having a professor dedicated to teaching a particular course live each semester at a designated day and time," explained Dr. Sarkani. "Students can always watch the recorded course later if they can't log in during the live class, but we really encourage them to attend live and ask questions of the professor, and this approach

promotes interaction with our faculty. We also have online office hours every day so students can interact with the faculty."

SEAS Launches Center for Women in Engineering

SEAS continues to break new ground in efforts to support women faculty, students, staff, and alumni of the school and to be a leader nationwide in promoting gender equity in engineering. In April 2019, the school reached another milestone in this effort when it officially launched the SEAS Center for Women in Engineering.

The center—known throughout the school as "WiE," for "Women in Engineering"—is intended to serve as a model, providing programming and information to help women reach their fullest potential in engineering.

At the launch event, the center's director, Dr. Rachele Heller (Computer Science), spoke of some of the disparities that are pervasive in engineering and the STEM fields, stating, "We need to address these challenges to provide these women with satisfying careers."

Dr. Heller also said that higher education is a great place to create a pipeline to eradicate such disparities and that SEAS is uniquely poised to help address them. "Here at Foggy Bottom, in SEAS, we are situated at the heart of policy, professional, and productive national leadership," she remarked, noting the school's potential influence.

New York Times correspondent Cecilia Kang delivers keynote



The keynote address for the launch was given by Ms. Cecilia Kang, a technology correspondent for the *New York Times*. Ms. Kang directed her comments to the need to involve women in the design and creation of technology, stating that she believes technology is better when it is created by diverse teams of people who reflect the users and consumers of the technologies.

Since its launch, the center has focused most of its programming activities on career skills development and mentoring workshops. Its Career Toolkit Workshop series, hosted in conjunction with the W. Scott Amey Career Services Center and the GW Office of Innovation and Entrepreneurship, has offered workshops on negotiating skills, resume and cover letter writing, internship or job searches, and other topics.

The center plans to continue to expand its workshops and activities, as well as the information and resources it provides. Dr. Heller has been instrumental in building the center and also in bringing other opportunities to campus for women engineers.

In 2018, she shepherded the school's application for a Clare Boothe Luce Program Undergraduate Research grant, helping SEAS win a \$300,000 grant that is providing funding for promising female students to pursue research with guidance from faculty mentors, hone their professional skills, and establish themselves as university leaders. The program is now in its third year, with nine students currently actively involved in research with SEAS faculty mentors.

The nine Clare Boothe Luce Scholars keep a blog of their research experience, noting particularly what they are learning along the way. Rachel Gray is a senior who works with Dr. Saniya LeBlanc (Mechanical Engineering) in her lab. Early in her research activities, Rachel used her blog entry to offer advice to other students who might also be considering doing undergraduate research, and to give them the confidence to try it. "Research will teach you a lot about life, if you allow it," she counseled. "For now, let it teach you not to be scared of new and challenging things. When you fall, and you will and should many times, pick yourself up, learn from the fall, and keep going."



Dr. James Hahn and Dr. Jane Goodall

Information about both the Clare Boothe Luce Scholars and the SEAS Center for Women in Engineering is available on the SEAS website at cbl.seas.gwu.edu and womenengineers.seas.gwu.edu, respectively.

Partnering with the Jane Goodall Institute

SEAS and other GW students are working to build a new educational platform that will use virtual reality to spread a message of environmental conservation from renowned animal behavior expert and conservationist Jane Goodall to future generations. The project, a partnership with the Jane Goodall Institute, is housed in the GW Innovation Center (GWIC).

The "Virtual Jane" project was born out of conversations with the Jane Goodall Institute on how to best engage the next generation of students on conservation themes and Dr. Goodall's research. Throughout 2019, GW students who study computer science, business, marketing, anthropology, art, and more worked on the project framework and technology.

Dr. Goodall, founder of the Jane Goodall Institute and UN Messenger of Peace, is a pioneer in wild chimpanzee behavior. Her focus shifted from research to conservation during a plane ride over Tanzania's Gombe National Park in 1992, when she saw the rampant deforestation of the once-lush Gombe forests and knew that in order to save chimpanzees she must save the forests they live in.

In April 2019, Dr. Goodall visited GW's Motion Capture and Analysis Laboratory, run by Dr. James Hahn (Computer Science), where researchers were able to accurately capture her likeness and movements. These captures will be critical to recreating Dr. Goodall's image on the "Virtual Jane" platform. She also spoke with students about the "Virtual Jane" project and her vision for its design.

The students hope to launch a minimally viable version of the "Virtual Jane" platform by the end of this year. They already have put together the first design elements, concept art, and a storyboard that explores Dr. Goodall's early field work. They also have been working with students at the nearby School Without Walls to get feedback on the ideal user experience for student learners.

Ms. Annamaria Konya Tannon, executive director of GWIC and chief evangelist for innovation, entrepreneurship, and invention in SEAS, said she hopes the project is just the beginning of a long and productive partnership.

"This project will bring classroom concepts to life and enable students to apply what they learn in the classroom in an unusually meaningful way," she said. "This project creates an opportunity for the entire university to engage on one topic and advance the GWIC mission to create socially responsible projects."

Editor's Note: This article is adapted from the *GW Today* article "Bringing Dr. Jane Goodall's Mission into the Digital Age."

A Rich Display of Research

Nearly 130 graduate and undergraduate students exhibited posters of their research and competed for nearly \$40,000 in prizes at the 2019 SEAS Student R&D Showcase. The showcase was held October 25 in the Science and Engineering Hall and sponsored by RIVidium.

This annual event celebrates and highlights state-of-the-art research projects being conducted across the school, and includes collaborative work with faculty and students both inside and outside SEAS.

Addressing the participants at his first SEAS showcase, Dean John Lach commented, “I’m glad to note all the interdisciplinary research collaboration among this year’s participants. This is increasingly how great innovation happens, so I’m proud to see that SEAS student researchers are collaborating not only with students and faculty in other SEAS departments, but also with colleagues in the Medical School, the Colombian College of Arts and Sciences, and with researchers from other universities both in the US and abroad.”

Prizes were awarded to the best graduate poster, best undergraduate poster, and runner-up poster in each of the school’s six departments. The research presentations covered a wide array of topics and included both theoretical and applied research. A sampling of the winners includes:

Rose Yin, graduate student (Biomedical Engineering): “Bioresorbable Wireless Battery-Free Pacemaker for Electrical Stimulation of the Heart”

Khyati Patel, undergraduate student (Civil and Environmental Engineering): “Integrated Micro-Irrigation and Surface Water Catchment System for Water Management in India”

Justin Williams, undergraduate student (Engineering Management and Systems Engineering): “Engineered Coal: A New Green Product for the Coal Industry”

Pedram Hosseini, graduate student (Computer Science): “Predicting Spread of Fake News on Social Media”

The awards ceremony also included the presentation of AccelerateGW I-Corps



R&D Showcase winners from the Department of Civil and Environmental Engineering

Site Program grants to 13 students. The AccelerateGW program is funded by the National Science Foundation and managed by GW’s Office of Innovation and Entrepreneurship. It provides grants of up to \$3,000 to GW students, faculty, and staff who have innovative technology and want to explore the potential for commercializing it.

This year’s competition also featured department seminars and Science and Engineering Hall laboratory tours for prospective graduate and undergraduate students to introduce them to SEAS and show the range of research options open to them.

SEAS Students Excel at George Hacks Hackathon

SEAS was very well-represented in the Third Annual George Hacks Medical Solutions Hackathon, held in January in the Science and Engineering Hall. Nearly 100 students from across GW—and other local universities—participated in the 24-hour hackathon designed to solicit innovation solutions from students to real-world challenges facing the medical community.

Partnering organizations including GW Hospital, the GW School of Medicine and Health Sciences, Children’s National Hospital, and others pitched health care challenges to the students at the start of the hackathon. Students then had an hour to form teams and select the challenge on which they wanted to work.

With enthusiasm and energy drinks to sustain them, students spent the next 24

hours developing working prototypes such as apps, devices, systems processes, and business models to solve challenges that ranged from a patient-doctor communication platform, to a family history and genetics mobile application, and beyond.

First, Second, and Third Place prizes were awarded to the following teams:

First Place: Heyo Solutions

Pitch: A system to create a cleaner and safer hospital environment for immune-compromised cancer patients by forcing hand washing through a radio-enabled wristband system that restricts movement around the medical center until the wearer uses an automated hand sanitizer machine
Team: **Evan Lindeman** and **Yahya Aliyu** (Biomedical Engineering); **Huzeyfa Telha** (Computer Science); and **Oscar Southwell** (Mechanical Engineering)

Second Place: Instafusion

Pitch: An algorithm to optimize treatment scheduling at chemotherapy infusion centers and provide data analytics of the infusions



Team: **Huma Ilyas** (Mechanical Engineering) and **Waqas Haque** and **Aqsha Nur** (Public Health, Johns Hopkins University)

Third Place: Smart Stool

Pitch: An ergonomic height-adjustable step stool for surgeons
Team: **Yasser Althuwaini** and **Phoenix Price** (Mechanical Engineering); **Jonathon Lee** (Computer Science); and **Cordelia Scales** (Biomedical Engineering)

Exploring Engineering at SEAS

For several years, SEAS has offered Applied Science 1001 (APSC 1001), an eight-week module to help students who enter SEAS as “undecided majors” find the right academic program. Three years ago—after being mentored by Associate Dean Bhagirath Narahari—Dr. Kartik Bulusu (Mechanical and Aerospace Engineering) took over the course and redesigned it, adding an emphasis on building basic engineering skills through popular hardware and software technologies.

“I’ve always wanted my students to be innovators and experience what it takes to be an engineer developing new technologies. That’s why I added several experiential-learning modules in this first-year course. The goal is to have them learn-by-doing and also find a pathway to one of the several undergraduate programs in SEAS,” said Dr. Bulusu.

Dr. Bulusu described the APSC 1001 course as a “holistic experience with skills and micro-labs directly related to each major.” Each week during the course, students participate in a micro-lab that follows a departmental lecture. In the micro-lab, a problem representative of that particular engineering field is presented to them. Using a Raspberry Pi (a single board computer) and Python (an open source programming language), students get to address the problem as an engineer in that field might and learn to develop a piece of technology.

At the end of the course, they work in groups on interdisciplinary projects that Dr. Bulusu has designed for them. This year’s projects included a climate monitoring system for the Science and Engineering Hall greenhouse, a server room heat monitoring system, and a parking space detection system. In the server room project, for example, the student teams developed and deployed a

real-time, heat monitoring system using a Raspberry Pi, environmental sensors, Python programming, and an Internet of Things (Cayenne IoT project builder) application.

“Some of the strongest feedback I received was that the course expanded the students’ vision of what engineering can be. Since the micro-labs and departmental guest lectures complement each other, the students find it empowering to choose the right academic program through this course,” explained Dr. Bulusu.

The course is also meant for students who may be uncertain about remaining in engineering at all. “There are several students who are unsure about choosing engineering,” Dr. Bulusu said, “and I want to make sure they understand the beauty of the profession. Through this course, they acquire practical skills and embrace the exciting possibilities the engineering profession can offer.”

Rocket Team Rocks the Competition

The GW Rocket Team excelled in the 2019 Spaceport America Cup/International Rocket Engineering Competition, taking First Place and Third Place, respectively, in two of the competition categories. Spaceport America Cup is the world’s largest and most demanding university rocket engineering competition.

The Intercollegiate Rocket Engineering Competition was held in June 2019 in Las Cruces, NM, and was hosted by the Experimental Sounding Rocket Association. Student teams from 95 universities and representing 15 countries attended and

launched rockets in the competition. The GW Rocket Team captured First Place in the 10,000-ft Above Ground Level Student Research and Development category, and Third Place in the related Space Dynamics Laboratory Payload competition. They also received the Dr. Gil Moore Award for Innovation.

Dr. Murray Snyder (Mechanical and Aerospace Engineering) advises the team and is proud of its success. “We have a diverse team of students from many majors—electrical and computer engineering, mechanical and aerospace engineering, and physics—and they’ve developed a ‘collective team memory’ that transfers experience and lessons learned from prior year students to those currently on the team,” he said.

The 2020 team planned to compete in the competition again this year, bringing the same level of dedication and preparation to it as last year’s winning team. Unfortunately, the competition was cancelled due to the COVID-19 pandemic.

Members of the GW Rocket team pictured below include (*back row, left to right*): Dr. Murray Snyder, Adrian Haber, Jeremy Waldron, James Hofer, Noah Bakr, Bryce Halter, Adam Brewer, Benjamin Wormuth; (*front row, left to right*): Tom Susi, Ariana Lesniak, and Colin Pate.

Dr. Snyder and the team members thank Iridium, Kulite, and Futek for sponsoring the GW Rocket Team.



Faculty News



White House Names Dr. Sorger a PECASE Winner

Last July, the White House announced the 2019 winners of the Presidential Early Career Award for Scientists and Engineers (PECASE), naming Dr. Volker Sorger (Electrical and Computer Engineering) as one of the recipients of this very prestigious award.

“It’s overwhelming and a true honor, and it underlines the STEM momentum of GW,” Dr. Sorger remarked.

According to the White House, the PECASE is “the highest honor bestowed by the US government to outstanding scientists and engineers who are beginning their independent research careers and who show exceptional promise for leadership in science and technology.” Federal agencies can nominate potential winners, who eventually are selected by the president and the White House Office of Science and Technology Policy. Dr. Sorger, who also won a Young Investigator Program award in 2014, was nominated for the PECASE by the Department of Defense.

He is the leader of GW’s Integrated Nanophotonics Lab, where he researches

and develops photonic integrated devices and systems such as minimized lasers, modulators, and detectors. His research spans from emerging materials to developing circuits and systems for faster and more efficient information processing. Dr. Sorger’s latest research develops photonic and optical neural networks for machine learning and cyber security applications, including a recent innovation that allows machines to extract data from photographs or electronic signals much faster than is possible with current systems.

“Receiving an award such as this one is about scholarly novelties and celebrating successful teamwork,” Dr. Sorger said. “It includes my students, colleagues, and also facilities here at GW. For example, I heavily rely on the Nanofabrication and Imaging Center in the Science and Engineering Hall. So I’m pleased to see the joint research and development enterprise we have been fostering coming to fruition.”

Editor’s Note: This article is adapted from the *GW Today* article “Two GW Researchers Receive Prestigious Presidential Award.”

Dr. Dehghanian Wins DOE Award

Dr. Payman Dehghanian (Electrical and Computer Engineering) and his team won the Tier I, Silver (\$50,000) award last fall in the US Department of Energy’s (DOE) first Electricity Industry Technology and Practices Innovation Challenge (EITPIC).

The DOE awarded approximately \$300,000 to seven teams from industry and universities in this nationwide competition. Through the competition, it hopes to identify and support ideas to make the nation’s electric grid stronger and more resilient.

The proposal submitted by Dr. Dehghanian’s team seeks to design next-generation sensors for the power grid, a technology-to-market solution that would shift the industry from sensing-only to sensing and actuating devices embedded with advanced signal processing and machine learning analytics. Their project aims to enhance the power grid’s online situational awareness and resilience to extremes.

“Smart power grids are constantly subject to unpredictable hazards that not only may leave customers without electricity, but also impose critical threats to health and public safety, and could potentially compromise national security,” said Dr. Dehghanian. “Our proposed technologies could help reduce undesirable social, psychological, and physical outcomes associated with prolonged power system outages.”

Dr. Dehghanian conducts research on power systems engineering and directs GW’s SmartGrid Laboratory. His EITPIC team includes researchers from the SmartGrid Laboratory, as well as electric industry partners.



New Faculty



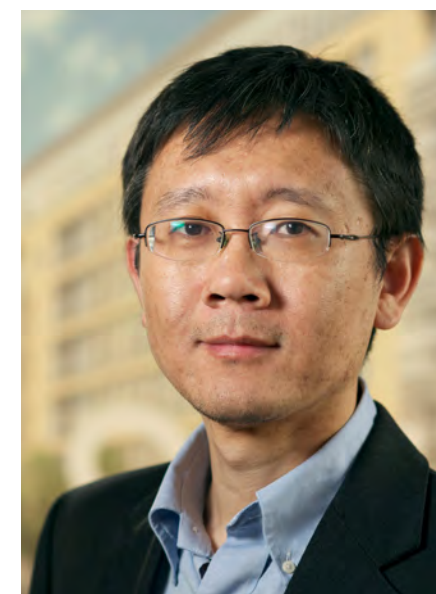
Dr. Adam Aviv

Adam Aviv is an associate professor in the Department of Computer Science. He previously was an assistant professor at the United States Naval Academy. His primary research

interests are in computer security, where he has focused on network security, applied cryptography, and usable security and privacy. In particular, Dr. Aviv is interested in human factors in security and how human computer interaction interfaces with computer security with the goal of designing and deploying more secure systems. Dr. Aviv holds a PhD in computer and information science from the University of Pennsylvania. He is also a National Science Foundation CAREER award winner for his research on mobile authentication.

Dr. Mahdi Imani

Mahdi Imani is an assistant professor in the Department of Electrical and Computer Engineering. Dr. Imani received his PhD in electrical and computer engineering from Texas A&M University in 2019. His research interests include



machine learning, reinforcement learning, and signal processing with special interests in scalable and risk-based decision making in complex uncertain dynamical systems. He received the Best PhD Student

Award in Texas A&M’s Department of Electrical and Computer Engineering in 2015, and the best paper finalist award from the 49th Asilomar Conference on Signals, Systems, and Computers in 2015.



Dr. Xitong Liu

Xitong Liu is an assistant professor in the Department of Civil and Environmental Engineering. Prior to joining SEAS, Dr. Liu was a postdoctoral associate in the Department of

Civil and Environmental Engineering at Carnegie Mellon University. His research interests lie at the intersection of nanotechnology, interfacial and colloid science, and electrochemistry. His research aims to study fundamental interfacial phenomena to provide guidance

for developing more efficient and cost-effective water treatment and resource recovery technologies. He is also interested in elucidating the health impacts of engineered and naturally occurring nanoparticles. Dr. Liu holds a PhD in geography and environmental engineering from Johns Hopkins University.



Dr. Peng Wei

Peng Wei is an assistant professor in the Department of Mechanical and Aerospace Engineering. He develops autonomy and human-in-the-loop decision support tools for aeronautics,

aviation, and aerial robotics. His current focus is on safety, efficiency, and scalability for decision making systems in complex, uncertain, and dynamic environments. Recent applications of his research include air traffic control/management, airline operations, and autonomous drone racing, among other areas. Dr. Wei earned his PhD in aerospace engineering from Purdue University in 2013. He comes to GW from Iowa State University, where he was an assistant professor in aerospace engineering and the 2017 Black and Veatch Faculty Fellow at Iowa State University College of Engineering.

Aran and Fritz for their continuous support of SEAS.”

Dr. Li directs GW’s Nanophotonics and Microfluidics Laboratory, where he and his research group develop cutting-edge enabling technology for personalized medicine. Their technologies range from lab-on-chip microfluidic platforms for single cells and tissues to point-of-care, cloud-based wearable devices. He has won large research grants from the National Institutes of Health, the National Science Foundation, and the FDA, and he has several patents to his name.

Dr. Li Receives Hegarty Innovation Award

SEAS congratulates Dr. Zhenyu Li (Biomedical Engineering) on being named the winner of the 2019 Hegarty Award for Faculty Innovation. Dr. Li was selected last October for the award.

This annual \$10,000 prize was established in 2015 by SEAS alumnus and National Advisory Council chair Aran Hegarty, MS, ’97, and his wife, Fritz Partlow, to recognize one SEAS faculty member who had an exceptional year in innovation.

“To be selected among our many talented faculty members is truly an honor that reflects my team and our collaborators’ efforts to create inventive engineering solutions,” said Dr. Li. “I want to thank



Faculty Excellence

SEAS honored four faculty members for excellence in May 2019 during the 11th Annual SEAS Faculty Research and Teaching Awards Celebration.

The SEAS Distinguished Teacher Award was presented to **Dr. Tom Mazzuchi**, who is the chairman of the Department of Engineering Management and Systems Engineering (EMSE) and is known as an extremely versatile teacher. Throughout his career he has worked with university students of nearly all ages and taught an array of courses from freshman orientation to graduate level courses. Dr. Mazzuchi also has been key to developing many of the EMSE department's academic programs. At the undergraduate level, he was the driving force behind the development of the department's systems engineering program, building it from scratch to an ABET-accredited program with a healthy enrollment. Outside of the classroom, he is appreciated by students for his legendary mentoring efforts and for creating a sense of community within the department. (Read the profile on Dr. Mazzuchi on page 13.)

Dr. James Hahn (Computer Science) received the SEAS Distinguished Researcher Award. He conducts research in the field of computer graphics, augmented reality, and haptics (the study of digital interfaces that allow a user to feel forces.) In recent years, he has concentrated on the

application of computer graphics, rendering, and motion control to medical applications, particularly the use of augmented reality for surgical training and novel treatments to address eating disorders. After publishing groundbreaking work on physics-based motion control for computer animation in 1988, Dr. Hahn continued research that pioneered the field of automated motion control, using simulation, motion capture, and genetic programming. Dr. Hahn is the director of GW's Institute for Computer Graphics.

The SEAS Outstanding Junior Researcher Award was shared by two faculty members, **Dr. David Broniatowski** (EMSE) and **Dr. Chung Hyuk Park** (Biomedical Engineering).

Dr. Broniatowski's areas of expertise are in system architecting, data analytics, and decision analysis, and he has achieved a degree of success that is very unusual for a researcher at such an early stage of his career. He is the principal investigator of a \$1.5 million National Institutes of Health R01 grant to study the challenges that social media data pose for public health officials and researchers. This work also has received significant media attention due to its far-reaching implications for public health, psychology, social media, and policy. His use of sophisticated analytical techniques to inform policy in other areas has also gained wide attention, with a paper on Russian bots

that was picked up by news outlets all over the world and featured in more than 310 national and international media outlets.

Dr. Park's research areas include assistive robotics, human-robot interaction, machine learning, haptics, computer vision, and tele-medical systems. He was among the first researchers who recognized the huge potential of assistive robotics and artificial intelligence to improve interventions for children with Autism Spectrum Disorder (ASD), and his research already has had a significant impact on using robots to develop social interactions with children who have ASD. It also caught the attention of a broader audience outside of academia, gaining coverage in *USA Today*, Britain's *Mirror*, and the *Voice of America*.

Hosting the awards for the school, Interim Dean Rumana Riffat congratulated the awardees and thanked them for "inspiring each of us in our teaching and research, inspiring our students, and building pride in SEAS."

Dr. Louri to Receive Prestigious IEEE Computer Society Award

Dr. Ahmed Louri (Electrical and Computer Engineering) was recently selected to receive the IEEE Computer Society 2020 Edward J. McCluskey Technical Achievement Award for his "pioneering contributions to the solution of on-chip and off-chip communication problems for parallel computing and manycore architectures."



This annual award is given for outstanding and innovative contributions to the fields of computer and information science and engineering or computer technology, usually within the past 10 to 15 years. To be named to receive the award, the recipient's contributions must have significantly promoted technical progress in the field.

"This is a very prestigious award given out by the IEEE Computer Society, and it's a tribute to Dr. Louri's pioneering work over the past decade," said Dr. Suresh Subramaniam, chair of the school's Department of Electrical and Computer Engineering (ECE). "A glance at the past recipients of the award is enough to tell you that this puts him among the top researchers in the field. We're very proud of the recognition it brings to him, to ECE and SEAS, and to GW."

For more than 30 years, Dr. Louri has done seminal work on the development of general frameworks for scalable, energy-efficient, high-performance, reliable and secure computing and communication systems to important application domains and societal needs. His research consists of investigating novel approaches that synergistically combine advances in technology, computer architecture, application, and machine learning techniques to overcome challenges to today's computing systems.

"We rely on computing in the design of systems for energy, transportation, finance, education, health, defense, entertainment, and overall wellness," said Dr. Louri. "However, today's computing systems are facing major challenges in terms of power consumption, limited performance, reliability, and security. These challenges if not addressed, will dramatically impact our overall progress."

Dr. Louri is an IEEE Fellow and the director of GW's High Performance Computing Architectures and Technologies Laboratory. His research has been sponsored by the National Science Foundation, the Department of Energy, the Air Force Office of Scientific Research, and industrial corporations such as Intel, IBM, Cisco, Oracle, Raytheon, Physical Optics Corporation, US West Technologies, and several others.

NSF CAREER Award Winners

Three SEAS faculty members have won National Science Foundation (NSF) Faculty Early Career Development (CAREER) grants in the past year. CAREER grants are the most prestigious awards given by the NSF to junior faculty. They are offered to faculty who excel at both research and teaching.



Dr. Adam Aviv (Computer Science) received a CAREER award for his project "Enhancing Mobile Authentication by Measuring the Authentication Life-Cycle." In this project, Dr. Aviv studies how users authenticate on their mobile devices, for example using a PIN or pattern to unlock their smartphones, and the impact of the user authentication choices on security and privacy. The project focuses on lifecycle events, seeking to understand how users authenticate on their devices over periods of time and how authentication is affected when users encounter new security features or advice.



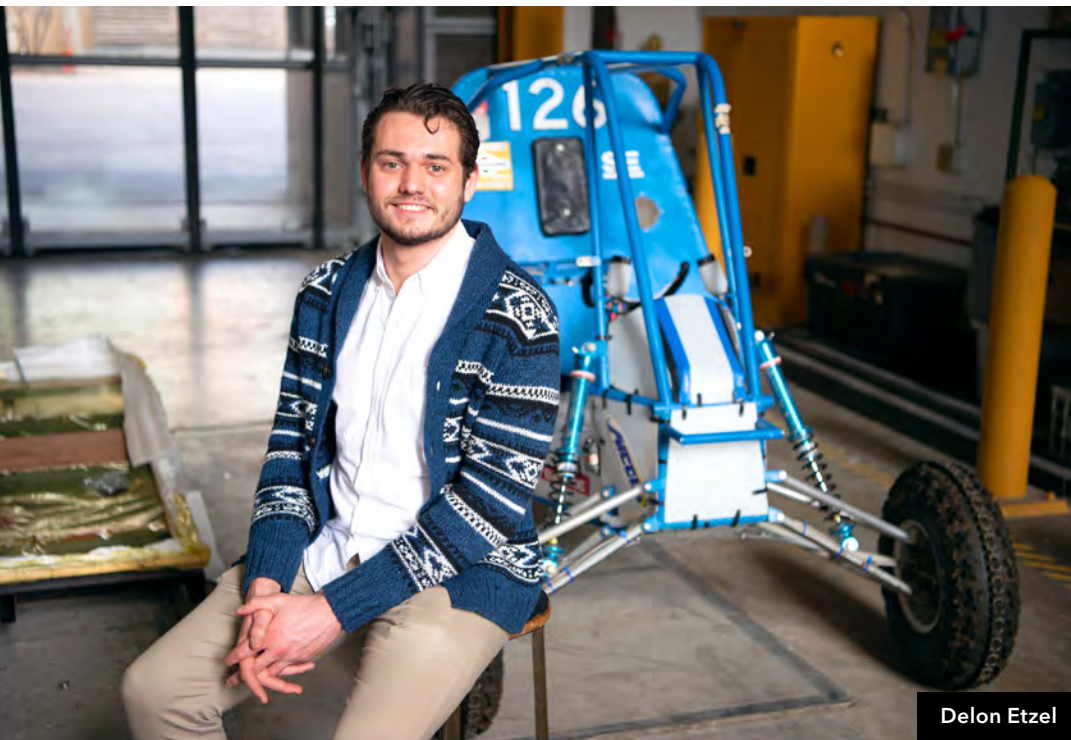
Dr. Leila Farhadi (Civil and Environmental Engineering) won an NSF CAREER award for the project "Observation-Driven

Mapping of the Linkages between the Terrestrial Water, Energy, and Carbon Cycles." The exchange of heat (energy), water, and carbon between the land and the atmosphere plays a key role in the Earth's climate. Understanding the links between these cycles helps us explain how the environment will respond to changing conditions, including climate change and land use change. Currently the lack of proper representation of the linkages results in a wide range of uncertainties and variations in simulated climate projections. Dr. Farhadi will use a novel observation-driven approach to diagnose and map the linkages at regional scales from the implicit (hidden) information embedded in land surface state observations, available through space-borne remote sensing data.



Dr. Saniya LeBlanc (Mechanical and Aerospace Engineering) received a CAREER award for the project "Interface Formation in Laser Processed Thermoelectric Materials." Thermoelectric devices offer great potential to improve energy efficiency by converting waste heat into electricity. However, current manufacturing approaches prevent these devices from having widespread impact. Laser additive manufacturing offers a new and novel way to make thermoelectric devices by engineering the devices from the nano- to macro-scale. In this project, the team will investigate how the additive manufacturing process changes the material across all these length scales. This knowledge will enable new energy conversion devices that are more effective and adaptable than ones made with traditional manufacturing techniques.

Achievement



Delon Etzel

Picking Up Practical Skills

When Delon Etzel develops an interest in something, he's all in. He devotes himself to his interest, learning it, developing it, and sharing it with others.

At GW, he's been particularly interested and active in the mini-Baja team and in student radio, and he believes both have given him skills that will help him professionally.

Delon joined the mini-Baja team during his first semester at GW. Now a graduating senior, he led the team as it prepared over the course of a full year to design and manufacture the off-road vehicle it planned to enter into this spring's Society of Automotive Engineers' annual intercollegiate competition. Unfortunately, the competition had to be cancelled due to the COVID-19 pandemic.

Delon is very proud of how far GW's team has come since his freshman year, and he credits the previous co-captains who led the team. "We've made some incredible leaps," he observes. "We went from not competing my freshman year to being 20th in the whole world last year."

When asked how the experience of being on the team and leading the team has helped him prepare for the professional world, Delon ticks off a long list of skills one might expect him to name—leadership experience, technical skills, applying textbook knowledge to solve real world problems. And then he simply sums it up, stating, "It's priceless."

He talks about his future plans and the job interviews he has had, noting that he's answered a number of interview scenario questions with the statement, "I did that last week in Baja." He's passionate about car design and speaks with ease about the future of the automotive industry.

"We're in a really cool time for the automobile. Every car company is rethinking what the car is and what it can be. I think it will look a lot different than it does now," he predicts. "I'm interested in the design end. That's where my heart's always been."

Delon's heart is also in music, which he follows by listening to bands play and then promotes as a host of a program on GW's student-run radio station. He and three

other students host a weekly show, during which they play and discuss a variety of music. Initially skeptical about being on-air, Delon has learned to really enjoy the show.

"I went on-air once and was hooked. It's a whole lot of fun, and every week it's my chance for an hour to turn off engineering and talk about something else," he says. "There's a sense of improvisation that's necessary when you're on a live radio show. I'm better at thinking on my feet now."

Auditing Elections, Not Classes

"We get to do work that is actually making its way into the real world. It's so important," says Sarah Morin. She's referring to the research that she and Grant McClearn, both juniors studying computer science, do with Dr. Poorvi Vora (Computer Science). Both of them have been working with Dr. Vora on election auditing for more than a year.

"The goal of an audit is to confirm that the reported winner really did, in fact, win," explains Grant. "We do this by drawing a series of samples from the ballots. The audit stops and confirms the reported outcome when there is convincing statistical evidence that the reported winner did, in fact, win."

The number of ballots that the auditors have to draw for an election depends very much on the margin of the winner's victory rather than the total number of ballots cast; the bigger the margin of victory, the fewer the number of ballots they need to sample. Grant and Sarah had a taste of this last November, when they helped Dr. Vora and her collaborators pilot a new approach to statistical election audits in Mercer County, PA. The state plans to deploy statistical election audits with rigorous error guarantees, known as risk-limiting audits, all over the state in 2020.

Leading up to the pilot, they each had their own research roles. Grant worked primarily on trying to increase the efficiency of the audits, that is, minimizing the number of ballots that elections officials have to draw from ballots cast in order to confirm their accuracy. Sarah converted into Python code the statistical methods that Dr. Vora generates; she then ran the methods on various elections data to determine whether the methods worked in an experimental setting.



Sarah Morin & Grant McClearn

Sarah and Grant both believe they're learning a lot from their research. They mention learning how to present their work and how to write abstracts for conferences, for example. But the research is "first and foremost, a lot of statistics," Grants says. Sarah seconds that with a hearty, "Oh, yeah."

They also appreciate getting to hear from other people who are leaders in the field—people with whom Dr. Vora works directly—as well as the chance to talk about their research with others.

"It is also fun to have your work make sense to people outside of your field. It's pretty easy for us to explain how an audit works, and it's nice to be able to share it with people," Sarah states.

The Power of an Idea

While Caitlin Carfano was working for a tutoring program in an affluent Washington, DC suburb during her freshman year, she decided she wanted to try to provide similar opportunities for elementary school students in DC public schools. She pitched the idea for a free, after-school STEM education program to her roommate, Monica Kavathekar, and the two began planning.

They took the idea to the former dean of SEAS, Dr. David Dolling, who thought it had promise and was willing to support it.

"When we started this program we needed funding because we wanted to make it free for the schools and the parents," Caitlin recalls. "The funding was very fundamental because it really kick-started everything."

Needing a name for the program, they began bouncing ideas off each other and ultimately settled on "Atoms to Astronauts." "It's about potential," Monica explains. "The kids are small. They're like atoms, and they have the potential to grow into astronauts." Caitlin adds, "Yeah, my chemistry textbook was on the ground and it had an atom on it, and that's how it kind of came to be."

Their idea took root, and four years later the program has 30 student volunteers who lead STEM activities at five public schools in Washington, DC, throughout the academic year. SEAS student volunteers lead the elementary school students through projects that use foam pipes and marbles for "Roller Coaster Engineering;" magnets, string, and paperclips for "Defying Gravity;" and popsicle sticks and marshmallows to build "Marshmallow Towers."

The goal of the program is to de-stigmatize STEM for kids at a young age and to show them the potential of a career in STEM. "By bringing fun after-school activities to kids, we want to show them that you can

be cool and have a career in STEM," Monica effuses.

Seeing the impact of their idea has been gratifying to both Caitlin and Monica. "What I personally like best is when a kid finally is able to complete the activity, and they get that small dose of achievement. They say things like, 'Oh my gosh, I did that. I'm an actual engineer.' And they are. They're doing the engineering process. They're problem solving," says Monica.

Caitlin and Monica are proud of the success of the Atoms to Astronauts program and want to see it continue. They've already lined up two SEAS students to take over the program after they graduate this spring, and they've received lots of feedback from SEAS and other GW volunteers about how much they enjoy mentoring the elementary school students. "It's great to feel that you're making a difference in a community," concludes Monica, "but it's also great to empower other college students to do the same thing."

Monica Kavathekar & Caitlin Carfano



News



Siobhan Whittle and David Dolling

Donors Establish Scholarship to Honor David Dolling

At the 2019 GW Engineering Hall of Fame, SEAS alumni and friends honored Dr. David Dolling, former dean of SEAS, with the surprise announcement of a \$380,000 endowed scholarship created in his name. Dr. Dolling stepped down as dean of SEAS in August 2018, after 10 years of leading the school.

The David S. Dolling Endowed Scholarship in Engineering is an undergraduate need-based scholarship fund to support women in engineering at SEAS. Donors to the scholarship created it in his name to honor his commitment to increasing the number of SEAS women students and faculty members.

“One of the most appropriate ways to recognize Dean Dolling’s leadership in attracting, retaining, and promoting female students in SEAS is to create an enduring scholarship in his name. Once my wife, Monica, and I learned of the movement to create the David S. Dolling Endowed Scholarship, we knew we wanted to play a key role to help make this idea a reality for David, SEAS, and most importantly, the students,” said Mr. Kevin Kelly, MS ’97, a lead donor to the scholarship and member of the SEAS National Advisory Council.

The first recipient of the scholarship, Ms. Siobhan Whittle, was announced at the

SEAS Inducts Four to Hall of Fame, Pays Tribute to David Dolling

At his first ceremony since being named dean of SEAS, Dean John Lach inducted four honorees into the GW Engineering Hall of Fame last October. The 2019 honorees included three SEAS alumni and the school’s recent former dean, Dr. David Dolling.

In addition to the Hall of Fame induction ceremony, the celebration paid special tribute to Dr. Dolling, focusing on his decade of leadership at SEAS and his legacy of transforming the school and creating a foundation for its continued growth.

The tribute included a video overview of Dr. Dolling’s legacy and the surprise announcement of an endowed scholarship created in his name to honor his commitment to increasing the number of SEAS women students and faculty members (*see previous article*). Dr. Dolling also received a special video salute from SEAS alumna and NASA astronaut Serena Auñón-Chancellor, BS ’97, and a GW lapel pin that she took to the International Space Station in 2018, when she served aboard it on a six-month mission. Dean Lach did the honors of pinning it on Dr. Dolling in Dr. Auñón-Chancellor’s stead.

SEAS congratulates our 2019 GW Engineering Hall of Fame inductees:

Davinder Anand, BS ’59, MS ’61, DSc ’65, is professor emeritus of mechanical engineering and director of the Center of Engineering Concepts Development at The University of Maryland, College Park (UMCP). During

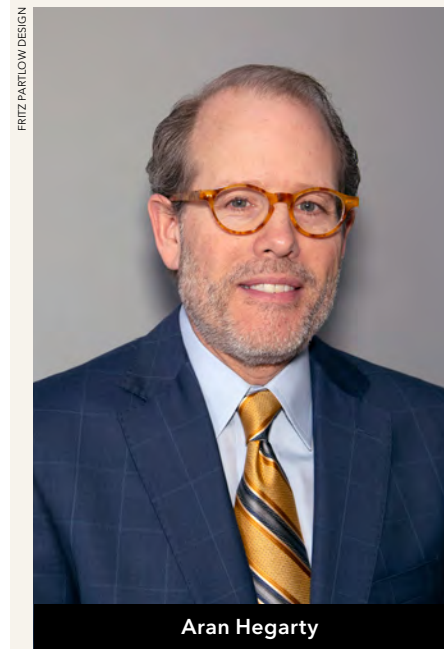
his career, he served as senior staff at the Johns Hopkins University Applied Physics Laboratory, as a program director at the National Science Foundation, and as the chairman of the Department of Mechanical Engineering at UMCP. He also founded two consulting companies—TPI, Inc. and Iktara Associates, LLC—and The Neilom Foundation, whose vision is to help improve the lives of young people at the intersection of health, education, and technology. Most recently, he developed a successful new program in engineering for social change in partnership with the School of Public Policy at UMCP.

David Dolling was dean of SEAS from 2008 through 2018, and led the school through an exceptional growth period that included adding the Department of Biomedical Engineering, recruiting approximately 60 new faculty across SEAS who subsequently secured record levels of research funding, adding new endowed professorships and scholarships, doubling the undergraduate body, increasing the number of women earning bachelor degrees to more than 40 percent of the graduating class, and transitioning the school into the new Science and Engineering Hall. He is currently a professor in the Department of Mechanical and Aerospace Engineering. Prior to joining SEAS, he was a professor, department chair, and associate dean for academic affairs in the College of Engineering at The University of Texas at Austin. Dr. Dolling is a graduate of London University (United Kingdom), where he earned a bachelor’s degree with first class honors and a doctorate, both in aeronautical engineering.

Aicha Evans, BS ’96, is the chief executive officer of Zoox, an autonomous mobility developer. Prior to joining Zoox in February 2019, Ms. Evans worked for Intel Corporation for 13 years, serving most recently as senior vice president and chief strategy officer at Intel. Before that, she was general manager of Intel’s Communication and Devices Group, where she oversaw a 7,000-person global organization and was responsible for its wireless business and engineering for multi-communications products and platforms. She was appointed to the Anita Borg Institute Board of Trustees in 2016 and to the Supervisory Board of SAP in 2017.

Richard Spires, MS ’87, is the chief executive officer of Learning Tree International. Before leading Learning Tree, he was appointed as the US Department of Homeland Security’s chief information officer (CIO), a position he held for four years. He also served as the vice-chairman of the Federal Government CIO Council and the co-chairman of the Committee

for National Security Systems, and he recently held the position of chairman of ACT-IAC, the leading non-profit organization dedicated to improving the effectiveness of government through the use of information technology. Mr. Spires previously served as the CIO and then as the deputy commissioner for operations support at the Internal Revenue Service.



Aran Hegarty

thank Dr. Rumana Riffat, who stepped in to guide SEAS as the interim dean during the search process for our new dean. Also, a special thanks to Dr. Mark and Ms. Amy Mykityshyn for graciously hosting an NAC welcome reception for Dean Lach.

The SEAS Center for Women in Engineering launched in April 2019 and is dedicated to providing SEAS students, faculty, staff, and alumnae with the information and skills to become the best engineers they can be. Dr. Rachele Heller, professor emeritus of computer science, directs the Center with the assistance of Ms. Taly Walsh, assistant director, and an external advisory board that includes NAC members Gene Colabattisto, Barbara Fleming, and Elma Levy.

At the 2019 GW Engineering Hall of Fame induction ceremony, held last October, we honored Dr. Davinder Anand, Dr. David Dolling, Ms. Aicha Evans, and Mr. Richard Spires. The article on the previous page summarizes their accomplishments, and I encourage all of you to read it and learn more about them.

I had the honor of attending the 2019 Spirit of GW Awards Ceremony last September during Colonials Weekend and was able to witness first-hand President Thomas LeBlanc’s presentation of the 2019 Alumni Outstanding Service Award to NAC member Barbara Fleming. The award recognizes alumni who advance the mission of the university through dedicated volunteer efforts. We are so proud that Barbara is a member of the NAC.

Finally, I want to thank my fellow NAC members for all that you do across the school, campus, and community. It is an honor to serve GW with all of you.

Raise High,
Aran Hegarty

Left to right: Richard Spires, Davinder Anand, Dean John Lach, David Dolling, and Aicha Evans



Expanding Opportunities at SEAS

SEAS thanks our alumni and friends whose generous gifts support new funds or programs that are helping to grow SEAS and expand opportunities for our faculty and students. The following list includes those gifts received since April 1, 2019:

W. Scott Amey, MS '75, and his wife, Deborah, continued their support of the Knowledge in Action Career Intern Fund (KACIF) at SEAS and the Amey Scholarship Fund. KACIF is a highly competitive program that provides grants of up to \$3,000 to GW undergraduate and graduate students pursuing internships that are necessarily unpaid. The Amey Scholarship Fund supports scholarships for children and grandchildren of US veterans killed in action. Scott is a former trustee of the GW Board of Trustees and current member of the SEAS National Advisory Council. He is also a member of the GW Engineering Hall of Fame.

Davinder Anand, BS '59, MS '61, DSc '65, established The Neilom Prize for Social Impact to award annual prizes in perpetuity to undergraduate students at SEAS. Davinder is a member of the GW Engineering Hall of Fame.

Peter and Grace Baughan, parents of Joy Nikkel (CCAS), established the Dr. Jhong Sam Lee Scholarship in Engineering, an annual need-based scholarship with preference to incoming freshmen in the Department of Electrical and Computer Engineering. The scholarship was created in memory of Grace's father, **Dr. Jhong Sam Lee, MS '61, DSc '67.**

Clark Construction Group, LLC provided support to establish the David S. Dolling Endowed Scholarship in Engineering to support women in engineering at SEAS.

The **Estate of Samuel Einfrank, BS '51,** supported the SEAS Annual Support Fund through a realized bequest.

Alfred Ferrari, MS '67, DSc '72, and his wife, Evelyn, continued support of the Alfred and Evelyn Ferrari Scholarship Fund for undergraduate students.

Frederick Gluck, MS '72, created the Rhodes-Gluck Family Scholarship, which provides need-based scholarships for female undergraduate students.

Mark Hughes, III, BS '69, MS '77, and his wife, Susan, made a pledge to support the David S. Dolling Endowed Scholarship in Engineering in honor of the former dean of SEAS, and they made an additional gift to support the SEAS Dean's Excellence Fund. Mark is an emeritus trustee of the GW Board of Trustees, and a member of the SEAS National Advisory Council and the GW Engineering Hall of Fame.

Douglas Jones, BS '63, MS '65, DSc '70, and his wife, Mary, provided support for the Douglas L. Jones Endowed Mechanical Engineering Graduate Fellowship. Douglas is a past member of the GW Engineer Alumni Association and a member of the GW Engineering Hall of Fame.

David Karlgaard, DSc '74, and his wife, Marilyn, contributed to the David S. Dolling Endowed Scholarship in Engineering in honor of the former dean of SEAS. David is a former trustee of the GW Board of Trustees and a current member of the SEAS National Advisory Council. He is also a member of the GW Engineering Hall of Fame.

Kevin Kelly, MS '97, and his wife, Monica, established the David S. Dolling Endowed Scholarship in Engineering in honor of the former dean of SEAS. Kevin is a member and immediate past chair of the SEAS National Advisory Council and a member of the GW Engineering Hall of Fame.

Anirudh Kulkarni, BS '86, MS '88, established the Kulkarni Family Scholarship to provide need-based scholarships for female undergraduate students in SEAS. Anirudh is a member of the SEAS National Advisory Council and the GW Engineering Hall of Fame.

David and Jacqueline Martin, parents of Zack Martin, BS '19, established the endowed and annual Zack D. Martin 2020 Scholarship Fund to provide support to undergraduate students at SEAS.

Nicholas Paleologos, BS '69, and his wife, Suellen, helped to establish the David S. Dolling Endowed Scholarship in Engineering in honor of the former dean of SEAS. Nicholas is a member of the SEAS National Advisory Council and a member of the GW Engineering Hall of Fame.

Avram Tucker, GWSB, BA '77, provided support for the Nelson & Michele Carbonell Engineering Endowed Scholarship for students at SEAS. Avram is a member of the GW Board of Trustees and past advisor of the GW School of Business Board of Advisors.

George Wellde, GWSB, MBA '76, provided support for the Nelson & Michele Carbonell Engineering Endowed Scholarship for students at SEAS. George is a member of the GW Board of Trustees and past advisor of the GW School of Business Board of Advisors.

Ellen Zane, CCAS, BA '73, provided support for the Nelson & Michele Carbonell Engineering Endowed Scholarship for students at SEAS. Ellen is a member of the Board of Trustees and past member of the CCAS National Council for Arts & Sciences.

GW Honors Barbara Fleming for Service

SEAS congratulates alumna **Barbara Fleming, CCAS BS '81, SEAS MS '85,** who was one of just five GW alumni honored by the university during Colonials Weekend 2019 for their achievements, service, and philanthropic contributions. Formerly called the GW Alumni Achievement Awards, they are now called the Spirit of GW Awards.

GW honored Barbara with the Alumni Outstanding Service Award for her dedicated and persistent service to the university and to SEAS.

Barbara first volunteered for SEAS in 2013, as a judge for the annual school-wide Pelton Senior Design Competition. After her first experience serving as a judge, she subsequently volunteered four additional times to judge this and other SEAS events.

In 2016, Barbara participated in the inaugural "GW Women in Engineering: Navigating Your Career" student program, and that experience launched an unbroken string of dedicated service to the cause of supporting young women in their pursuit of careers in engineering and computer science. Barbara completed her own career in software technology, retiring as a senior cyber security policy advisor with the US Department of Defense,

and she is committed to helping future generations of female engineering students.

She later served as an alumna networker for the annual women in engineering event, participated in the GW Innovation Center's 2017 "Women in STEM" event, and devoted a full year to being a mentor to a female SEAS Clark Scholar. After joining the SEAS National Advisory Council (NAC) in 2016, she continued to help build the school's focus on issues affecting women in engineering, volunteering to serve on a working group and taking the lead on an external task force on the issue. In 2018, she was named a founding member of the external advisory board of the SEAS Center for Women in Engineering.

"Barbara's passion and investment in the program was clear, and the center would not be where it is today without her ardent support," said Ms. Durriyyah Jackson, who formerly worked with Barbara as the liaison to the SEAS NAC.



Will Alexander and Barbara Fleming

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Happenings



Mounir Alafrangy, MS '18 (mechanical engineering), was selected as one of four crew members of HERA's (Human Exploration Research Analog) Mission XX, a 45-day confined space mission simulation to Mars' moon, Phobos. The crew successfully completed their mission in late 2019 in Houston, TX. This exercise helps researchers acquire more data regarding team dynamics and behavioral health. Mounir and his crew mates were selected from applicants who have astronaut-like qualities. More information is available at www.nasa.gov/analogs/hera.

Jorge Auñón, BS '67, MS '69, DSc '72 (electrical engineering), is a retired dean of the College of Engineering at the University of Alabama in Huntsville, and received the Doctor Honoris Causa 2012 from the Universidad Autonoma Metropolitana, Mexico City in 2012. He writes that he is very proud of his four daughters. Christine studied industrial engineering at Purdue University. Melissa has an advanced degree in computer science. **Serena, BS '97 (electrical engineering)**, is a NASA astronaut and NASA flight surgeon who is fluent in Russian. She spent six months aboard the International Space

Station in 2018 and is one of two Hispanic woman astronauts in the history of NASA. Maria has had tours of duty in Iraq and Afghanistan and works for the Defense Intelligence Agency. Dr. Auñón left Cuba in 1960 as an exile.



CRC Press recently published the book *Plasma Simulations by Example*, written by **Lubos Brieda, PhD '12 (mechanical and aerospace engineering)**. The book guides readers through how to develop C++ computer codes for simulating plasmas primarily with the kinetic Particle in Cell method.



In 2019, **William Broman, BS '14 (biomedical engineering)**, joined Bejin Bieneman PLC in Southfield, MI, as a patent clerk. William is currently in his 3rd year at Wayne State University Law School in Detroit, MI, is an editor for the *Wayne Law Review*, and expects to graduate in May 2021.

Bruce Cazenave, MS '79 (management science), was named CEO of Bluestem Group in March 2019. Previously, he served as CEO of Nautilus.



Dean Coclin, BS '84 (electrical engineering), returned to GW and received a Masters in CyberSecurity via the online program. He is currently employed with DigiCert as senior director of business development.

Kristin Deason, PhD '09 (engineering management), began a new position as the regional director of the Global Green Growth Institute in the Caribbean region

in May 2019. Operating out of St. Lucia, Kristin has responsibility for assisting 11 island nations in the eastern Caribbean to achieve the commitments expressed under the Paris Climate Accord and their Sustainable Development Goal targets.

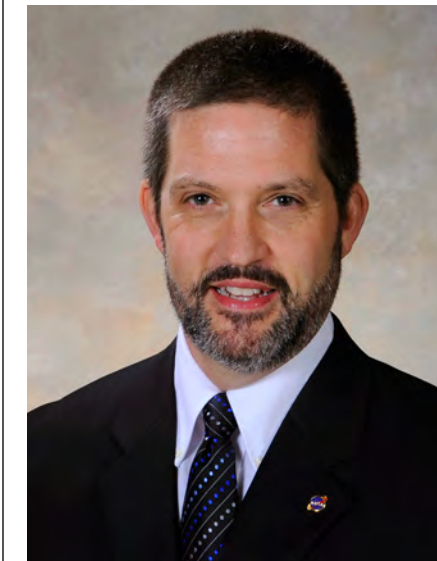
Hitesh Dev, MS '02 (computer science), started Stemtree of Ashburn, a STEM enrichment center for K-12 kids in Ashburn, VA, in January 2020. Stemtree is enrolling children from K-12 for its science, software coding, and robotics after-school enrichment programs (van pickup included). Children of GW alumni will receive an additional 20 percent off on camps and birthday parties.

Deena Disraelly, PhD '12 (engineering management), is a member of an Institute for Defense Analyses research team that was recognized with an Honorable Mention Award in the US General Services Administration's and the Office of Management and Budget's Government Effectiveness Advanced Research Center challenge.



Howard Eisner, DSc '66 (electrical engineering), has recently written two books, both published by CRC Press. The first is *Thinking – A Guide to Systems Engineering Problem-Solving*, 2019, and the second is *Systems Architecting – Methods and Examples*, 2020. He will give a tutorial on the latter for INCOSE (International Council on Systems Engineering) in May of 2020.

Amir Faghfoory, BA '02 (computer science), is working as a psychiatrist and tele-psychiatrist in Southern California.



Lawrence "Larry" Huebner, MS '86 (aeronautics), was recently awarded the NASA Engineering and Safety Center (NESC) Director's Award for outstanding achievement in upholding the guiding principles of the NESC in leading the Boeing Commercial Crew Program Aero-science Peer Review Team. Last year he was awarded the NASA Exceptional Service Medal.

Kyle Jones, DEng '18 (engineering management), is now a principal solutions architect for Amazon Web Services specializing in the energy sector.

John Kallenberger, MEA '83, is a retired federal Navy civilian engineer. His current primary activities include Toastmasters and providing seminars in chemistry, mathematics, and program management.

Likambo Kenyi, DEng '19 (engineering management), has taken a new position as a US Department of Defense Research Development Test and Evaluation lead.

Elliott Kugel, MS '83 (computer science), was nationally recognized in the April 18th issue of the *Financial Times* in their Top 400 Financial Advisers list; this is his fourth time being recognized on this list. He was also listed in the March 11th issue of *Barron's* magazine as one of the Top 1200 Advisors in America and

was ranked #15 in NJ. This is his 10th year in a row on this list. In addition, Elliott was ranked 4th in NJ on the 2019 *Forbes* Best-in-State Wealth Advisors List, published on February 20th. He is a managing director of investments at Merrill Lynch in Bridgewater, NJ, and resides in Skillman, NJ.



Last May, **Anthony Lyons, BS '15 (mechanical engineering)**, helped found Washington, DC's first independent wrestling promotion, Prime Time Pro Wrestling, as "Tony the Intern," a valet for his boss in the ring, and a production assistant in the locker room. PTPW is the first DC-based wrestling promotion, and it focuses on building a modern and inclusive wrestling community. Tony writes, "Come to a show and see what the hype is all about. The fighting may be choreographed, but the energy in the crowd is 100 percent real."

Samson March, BS '14 (electrical engineering), built his own smart watch from scratch as a do-it-yourself project, and as word spread, Samson and his watch were featured in articles on the tech blogs *Engadget* and *The Verge*, and he ended up getting job offers from Google, Oculus, Uber, and SpaceX. Samson designed and built every aspect of the watch, from creating the housing to 3D printing it and writing every line of code for it. He also made the project open source, so anyone else can access the files and make his own watch.

Dorian G. Newton, MS '13 (systems engineering), DEng '17 (engineering management), received the BEYA Educational Leadership—Corporate Promotion of Education Award at the 34th annual Black Engineer of the Year Award (BEYA) STEM Global Competitiveness Conference. This award recognizes

individuals from the private sector who demonstrate an exemplary commitment to enhancing the opportunities for minorities in technology-based careers through the promotion of scientific and technical education programs.



Arthur Pantelides, PhD '09 (engineering management), says hello from Eastern Europe, where he established his own consulting company after finishing his

PhD. He consults with small and medium-size enterprises on optimizing value chain and operations as a result of Brexit. He also teaches strategic management at the American University in Bulgaria.



Phil Perconti, PhD '06 (electrical engineering), moved from the Army Night Vision Lab to the Army Research Lab and became its director about five years ago. He recently was appointed Deputy Assistant Secretary of the Army for Research and Technology. This is the chief scientist position in the Army.

Sergio Ramírez-Mena, MS '93 (information management), works in Honduras for Education Development Center, a US education non-governmental organization. Since April 2018, he has served as chief-of-party for the Honduras Reading Activity project funded by USAID. He has more than 28 years of experience in international development, leading contracts for the US government, multi-laterals, and a large public-private partnership.

Tassos Recachinas, BS '05 (mechanical engineering), is president and chief investment officer of Sophis Investments LLC, an SEC-registered investment adviser, providing investment management services to individual and institutional investors. Tassos loves working with engineers and other professionals, especially SEAS alumni, and would love to hear from you.



On June 27, 2019, the United States Senate confirmed **Christopher Scolese, MS '82 (electrical engineering)**, as the new director of the National Reconnaissance Office.

Bill Varner, BS '73 (electrical engineering), has joined corporate boards of directors for Novetta Corporation, Cornerstone Defense, and Applied Research Solutions. He is also on the advisory board for ManTech International Corporation, as well as the SEAS National Advisory Council (Emeritus) and the Purdue University School of Electrical and Computer Engineering Advisory Board. He was awarded the Purdue Outstanding Electrical and Computer Engineer award in 2016.

Samuel Velázquez, DEng '19 (engineering management), has continued working for the Department of the Navy since his graduation. His work responsibilities have increased as well as his participation in an array of engineering projects, including working on a technical review team as a subject matter expert in risk management, earning the nickname "Dr. Risk" from his colleagues. He reports that he is "a proud cat parent of two wonderful kittens."



Kiersten Washle, BS '17 (systems engineering), MS '18 (engineering management), is happy to share that she and SEAS alumnus **Yahya Alabbas, BS '17 (systems engineering)**, are engaged to be married.

Charisma Williams, MS '14 (engineering management), has published her sixth article, "Bridging the Gap Between the Under-Privileged and Preparedness," in *Emergency Management Magazine*. The article ran as the lead story on the magazine's website. Charisma is an emergency management consultant based in Washington, DC.



Ya-Qin Zhang, DSc '89 (electrical engineering), was inducted to the American Academy of Arts and Sciences in October 2019. Founded in 1780, the Academy honors excellence and convenes leaders from every field of human endeavor to examine new ideas and address issues of importance to the nation and the world. With his election to the Academy, Dr. Zhang joins the company of notable members such as Thomas Jefferson, George Washington, Alexander Graham Bell, Albert Einstein, Winston Churchill, and more than 250 Nobel and Pulitzer Prize winners.

Thank You

SEAS thanks our alumni who donated their time to GW during calendar year 2019. The following alumni volunteered on campus or throughout the country or world during 2019:

Erkinay Abliz
William Alexander
Sana Al-Hajj
Dina Al-Sabah
Alonzo Alvarez Meola
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