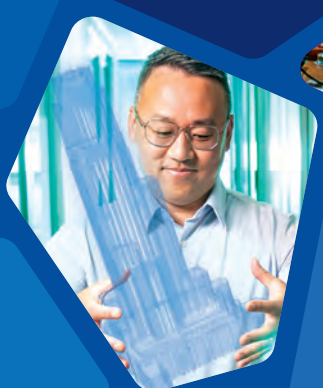
OFFICE OF THE SENIOR VICE CHANCELLOR FOR RESEARCH

ANNUAL REPORT 2024–25







University of Pittsburgh®

INSIDE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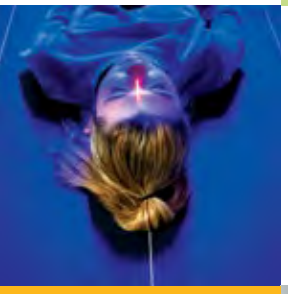


PLAN FOR PITT 2028

The University of Pittsburgh's Plan for Pitt 2028 is defined by excellence and focused on serving our community. This plan offers actionable and measurable initiatives and outcomes that invest in people and ideas, accelerate our momentum and ensure Pitt's best days lie ahead. The Plan for Pitt 2028 outlines our strategic growth areas for research and scholarship, including our work to lead the life sciences century, power a healthy future, transform assistive technologies to enable human achievement and advance a digital future for everyone.

NATIONAL R&D SURVEY

Every fiscal year, the Higher Education Research and Development (HERD) Survey gathers data on research and development (R&D) spending at U.S. colleges and universities that have spent at least $150,000 on separately accounted-for R&D.[1] The survey is administered by the National Center for Science and Engineering Statistics, a division of the National Science Foundation. For the 2023 academic fiscal year, Pitt's research spending increased by 11.7%, ranking us 17th out of 900 institutions. Pitt is part of a distinguished group that includes institutions such as Johns Hopkins University; the University of California, San Francisco; the University of Michigan; Duke University; Stanford University; and Harvard University. Pitt ranked 10th in expenditures from federal sources and 25th in spending from nonfederal sources, moving up two spots from FY 2022 in both categories. Specifically, Pitt's spending from U.S. Department of Health and Human Services funding grew by 11.6%, solidifying our rank at fifth. Our ranking for spending from U.S. Department of Defense funding now stands at 21st, two places higher than last year. Pitt also ranked in the top 10 in two life sciences categories: health sciences (ninth) and biological and biomedical sciences (eighth).

PITT RANKS

#17 OUT OF **900** INSTITUTIONS

FOR RESEARCH AND DEVELOPMENT EXPENDITURES

TOP 10

IN TWO LIFE SCIENCES CATEGORIES

[1] Separately accounted-for R&D refers to spending that is tracked in separate R&D accounts. This spending cannot be part of general expenditure accounts that include teaching salaries, other direct costs, etc.

From left:
Senior Vice Chancellor for Research Rob A. Rutenbar, Chancellor Joan Gabel

A MESSAGE FROM THE SENIOR VICE CHANCELLOR FOR RESEARCH

For more information about research at the University of Pittsburgh, visit us online.

pittresearchannualreport.com

research.pitt.edu

linkedin.com/showcase/pitt-research

Despite the uncertainties of the past year, the University of Pittsburgh has continued to far exceed expectations in research and funding success. Our researchers and scholars have doubled down in publishing, applying for funding and advocating for research, while our leadership has remained steadfast in support of our research enterprise and continuing to build our life sciences ecosystem in Pittsburgh. These combined efforts not only keep knowledge moving forward but also help to keep the United States—and the Pittsburgh region—competitive on the global stage.

One area where we are certainly keeping our foot on the gas is artificial intelligence (AI) research. We are all witnessing the revolution of AI, which will drive some of the most profound technological, social, political, scientific and economic transformations in generations—on par with the Internet and perhaps greater.

At Pitt, we are using, measuring, evaluating and exploring AI in every way imaginable. Our faculty members have the breadth and depth of expertise to apply AI in any field, and here at Pitt, they have the resources to keep up with the velocity of the changing technology. Together with our academic partners, the Pittsburgh Supercomputing Center, and new industry partners like NVIDIA Corporation, Dell Inc. and Amazon Web Services, Inc., we are turning Pittsburgh into an epicenter of AI research and integration.

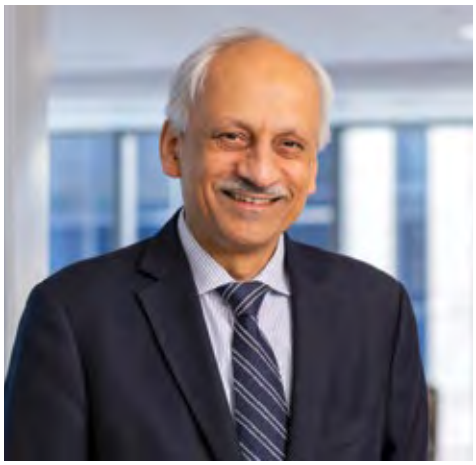
Complementing our work in AI, Pitt faculty members are exploring new ways to generate the energy needed to drive the technology as well as to keep our society healthy and communities moving forward. These efforts to maximize our natural resources to create efficient and sustainable energy sources will help to secure the nation's energy independence.

No matter the field or tool that they use, Pitt researchers continue to strive to improve human life and engage human curiosity. In this annual report, you'll find out about groundbreaking work not only in AI and energy but also in areas as diverse as agriculture in East Africa, the effect of social media on girls' mental health, how infrastructure shapes communities, novel Alzheimer's disease biomarkers and how consumers relate to different types of branding.

I hope you find this annual report to be both insightful and inspiring. At the University of Pittsburgh, we take immense pride in our research enterprise, which spans a diverse array of fields and unique perspectives. I am confident that you will uncover the breadth and depth of our innovative work throughout these pages.

Rob A. Rutenbar
Senior Vice Chancellor for Research

A MESSAGE FROM THE SENIOR VICE CHANCELLOR FOR THE HEALTH SCIENCES



As we close out the first quarter of the 21st century, the University of Pittsburgh remains among the most elite biomedical research institutions worldwide and, in 2025, surpassed $1 billion in health sciences research and development expenditures for the first time.

We're also emerging as a worldwide leader in the integration of AI technologies to radically transform health research and patient care. As these technologies advance at lightning speed, we find ourselves ever at the brink of crossing a continually advancing finish line—a pace that perfectly positions us to more rapidly translate our abundant research discoveries into products, tools and services benefiting patients.

In fiscal year 2025 alone, our landmark Computational Pathology and AI Center of Excellence entered a $10 million partnership with tech giant Leidos to develop AI-powered tools for faster detection of heart disease and cancer. For patients, that means earlier, more effective care. We were tapped by NVIDIA Corporation to form its inaugural AI Tech Community alongside Carnegie Mellon University to advance robotics, autonomy and AI innovation. And we launched GAINMED, an international research and health care collaborative to conduct deep biologic and lifestyle analysis of global patient cohorts. The goal is to develop "AI agents" capable of delivering precision medicine guidance to health care providers at any point-of-care location.

The further down the track we get in AI expertise, the greater the opportunity for extending the human health span—the number of years populations around the world can lead healthy, active lives. In all that we do at Pitt Health Sciences, that's the ultimate finish line.

Anantha Shekhar
Senior Vice Chancellor for the Health Sciences
John and Gertrude Petersen Dean,
School of Medicine

BIOFORGE MOVES FORWARD WITH NEW TECHNOLOGIES

In fall 2024, University of Pittsburgh leaders and community members gathered to celebrate a construction milestone for BioForge, a facility that promises to transform how precision biological medicines are made and to drive life sciences innovation in the region. Located on the site of a former steel mill, BioForge is intended to revolutionize the way precision medicines are manufactured, making them more affordable and accessible.

Recently, the facility has been acquiring next-gen equipment to enhance its ability to create breakthroughs and innovations. "We are not only creating a traditional laboratory for biological systems development and manufacturing, but we're bringing the best-in-class technology in nano-3D printing," says **Kaigham (Ken) Gabriel**, CEO of BioForge. "It's 3D printing, but at a scale where we can resolve at 100 angstrom of resolution."

Other new tools available at BioForge will enable researchers to perform cell-free DNA synthesis and efficient automated liquid handling for developing specific DNA constructs. Gabriel says that these types of technologies create opportunities to accomplish things in ways that were not available as recently as just three years ago. ■

ASSISTIVE TECHNOLOGY GETS A BOOST FROM NVIDIA PARTNERSHIP

Rory Cooper

The University of Pittsburgh and Carnegie Mellon University have joined forces with AI tech giant NVIDIA to form an "AI Tech Community," the first of its kind in the United States.

"This is a new research model," says Pitt's Senior Vice Chancellor for Research Rob A. Rutenbar. "NVIDIA saw Pittsburgh as a unique opportunity to combine Pitt's expertise in using AI for medical applications and education with Carnegie Mellon's expertise in core AI and next-generation robotics."

The first project supported within the AI Tech Community is being done at the Human Engineering Research Laboratories (HERL), a joint venture between Pitt's School of Medicine and the U.S. Department of Veterans Affairs led by founder and director **Rory Cooper**.

"We are refining the development of a semi-autonomous robotic wheelchair with integrated robotic arm, known as RAMMP, that can negotiate different terrain and manipulate everyday objects," explains Cooper, who is also a distinguished professor in the School of Medicine. "We are creating a virtual twin that models the RAMMP within various environments, which includes integrating real world data. By simulating the RAMMP and the environment, we can apply the results to advance and accelerate how the system functions in the real world."

NVIDIA provides human and computing resources that are helping HERL work faster and in greater detail than previously possible. The digital twin of the RAMMP, created with assistance from NVIDIA, reacts and behaves like the real system in a simulated environment rich with real-world data. NVIDIA has also provided processors used within the RAMMP system.

"This project is part of AI for good," says Cooper. "The technology will help people who need assistance to function with greater autonomy in their lives. It's robotics for the real world." ■

RESEARCH BY THE NUMBERS

4,863
PROPOSALS SUBMITTED

1,550
NEW AWARDS

6,310
ACTIVE AWARDS

1,393
DIRECT SPONSORS

RESEARCH GRANTS AWARDED

This wildflower field illustrates the breadth and diversity of research at Pitt. Each flower type represents one of four research areas. The number of flowers reflects the total percentage of research grants awarded in each area during FY 2025.

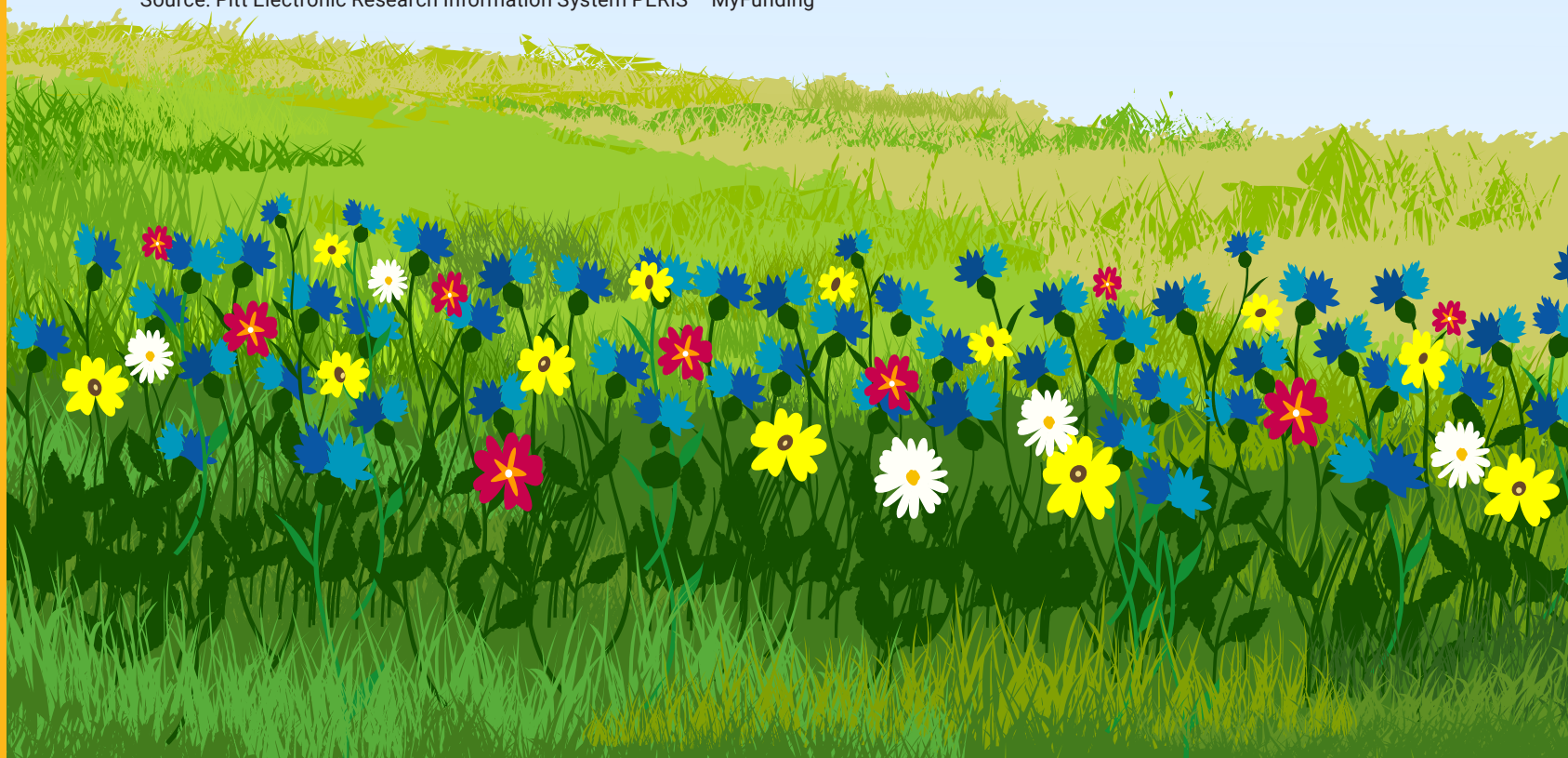
985 | 66%
Medicine

173 | 12%
Health Sciences

228 | 15%
STEM (Science, Technology, Engineering, and Mathematics)

105 | 7%
Arts, Humanities, Social Sciences, and Related Fields (ASSHRF)

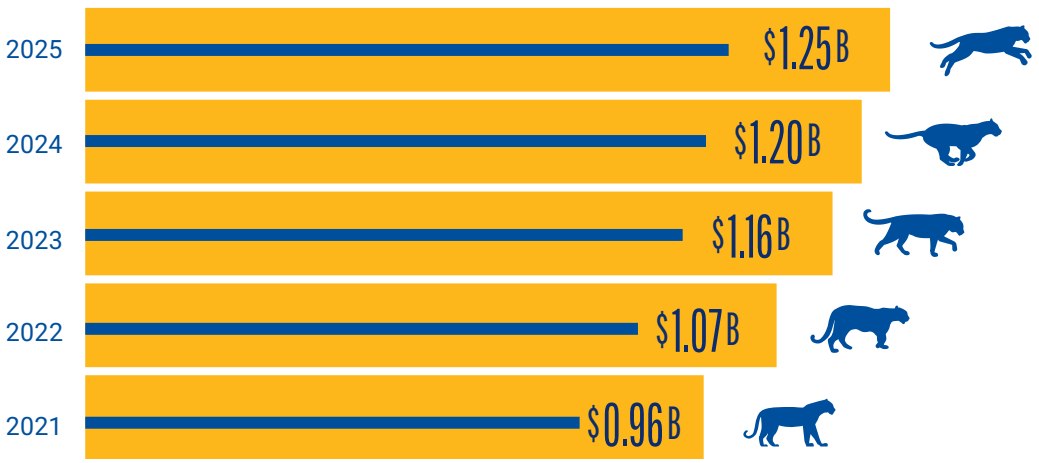
Source: Pitt Electronic Research Information System PERIS™ MyFunding



Pitt's research enterprise continued to grow in fiscal year 2025, with total sponsored research expenditures rising to $1.25 billion, a 4.5% increase from the prior year.

Source: Office of the Chief Financial Officer

OUR EXPENDITURES HAVE INCREASED **30%** IN THE LAST 5 YEARS



THE FUTURE IS DIGITAL: AI, COMPUTING AND DATA SCIENCES

Barr von Oehsen

"We are trying to integrate systems that are currently in silos into an open but secure national platform where PSC is the entry point to that infrastructure."

—Barr von Oehsen

SUPPORTING AN AI ECOSYSTEM

Poised between the University of Pittsburgh's health care AI innovators and Carnegie Mellon University's machine learning robots is the Pittsburgh Supercomputing Center (PSC), a decades-long joint project of the two universities that is helping to drive Pittsburgh as an AI ecosystem.

"It's a lot of fun," says **Barr von Oehsen**, director of PSC. "Our relationship between Pitt and Carnegie Mellon is unique because instead of just one, we're associated with two very strong research programs. Based on that relationship, we can build systems locally that we can then turn into national solutions."

But how can people at different institutions collaborate while maintaining secure systems? Von Oehsen has led efforts to build networks using the authentication at a researcher's home institution to be accepted at other institutions to access computing, data and research.

"We looked at ways to build infrastructure that makes it easier for people to collaborate without having to jump through security hoops," von Oehsen explains. "We are trying to integrate systems that are currently in silos into an open but secure national platform where PSC is the entry point to that infrastructure."

Von Oehsen points out that with the demand of AI, many universities are now struggling with the power and cooling needs that AI systems require. He says that now is the time for research institutions to come together to develop common integrated solutions that will spur collaboration, increase innovation and save money. For Pittsburgh, PSC is part of that solution. ■

Specialized Datasets Drive New Discoveries

After nearly eight years of coalition building, Pitt is opening a new Federal Statistical Research Data Center (FSRDC)—a secure data facility managed in partnership with Carnegie Mellon University and the U.S. Census Bureau. Its sensitive data will only be available to researchers who obtain special clearance.

For years, Pitt and Carnegie Mellon researchers have been leveraging federal data to tackle pressing societal issues. But the opening of the FSRDC in Pittsburgh will bring new research opportunities to the universities, especially in the areas of social policy, regional health care challenges and economic investment.

Set to open in early 2026, the FSRDC leaders were thoughtful about the design of the facility. "The design echoes shapes and structures found in the Cathedral of Learning and in area buildings," said **Rob Cunningham**, Vice Chancellor for Research Infrastructure. "We wanted to build an attractive workplace that reminds people of the importance that their work could have for the nation, for Pittsburgh, and for the surrounding communities." ■

Rob Cunningham

KEEPING PACE WITH MEDICAL AI

From left: Liron Pantanowitz, Hooman Rashidi

It has been estimated that 70-80% of decisions made in a hospital or medical practice are driven directly or indirectly by pathology, laboratory medicine and radiology. These fields are essential for everything from identifying heart attacks to pinpointing growing tumors to detecting hidden injuries.

"It's not surprising that pathology and lab medicine emerged as the epicenter of medical AI," says **Hooman Rashidi**, associate dean of AI in medicine in the School of Medicine. "Because these critical decisions touch so many patients with different diseases and conditions, AI-enhanced imaging tools are now present throughout all health care disciplines. That growing presence is what drives innovation."

Rashidi directs the Computational Pathology and AI Center of Excellence (CPACE), where researchers are working on many collaborative projects, some of which are unrelated to imaging. For example, CPACE scientists are working with plastic surgeons to improve the use of embedded AI tools in surgical instruments.

Perhaps CPACE's most significant achievement so far has been in medical education: In collaboration with the School of Medicine, CPACE scientists have created a fully interactive suite of educational apps known as the Pitt-AI-cademy. The goal of the Pitt-AI-cademy is to democratize AI literacy for health care professionals through an approach that does not require coding. These educational tools are designed to help clinicians effectively integrate cutting-edge AI tools into their clinical practice responsibly and efficiently, with a low barrier to entry.

"We have built a fully interactive educational application with resources bundled under one umbrella, and it's an environment that is easy to interact and play with," Rashidi says. "There is nothing like this on the entire planet, as far as I am aware." ■

AI IS FOR EVERYONE

AI already is part of our everyday lives and will inevitably continue to grow. But one important question lingers: Is AI, particularly the large language models that have exploded since ChatGPT appeared in 2022, actually good for people?

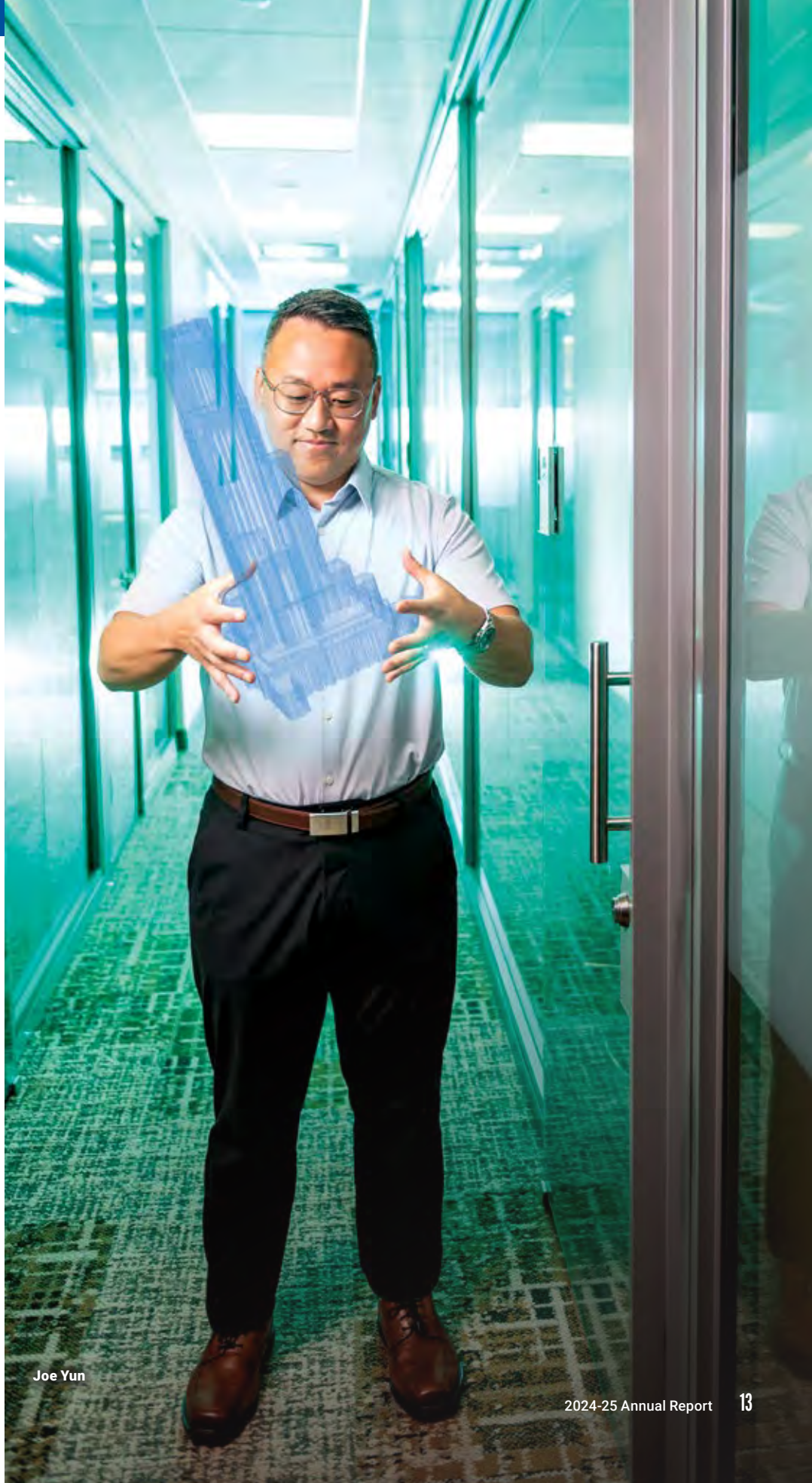
Joe Yun, research professor of electrical and computer engineering in the Swanson School of Engineering, has an answer: "Because it is inevitable, we have to make AI as good as we can for everyone. Obviously, there is a lot that could go very badly. But we need to work for the good so that it doesn't end up that way."

Yun also is Pitt's director of artificial intelligence enablement, a new role in which he leads efforts to define the roles of AI at the University to help students, faculty and staff adjust to and learn the ways they can use AI technology. He is leading a project to build an internal generative AI model tailored specifically for Pitt and connecting University data systems.

"We envision a future where faculty, staff and students could ask generative AI-type questions in a system that brings together different information sources," he says.

Yun predicts that mature generative AI will democratize software, essentially reviving the excitement and do-it-yourself vibe of computing in the 1980s.

"We're growing that capability at Pitt for college students," he says. "AI is not like just using the Internet. It is about creating something." ■



Joe Yun

Bruce Childers

SOCIETY BENEFITS FROM REPRODUCIBLE SCIENCE

Science is logical and reproducible—add substance A to substance B and get substance C. But in science based on computation, particularly simulations and modeling, the same data do not necessarily arrive at the same result every time. Add generative AI to the mix and the chain of reproducibility (being able to recreate another's work) becomes even more complicated.

It is not just a scientific problem; it also can be a political or social problem. For example, during the COVID-19 pandemic, computational models helped to inform public health policies, but inconsistencies in those models contributed to undermining confidence in public health policy and trust in science itself.

"Trust is an issue at the moment, but trust has always been an issue in science," says **Bruce Childers**, dean of and professor in the School of Computing and Information. "The credibility of science has always stood on our willingness to share and to validate and verify."

Childers is helping to develop tools and protocols that push researchers to validate their own results and those of others. Skepticism, including skepticism from the public, is not a bad thing, Childers says, but rather a fundamental principle in science.

He recently published a paper with colleagues proposing requirements to improve reproducibility, specifically in infectious disease models. Researchers would need to detail their computational environment, analytical software, model description, model implementation, data and experimental protocol.

"We should poke at results and be skeptical about things until we have built up a body of evidence behind an idea, an innovation, a new discovery—until we have confidence in it," Childers explains. "We build upon other scientists' work while ensuring best practices for verification and validation." ■

Anna Balazs

LIVING MATERIALS INSPIRE NEW COMPUTING METHODS

Anna Balazs, John A. Swanson Chair of Engineering and Distinguished Professor of Chemical Engineering in the Swanson School of Engineering, has heard her work described many ways: biomimicry, soft robotics, soft materials, self-assembling materials.

"I don't know if I like any of those terms," says Balazs. "What we would like to do is blur the line between the living and nonliving and use principles from biology to make materials that show lifelike attributes. We are designing living systems."

Balazs has described biology as a source of inspiration and metaphors. After her family fled Hungary in 1956, watching her veterinarian father drew her into science. Observing plant and animal life led Balazs to the concept of materials organizing themselves, like trees growing annual rings and amphibians growing back severed limbs.

Observing organisms like mimosa plants, whose leaves suddenly collapse if they are touched, draws her to design materials that would be equally responsive to pressure, touch and temperature change.

In search of that material, Balazs has created unique computational models of self-assembling behavior in polymers, nanomaterials and fluids. Along the way, she earned a long line of distinctions, including the rare achievement of being elected to both the National Academy of Sciences and the National Academy of Engineering in the space of one year. Most recently, she won the 2025 Gutenberg Research Award from Johannes Gutenberg University in Germany.

Exploring materials with biological functions led to the concept of using those materials for computing. In a 2020 research paper, Balazs and her colleagues created a model of circuitry-free systems powered by the interactions of beams of light trapped in a gel material. The interactions create wave guides that can be used to create fundamental computing algorithms.

Could this work at scale to do practical computing?

"There was this wonderful quote that if you think of a new technology, then you don't want it for an old purpose," says Balazs. "New technology for computing allows you to do new things, and it is not wise to use it for an older application because it will be slower in lots of ways. But it can open the door to something else." ■

POWERING PROGRESS: ENERGY, INFRASTRUCTURE AND COMMUNITIES

Fernando Tormos-Aponte

RESTORING POWER AFTER NATURAL DISASTERS

In 2017, Hurricane Maria devastated the archipelago of Puerto Rico. A month after the storm, less than 8% of roads were open. Five months after the storm, a quarter of residents still had no power. Though **Fernando Tormos-Aponte**, assistant professor of sociology in the Kenneth P. Dietrich School of Arts and Sciences, had no background in energy restoration research at the time, he knew he had to do something to help his home.

"This disaster inspired my yearslong journey investigating what it takes to restore energy through a social science lens," Tormos-Aponte says. "Who gets prioritized and who gets left behind?"

Energy is a matter of life and death. Impacting everything from hospitals to grocery stores, a prolonged power outage means critical resources are unavailable to those who need them most. And those outages are increasing in both frequency and length. Thus, there is an urgent need to understand who are the most impacted and how their needs can be addressed.

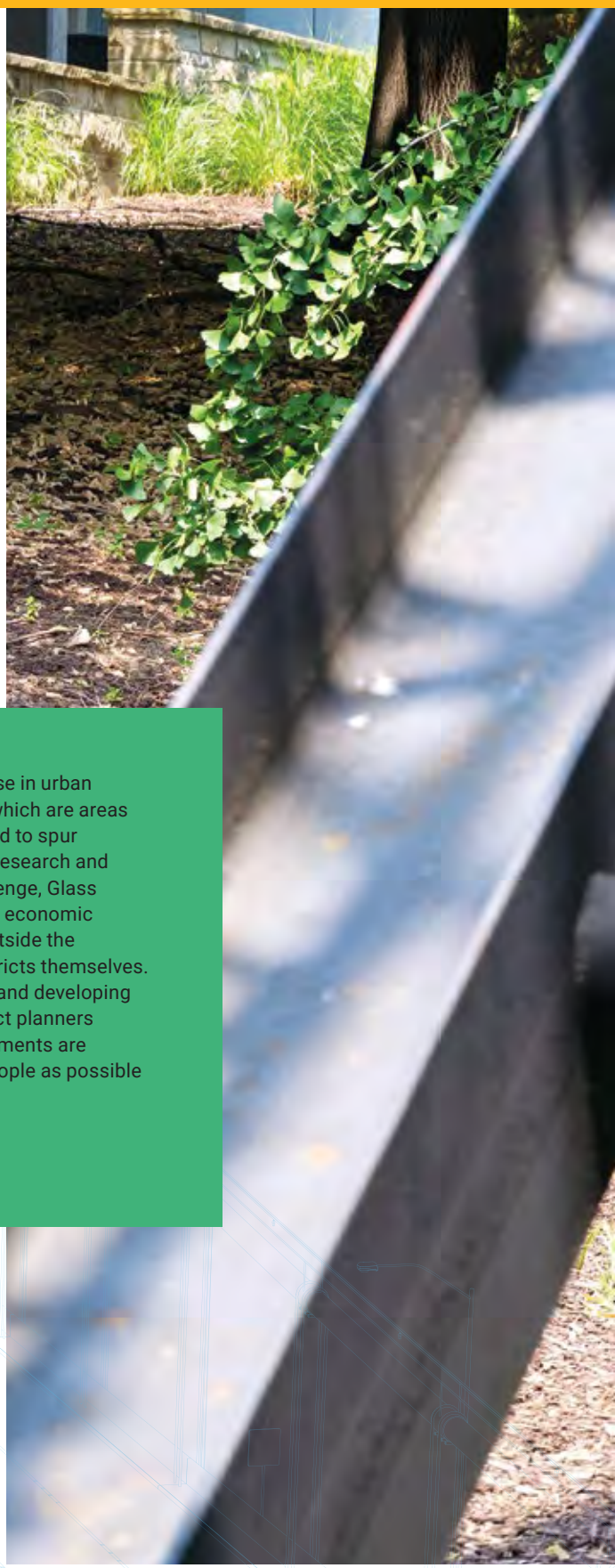
Tormos-Aponte and his collaborators developed and improved measurements of vulnerability to disasters, mortality from disasters and geolocation of data that can be used anywhere. This research provides a framework for energy restoration in a multifaceted and equitable way that involves both the community and government policies.

"The impact of this work is undeniable," he says. "There are pathways to energy reliability and energy democracy that we can use to guide our policymaking and our work moving forward."

One way of working toward energy reliability is through community-led infrastructure development for energy and sustainability. Installing a single solar panel system in one community could mean access to clean water, food and health care even after a disaster. By working directly with those affected to implement solutions, Pitt is developing grounded expertise and community-engaged research practices that can go beyond a single disaster.

"Thriving communities and a healthy planet are not mutually exclusive," Tormos-Aponte says. "We don't have to choose a dirty planet in exchange for a strong economy." ■

INVESTING IN INFRASTRUCTURE TO BENEFIT COMMUNITIES



In Fayette County, Pennsylvania, a groundbreaking project is underway to address regional development challenges. This initiative, titled Appalachian Bridges to the Future, aims to slow the loss of educated residents in the county.

The 10-year-long project is led by **Michael Glass**, assistant professor of urban studies in the Kenneth P. Dietrich School of Arts and Sciences, and three other Pitt faculty members. Glass is an expert in how aging infrastructure influences how regions are conceived and planned. By investing in and leveraging these assets, Glass believes that regional equity, sustainability and practical policy development can be achieved, thereby enticing younger, more educated people to live in the area.

Glass also is applying his expertise in urban planning to innovation districts, which are areas near universities that are designed to spur economic development through research and business partnerships. The challenge, Glass explains, is in ensuring that these economic benefits reach the community outside the boundaries of the innovation districts themselves. He is researching best practices and developing a framework for innovation district planners to ensure that universities' investments are maximized to benefit as many people as possible in their communities. ■

Michael Glass

ENSURING ACCESS TO RELIABLE ELECTRICITY

As the energy grid in the United States ages and power usage increases, something needs to be done to ensure that everyone has reliable access to electricity. Luckily, there's a team of University of Pittsburgh researchers working with industry partners to tackle these energy issues.

Fang Peng, RK Mellon Endowed Chair Professor of Electrical and Computer Engineering in the Swanson School of Engineering, is one of a number of Pitt scholars and researchers who are tackling the aging characteristics of the U.S. power grid. Peng directs the Energy GRID Institute at Pitt, with **Brandon Grainger**, associate professor of electrical and computer engineering and Eaton Faculty fellow in Pitt's Swanson School of Engineering, serving as associate director.

Located in the Energy Innovation Center, the Energy GRID Institute focuses on advancing electric power systems through the use of novel power electronics conversion systems.

"Our real-world setups enable us to perform at-scale research, development, testing and validation of new grid technology," says Peng. "By working together with industry, agency, local foundation and academic partners, we are poised to rebuild and revolutionize the electric grid."

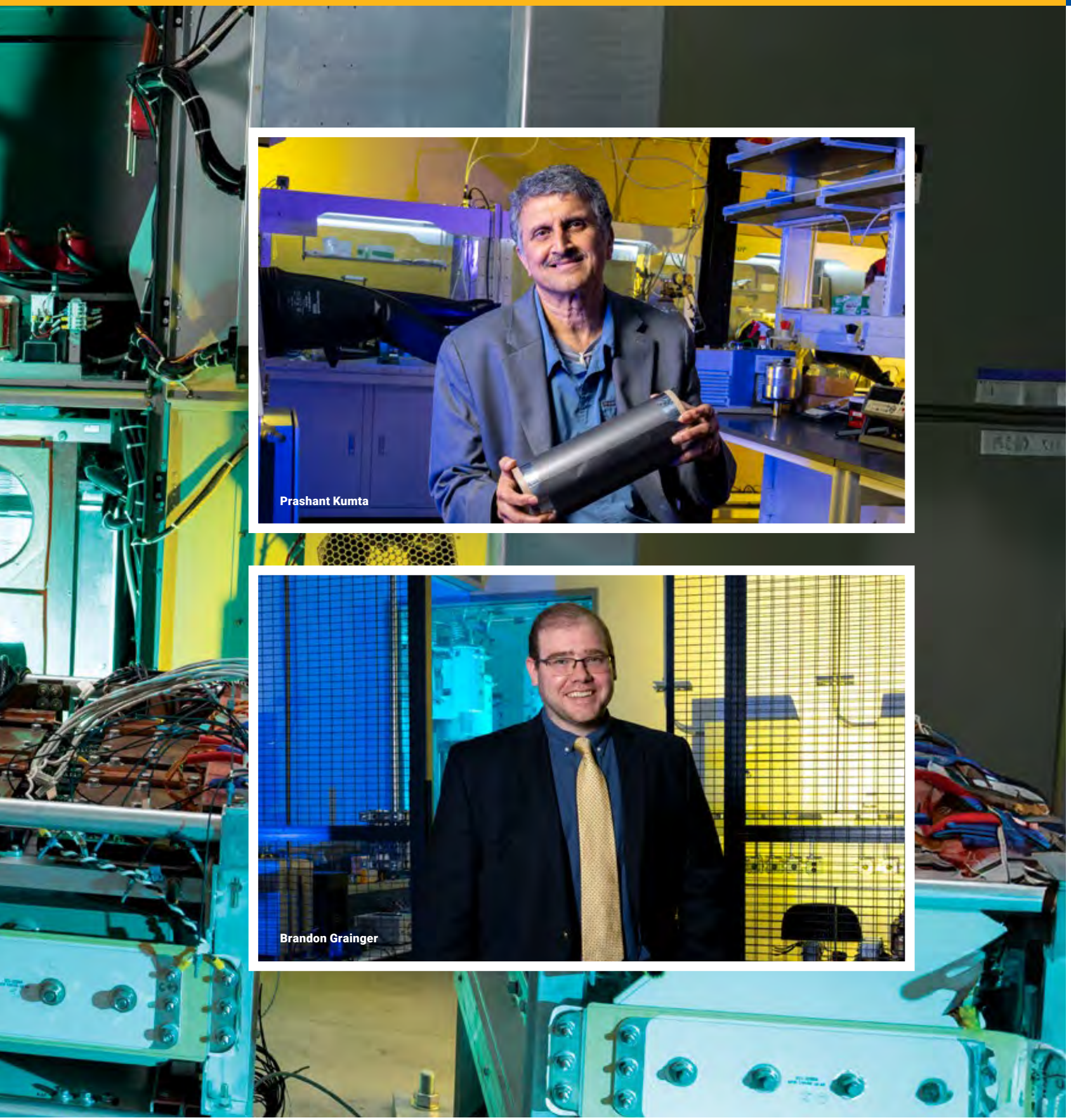
But it's not only large-scale grids that have an effect on energy consumption. As more necessary products in our lives use electricity, the capacity of batteries is increasingly important.

Prashant Kumta, Distinguished Professor of Bioengineering and Edward R. Weidlein Chair Professor in the Swanson School, explores novel ways to safely pack more power into smaller batteries using nanostructures, new redox chemistries and new approaches for making those materials, resulting in safe and long-lasting high-power batteries.

One way he is doing this is by investigating a new battery chemistry that combines lithium and sulfur, a cheap industrial affluent, which could easily outperform the current lithium-ion batteries but leads to a reaction that will eventually dissolve the sulfur. The new materials he and his group have identified can generate a more resilient, safe and long-lasting battery.

By uniting large-scale grid modernization with advanced materials science, the work of these engineering researchers highlights a comprehensive approach to future energy challenges. Their combined efforts—integrating resilient power system architectures with breakthroughs in energy storage—represent a critical step toward building an electricity infrastructure that is not only reliable and efficient but also adaptable to the evolving demands of modern society. ■

Fang Peng



Prashant Kumta

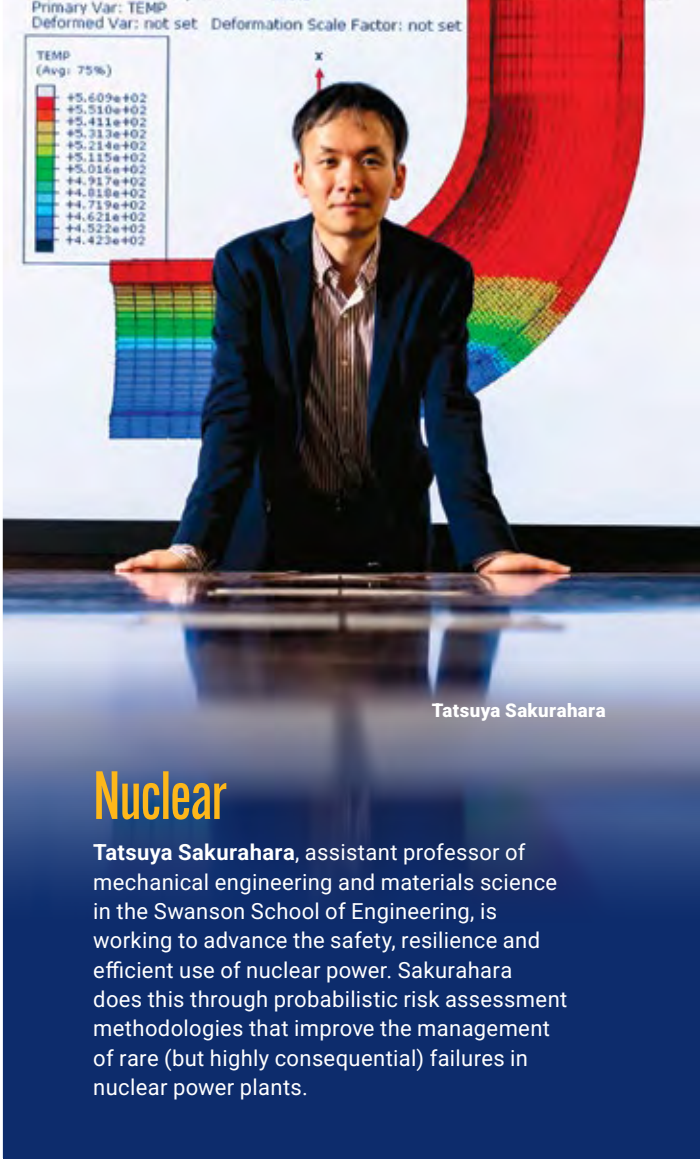
Brandon Grainger

TRAINING ENGINEERS ACROSS THE ENERGY SPECTRUM

In energy, the University of Pittsburgh is taking a giant step beyond the binary choice between renewable and traditional carbon resources.

Pitt is establishing a groundbreaking undergraduate degree in Natural Gas, Renewables, and Oil Engineering (GRO), using the Swanson School of Engineering's broad expertise to ensure that students can adapt to evolving energy demands. Students study geology, chemistry, drilling and oil production along with renewable energy courses such as solar, wind, hydro, biofuels, batteries, fracking and carbon sequestration.

"Industry and society are at a pivot point as our energy portfolio adapts to a complex balance of components, from traditional oil and natural gas to solar, wind, biomass, hydroelectric or geothermal," explains **Bob Enick**, professor of chemical and petroleum engineering in the Swanson School of Engineering. "This program enables our students to move seamlessly between industries." ■



Tatsuya Sakurahara

Nuclear

Tatsuya Sakurahara, assistant professor of mechanical engineering and materials science in the Swanson School of Engineering, is working to advance the safety, resilience and efficient use of nuclear power. Sakurahara does this through probabilistic risk assessment methodologies that improve the management of rare (but highly consequential) failures in nuclear power plants.

Bob Enick

Oil Recovery

After fracturing underground layers of shale, only 5% of oil can be collected. **Bob Enick** is working to recover even a small portion of the 95% that remains. He is doing this by injecting liquid CO_2—with an added chemical to help release the oil from the shale—into the well so the CO_2 can soak into the oil. The well remains closed for a period of time, and once it is reopened, some of the CO_2 emerges along with additional oil, while the rest of the CO_2 remains stored underground.

Melissa Bilec

Sustainability

Melissa Bilec, George M. and Eva M. Bevier Professor of Civil and Environmental Engineering in the Swanson School of Engineering and codirector of the Mascaro Center for Sustainable Innovation, explores innovative strategies for material reuse, modular design and closed-loop construction systems that reduce waste and extend product life spans. Her work reimagines how humanity designs the built environment for a more resilient and regenerative future.

Zachary Harris

Hydrogen

Zachary Harris, assistant professor of mechanical engineering and materials science in the Swanson School of Engineering, focuses on how hydrogen affects the fracture resistance of structural metals, a key impediment to the broader adoption of hydrogen as an energy carrier. Harris pushes these materials to their limits in the lab to prevent catastrophic failure in the real world and to design new materials that withstand the effects of hydrogen.

Catalysis

With the goal of improving efficiency and the environmental footprint of chemical processes, **Götz Veser**, professor of chemical and petroleum engineering in the Swanson School of Engineering, develops novel catalysts and reactor concepts. In collaboration with **Mohammad Masnadi**, assistant professor of chemical and petroleum engineering, Veser is investigating low-melting liquid metals as an entirely new field of catalysis.

Götz Veser

UNDERSTANDING PEOPLE AND CULTURE: THE HUMANITIES, ARTS AND SOCIAL SCIENCES

Shelome Gooden

BUILDING A NATIONAL HUMANITIES, ARTS AND SOCIAL SCIENCES NETWORK

Shelome Gooden has been a pivotal figure in advancing research in the humanities, arts and social sciences, both within Pitt and at a national level. As Pitt's first-ever assistant vice chancellor for research in the humanities, arts, social sciences and related fields, Gooden has been instrumental in developing new programs and initiatives that bridge the gap between different academic disciplines that have become hubs of academic excellence and innovation.

In 2023, Gooden cofounded the Humanities, Arts, & Social Sciences Research Leaders Network (HASS-RLN), a national effort to support and advance arts, humanities, social sciences and humanities-adjacent research at comprehensive research universities. At its initial meeting, HASS-RLN brought together 25 university-based senior research leaders from 23 different states to learn how best to promote, support, strategize and advance opportunities for researchers in these fields.

As a direct result of the success of that meeting, Gooden and her colleague, Christine Mallinson at University of Maryland, Baltimore County, were awarded a National Endowment for the Humanities Chair's Grant to support a new convening, titled "New Frontiers in Strengthening and Supporting Humanities and Humanities-Adjacent Research." The convening was held this fall in Washington, D.C., not only bringing together HASS research leaders, but also representatives from national funding agencies and other national stakeholders dedicated to supporting and strategically advancing humanities and humanities-related research.

"HASS research has varied qualities and needs," Gooden says. "We look forward to sharing strategies and recommendations for how to amplify these important research programs and help them advance their success."

THE NATURE OF ART

With joint roles as teaching assistant professor of museum studies in the Kenneth P. Dietrich School of Arts and Sciences and curator at the Carnegie Museum of Natural History, **Deirdre Madeleine Smith** has an interdisciplinary approach to the history of visual culture and philosophical inquiry.

Some of her recent work has been with the museum's natural history art collection, which includes thousands of prints, drawings, paintings and photographs that tie together art and the natural world. From photographs of wide-eyed does to paintings of salamanders, the collection is made up of a wide variety of works that extend back into the late 19th century.

"This collection archives fascinating stories about the history of art and image making, the history of science, the history of the museum and the history of animal and plant life," says Smith.

She is not only interested in art featuring animals but also has published on the creation of art by animals. Rather than determining whether or not animals can create art, Smith looks at the creations of two species to reflect on what humans mean by art in the first place. Chimpanzees and bowerbirds are the most common animals singled out in debates on animal art due to their history of painting and elaborate mating rituals, respectively.

"Situating the practices of these two species within art history and the philosophy of art reveals that the story of art has always exceeded human boundaries," Smith says. "It challenges us to rethink art as a continuum of aesthetic and social life across species." ■

Deirdre Madeleine Smith

Photo By Joshua Franzos / courtesy of Carnegie magazine

Sophia Choukas-Bradley

SOCIAL MEDIA'S IMPACT ON ADOLESCENT GIRLS

What makes social media the perfect storm for body image issues and depression in adolescent girls? **Sophia Choukas-Bradley**, associate professor of psychology in the Kenneth P. Dietrich School of Arts and Sciences, focuses her work on understanding how specific experiences with social media impact mental health.

"When I first started this work in 2014, I was told it was a waste of time. People said social media didn't change teen interactions, it just gave them a new place to interact," says Choukas-Bradley. "What I knew even back then was that it was not only a new tool; social media completely shifted the landscape of adolescent development."

There is a large change during puberty where girls' self-esteem drops, and mental health concerns sharply rise. One reason for this is what psychologists coin the "imaginary audience." Adolescents assume everyone thinks about them as much as they think about themselves. With things like photo editing software and seeing the number of likes a post gets, social media only perpetuates this phenomenon.

Though Choukas-Bradley emphasizes that individuals can only do so much without top-down policy changes, there are ways to help combat these issues.

"We are living through an unprecedented mental health crisis among adolescents," says Choukas-Bradley. "I work with television networks, government agencies and national organizations to ensure we reach as many people as possible. I would not continue this research if I didn't firmly believe that it will improve adolescents' lives." ■

AFRICA'S AGRICULTURAL HISTORY INFORMS MODERN STRATEGIES

East Africa is known as the cradle of human life, home to the evolution of hominids from the earliest upright walkers to modern humans. But one evolutionary step remained a blank slate for Africa: the development of agriculture. It is well documented in much of the world where and when people began to farm and raise animals as cultures transitioned out of hunter-gatherer economies. People in East Africa, like most of the continent, long ago transitioned to agricultural economies, but the histories of when and how were not well known.

The story of the origins of agriculture in East Africa is now being illuminated. In 2024, **Steven Goldstein**, assistant professor of anthropology in the Kenneth P. Dietrich School of Arts and Sciences, and his colleague, Natalie Mueller of Washington University in St. Louis, reported the earliest evidence for plant farming in East Africa based on dating seeds and grain excavated at the Kakapel Rockshelter in the Lake Victoria region of Kenya.

The work showed evidence of a wide range of crops from all over Africa and pushed back the dates for farming in East Africa. A West African crop, cowpeas, was dated to 2,300 years ago, making it the earliest documented domesticated crop in East Africa.

"The fact that West African crops are growing first supports the theory that migrations of Bantu speakers from around modern Nigeria brought farming. But crops like finger millet and sorghum do not show up together as a package; rather they integrated at separate times," explains Goldstein. "There were many individual movements of people and trade, and farmers in East Africa had choices of what crops to focus on."

Goldstein believes that the principle of choice is a way of combatting variability of soil and water in East Africa, as opposed to an economy of cash crops that accompanied the colonial integration of East Africa into a global economy.

"A crop like finger millet requires a bit more labor and produces fewer calories per acre than corn, but it has more micronutrients, and it is more resistant to insect predation. It grows well in relatively nutrient-poor soils in much of East Africa. In the face of droughts, aridity and climate change, it is hugely beneficial to have those strategic options," Goldstein observes.

Goldstein and his collaborators want to help change the portrayal of Africa as a place of constant famine and food insecurity.

"It's just simply not true," he says. "The major complex states across sub-Saharan Africa only began to change after colonialism. I think we are rectifying the portrayal by looking at the sustainable options and strategies that clearly were successful in supporting large populations in the past." ■

Steven Goldstein

EMPOWERING MULTILINGUAL LEARNERS

Hayley R. Weddle

Hayley R. Weddle, assistant professor in the School of Education, wants to ensure that all educators and leaders are well prepared to support multilingual learners. To achieve this goal, she co-leads a national research/practice partnership focused on multilingual learner policy change that includes six researchers and 30 state education department leaders across 28 different states.

In education, multilingual learners often are viewed through a deficit lens and can be underestimated, but they and their families bring many assets to their schools and communities. The key is creating a system that not only includes multilingual learners but recognizes their assets and supports their educational needs.

The national partnership convenes every three weeks to develop guidelines and professional learning materials while also thinking about the policies that would help the vision for equitable education to become a reality. Because the group includes members from across the country, each person has a different perspective, allowing for tailored approaches for specific contexts rather than a one-size-fits-all approach.

"Every multilingual learner deserves not just access to but positive experiences within high-quality learning environments," says Weddle. "My vision is for every multilingual learner to have access to public education that builds on their strengths. With enough collaboration and persistence, I believe we can get there." ■

UNDERSTANDING COMPLEX BUSINESS SYSTEMS

Ravi Madhavan

A car has 30,000 parts. A nuclear reactor has hundreds of thousands of parts. The Boeing 777 has 4 million parts. What technical, human and managerial skills does it take to design, engineer, manufacture and safely operate such complex systems? This is the question that motivates **Ravi Madhavan**, professor of business administration in the School of Business.

Much of scientific research is focused on discovery, which usually means asking progressively narrower questions. But to understand complex capabilities, Madhavan believes that a more comprehensive approach is needed because the roots of such capabilities are not only inside a company building a system but in society more broadly. The problems are not just technological but also managerial and regulatory, requiring an integrated, multidisciplinary approach.

"For some questions, it is best to actually go out into the field and talk with people to understand how managers do things," says Madhavan.

While his journal-focused scholarship examines networks and alliances between companies, his fieldwork elaborates what he calls "a socio-cognitive theory of complex capabilities," an explanation of how people and organizations operate in complex systems. Following more than a decade of fieldwork in China in the nuclear energy and commercial aircraft sectors, he has published and presented his work widely and is now working on a book.

He got a chance to observe the growth of the nuclear power industry in China closely beginning in the mid-2000s, when the Pittsburgh-based Westinghouse Electric Company LLC approached the Joseph M. Katz Graduate School of Business with a strategy problem.

Westinghouse called on the Katz School's consulting field projects, in which teams of MBA students work on consulting projects for outside companies. As luck would have it, Madhavan was the faculty supervisor and traveled with the students to Westinghouse's operation in China, where they interviewed Westinghouse people and their Chinese counterparts.

Madhavan continued to visit China over the next several years, along with faculty colleagues from the Departments of Economics and Political Science and the Swanson School of Engineering.

"I've had the opportunity to watch this industry change and shift. Today, China is the leader in reactor building and a formidable competitor in nuclear energy exports," he points out.

"Learning to keep the edge in high-value advanced industries like nuclear energy, space systems and the electrical grid is a 'whole of society' endeavor," Madhavan says. "Understanding complex capabilities is crucial." ■

THE EVOLUTION OF BRANDING IN A DIGITAL ERA

While branding was once only applicable in the business sector, it is now found in all parts of our culture. **Vanitha Swaminathan**, associate dean for research and strategic initiatives and Thomas Marshall Professor of Marketing in the School of Business, focuses her work on how branding influences consumers and how that influence has changed over time.

One of her major contributions includes identifying two modes of brand differentiation. Horizontal differentiation is when people use brands to express personality and taste, while vertical differentiation is when people use brands to signal status or superiority. Responding to social exclusion typically results in someone attaching themselves to horizontal brands to stand out, while responding to social inclusion results in someone gravitating toward vertical brands to fit in. To put it simply, being included or excluded changes how a consumer seeks brand affiliation.

The influence of brands has changed so profoundly that Swaminathan argues that established theories need to be refocused to take into consideration the rapidly growing digital world. From corporate social responsibility to data privacy, marketing and branding play a unique role in how consumers interact with the world around them.

"My work on consumer cocreation and empowerment sheds light on how digital platforms have shifted power dynamics between brands and consumers," Swaminathan says. "In this hyperconnected world, my findings encourage firms to act transparently and ethically, because consumer voices truly can shape brand narratives." ■

EXPANDING OPPORTUNITIES IN PUBLIC AND INTERNATIONAL AFFAIRS

In spring 2025, the Graduate School of Public and International Affairs changed its name to the School of Public and International Affairs (SPIA), a name that reflects its commitment to welcoming and preparing students at every stage of their academic and professional journeys.

"We've found that undergraduate students are increasingly motivated by opportunities in public and international affairs," says **Carissa Slotterback**, dean of SPIA. "By engaging with students earlier, we're helping them build the foundational skills of leadership and public service that are needed now more than ever."

With the introduction of a Bachelor of Arts in public policy, SPIA is opening up new ways for students to begin their research and scholarship journeys during their undergraduate careers. Students will have the chance to participate in internships, fellowships, research opportunities and community-based projects.

One example of undergraduate research is the Policy and Social Impact Fellows Program, a cocurricular experience designed exclusively for undergraduate students. Under the guidance of experienced mentors, fellows apply their knowledge and skills to address real community and organizational needs. The program also encourages fellows to reflect on their experiences, fostering a sense of civic responsibility and a lifelong commitment to community engagement.

One of these projects revolves around fire preparedness in Allegheny County, Pennsylvania. Students worked with the Congress of Neighboring Communities—known as CONNECT—to identify challenges that firefighters and municipalities face due to the growth of new technologies such as electric vehicles, solar panels and lithium-ion batteries. They found that despite the low risk of emergencies associated with these new technologies, the lack of standardized training and policy poses a large risk.

By emphasizing research opportunities at the undergraduate level, SPIA is helping to build a community-led research enterprise to better the world around us.

"This is not just a name evolution, it's a milestone in our journey," Slotterback says. "We embrace a future that expands our mission, deepens our impact and invites even more students to shape the world with us." ■

> "We embrace a future that expands our mission, deepens our impact and invites even more students to shape the world with us."
>
> —Carissa Slotterback

A CHAMPION OF LAW STUDENT WELL-BEING

Since joining the School of Law faculty in 2020, **Andrele Brutus St. Val**, associate professor of legal writing, has been a dynamic presence deeply engaged in teaching, scholarly pursuits and service to the institution and the legal education community at large. She cocreated a unique course, titled Thriving in the Law: Tools for Academic, Professional, and Personal Well-being, aimed at equipping students with resilience skills, habits and routines in different areas of their lives to minimize stress and optimize well-being.

In her recent scholarly publication, St. Val discussed the course and addressed common barriers faced by law students, such as high demands on their time and the pressure to conform to a single "right way" of being a law student and lawyer. She also described the conceptualization of her Thriving in the Law course, which was the product of a collaboration with psychology researcher Omid Fotuhi, a group of law students and her School of Law colleague **Ann Sinsheimer**. The course helps students to cultivate a resilience toolbox using science-based strategies to boost motivation, manage distractions, form meaningful connections and improve performance, ultimately guiding students in developing their professional identity.

In her most recent publication, St. Val also explored the historical roots of distance education and drew parallels to the current debate on online legal education. She discussed how the historical evolution of distance education can help to create an equitable, technology-forward legal academy. She believes that robust frameworks for effective online legal teaching can be built, fostering a more inclusive and modernized legal profession. Her research and innovative courses are helping to improve the experiences of law students to enable them to thrive. ■

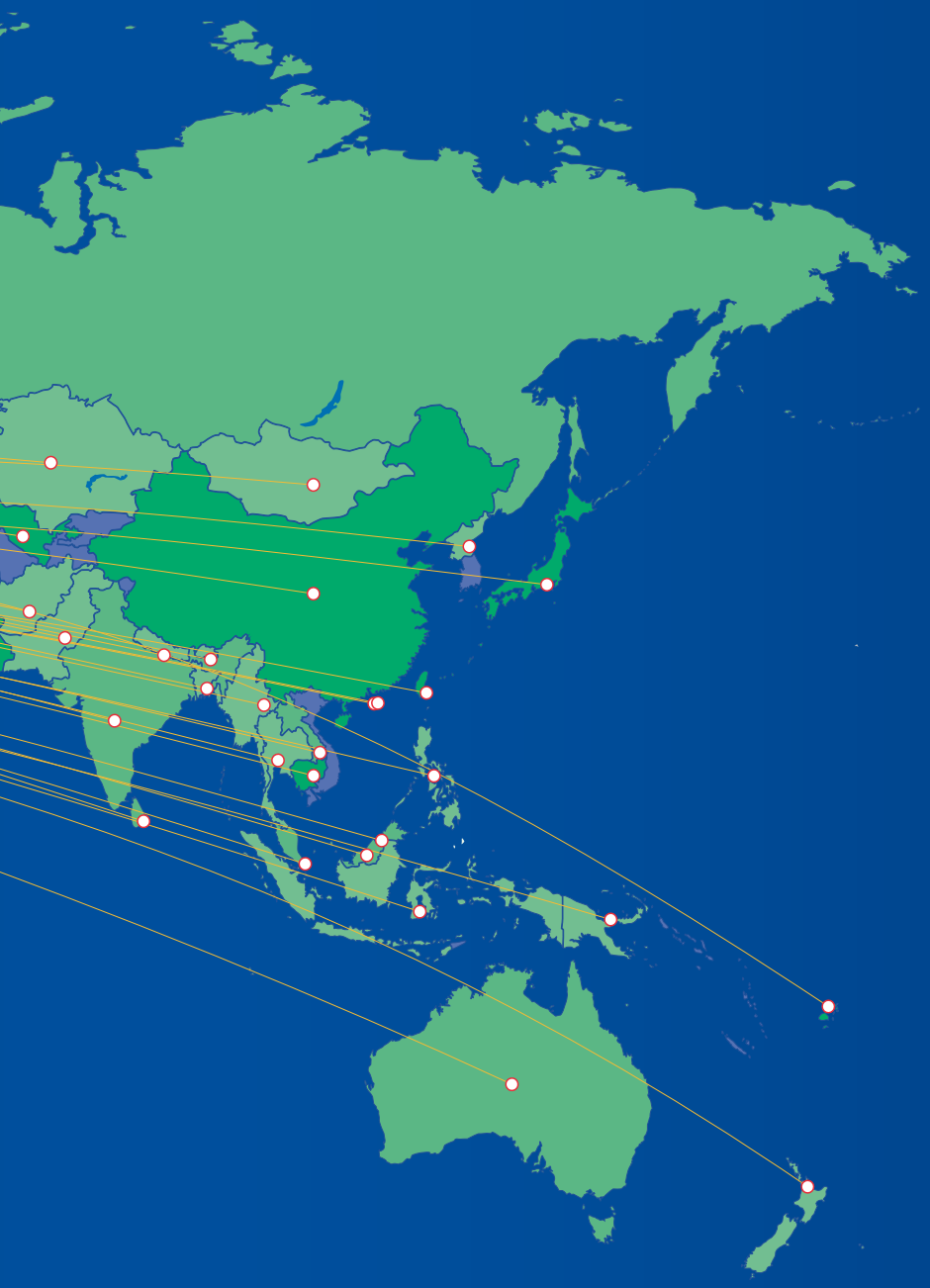
Andrele Brutus St. Val

INTERNATIONAL COLLABORATION

This map connects the U.S., and Pittsburgh more specifically, to all the countries where the co-authors of our researchers' publications are located.

Source: Clarivate InCites

PITT'S INTERNATIONAL FOOTPRINT



17,606 PUBLICATIONS

157 COUNTRIES

Top 10 International Collaborators

By number of co-authored publications

United Kingdom
2,370

Australia
628

Canada
1,179

France
610

Germany
820

Spain
567

China
763

Netherlands
505

Italy
674

Japan
478

HEARING IS A HUMAN RIGHT

Catherine Palmer views communication as a human right. Because of this, she has dedicated her clinical practice and research program to developing, testing and implementing accessible pathways to hearing care.

Palmer, who is professor of otolaryngology in the School of Medicine and professor in and chair of the Department of Communication Science and Disorders in the School of Health and Rehabilitation Sciences, explains that millions of American adults have untreated hearing loss that often leads to social isolation and poor health outcomes. Patients face a variety of barriers to care, which may include limited financial resources or access to appointments and confusion related to the care pathway.

Palmer approaches this problem from multiple angles, starting with improving the identification of hearing loss. Her lab developed LiDIA (Listening iDentification and Immediate Amplification), the first low-cost simple hearing screener that is used in health care settings by non-audiologists. LiDIA helps clinicians to identify individuals with impactful hearing loss and provides sound amplification in real time to support access to health care communications.

Palmer's group also launched the website CLEARdashboard, which is a free resource that helps individuals to navigate the numerous devices that have come onto the market since the U.S. Food and Drug Administration approved over-the-counter hearing aids for individuals with mild to moderate hearing loss in 2022.

Palmer also takes her work where the patients are: in the community. She develops educational materials to support community health workers who can guide patients toward hearing and vision care and, together with colleague **Elaine Mormer**, also a professor in the School of Health and Rehabilitation Sciences, collaborates with them to develop smart and practical strategies. And with the advent of a mobile clinic called the Communication Van, Palmer's team can reach even more patients.

"We want to give our colleagues and patients the tools they need to be evangelists for hearing care," she explains. "In this way, we can actualize our goal of making communication a human right." ■

Catherine Palmer

USING BLOOD BIOMARKERS FOR INNOVATIVE ALZHEIMER'S DISEASE DIAGNOSIS

Thomas Karikari

If there is Alzheimer's pathology in the brain, could there be markers of it in the blood before cognitive symptoms appear?

Thomas Karikari, assistant professor of psychiatry in the School of Medicine, has dedicated his research career to finding an easier way to test for Alzheimer's disease by finding biomarkers in the blood. The most widely used tests for Alzheimer's disease are invasive, expensive and approved for use only after symptoms emerge. This means the brain is already damaged and there are only so many treatments that can help.

While other experts in the field said that blood could not reveal neurodegenerative pathology, Karikari hypothesized that it might show more than people thought. His team and collaborators reviewed autopsy reports and clinical information and performed molecular studies of human brain tissue and their matched blood samples obtained during life to identify any potential connections. They found that specific forms of tau protein could be detected in blood plasma nearly a decade before it would show up on a PET scan.

By capturing information in the blood before symptoms emerge, these blood biomarkers allow physicians to track disease progression for those at risk for Alzheimer's. But not everyone who has biomarkers will develop symptoms. While Karikari and his team hope to use those special cases to identify why some people develop Alzheimer's and others do not, it opens the door to some ethical dilemmas.

"The question becomes: Should we tell someone they have biomarkers evidence of Alzheimer's?" says Karikari. "Many people with altered biomarker levels will never develop symptoms, but those who do could benefit from earlier treatment interventions."

To handle this dilemma, Karikari aims to develop a predictive model that correlates biomarker changes with cognitive assessments to best identify who will need treatment most. As he works toward this goal, Karikari emphasizes the need for testing and treatment to be accessible to the masses.

"The beauty of blood biomarker testing is that it can be implemented nearly anywhere," he says. "Once we figure out the logistics of the lab testing, this testing could make a huge difference for communities without traditional access to health care, who often need it the most." ■

> "Once we figure out the logistics of the lab testing, this testing could make a huge difference for communities without traditional access to health care, who often need it the most."
>
> —Thomas Karikari

HELPING PATIENTS ADHERE TO THEIR ANTICANCER MEDICATIONS

Oral medications are increasingly used to treat cancer, providing a convenient alternative to intravenous treatments. Though taking pills at home may seem easier than receiving chemotherapy in a hospital or clinic, some patients have difficulty adhering to their anticancer medication regimen.

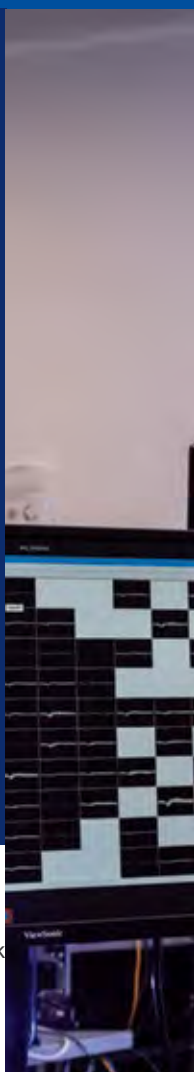
"Patients understand how important these medications are and want to take them," says **Sarah Belcher**, assistant professor in the School of Nursing, "but there are many reasons why a patient may not adhere. They might forget to take them regularly, experience burdensome side effects or experience barriers to accessing them."

Belcher received a $3.1 million grant from the National Institutes of Health to study patterns, predictors and outcomes of oral anticancer medication adherence to inform targeted interventions to identify patients at risk for nonadherence and support patients taking these therapies. If clinicians can identify patients who are at risk for nonadherence, they can provide support for particular behaviors or trigger points before they become a problem.

"I've spent my entire career as an oncology nurse, and I think nurses have a very holistic lens through which we view our patients, their families and the health care system overall," says Belcher. "Cancer will touch everyone at some point, and the research we do helps to not only treat the disease more effectively but support the individuals going through it." ■

Lucas Berenbrok

OVER-THE-COUNTER CARE FOUND AT PHARMACIES



> "People look to pharmacies as a place where they can get health care and wellness support."
>
> —Lucas Berenbrok

Though many Americans face difficulties accessing certain health care providers, almost everyone can easily get to a pharmacy. **Lucas Berenbrok**, associate professor in the School of Pharmacy, focuses on how pharmacies can be entry points or delivery centers for certain aspects of health care.

A common talking point in the pharmacy field is that 90% of Americans live within five miles of a pharmacy, but it was difficult to determine where the statistic came from. Berenbrok worked with colleagues in the Department of Geology and Environmental Science to map the approximately 62,000 pharmacies in the United States to confirm that talking point.

"Pharmacies are in every neighborhood, and they're open on nights, weekends [and] holidays, when some other health care providers might not be open," says Berenbrok. "People look to pharmacies as a place where they can get health care and wellness support."

But with pharmacies rapidly closing across the country, Berenbrok's work is becoming even more relevant. Areas without a pharmacy, known as pharmacy deserts, are typically in medically underserved areas, and more pharmacies closing could lead to even larger health disparities. In a paper published in the Journal of the American Medical Association in March 2025, Berenbrok and his colleagues found that 17.7% of Americans live in pharmacy deserts and an additional 8.9% rely on a single pharmacy for access. This means that a single pharmacy closure could have a lasting impact on a community's health.

"We've applied our map to a variety of over-the-counter health care needs you can access at pharmacies," says Berenbrok. "We are able to show that when things are available at a community pharmacy, people can access them more easily than if they are only available at other health care facilities." ■

From left: Jennifer Collinger, Robert Gaunt

ADVANCING TOUCH SENSATION IN PROSTHETIC LIMBS

Imagine being able to feel the texture of a cat's fur or the smoothness of a key, even if you can't physically touch them. This could be a reality for some patients with prosthetic limbs, thanks to the innovative work of **Robert Gaunt** and **Jennifer Collinger** associate professor and professor, respectively, in the School of Medicine. Together they are designing, building, implementing and refining brain-computer interface devices and robotic prosthetic arms that could restore both movement control and a sense of touch in people who have lost significant limb function.

Gaunt and Collinger, faculty in the Rehab Neural Engineering Labs, along with their colleagues, have demonstrated that they can recreate realistic tactile feedback for prosthetic limbs. Their studies document how tiny electrode arrays placed in the brain enable participants to move robotic arms and experience specific touch sensations when viewing photos of different objects on a tablet—an apple, a piece of toast, a towel, a cat or a key. The images evoked touch sensations that were stable, in the correct location and strong enough to be useful for everyday tasks. In addition, they showed that if they activate the electrodes in certain orchestrated patterns, the participants could "feel" the boundaries of an object or the motion of something sliding against their skin.

These breakthroughs, recently published in the high-profile journals Science and Nature Communications, are paving the way for a new era in neuroprosthetics. But the researchers say that these studies are not just about advancing technology, they're about improving lives. For individuals with prosthetic limbs, Collinger and Gaunt's research offers hope and a glimpse into regaining independence and confidence. ■

Or Shemesh

A CONNECTION BETWEEN HERPESVIRUS AND ALZHEIMER'S DISEASE

Or Shemesh, assistant professor of ophthalmology in the School of Medicine, leads a research group that is uncovering critical links between herpes simplex virus type 1 (HSV-1) and Alzheimer's disease. Using a novel method called expansion microscopy, Shemesh has directly demonstrated that HSV-1 is more frequently expressed in the brains of individuals with Alzheimer's, especially in regions affected by disease progression.

The team found that HSV-1 often colocalizes with tau, a key protein involved in Alzheimer's pathology. Conventionally considered toxic, tau is reframed in this work as part of the brain's innate immune response.

"Tau may initially act to defend neurons from viral infections," says Shemesh, "but its persistent activation could ultimately lead to the pathology we associate with Alzheimer's."

Shemesh's research not only broadens the understanding of Alzheimer's etiology but also opens a new avenue for therapeutic development, targeting the root causes of neurodegeneration through infection biology and immune modulation.

"These findings challenge the existing paradigm of Alzheimer's disease pathology and open the door to new targets for therapeutic development," says Shemesh. "If we can figure out what causes Alzheimer's, we could prevent millions of people from getting this debilitating disease." ■

Hansruedi Mathys

UNVEILING RESILIENCE THROUGH BRAIN MAPPING

Normally, if a person has Alzheimer's disease pathology in their brain, it would be reflected in impaired cognition. But there is a small subset of "resilient" individuals with Alzheimer's pathology who never showed any symptoms of the disease while they were alive. **Hansruedi Mathys**, assistant professor of neurobiology in the School of Medicine, is mapping the brain to determine what distinguishes these resilient individuals from those who are not resilient.

To accomplish this goal, Mathys used a method known as single-cell transcriptomic analysis, examining RNA in individual cell nuclei. Previously, the standard method took an average of all cells in a frozen brain tissue sample, which did not allow researchers to differentiate between cell types.

"If we combine all cell types and look at the average, we have to infer what genes are expressed. The average may not reflect the reality of what happens in any one cell," Mathys says. "But if you can measure the gene expression in individual cells, you get much more powerful, granular information."

Mathys and a team from the Massachusetts Institute of Technology used this single-cell analysis to create an atlas as a tool for gene and molecular discovery. They analyzed the transcriptomes of individual cells across six different brain regions, focusing on pathways affecting brain health.

"I am extremely interested in understanding the phenomenon of cognitive resilience, where, despite the characteristic signs of Alzheimer's tissue pathology, individuals display no cognitive impairment," Mathys says. "Our recent findings have made me more hopeful than ever that it might be possible to therapeutically induce such resilience in people who would otherwise be susceptible to memory loss." ■

> "Our recent findings have made me more hopeful than ever that it might be possible to therapeutically induce such resilience in people who would otherwise be susceptible to memory loss."
>
> —**Hansruedi Mathys**

COMMUNITY-BASED RESEARCH FOR HEALTHY AGING

Everyone deserves to age with dignity, but it takes more than being medically healthy to live a long and fulfilling life.

Elizabeth Mulvaney, clinical assistant professor, and **Quinton Cotton**, assistant professor—both in the School of Social Work—are looking at social factors that contribute to people's ability to live out their later years in a meaningful way. From social connection to nutrition to workforce development, everyone has different needs. Knowing how to address those needs makes social workers uniquely qualified to help.

"We use knowledge from our field to help communities determine their best solution," says Mulvaney. "Just because something worked in one community does not mean it will work everywhere. Having that conversation is how we bring research and understanding about aging into these spaces."

But this work cannot be done in a silo. Partnering with Age-Friendly Greater Pittsburgh and other community organizations, Mulvaney and Cotton use their social work expertise to enhance community-led initiatives to benefit as many people as possible.

"Reviewing grants from community partners may not seem like much," says Cotton, "but we can use our knowledge in research and of social issues to assist neighborhood groups to strengthen funding applications. We help bring in needed resources, and it creates a ripple effect throughout the community, with positive outcomes extending far beyond the initial project."

Once a community project gets funded, the research team also helps to implement it and ensures that it's accessible to all ages. The older population in Allegheny County, Pennsylvania, is growing fast, and this new demographic is an opportunity for better community engagement if institutions invest in it through both the community and research lens.

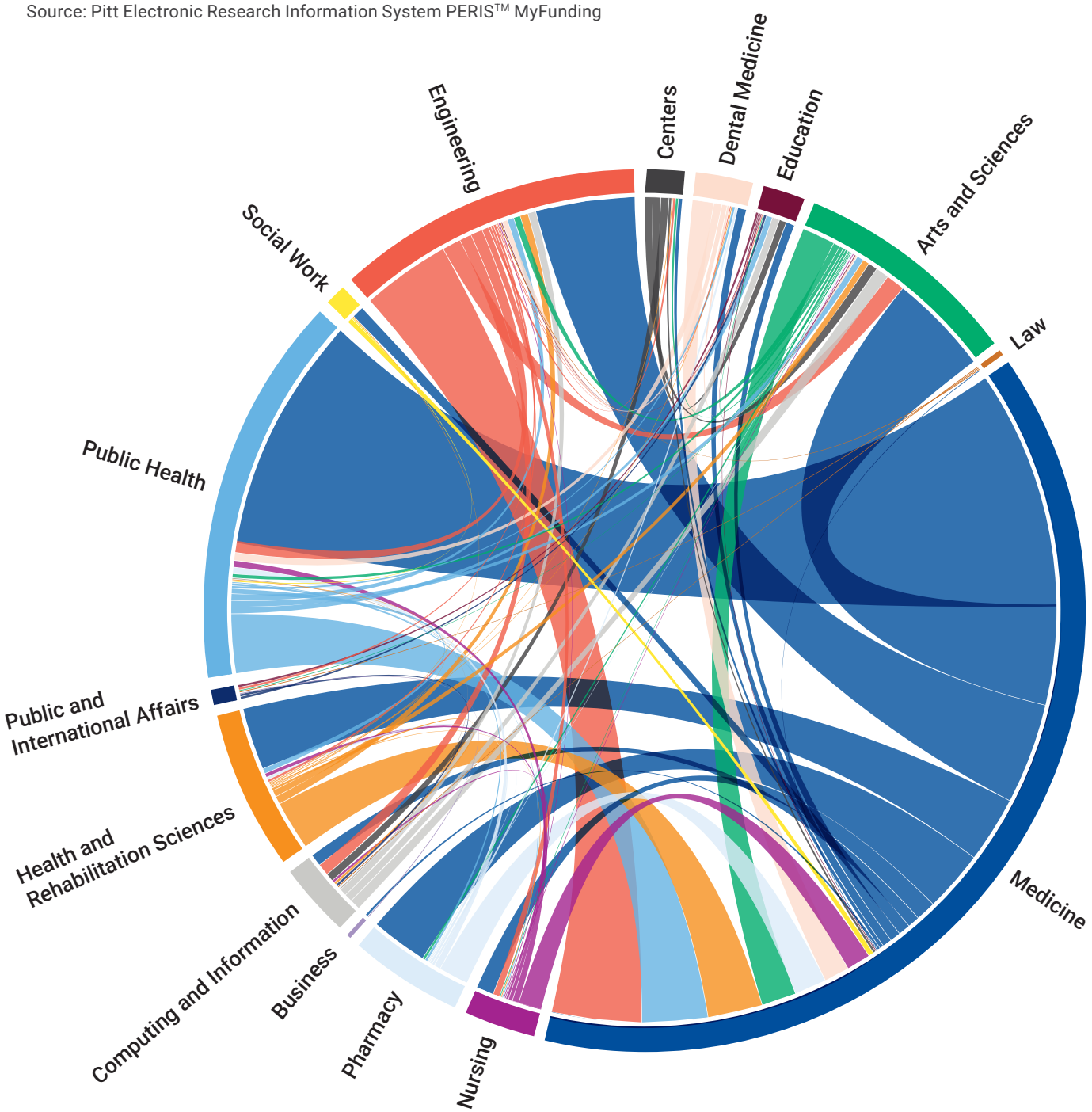
"While people may not see the work that goes on behind the scenes, research is at the core of every step," says Cotton. "Our role as social work researchers is to make sure knowledge is translated into real change. We carry a responsibility to ensure that research as a whole makes people's lives better."

Additional Pitt collaborators on this project are: Fengyan Tang, Kyaien Conner, Rafael Engel, Daniel Rosen, Mary Elizabeth Rauktis, Daniel Hyung Jik Lee, Amy DeGurian and Kelsey Ott-Sudik. ■

FORMING STRONG COLLABORATIONS ALL AROUND CAMPUS

This chord chart illustrates the patterns of cross-school collaboration in research proposal submissions at Pitt during FY 2025. Ribbons connect schools whose researchers have partnered on proposals, and their widths indicate the volume of these joint submissions. Increasing collaboration across academic units is essential to advancing interdisciplinary research and driving the University's research growth and impact.

Source: Pitt Electronic Research Information System PERIS™ MyFunding



PITT EXPLORES THE SPACE FRONTIER

SPACE RESEARCH
GAINS NEW VISIBILITY AT PITT

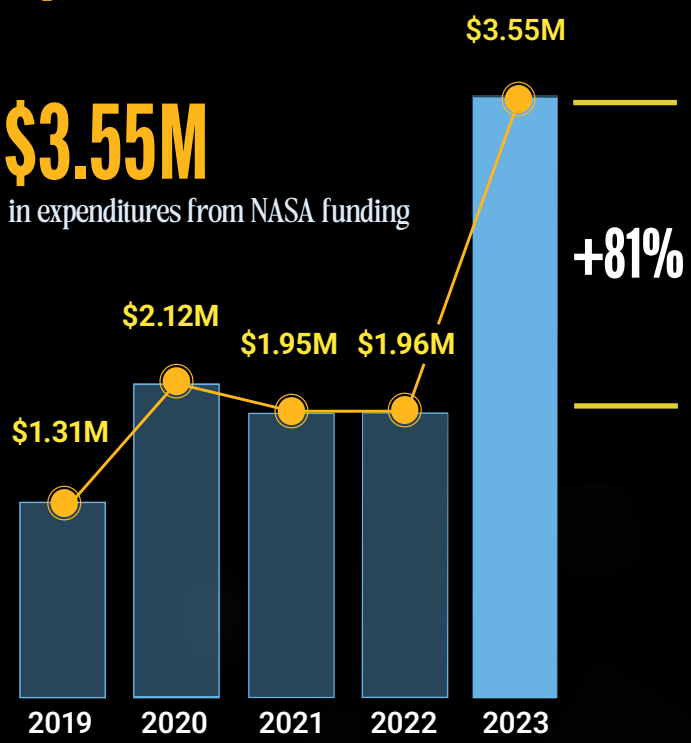
Pitt Space aims to address the critical needs of the U.S. space community in terms of both basic and applied research. The initiative is made up of three core areas: engineering, biomedicine and science.

Space engineering includes researchers who create and operate advanced spacecraft systems and applications for on-board sensing, processing, storage and communications while simultaneously maximizing reliability and performance.

Space biomedicine revolves around the design and development of technologies to support astronaut health in addition to leveraging the space environment to produce biomedical technologies for terrestrial use.

Space science researchers combine cutting-edge theoretical, computational and observational techniques with instrument and mission development to better understand the properties and evolution of the universe.

$3.55M
in expenditures from NASA funding



Source: National Center for Science and Engineering Statistics. Higher Education Research and Development Survey (HERD) FY 2023.

REGENERATIVE MEDICINE ON A MISSION


Giuseppe Intini

When trying to solve problems of bone-related disorders and injuries observed in clinics, **Giuseppe Intini** doesn't just take the research to the lab—he takes it to space.

A periodontist and an associate professor of periodontics and preventive dentistry in the School of Dental Medicine, Intini examines the functions of skeletal stem cells, which are crucial for bone growth and repair. Specifically, his team explores the potential of skeletal stem cells to advance therapies in areas like bone regeneration; craniofacial malformations; periodontal regeneration; and osteosarcoma, a type of bone cancer.

Three years ago, Intini and his team launched their research into space from Cape Canaveral, Florida, as part of a NASA/Center for the Advancement of Science in Space-sponsored SpaceX mission to the International Space Station.

Astronauts experience bone density loss and subsequent bone fragility due to microgravity, similar to osteoporosis on Earth, suggesting that skeletal stem cells behave differently when not under the influence of gravity.

"The idea is to look at bone loss and regeneration under microgravity," Intini explains. "That research can help astronauts, and it can help people here on the ground, too."

Back on Earth, Intini's research continues. He recently was awarded a National Institute of Dental and Craniofacial Research grant to study periodontal stem cells and regeneration, and his lab is exploring the spatial transcriptomics of human osteosarcoma tissue to understand gene expression patterns in the disease. Intini collaborates regularly with clinicians at the UPMC Hillman Cancer Center and with scientists and engineers in the Pitt Space initiative. He credits these partnerships for his success.

"We work together. We do things together," he says. "That's the Pitt difference." ■

Kate Flickinger

METABOLIC MANIPULATION FOR LONG DURATION SPACE FLIGHT

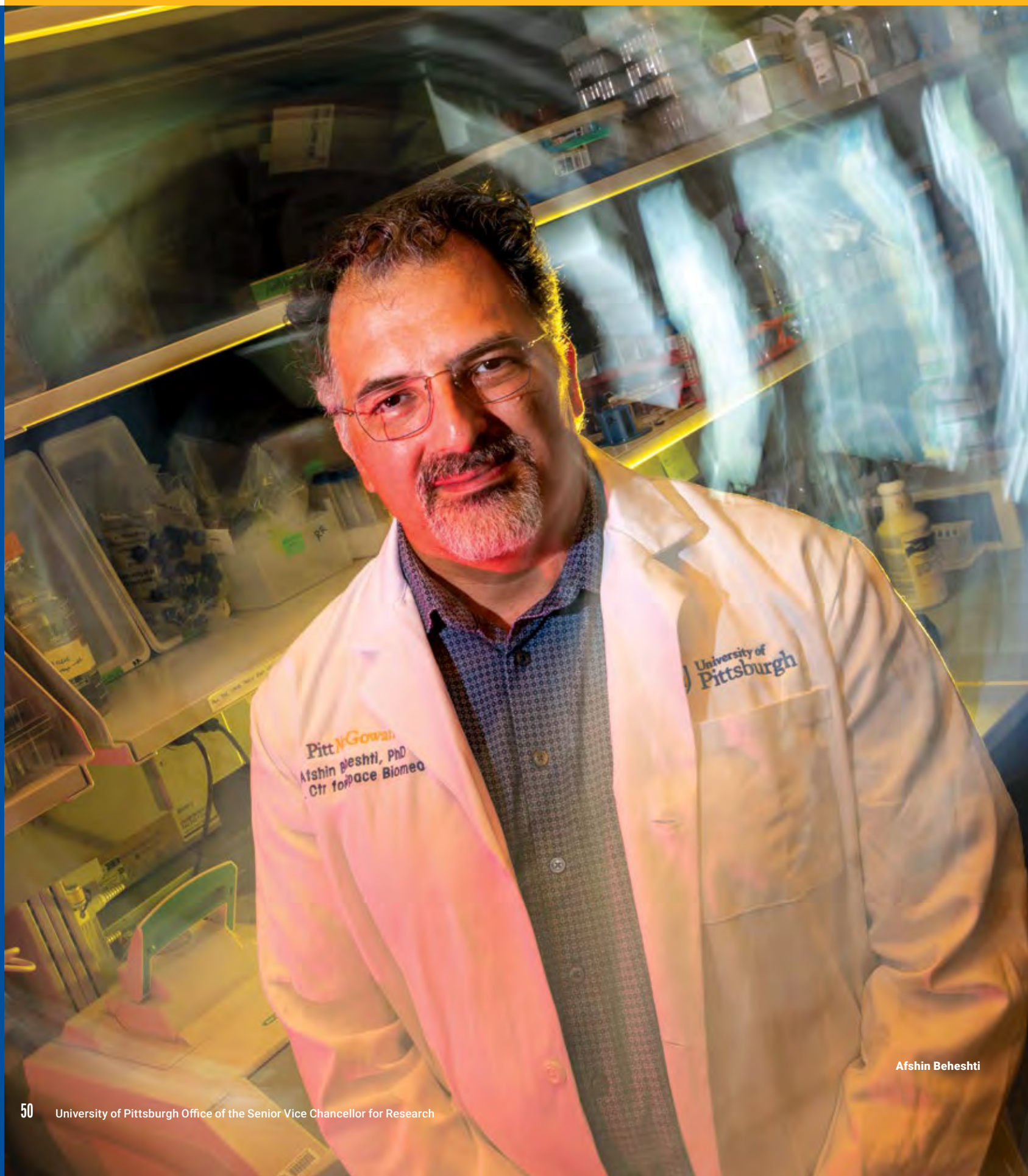
Inducing hibernation or hibernation-like traits in astronauts to reduce the burden of space on their bodies seems like science fiction, but it might be closer to reality than you think.

Kate Flickinger, principal physiologist in the Applied Physiology Laboratory in the School of Medicine, is studying the effects of metabolic rate reduction by lowering body temperature to induce a hibernation-like state in humans.

A primary reason to induce this state for long-duration spaceflight is that it reduces oxygen consumption and carbon dioxide production for each passenger. Flickinger's team found that for every degree the core temperature decreases (from 37 to 33 degrees Celsius), there is approximately a 5% reduction in metabolic rate.

This protocol would have more benefits than just lowering oxygen consumption. By sleeping for a portion of their travel time, astronauts could avoid many of the psychological and physiological effects traditionally experienced during long-duration spaceflight, particularly related to musculoskeletal health. But this work has tremendous implications for those on Earth, too.

"All space research has a direct impact on life on Earth," says Flickinger. "This protocol could be applied to patients recovering in the ICU and emergency medicine practices in remote areas. My goal is for this work to benefit as many people as possible, both in space and on Earth." ■



Afshin Beheshti

ADDRESSING THE HEALTH EFFECTS OF SPACEFLIGHT

As more people venture into space, it has become imperative to address the health effects of spaceflight. **Afshin Beheshti**, professor of surgery and of computational and systems biology in the School of Medicine, focuses on how radiation and microgravity damage the human body.

Humans have evolved over millions of years to optimize themselves for Earth's gravitational force. Once someone is no longer subjected to that force, major health issues arise. In addition to gravitational effects on the body, space also subjects astronauts to high levels of radiation. Background radiation in space is five to 10 times more damaging to the body because it is always present and happens over time.

"It's not just bone loss and muscle degeneration," says Beheshti. "Exposure to microgravity and radiation causes downstream health effects, from cardiovascular to neurological issues. And the longer an astronaut is in space, the worse it gets."

To combat these issues, Beheshti focuses on mitochondria—the parts of the cell that produce about 90% of the energy required by the body to function. The number and function of mitochondria decrease as you age, which is why diseases like cancer and cardiovascular disease are more common later in life. By testing different supplements and medications that target mitochondria, there is potential to mitigate the damage on the body from both spaceflight and mitochondria-related conditions on Earth.

"We're seeing that mitochondrial damage from space travel is extremely similar to mitochondrial damage in things like cancer and post-acute fatigue syndrome," says Beheshti. "With millions of people around the world experiencing diseases like this, any treatment we test for mitigating damage in space could directly impact those people on Earth."

Because space is an accelerated model for aging and various diseases, what would take years to study on Earth in a lab could potentially happen in a matter of weeks in space.

"Some people ask why we put all this effort into space when very few people ever go there," says Beheshti. "Not only is it fun to work on, but anything you do in space can easily translate to Earth. From portable dental x-rays to handheld Bluetooth devices to potential treatments for ALS, space research affects more people on Earth than could ever actually travel to space." ■

REGIONAL CAMPUSES

PITT'S REGIONAL CAMPUSES in Bradford, Greensburg, Johnstown and Titusville offer the advantages and environment of liberal arts colleges along with the resources and prestige of a major research university.

University of Pittsburgh at Bradford

In partnership with the School of Health and Rehabilitation Sciences, Pitt-Bradford has launched a new four-year emergency medicine degree. Training more health professionals at a rural university encourages those students to return to the area to practice, an especially important goal considering that 26% of Pennsylvania's rural population lives in federally designated Health Professional Shortage Areas, according to the Pennsylvania Office of Rural Health.

University of Pittsburgh at Greensburg

While other Pennsylvania education programs have experienced a steady decline in enrollment, **Melissa Marks**, director of the Education Program at Pitt-Greensburg, has overseen generations of unprecedented growth. In her 22 years at Pitt-Greensburg, the program has ballooned from a few dozen students to more than 160—significant on a campus of 1,500. She's also created a steady college-to-classroom pipeline that helps to keep Pitt-Greensburg graduates in the area, teaching local kids.

University of Pittsburgh at Johnstown

Pitt-Johnstown has retained its designation as a certified Audubon Cooperative Sanctuary, an Audubon International program. By participating in the Audubon Cooperative Sanctuary Program, Pitt-Johnstown has been involved in projects that enhance habitats for wildlife and preserve natural resources for the benefit of the local community, including conserving energy and reducing waste, using integrated pest management techniques, naturalizing areas and managing resources in an environmentally responsible manner.

University of Pittsburgh at Titusville

Nearly 25 million Americans live in areas where there are not enough dentists to serve the needs of the population. In an effort to combat this shortage, the School of Dental Medicine, the Education & Training Center at Pitt-Titusville and Titusville Area Hospital have partnered to establish the state's first regional training center to offer dental training and care in rural Pennsylvania communities.

Regional Catalyst Grants

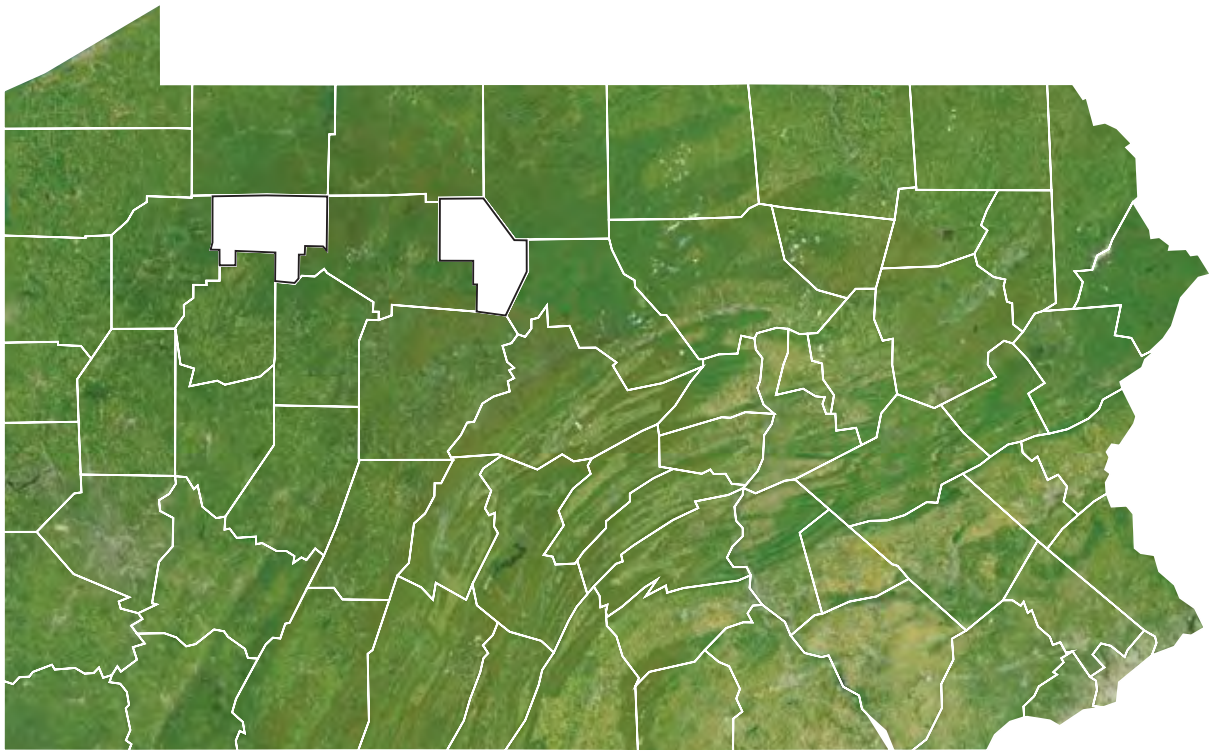
In 2025, the Office of the Senior Vice Chancellor for Research began offering Regional Catalyst Grants as part of the Pitt Momentum Funds initiative. Regional Catalyst Grants aim to strengthen the regional campuses' research ecosystems by supporting high-quality research, scholarship and creative endeavors by their faculty.

PITT RESEARCH IMPACT ON THE STATE

$54.7 M
SPENT IN PENNSYLVANIA

$10.9 M
SPENT IN SMALL BUSINESSES IN PENNSYLVANIA

$31.9 M
SPENT IN BUSINESSES IN ALLEGHENY COUNTY



This map highlights the economic reach of Pitt's research enterprise across Pennsylvania in fiscal year 2025. Each highlighted county represents vendors that benefited from Pitt's research spending, demonstrating how research activity supports local economies statewide. Pitt research spending in Pennsylvania totaled **$54.7 million**, of which **$10.9 million supported small businesses**. Allegheny County accounted for the largest share, with **$31.9 million** in expenditures.

Source: Office of the Chief Financial Officer

UNITED NATIONS

The School of Medicine's **Rory Cooper** was invited by the United Nations to speak at their AI for Good Global Summit in Geneva, Switzerland. The esteemed Pitt innovator discussed how artificial intelligence (AI) is being deployed to fuel collaboration and improve the lives of people with disabilities, along with the challenges and ethical considerations of using AI in rehabilitation engineering. Cooper's talk highlighted several pieces of technology developed in the Human Engineering Research Laboratories (HERL), a joint venture between Pitt and the U.S. Department of Veterans Affairs. Cooper is the founding director and VA Senior Research Career Scientist at HERL and serves as Pitt's assistant vice chancellor for research for STEM-health sciences collaborations. ■

FACULTY NAMED FULBRIGHT SCHOLARS

Three University of Pittsburgh faculty members received Fulbright U.S. Scholar Program Awards from the U.S. Department of State and the Fulbright Foreign Scholarship Board.

Jennifer Brick Murtazashvili, professor in the School of Public and International Affairs and founding director of the Center for Governance and Markets, will serve as a distinguished scholar at Tel Aviv University in Israel, where she will study how formal agreements and informal networks shape regional cooperation in the Middle East, Central Eurasia and Eastern Europe.

Guillermo Calero Velazquez, associate professor in the School of Medicine's Department of Structural Biology, will collaborate with scientists in Granada, Spain, on identifying small drug fragments that can inhibit the RAS oncogene, a protein involved in nearly 30% of human cancers. Using advanced X-ray crystallography, he creates detailed "molecular movies" of RAS's activity cycle to help prevent uncontrolled cell growth.

Aleksandar Stevanovic, associate professor in the Swanson School of Engineering's Department of Civil and Environmental Engineering, will travel to Podgorica, Montenegro, to assist the city's government and local university in designing and implementing an adaptive traffic signal control system. His project combines research, collaboration and teaching to optimize the system and train local professionals for its long-term maintenance.

NSF CAREER AWARDS

Four Pitt faculty members earned a National Science Foundation (NSF) Faculty Early Career Development (CAREER) Award, one of the foundation's most prestigious in support of early career faculty. Winners not only serve as principal investigator on a project but also integrate an education aspect into their research. NSF selects recipients who are role models and can lead advances in their department and institutions.

Jessica Anna
Professor, Department of Chemistry,
Kenneth P. Dietrich School of Arts and Sciences

Na Du
Assistant Professor, Department of Informatics and Networked Systems, School of Computing and Information

Chengcheng Huang
Assistant Professor, Departments of Neuroscience and Mathematics, Kenneth P. Dietrich School of Arts and Sciences

Natasa Miskov-Zivanov
Associate Professor, Department of Electrical and Computer Engineering, Swanson School of Engineering

NATIONAL ACADEMY OF INVENTORS

Yuan Liu, assistant professor of pulmonary, allergy and critical care medicine in the School of Medicine, and **Juan Taboas**, associate professor of oral and craniofacial sciences in the School of Dental Medicine, have been elected senior members of the National Academy of Inventors (NAI). NAI senior members have shown success in commercialization activities as well as exceptional creativity in developing technologies that benefit society.

ASA DISTINGUISHED EARLY CAREER AWARD

Fernando Tormos-Aponte, assistant professor of sociology in the Kenneth P. Dietrich School of Arts and Sciences, won the Distinguished Early Career Award for Contributions to Social Movements Scholarship from the American Sociological Association (ASA). He was honored by ASA's Collective Behavior and Social Movements section, which focuses on the study of emergent social forms and behaviors, including crowds, social movements, disasters, riots and fads.

NATIONAL ACADEMY OF ENGINEERING

Fang Peng, RK Mellon Endowed Chair Professor of Electrical and Computer Engineering in the Swanson School of Engineering and director of the Energy GRID Institute, was elected to the National Academy of Engineering. He was recognized for "contributions to the development of high-power electronics technologies for advanced power grid control and energy conversion."

UNIVERSITY AWARDS AND HONORS

CHANCELLOR'S DISTINGUISHED RESEARCH AWARD

The Chancellor's Distinguished Research Awards annually recognize outstanding scholarly accomplishments by members of the University of Pittsburgh faculty. The following are the 2025 recipients.

SENIOR SCHOLAR AWARDEES

Piotr Hajłasz, professor of mathematics in the Kenneth P. Dietrich School of Arts and Sciences, was honored for his groundbreaking contributions to mathematics, including work on Sobolev (now Hajłasz-Sobolev) spaces, which have become fundamental in the analysis of metric geometry. Hajłasz's peers praised his ability to "bridge abstract theoretical concepts with practical applicability" and described him as an inspiring mentor and a leader in mathematical analysis and geometric function theory.

Michael Madison, professor and John E. Murray Faculty Scholar in the School of Law, was recognized for the establishment of a framework for governing knowledge commons, work that has had a global impact on the field. Madison's peers described him as "a preeminent scholar of knowledge commons," an "interdisciplinary community builder" and a "visionary thinker" whose work has been highly influential in the field of intellectual property.

Rebecca Thurston, Pittsburgh Foundation Chair in Women's Health and Dementia and professor in the Schools of Medicine and Public Health, was recognized for her research's profound impact on public discourse and policy, transforming the understanding of menopause as a critical life stage affecting cardiovascular and brain health. Her peers described her as "among the most exceptional scholars in women's health research" and "an international leader."

JUNIOR SCHOLAR AWARDEES

Rachel Bezanson, associate professor of physics and astronomy in the Kenneth P. Dietrich School of Arts and Sciences, was honored for her innovative research, work to improve the excellence of the field of astronomy and strong leadership of multiple successful collaborations for observational research programs on the James Webb Space Telescope. Her peers described her as "one of the most promising young researchers in galaxy evolution" who is leading "one of the most critical extragalactic surveys in astronomy."

Nev Jones, associate professor in the School of Social Work, was recognized for her past leadership of the Lived Experience Research Network and interdisciplinary research focused on changes in mental health policy and care delivery. Her peers called her work "paradigm shifting" and described her as "a highly regarded researcher and thought leader" who brings "creativity and intellectual rigor to research."

Thomas Karikari, assistant professor of psychiatry in the School of Medicine, was recognized for his substantial contributions to research on Alzheimer's disease and neurodegeneration. His peers described him as a "world authority on blood-based biomarkers of Alzheimer's disease" and a "uniquely talented leader and innovator."

PROVOST'S AWARD FOR EXCELLENCE IN DOCTORAL MENTORING

The Provost's Award for Excellence in Doctoral Mentoring recognizes outstanding mentors who substantially impact students seeking research doctoral degrees. Each year, the provost's office presents up to four awards, which include a $2,500 prize, to graduate faculty members responsible for training the next generation of researchers. The prize is in its 20th year.

This year's awardees were as follows:

Heidi Donovan, professor, School of Nursing and School of Medicine

Burcu Savun, professor, Department of Political Science, Kenneth P. Dietrich School of Arts and Sciences

Vanitha Swaminathan, associate dean for research and strategic initiatives and Thomas Marshall Professor of Marketing, School of Business

David Vorp, senior associate dean for research and facilities and John A. Swanson Professor of Bioengineering, Swanson School of Engineering

HONORIFIC AWARDS

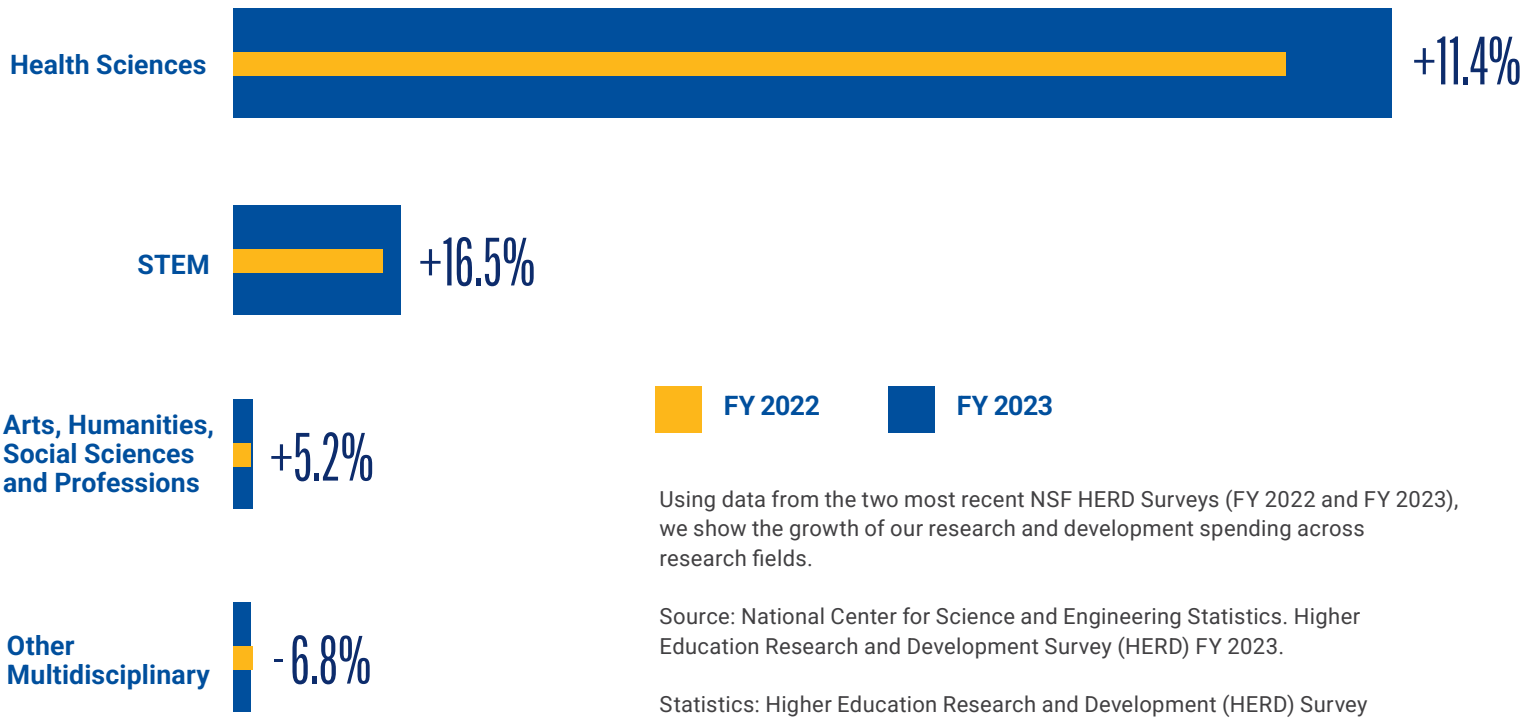
256 AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE FELLOWS	**59** NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE MEMBERS
28 AMERICAN ACADEMY OF ARTS & SCIENCES MEMBERS	**16** NATIONAL ACADEMY OF INVENTORS FELLOWS
234 FULBRIGHT GRANTEES	**9** NATIONAL BOOK AWARD FINALISTS/WINNERS
46 GUGGENHEIM FELLOWS	**118** NATIONAL SCIENCE FOUNDATION CAREER AWARDS
2 MACARTHUR FELLOWS	**3** PRESIDENTIAL NATIONAL MEDALS OF SCIENCE/TECHNOLOGY AND INNOVATION
39 SLOAN FELLOWS	

Honorific recognitions awarded to Pitt individuals throughout the history of the University.

This list includes all awards announced before the date of publication. Fulbright grantees count includes only faculty members and professors.

Source: Official websites of awarding organizations

NSF HERD EXPENDITURES BY RESEARCH FIELD 2022 VS 2023



Using data from the two most recent NSF HERD Surveys (FY 2022 and FY 2023), we show the growth of our research and development spending across research fields.

Source: National Center for Science and Engineering Statistics. Higher Education Research and Development Survey (HERD) FY 2023.

Statistics: Higher Education Research and Development (HERD) Survey

SELECT PITT ACADEMIC RANKINGS

SCHOOL	RANKING ORGANIZATION	RANKING TYPE	FIELD	YEAR	RANK
Kenneth P. Dietrich School of Arts and Sciences	Quacquarelli Symonds (QS)	World University Rankings by Subject - National	Philosophy	2025	3
School of Public and International Affairs	U.S. News & World Report	Best Graduate Professional Schools	International Global Policy and Administration	2024	6
Joseph M. Katz Graduate School of Business	U.S. News & World Report	Best Graduate Professional Schools	Part-time MBA	2025	36
School of Computing and Information	QS	World University Rankings by Subject - National	Library and Information Management	2025	13
School of Dental Medicine	University Ranking by Academic Performance (URAP)	Field Ranking	Dentistry	2024-25	27
School of Education	U.S. News & World Report	Best Graduate Schools	Educational Psychology	2025	23
School of Health and Rehabilitation Sciences	U.S. News & World Report	Best Graduate Professional Schools	Occupational Therapy	2025	3
School of Law	U.S. News & World Report	Best Graduate Professional Schools	Health Care Law	2025	34
School of Medicine	URAP Field Rankings	Field Ranking	Surgery	2024-25	4
School of Nursing	U.S. News & World Report	Best Graduate Professional Schools	Nursing Anesthesia	2025	2
School of Pharmacy	U.S. News & World Report	Best Graduate Professional Schools	Pharmacy	2024	9
School of Public Health	U.S. News & World Report	Best Graduate Schools	Public Health	2025	16
School of Social Work	U.S. News & World Report	Best Graduate Schools	Social Work	2024	12
Swanson School of Engineering	U.S. News & World Report	Best Graduate Schools	Industrial /Manufacturing / Systems Engineering	2025	24

Academic rankings by subject and field for schools across the University.
Not all fields are ranked every year, hence the latest available ranking has been included.

Source: Office of the Provost

INNOVATION BY THE NUMBERS

Pitt's innovation indicators for FY 2025

Source: Office of Innovation and Entrepreneurship (OIE)

NIH RANKINGS BY CATEGORY

Category	Rank	Category	Rank
Otolaryngology	2	Anesthesiology	6
Physical Medicine	2	Neurosciences	6
Psychiatry	2	Schools of Public Health	6
Anatomy/Cell Biology	3	Neurosurgery	8
Dermatology	3	Schools of Medicine	8
Microbiology	3	Surgery	8
Pharmacology	4	Internal Medicine	9
Opthalmology	5	Schools of Nursing	10

The University of Pittsburgh's rankings in various categories, as defined by the Blue Ridge Institute for Medical Research, are based on NIH funding data for federal FY 2024.

Source: Blue Ridge Institute for Medical Research (BRIMR)

SELECT FUNDING AGENCIES AND SPONSORS

GOVERNMENT AGENCIES

FEDERAL

- Administration for Community Living
- Advanced Research Projects Agency for Health (ARPA-H)
- Appalachian Regional Commission
- Centers for Disease Control and Prevention
- Defense Advanced Research Projects Agency (DARPA)
- Defense Health Agency
- National Institute of Food and Agriculture
- National Institutes of Health
  - National Cancer Institute
  - National Eye Institute
  - National Heart, Lung, and Blood Institute
  - National Institute of Allergy and Infectious Diseases
  - National Institute of Child Health and Human Development
  - National Institute of Mental Health
  - National Institute of Diabetes and Digestive and Kidney Diseases
  - National Institute of General Medical Sciences
  - National Institute of Neurological Disorders and Stroke
  - National Institute on Aging
- National Science Foundation
- Patient-Centered Outcomes Research Institute (PCORI)
- U.S. Army Medical Research Acquisition Activity (USAMRAA)
- U.S. Army Medical Research and Development Command
- U.S. Department of Education
- U.S. Department of Energy
- U.S. Department of Health and Human Services
- U.S. Department of Veterans Affairs

STATE

- Pennsylvania Commission on Crime and Delinquency
- Pennsylvania Department of Health
- Pennsylvania Department of Human Services (DHS)
- Commonwealth of Pennsylvania
- Pennsylvania Higher Education Assistance Agency

CITY AND COUNTY

- Allegheny County Department of Human Services
- Allegheny County Health Department
- Syracuse City School District
- Tuscarora Intermediate Unit 11
- York City School District

INDUSTRY COLLABORATORS

- Covestro
- Duquesne Light Company
- Eli Lilly and Company
- Genprex
- Leidos
- Lubrizol
- Malvern Panalytical
- Milsoft
- Pfizer
- Tanabe Pharma America
- Westinghouse

MAJOR INCOMING SUBAWARDS

- Carnegie Mellon University
- Stanford University
- University of Pennsylvania
- Vanderbilt University
- Wake Forest University
- Washington University in St. Louis

FOUNDATIONS

- Alfred P. Sloan Foundation
- Breast Cancer Research Foundation
- Gates Foundation
- Heinz Endowments
- Hewlett Foundation
- Richard King Mellon Foundation
- Simons Foundation
- The Pittsburgh Foundation
- William T. Grant Foundation
- Wings for Life Spinal Cord Research Foundation

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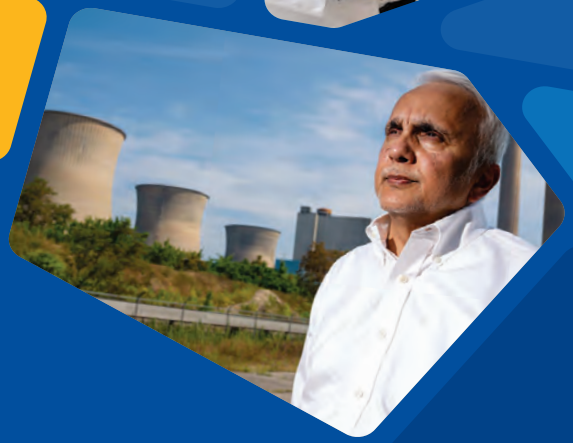

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