

**DRIVEN**

OFFICE OF THE SENIOR VICE CHANCELLOR FOR RESEARCH

EXPLORE INNOVATE  
INNOVATOR WONDER  
POSSIBILITIES **BY**  
CONNECTIONS DATA  
PURPOSE LEADER  
FORGE **THE** INSIGHT  
COLLABORATION  
DISCOVERER ACT  
THRIVE **SEARCH** >  
APPLICATION WORK



University of  
Pittsburgh®

2021-22 ANNUAL REPORT

Pitt Research Powered by Vision, Determination,  
Innovation, Collaboration

# \$1.07B

## Pitt Joins an Elite Group with More than \$1 Billion in Expenditures.

Pitt surpassed a landmark of \$1 billion in research expenditures, placing the University among an elite national cohort of research peers.

### Schools with more than \$1 billion in expenditures

| Higher Education Research and Development Expenditures  | Rank      |
|---|-----------|
| Johns Hopkins U.  | 1         |
| U. Michigan, Ann Arbor                                  | 2         |
| U. California, San Francisco                            | 3         |
| U. Pennsylvania   | 4         |
| U. Washington, Seattle                                  | 5         |
| U. California, San Diego                                | 6         |
| U. California, Los Angeles                              | 7         |
| U. Wisconsin-Madison                                    | 8         |
| Harvard U.  | 9         |
| Stanford U.   | 10        |
| Duke U.   | 11        |
| Cornell U.  | 12        |
| U. North Carolina, Chapel Hill                          | 13        |
| Texas A&M U., College Station and Health Science Center | 14        |
| <b>U. Pittsburgh</b>                                    | <b>15</b> |
| U. Maryland   | 16        |
| Yale U.   | 17        |
| U. Texas M. D. Anderson Cancer Center                   | 18        |
| Georgia Institute of Technology                         | 19        |
| U. Minnesota, Twin Cities                               | 20        |
| Columbia U., New York                                   | 21        |

Source: National Science Foundation Higher Education Research and Development (HERD) Survey, Fiscal Year 2020



The University of Pittsburgh was one of the first institutions to receive samples of the novel coronavirus from the Centers for Disease Control and Prevention to begin work on preventing spread of the virus.



**Rob A. Rutenbar**  
Senior Vice Chancellor for Research

**T**he University of Pittsburgh is home to a vast research enterprise. While the University's advances in health sciences are deservedly recognized around the world, a lot more research is happening at Pitt. Some of our work is well known. Some of our scholars and researchers are prominent in individual fields and some are creating new fields. Researchers at Pitt help to expand both the possibilities of our region's innovative and resilient economy and the limits of wonder—often at the same time.

Research in some vastly different fields of study may appear to have nothing in common. But one motivation drives all research: *curiosity*.



**Years before a biologist identifies viruses that combat bacterial infections, a student wonders at the organisms living in a soil sample.**



**Years before a historian develops an index of world geography, a student wonders where the Yellow River is in China.**



**Decades before an engineer creates a computer that can endure space travel, a student wonders why her computer gets hot.**

Curiosity leads to exploration. Now the student needs tools, techniques, guidance and a supportive environment. With hard work and some luck, exploration leads to insight—the who, what, where, why and how of the nature of life, the functioning of machines or the phenomena of the cosmos.

With more hard work, some luck and then still more hard work, insight can lead to discovery—finding what has never existed, realizing a new use for what exists, unearthing what has been overlooked. Research leads to application. It acts on the world, changes the world, creates new realities. With even more hard work, that initial curiosity can become a technique, a device, a medicine or a form of expression that leaves its mark on the world.

**Research may once have been portrayed as a lonely endeavor. It certainly is not. Collaboration and support are critical to any success.**

**The Office of the Senior Vice Chancellor for Research** works alongside our faculty, staff, students, business partners and supporters at every stage of the research process to consult on funding opportunities; unify computing resources; and constantly forge connections with entrepreneurs, investors and marketers who can bring discoveries into the lives of millions.

Our goal is to offer the structure, support and pathways to collaboration that help researchers—and their curiosity—to thrive.

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



[pittresearchannualreport.com](http://pittresearchannualreport.com)



[research.pitt.edu](http://research.pitt.edu)



[twitter.com/pittresearch](https://twitter.com/pittresearch)



[linkedin.com/company/pitt-research](https://linkedin.com/company/pitt-research)

# THE PLAN FOR PITT

## The University of Pittsburgh Has Never Stood Still

In 1787, six months before the adoption of the U.S. Constitution, Pennsylvania's state legislature chartered an academy of learning, the Pittsburgh Academy (later named the Western University of Pennsylvania, and, even later, the University of Pittsburgh). At the time, it was considered the first of its kind west of the Allegheny Mountains.

From its earliest years, the University attracted bright minds. Samuel P. Langley came to Pittsburgh in 1867 from the U.S. Naval Academy to serve as director of the Allegheny Observatory and a professor of astronomy at Pitt. By 1869, he had devised a system to regularly transmit the exact time to subscribers, a forerunner of standard time.

The subscriptions became a source of research funding, and his interest turned to flight. Today, Langley's Aerodrome Number 6, the second self-powered heavier-than-air flying machine, which flew more than 5,000 feet over the Potomac River in November 1896, remains aloft, displayed from the ceiling in the University's Wesley W. Posvar Hall.

When Langley left Pittsburgh for the Smithsonian Institution, he had his motto inscribed over the door of the Children's Room in the Smithsonian Institution Building: "Knowledge begins in wonder."

That sense of wonder continues to take flight daily at Pitt. The University's strategic plan—the Plan for Pitt—is guided by our people, programs and purpose. Woven through these three pillars, in many ways, is Langley's motto.

**Just like the students, researchers and scholars who walked these halls before us, we move from wonder to knowledge to discovery to solution.**

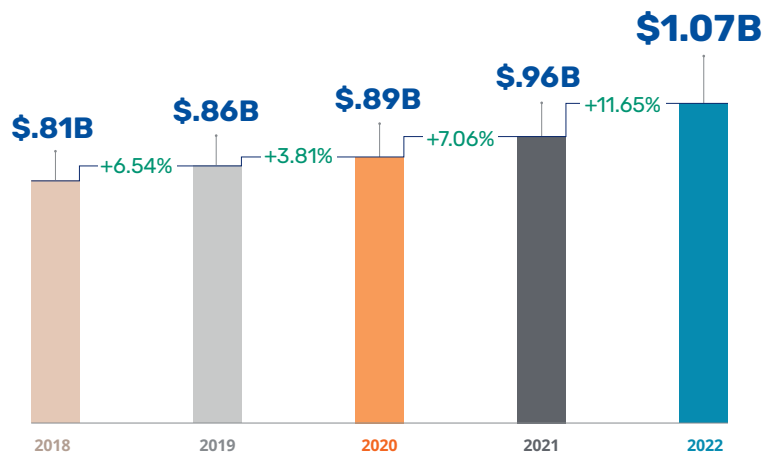


**To excel in our research programs, we purposefully direct ourselves to:**

- create more preeminent teaching, learning, scholarship and research experiences and
- increase our engagement in multidisciplinary, solution-sized research projects.

# EXPENDITURES DATA

## SPONSORED RESEARCH EXPENDITURES



### Pitt Researchers Pass \$1 Billion Mark in Expenditures

Over the past five years, sponsored project expenditures have consistently increased. In Fiscal Year 2022, Pitt surpassed a landmark of \$1 billion, putting Pitt in an elite national cohort of research peers. This achievement represents not the money awarded to researchers but the actual funds spent on research activities. Despite the disruptions to daily life and global supply chains caused by the COVID-19 pandemic, our researchers consistently achieved productivity.

Timeframe: FY18–FY22

Source: University of Pittsburgh Office of the Chief Financial Officer (CFO)

## SPONSORED RESEARCH DATA



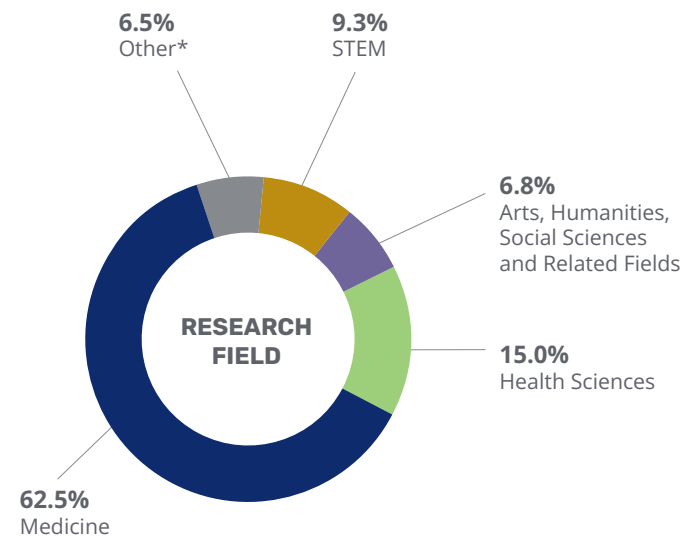
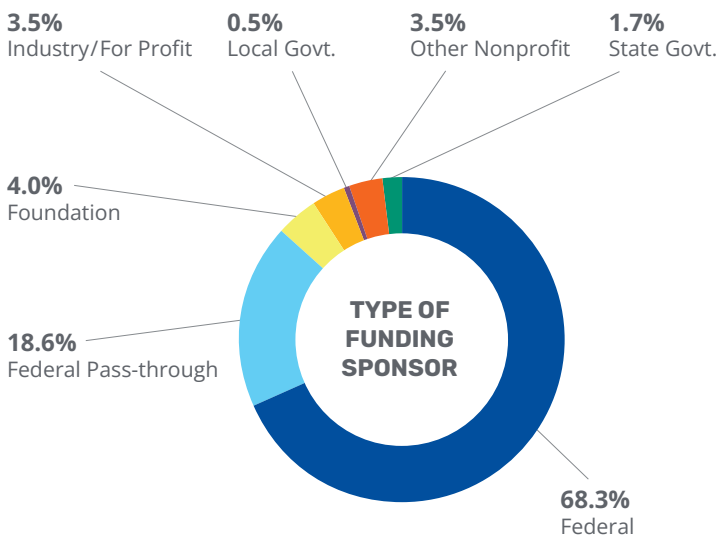
Timeframe: Fiscal Year 2021 and Fiscal Year 2022, except for Expenditures, which are only FY22

Sources: University of Pittsburgh Office of Sponsored Programs for proposals, awards and sponsors; Office of the CFO for expenditures data

## SPONSORED RESEARCH EXPENDITURES

Timeframe: Fiscal Year 2022

Source: Office of Sponsored Programs at the University of Pittsburgh



\*The "Other" category includes Pitt's regional campuses and administrative offices (e.g., Senior Vice Chancellor units, Chancellor, Student Affairs, etc.).

# Select Funding Agencies or Sponsors

## INDUSTRY PARTNERS

Bayer Corporation  
Covestro  
Gilead Sciences  
Janssen Research and Development  
Pfizer  
Semiconductor Research Corporation  
Stryker Corporation  
Wellcome Leap  
UPMC Enterprises

## GOVERNMENT AGENCIES

### U.S. Department of Defense

Defense Threat Reduction Agency  
National Security Agency  
Office of Naval Research  
U.S. Air Force  
U.S. Army Medical Research  
Acquisition Activity

### U.S. Department of Health and Human Services

Centers for Disease Control  
and Prevention

#### National Institutes of Health

National Institute on Aging  
National Cancer Institute  
National Institute of Allergy  
and Infectious Diseases  
National Heart, Lung,  
and Blood Institute

U.S. Food and Drug Administration

U.S. Department of Education

U.S. Department of Energy

U.S. Department of Labor

U.S. Department of Transportation

U.S. Department of Veterans Affairs

U.S. Geological Survey

U.S. Department of Agriculture

U.S. Nuclear Regulatory Commission

National Science Foundation

National Aeronautics and  
Space Administration  
National Endowment for  
the Humanities  
National Endowment for the Arts

Pennsylvania Department of Health  
Pennsylvania Department of  
Human Services

Allegheny County

European Commission  
International Olympic Committee  
United Nations Office for  
Project Services

## MAJOR INCOMING SUBAWARDS

Commonwealth of Pennsylvania  
Lawrence Livermore  
National Laboratory  
Oak Ridge National Laboratory  
Sandia National Laboratories  
Scripps Research Institute  
Smithsonian Astrophysical  
Observatory

## FOUNDATIONS

Aligning Science Across Parkinson's  
Breast Cancer Research Foundation  
The Michael J. Fox Foundation  
Bill & Melinda Gates Foundation  
The Heinz Endowments  
Hillman Family Foundations  
Robert Wood Johnson Foundation  
Richard King Mellon Foundation  
Gordon and Betty Moore Foundation  
The Pittsburgh Foundation  
Alfred P. Sloan Foundation  
John Templeton Foundation



## Rethinking

Powerhouse Influencers  
and We Are All the  
Wiser for It

“

The work  
begins in  
academia.

Research and  
education lead  
to innovative  
advancement.  
But to save the  
planet, it must  
fuel real-world  
solutions.

”

**Eric Beckman,**

Distinguished Service Professor,  
Swanson School of Engineering



# Pitt Responds to a Deadly Virus, Again

\$385M / 180

Pitt was awarded more than \$385 million to undertake more than 180 research projects, including clinical and vaccine trials.

\$900K / 17

Pitt's Clinical and Translational Science Institute awarded \$900,000 to 17 studies to address different aspects of the COVID-19 pandemic.

It would be nearly impossible to list or even count the ways University of Pittsburgh researchers contributed to the global effort to treat, prevent and address the consequences of COVID-19. Pitt researchers were principal and co-principal investigators on hundreds of papers, while researchers far beyond the University used simulation, mRNA, genomic and other techniques developed by Pitt researchers. The University was one of the largest sites in the United States for vaccine trials and clinical treatments as part of the COVID-19 Prevention Network and Operation Warp Speed, a partnership between the U.S. Departments of Health and Human Services and Defense aimed at accelerating the development of a COVID-19 vaccine. Pitt continues to be at the forefront of ongoing trials, including pediatric trials, as the research into vaccines evolves along with the virus.

Pitt's health science and public health research enterprise pivoted to COVID work at the beginning of the pandemic. Eventually, COVID research reached far beyond health-related sciences to areas like business and economics.

Pitt was awarded more than \$385 million to undertake more than 180 research projects, including clinical and vaccine trials. Researchers throughout Pitt stepped up to study a range of COVID-related issues, such as medical innovations in vaccine delivery, impacts of COVID infection on children, the evaluations of health care worker exposure and the role of social media in vaccine hesitancy.

To help get work launched as quickly as possible, Pitt's Clinical and Translational Science Institute (CTSI) launched the COVID-19 Pilot Grant Program to help fund pandemic-related research. More than 150 projects were submitted for grant consideration, representing 590 unique investigators from 14 different Pitt schools and more than 90 Pitt departments, divisions, centers and institutes. CTSI awarded \$900,000 to 17 studies to address different aspects of the COVID-19 pandemic.





# 1955



## Decades of Virology

COVID-19 is not the first deadly virus to confront Pitt researchers. The lab of Jonas Salk and Julius Youngner famously produced the polio vaccine in 1955 that nearly halved polio cases in its first year of existence in the United States and helped to all but eradicate polio worldwide. Youngner created techniques for producing poliovirus on a large scale in the laboratory and developed a process for eliminating the infectiousness of the virus without destroying its shape, while also developing the methodology used for safety testing before the first field trials.

After Salk left Pitt, Youngner stayed on and continued his groundbreaking work, including blocking the replication of RNA viruses and developing antiviral therapies, both techniques that contributed to COVID-19 vaccine research after his death in 2017.

## Spotlight on Vaccines: Our Revolutionary Past, Present and Future

Before America's first stay-at-home orders, before school and business closings, before overwhelmed hospitals and the confirmation that the world was facing a deadly pandemic, scientists at the University of Pittsburgh Center for Vaccine Research (CVR) were already hard at work on research that could prove key to stopping the COVID-19 pandemic.

Pitt was one of the first institutions in the country to receive the virus directly from the Centers for Disease Control and Prevention. Paul Duprex, the center's director, and his team are specially equipped to take it on. With support from the National Institute of Allergy and Infectious Diseases within the National Institutes of Health, CVR's facilities are specifically designed to handle this kind of high-stakes work, and its staff has years of experience working in biocontainment.

The team's research became part of a **\$4.9 million grant to develop and test a COVID-19 vaccine** as members of a three-way partnership with Institut Pasteur in Paris and Themis Bioscience, a biotech company based in Vienna.



U.S. Secretary of State Antony Blinken touring Pitt's Center for Vaccine Research, September 2021

To develop a vaccine during an active and evolving pandemic, the researchers zeroed in on the most visually notable component of the pathogen as it's depicted in computer-generated renderings: the parts that look like little red knobs sticking out of a gray sphere.

These are spike proteins, a feature of all coronaviruses. Research has shown that they can induce immunity by prompting the generation of antibodies, which fight the virus and build a person's resistance to future infection.

To create a vaccine using spike proteins, Duprex has applied his expertise in measles, the "most infectious human virus on earth," he says. A safe and effective measles vaccine already exists and has been successfully adapted to tackle other viruses.

The scientists say that there will not be a one-size-fits-all solution to this coronavirus. But Duprex asks and answers: "Will that burden of disease be treated by one of the most revolutionary biomedical interventions that we have ever come up with as a society—vaccines? Yes."

*Adapted from the summer 2020 Pitt Magazine article "Emergency Response"*





# Committed to Cancer Research Collaborations

The University of Pittsburgh School of Medicine rises on a hill above Pitt's campus in the Oakland neighborhood of Pittsburgh. For some—patients visiting the medical offices, collaborators in the laboratories or students in the classrooms—the complex is indeed a beacon on a hill, offering care, healing and hope.

Throughout those halls, and in satellites and sites spread far beyond Pittsburgh (as distant as Italy and Ireland), Pitt scientists work together to research the biology of aging, neuroscience, vision and vision restoration, genome stability, regenerative medicine and biomedical device development. They're asking and answering the big questions on vascular, developmental, structural, computational and systems biology.

So powerful is the focus on cancer that the UPMC Hillman Cancer Center has met the rigorous federal standards to be named a National Cancer Institute (NCI)-designated Comprehensive Cancer Center—one of only 53 in the United States. Receiving the NCI designation places a cancer center among the top 4% of cancer centers in the United States.

In the specialized field of cancer research, Pitt scientists at Hillman and in centers and institutes throughout the School of Medicine—and, in fact, across the University—are advancing the understanding, diagnosis and treatment of cancer through basic, translational, clinical and population-based research programs.

7 | 300

## Specialty Areas Faculty Researchers

In the following seven specialty areas, more than 300 faculty researchers are looking at cancer at the molecular, environmental and genomic level.

**Biobehavioral Cancer Control Program:** researching behavioral factors and the patient experience

**Cancer Biology Program:** examining fundamental aspects of cancer biology

**Cancer Epidemiology and Prevention Program:** understanding risk and effectiveness of prevention methods

**Cancer Immunology and Immunotherapy Program:** understanding how the immune system interacts with cancer

**Cancer Therapeutics Program:** developing innovative drug treatments

**Cancer Virology Program:** characterizing cancer-causing viruses and exploring therapeutics

**Genome Stability Program:** looking into the molecular pathways and how they're altered in cancer cells

Pitt's research is steadily enhancing Pittsburgh's reputation in the life sciences landscape. In the field of immunotherapy, which uses the body's own immune system, researchers in the Pitt School of Medicine and UPMC Hillman Cancer Center took their immunotherapy research to market with the 2021 launch of Novasenta, a drug discovery and development company that focuses on the ecosystem that surrounds and constantly interacts with the tumor inside the body to develop immunotherapies.

In addition, startups BlueSphere Bio; Generian Pharmaceuticals; Abound Bio, Inc.; and the UPMC Genome Center, all incubated in recent years as a collaboration between Pitt and UPMC Enterprises, the health system's venture capital arm.

Other cancer-focused Pitt startups, such as Oncorus, Inc.; INmune Bio, Inc.; KaliVir Immunotherapeutics, Inc.; and Replay, have raised significant venture capital and formed industry partnerships as they work toward or proceed through clinical trials.

## For the First Time, Again

“For the first time”—that phrase is music to the ears of medical researchers whose goal is to reverse once-inevitable health impairments. In 2021, those words were used to describe another Pitt breakthrough: the creation of a clinical trial that combines a biotherapy with special goggles to observe the first clinical evidence for vision restoration with optogenetics. As press announcements stated, “For the First Time, Optogenetic Therapy Partially Restores Patient’s Vision.”

“The eye is a very complex system that allows our vision to adapt to different levels of light,” says José-Alain Sahel, Distinguished Professor and chair of the University of Pittsburgh Department of Ophthalmology. “But complex systems are very fragile, so when vision disappears, there are few treatments left aside from using prosthetics or reactivating remaining cells in the retina.”

Sahel led the trial with researchers in Paris, Vienna and Pittsburgh that successfully reactivated those remaining cells and partially restored the vision of a patient with retinitis pigmentosa—a progressive neurodegenerative disease that destroys light-sensitive cells in the retina and leads to complete blindness. They used optogenetic therapy, which manipulates proteins and cells with light by using special goggles equipped with a camera that projects light pulses onto the retina—like a movie projector onto a theater screen. The results were remarkable. While wearing the goggles, the patient was able to locate, identify and count different objects using the treated eye.

“  
Patients’ voices  
will nurture  
our projects  
and define the  
successes we all  
want to deliver.”

”  
**José-Alain Sahel**



Photo credit: Laurent Arduin

This isn’t the first innovation credited to Sahel and his worldwide team. Coinventor on more than 40 patents, Sahel is one of the world’s top experts in retinal diseases and vision restoration research and is now supported by a five-year collaboration with the U.S. Food and Drug Administration’s Center for Devices and Radiological Health focused on collaborative research, public outreach, extension activities, cooperative international initiatives, disciplinary training and exchange of scientists and staff.

Sahel is committed to creating impact through his research and has formed several startup companies, including Avista Therapeutics, which he cofounded with Assistant Professor of Ophthalmology Leah Byrne. The company recently formed a partnership with Roche to develop gene therapy vectors for the eyes.

Driven by his humanitarian passion, Sahel says, “Patients’ voices will nurture our projects and define the successes we all want to deliver.”



## Rethinking Evolution



**Anne-Ruxandra Carvunis,**

associate professor, Department of Computational and Systems Biology

Carvunis shook the field of genomic evolution when she identified genes that were beginning to code for proteins within so-called “dark matter DNA.” In a landmark 2012 Nature paper, she showed that genes that were supposed to be doing nothing were, in fact, evolving. One of the most highly cited researchers in the field and the recipient of many awards, among them a 2021 Sloan Research Fellowship and a 2022 NSF CAREER Award, Carvunis asks one simple yet enormous question: What makes each species unique?

Studying the molecular mechanisms of physical change and innovation, Carvunis shows that traditional explanations of evolution may not be complete and that the story is not over. “Organisms,” she says, “are always evolving. We have learned that we don’t know as much as we thought.”



## Watch This Space

Ford Motor Company's former assembly line and vehicle showroom for its iconic Model T will transform into the epicenter of innovation in life sciences for Pitt researchers, entrepreneurs and established companies.



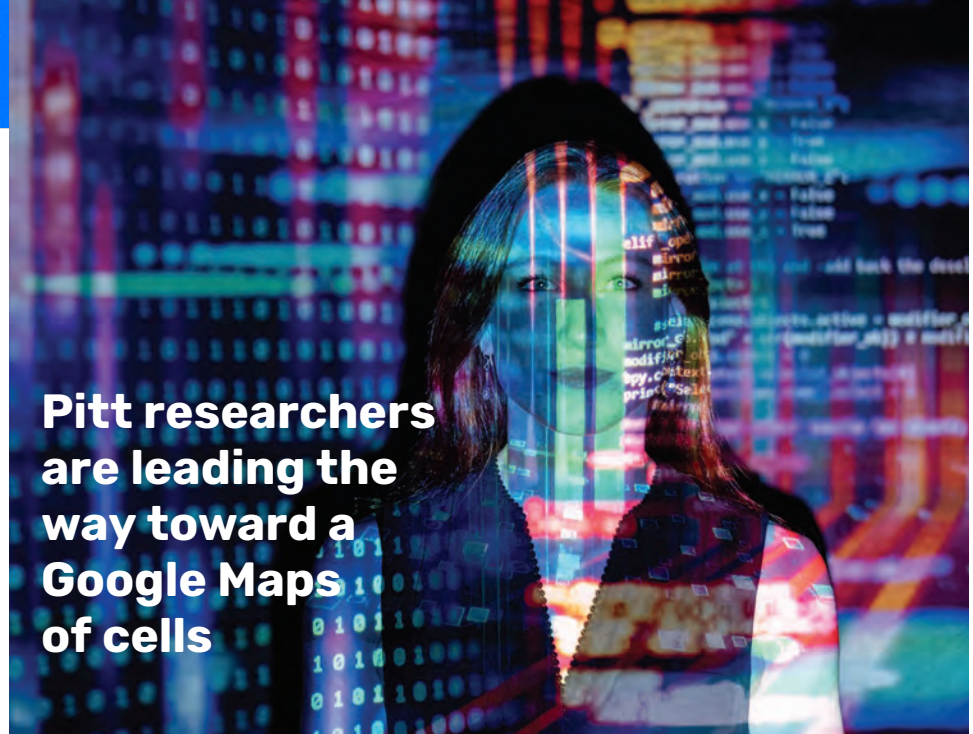
“

It is a confluence of Pittsburgh's storied past, relentless evolution and astonishingly bright future.

”

**Pitt Chancellor Patrick Gallagher**

in May 2022, when the ribbon was cut on The Assembly



## Pitt researchers are leading the way toward a Google Maps of cells

# Pitt Collaborates in NIH Human Cellular Atlas Project

Pitt researchers are collaborating in a National Institutes of Health (NIH)-funded collaboration with Carnegie Mellon and Stanford universities on an international network using data of unprecedented spatial resolution to create a global atlas of cells in the human body—often described as a cellular Google Maps.

The Pitt team, led by Jonathan C. Silverstein, chief research informatics officer and visiting professor in the Department of Biomedical Informatics, is part of the Human BioMolecular Atlas Program (HuBMAP) consortium, which is developing a multiscale, open human reference atlas, which scientists around the world can use to answer questions about human health and disease.

Akin to the Human Genome Project, which sequenced every single gene in the human body, HuBMAP goes deeper, with the goal of mapping gene expression, proteins, metabolites and other information in different types of cells across various organs and tissues. In humans, the proper functioning of organs and tissues is dependent on the interaction, spatial organization and specialization of all our cells.

The Pittsburgh Supercomputing Center, a joint research center of Pitt and Carnegie Mellon, is providing computer and software infrastructure. In August 2022, the teams received \$20 million in renewed funding from NIH to continue these efforts.



## Healthy Teeth, Healthy Me

Peggy Liu, associate professor in the Joseph M. Katz Graduate School of Business, and Jacqueline Burgette, assistant professor in the School of Dental Medicine, have combined business acumen and marketing with pediatric dentistry. Together, they have created the Healthy Teeth, Healthy Me Family Activity Box to help children prevent tooth decay, the most common chronic disease of childhood. An extensive five-year study with 126

Pittsburgh and West Virginia mothers led to development of this oral health promotion box intended to serve as a fun, family-based, community-engaged way of providing child oral health education and resources to families.

Burgette has just been named a White House Fellow for the class of 2022-23; the first dentist ever selected.

**W**ireless technologies have transformed how we interact with the world, and for people with disabilities, they promise new ways to solve problems and overcome barriers. **With a five-year, \$4.6 million grant from the U.S. Department of Health and Human Services'**

**Administration for Community Living,** Pitt's School of Health and Rehabilitation Sciences, Rehabilitation Engineering Research Center and Human Engineering Research Laboratories are embarking on an ambitious initiative to evaluate and improve wireless technology to optimize its use as a tool for people with disabilities.

**\$4.6M**

**Five-year, \$4.6 million grant from the U.S. Department of Health and Human Services' Administration for Community Living**



## Rethinking STEM Education



**Kari Kokka,**

assistant professor of mathematics education, School of Education

Kokka is rethinking how young people learn math and what they go on to do with math. Formerly a math teacher in New York public schools, she is using a grant from the National Science Foundation to help mathematics teachers learn to engage students, particularly students of color, in doing math tasks based on the world around them and relevant social issues.

“Students who learn academic content while investigating social inequities will ultimately take action in the pursuit of justice,” she says. “The goal is to change how students feel both about their abilities in mathematics and their abilities to create change toward an equitable society.”

# Inspired by the Impact: Dedicated to Supporting Heroes

Pennsylvania has the fourth-largest veteran population in the United States, making the area surrounding the largest university in Western Pennsylvania a likely choice for many students and their families to live and plant roots. In turn, Pitt proudly educates, employs and collaborates with those in the military community, tackling some of the toughest challenges facing the United States and the world.

As home to world-renowned research helping members of the military thrive in both combat and civilian life, Pitt enables researchers to set their sights on higher survival rates through assistive technology development, better long-term health outcomes and better care for veterans transitioning into civilian life. The research is groundbreaking and life affirming, pulling in experts from multiple disciplines.

The **Center for Military Medicine Research**—led by Ronald K. Poropatich, professor of medicine—provides a multidisciplinary approach

to military medicine research. Among the center’s recent innovations is TRAuma Care In a Rucksack (TRACIR), a fully autonomous medical backpack—now under development



Ronald K. Poropatich



Human Engineering Research Laboratories founding director Rory Cooper

for the U.S. Army—that can provide autonomous delivery of resuscitative and robotically controlled care to injured soldiers in remote environments.

TRACIR is poised for applications far beyond the active combat zone. It has direct civilian use and could “be deployed by drone to hikers or mountain climbers injured in the wilderness or expand trauma care capabilities in rural health clinics or be used by aid workers responding to natural disasters,” says Poropatich, a 30-year active-duty U.S. Army veteran with significant appointments at Walter Reed National Military Medical Center and extensive research experience in the role of artificial intelligence in telemedicine, prehospital care in remote locations and medical informatics.

**The Human Engineering Research Laboratories**—a U.S. Department of Veterans Affairs Research Center of Excellence—serves as the national Center for Wheelchairs and Assistive Robotics Engineering. Founding director Rory Cooper, a U.S. Army veteran who sustained a spinal cord

injury while stationed overseas, has led his team to assist veterans and injured troops through robotic assistive technology research collaborations in health rehabilitation sciences and engineering. For our armed forces, these research findings aspire to provide more social support for the transition from soldier to civilian and keeping our veterans’ well-being top of mind.

**\$10B**  
IN RESEARCH

In May 2022, the Defense Health Agency announced that a consortium of teams across Pitt is one of a select group of organizations—and **only one of two universities**—to win approval to lead “task orders” for R&D services contracts from the U.S. Department of Defense (DoD) to develop health care innovations over the next five years. DoD will fund up to \$10 billion under this contracting vehicle.



As just one example, Disabled American Veterans asked Cooper and his colleagues to design a novel computer mouse modification for upper limb amputees who use a hook-type prosthetic. Veterans who use a hook-type end effector with their upper extremity prosthetic device have a difficult time moving a mouse or trackball or activating the buttons. This new device modifies an existing mouse with a 3-D-printed cover that makes it easy for the user to grasp with a hook and to operate the switches by tilting the shell. The lab is printing a limited number of computer mouse covers to gather user feedback while TechLink, in partnership with the

VA Technology Transfer Program, finds a company to license and manufacture the device for sales to the public.

One of Pitt's trademarks is its creative and collegial approach to expanding collaboration, especially in this field. In fact, the University's leadership focus on military medicine and veteran-focused assistive technologies has resulted in colleagues gathering to conduct multidisciplinary research from key areas, such as engineering, health and rehabilitation sciences, medicine and robotics. The reputation for collaboration has been valuable to Pitt.



## Rethinking Viruses



**Graham Hatfull,**

Eberly Family Professor of Biotechnology,  
Department of Biological Sciences

For more than a decade, Hatfull has led students all over the world in identifying and naming new strains of bacteria-killing viruses known as phages. After amassing a freezer full of 15,000 phages and sequencing their genomes, his lab was presented with an unusual request: A teenage cystic fibrosis patient in London was on the verge of dying from a rare bacterial infection after a lung transplant. Was there a phage in the freezer that could attack the infection? The lab analyzed the RNA sequences of three candidates and identified and altered two genes to make the phages express the aggressive characteristics needed to attack the bacteria. The patient improved greatly.

A paper published in the journal *Clinical Infectious Diseases* described how Hatfull's team contributed to using the experimental phage treatment in 20 new cases of patients with infections by the mycobacterium bacteria that attack people with compromised immune systems or with cystic fibrosis. The phages killed the infection in 11 of the 20 patients. Now, more than 200 clinicians have sought him out, searching for phages that could be used to target unique strains of bacteria infecting individual patients. A large clinical trial of the phage therapy is expected.



**For five of the past six years, Pitt has been ranked in the top 20 on the Best Colleges for Veterans list by U.S. News & World Report.**

Addressing a 40-year-old problem in MRI scanning—the failure to coordinate scan-based diagnoses across different MRI machines—Walter Schneider, professor in the Kenneth P. Dietrich School of Arts and Sciences Department of Psychology, and his team at Pitt's Learning Research and Development Center have developed a cross-machine calibration solution that will be shared with 119 U.S. Department of Veterans Affairs imaging centers across the country through the VA Clinical Health Imaging Portability Standards project, sponsored by the U.S. Department of Defense. This project contributes to the improvement of medical diagnostics.





## Powering Invention, Igniting Progress

The University of Pittsburgh is committed to ensuring that its research enterprise not only makes important contributions to scholarship and basic science but also creates an impact on society. **The Office of Innovation & Entrepreneurship, through its four operating units—the Innovation Institute, Big Idea Center, Institute for Entrepreneurial Excellence and Office of Industry and Economic Partnerships**—works to translate research discoveries into new products and services that improve lives, generate positive economic activity and engage with external partners to achieve impact for society and businesses.

# Pitt's Innovation Institute Fuels the University's Commercialization Engine

Pitt faculty and student innovators produced a record number of licenses and options for University-developed innovation and were issued the second-highest number of U.S. patents in University history in fiscal year 2022, continuing a strong trend of positive growth in commercialization activity over the past five years. Key to the strong performance of Pitt innovators seeking to make an impact on the world with their research discoveries has been the effort to surround them with a selection of education, mentoring and other resources at every step of the commercialization

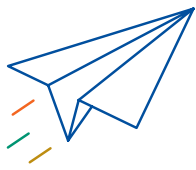
process. This includes critical funding to bridge the gap between research discovery and the point at which a company has been formed or a license has been issued. The Chancellor's Gap Funds were reauthorized in 2022 to provide funding for research projects that have demonstrated strong commercialization potential but require key proof-of-concept experiments, other data or prototypes to attract interest from potential investors or industry partners.

The fund provides grants ranging from \$25,000 to \$75,000 based on what is needed to advance the project

through a significant milestone. A total of \$263,000 was awarded in the most recent cycle.

The University continued to spin out startups in the double digits in fiscal year 2022, while previous Pitt startups achieved important milestones during the year. These include Diamond Kinetics (DK), based on Pittsburgh's North Shore, which announced it had become a trusted youth development platform of Major League Baseball (MLB). Through the partnership, youth players can take swings and make throws using DK's bat sensor technology and smart





# New Pitt Startups in Fiscal Year 2022

**Activity Rhythm Solutions Corporation:** Using circadian rest/activity rhythm data gathered by a wearable device to monitor for risk of health outcomes such as depression, and improve our ability to provide adaptive interventions

**Avista Therapeutics:** Recently entered into a development agreement for its next-generation gene therapies for blindness with the major pharmaceutical company Roche

**BioSystics, Inc.:** Analytics platform analyzes and computationally models complex data sets to create outcomes to accelerate and optimize basic biomedical research, drug discovery/development and preclinical trials as well as cosmetic, industrial and environmental chemical testing

**Elio AI, Inc.:** Delivering medical-imaging AI that is intuitive and understandable to clinicians for reliable, real-time AI diagnosis and treatment guidance for a range of crucial clinical applications, including ultrasound trauma assessment, tumor classification and biopsy, and ophthalmology

**GenexGen:** New generation of immune-suppressive therapies for improving the safety of CRISPR-based gene therapy

**HENY, Inc.:** An early stage startup building a decentralized biobank to empower patients, incentivize research collaboration and unlock the future of precision medicine

**Legal Triage:** Web-based legal database that helps individuals navigate legal summaries impacting volunteer participation in preparing for or responding to disasters

**MDR Therapeutics LLC:** Platform-based vaccine technology that elicits first-in-class bacteria-specific mucosal immune responses, including both T cell and B cell responses, providing dual levels of protection against pneumonia

**Painimation:** Technology-based pain assessment tool to help patients communicate their pain experience and provide clinicians with the needed information to accurately diagnose and treat pain symptoms

**Reach Neuro, Inc.:** Medical device solutions to fight chronic disability

**Remplir Bio:** Developing novel immunotherapy drugs for cancer that alter the metabolism of immune cells and the way that immune cells “see” their local environment, resulting in increased immune activity in cancer

**Synhale:** Developing drugs to address the molecular origins of pulmonary arterial hypertension

## INNOVATION INSTITUTE DATA, FISCAL YEARS 2021 AND 2022



649

**Invention Disclosures**



229

**Patents**



28

**Startups**



273

**Deals**

*Timeframe: FY21 and FY22; Source: Office of Innovation and Entrepreneurship at the University of Pittsburgh*

baseballs while merging MLB content directly into their everyday baseball activity through DK’s mobile apps. The technology was originally developed in the lab of William “Buddy” Clark, professor of mechanical engineering and materials science at the Swanson School of Engineering.

Meanwhile, Apollo Neuroscience, Inc., reported that it raised \$15 million in Series A funding as it ramped

up manufacturing and sales of its wellness wearable device. Apollo’s device improves the body’s resilience to stress so that users can relax, sleep, focus, recover and feel better. Worn on either the wrist or ankle, the Apollo device works by engaging with the sense of touch, delivering silent, soothing vibrations that help users feel safe and in control. The concept for Apollo was borne from research conducted at Pitt by Greg

Siegle, professor of psychiatry and psychology, and David Rabin, a former resident in the Department of Psychiatry.

And Novasenta, spun out of the University in 2018, announced it has received a \$40 million Series A investment to advance its pipeline of antibody-based therapeutics to treat cancer.

# Pitt: A Corporate Partner of Choice

Pitt's Office of Industry and Economic Partnerships (OIEP) serves as a centralized resource for industry and venture capital firms seeking to partner with the University. The OIEP team works closely with Pitt's industry partners to understand their interests, connect them with experts across campus and facilitate the initiation and management of mutually beneficial partnerships.

In fiscal year 2022, OIEP contributed to developing more than \$12 million in industry-sponsored research and interacted with more than 300 companies and 75 venture capital firms, showing Pitt's strong and growing influence as a corporate partner of choice. At the four-day 2022 BIO International Convention, the largest biopharma partnering conference in the world, at which more than 3,800 companies and universities gathered, Pitt had more than 75 meetings with potential partners.

## Facilitating collaborations resulted in Pitt's partnering with:

- Coceptis Therapeutics, Inc., a biopharmaceutical company developing innovative cell therapy platforms for cancer, to investigate technologies to address a range of breast and ovarian cancer tumors.
- Duquesne Light Company for Pitt's Energy GRID Institute to create a collaborative platform to advance and implement innovative solutions to support a more secure, resilient and clean energy grid in line with the rapidly evolving technology of electric power systems.
- UPMC and Bayer AG to fight chronic kidney disease, a condition with few treatments available to slow its progression, affecting one in seven American adults.
- Covestro LLC on the establishment of the Covestro Circular Economy Program at the Mascaro Center for Sustainable Innovation within the Swanson School of Engineering. The program will enable graduate students at Pitt to become experts in circular economy principles, informed by Covestro's advances in this area, and ultimately to create circular, sustainable products and service solutions.

OIEP also facilitated Pitt's participation in the Novartis Institutes for BioMedical Research (NIBR) Global Scholars Program. This competitive program is designed for innovators from invited institutions to gain funding for breakthrough science not covered by traditional grant support. Through this program, NIBR supports projects focused on novel science with the objective of being translated into drug discovery and clinical research.

## THE INSTITUTE FOR ENTREPRENEURIAL EXCELLENCE

### THE POWER TO PROSPER™

Since the pandemic began, many businesses have experienced supply chain issues, hiring difficulties and inflation.

Pitt's Institute for Entrepreneurial Excellence (IEE) is there to help, doing what it has been doing steadfastly for more than 25 years. IEE offers consulting, education and networking opportunities to individuals, entrepreneurs and small business owners throughout the region.

In fiscal year 2022, IEE and its Small Business Development Center held several specialized events designed to connect minority-, women- and veteran-owned businesses to contract opportunities and other regional resources. More than 400 small business owners attended at least one of these events, opening doors for their businesses to grow while further diversifying the Western Pennsylvania economic landscape.

IEE also saw 29 graduates—more than half of them minority business owners—of its full-year Entrepreneurial Fellows Class, a business training program for leaders in companies with annual revenue of more than \$1 million, and 22 graduates of its Community Power to Prosper Program, a business training program for entrepreneurs starting businesses in urban or disadvantaged neighborhoods.

IEE's newest programs include PantherlabWorks' Concept to Commercialization program for new product entrepreneurs and Seeds for Growth, a showcase with product-based business training.

The IEE team believes in the power of network connections to add jobs and create new businesses, which in turn have a positive influence on the region. IEE has seen firsthand the truth in its formula of offering resources to help build businesses and make beneficial contributions to a broader, more robust, more diverse and healthier Western Pennsylvania business ecosystem.

### IEE's Impact and Activity in Fiscal Year 2022

**1,549** Businesses Served

**11,848** Hours of Consulting Provided to Businesses

**\$17.48M** Capital Formation Obtained for Businesses

**61** New Startups Created

**353** New Jobs Created

**9,196** Total Jobs Receiving Consulting Services



## Big Idea: Growing Students into Innovators



Pitt's Big Idea Center, established in 2018 through a gift from Pitt alumnus and trustee Bob Randall, saw its own big idea come to fruition this year, as it opened its doors to a new 5,000-square-foot space in the heart of Pitt's campus in Oakland.

The Big Idea Center, part of the Office of Innovation and Entrepreneurship, is an on-campus, inclusive innovation catalyst that helps to develop the innovative and entrepreneurial mindset and skill set of the Pitt student community.

Under the direction of Rhonda Schuldt, the new facility offers student entrepreneurs access to two floors of physical space. Programming offers students acceleration, incubation, mentoring, networking, competitions and events to nurture and develop their original ideas into entrepreneurial projects.

"Innovation and entrepreneurship are not only for a select few. Often, people think innovators and entrepreneurs are reserved for those in business or technology fields, but really they are open to anyone—any student in any discipline where there is a problem to solve," says Schuldt.

"Creativity and curiosity can ignite a search for solutions to that problem.

The Big Idea Center is the place where students can step in and become the problem finders and problem solvers who change our world."

While some of the Big Idea Center programs are competition oriented, such as the Randall Family Big Idea Competition, all aim to advance students' learning and progress through the lens of innovation and entrepreneurship and are open to all Pitt students, from first-year undergraduates to postdoctoral researchers.

"The qualities and skills that students master while participating in the Big Idea Center, such as curiosity, problem solving, collaboration, empathy, resilience, taking action and adapting to change and uncertainty, are skills that are not just for students looking to establish a startup. They are experiential skills that will help them [to] succeed in any job or as part of any team in the future as well as [encourage] them to be lifelong learners," says Schuldt.

In turn, many students find that their entrepreneurial experiences bring more meaning to their research or clinical work and that they have access to a broader perspective when they return to the classroom.

“

Students graduating in the next few years will have between four and 11 careers over their lifetimes,” Schuldt says, “so it is vital that they develop these flexible skills.

”

### CONSIDER THESE CREATIVE COLLISIONS

- ▶ Swanson School of Engineering PhD students Utkars Jain and Adam Butchy joined with College of Business Administration graduate Michael Leasure to cofound HEARTio, a digital diagnostic startup weaving together health care and technology. Their business uses artificial intelligence and electrocardiography to help clinicians identify cardiovascular disease more quickly and accurately and at a fraction of the cost.
- ▶ Becca Segel, a PhD student in chemical and petroleum engineering, came to Pitt specifically to start a company and solve a problem. Segel's company, FlowCellutions, is developing a new type of grid-scale battery tester to advance sustainable energy solutions. In 2022, Pittsburgh Inno, part of the Pittsburgh Business Times, named her among its “5 Founders Under 25” who are developing new innovations and producing promising startups.
- ▶ Pitt medical student Joseph “Jack” Maggiore is creating a groundbreaking technology solution for the music business that allows performance DJs to interact spontaneously with live musicians in real time during the performance.

# Pitt: International Collaborator with Global Reach

The Pitt research story is rich with achievements and life-changing, world-sustaining, fascinating discoveries.

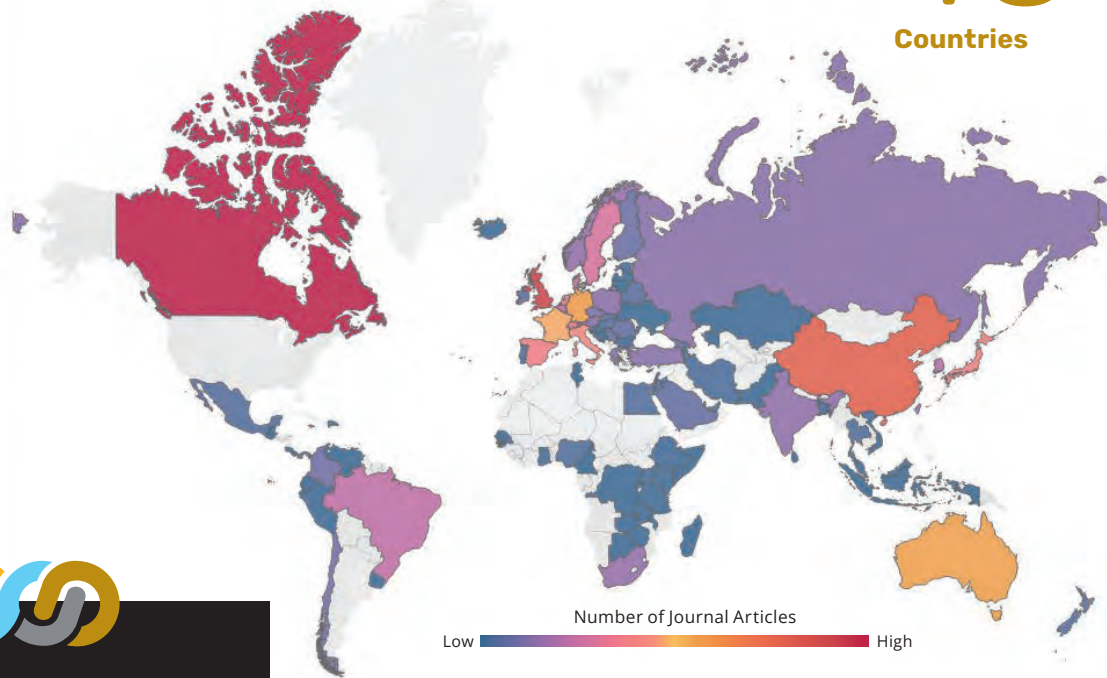
Our researchers have published articles with members of 2,218 institutions in 103 countries.

2,218

Institutions

103

Countries



“

International pursuits and collaborations are the oxygen for the University of Pittsburgh’s vibrant and rich academic environment.

”

Chancellor Patrick Gallagher

## Breakdown of Top 10 Countries

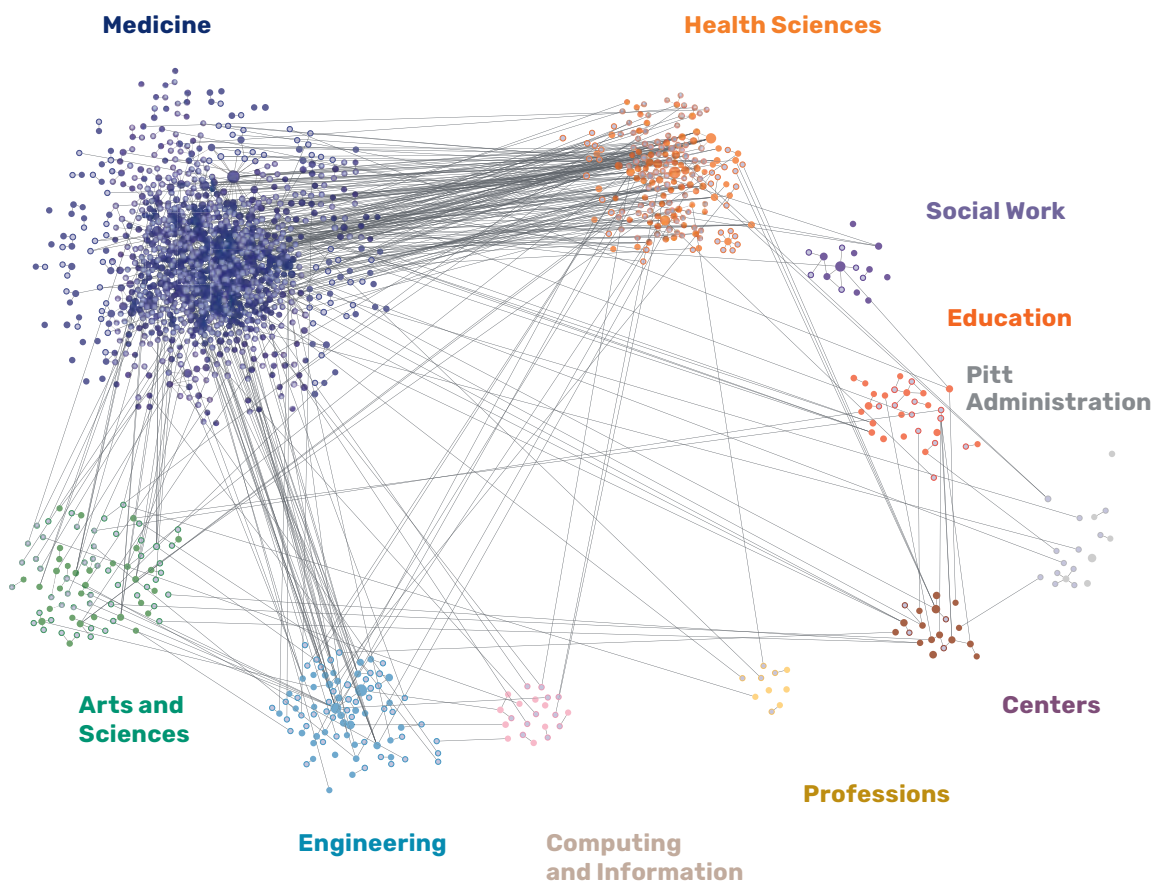
## Number of Journal Articles

| Rank | Country                    | Number of Journal Articles |
|------|----------------------------|----------------------------|
| 1    | Canada                     | 721                        |
| 2    | United Kingdom             | 649                        |
| 3    | People’s Republic of China | 563                        |
| 4    | Germany                    | 415                        |
| 5    | Australia                  | 403                        |
| 6    | France                     | 345                        |
| 7    | Italy                      | 308                        |
| 8    | Japan                      | 281                        |
| 9    | The Netherlands            | 277                        |
| 10   | Spain                      | 271                        |

Timeframe: Articles published between January 2016 and July 2022 by Pitt faculty members who were active in 2020 and 2021  
Source: Academic Analytics

# Pitt Research Social Network

Pitt's research social network is a graphic representation of the strong ties between researchers from different schools to produce high-impact, multidisciplinary research.



Nodes (circles) represent principal investigators (PIs) or co-principal investigators (co-PIs) in proposals submitted.

Each color represents a school or group of schools. A circle with a solid color represents an individual who is a PI in a grant proposal. A circle where only the border has the school color represents an individual who is a co-PI in a proposal. There is a link between two nodes (circles) if they are PI and co-PI in the same research proposal.

*Timeframe: Fiscal Year 2021 and Fiscal Year 2022*  
*Data Sources: Office of Sponsored Programs*



## Rethinking Cultural Exchange



**'BioDun Ogundayo,**  
 associate professor of French and comparative literature,  
 University of Pittsburgh at Bradford

Ogundayo, director of Africana studies and foreign language at Pitt's Bradford campus, has received a Fulbright U.S. Scholar Program award to study, teach and research the oral tradition of the Mossi people in Burkina Faso. He is spending the 2022-23 academic year teaching in the Department of Anglophone Studies at the Université Joseph Ki-Zerbo in Ouagadougou, the capital of the West African nation.

Ogundayo says, "I will be bringing a relevant and specifically American cultural, academic and cross-cultural input and perspective to their curriculum." He hopes to connect his Pitt-Bradford students with his new students in Burkina Faso through Zoom as well.

"We are like bridges,"  
 Ogundayo says of scholars in the Fulbright program.



## Investing in Our Communities: Community-Engaged Scholarship

To judge Pitt’s engagement with the surrounding community, just glance at Pitt’s Engagement and Outreach Map ([engagementmap.pitt.edu](http://engagementmap.pitt.edu)) to see more than 400 ongoing University-related research, engagement and outreach activities. You’ll find 412 Food Rescue internships; the Center for Russian, East European and Eurasian Studies’ Outreach Program; Pitt’s Center for Excellence in Autism Research; and partnerships with the Westmoreland Diversity Coalition.

**“It’s just the tip of the iceberg,” says Lina Dostilio, Pitt’s vice chancellor of engagement and community affairs. “Community-engaged research is a vital part of Pitt’s mission to create knowledge that serves society.”**

Much of the time, this takes the form of community-engaged scholarship, a type of engagement that occurs when community and University partners collaboratively undertake research and creative discovery activities that have a social impact purpose. For example, the Rhythm Experience and Africana Culture Trial (REACT!) helps older African American individuals to improve their brain aging by taking part in an African dance class or Africana culture class taught by local community-based artists at one of the University’s Community Engagement Centers. Funded by the National Institutes of Health, REACT! studies brain changes in late adulthood and how factors such as physical activity promote successful aging and neurocognitive health. The study is facilitated by Kirk Erickson, principal investigator of the Brain Aging & Cognitive Health Lab at Pitt and professor in the Kenneth P. Dietrich School of Arts and Sciences Department of Psychology, and project coordinator Mhloti Williams, a biokineticist and graduate of Pitt’s Master of Public Health program.

To facilitate Pitt’s community-facing work, the Office of Engagement and Community Affairs (ECA) brokers partnerships between community and University collaborators while leading the University’s place-based engagements in the city of Pittsburgh via its Community Engagement Centers. ECA and the centers support positive relationships with the neighbors and organizations closest to campus while creating opportunities to elevate and celebrate the breadth of community engagement at Pitt.

In another long-term outreach program known as The Pittsburgh Study, researchers from Pitt and UPMC Children’s Hospital of Pittsburgh are collaborating with more than 500 community partners to promote racial equity and child thriving. This longitudinal collective impact study focuses on conducting research with—not on—the community, implementing community-driven solutions and documenting social influences on a child’s well-being. Codirected by Elizabeth Miller, director of the Division of Adolescent and Young Adult Medicine at the Pitt School of Medicine, and Felicia Savage Friedman, an anti-racism trainer and integrated yoga instructor, The Pittsburgh Study confronts the social, racial and economic inequalities that prevent children and communities from thriving. It is one of the first studies to explore these factors over an extended period with community partners involved as citizen scientists.

Researchers in The Pittsburgh Study strive to identify bright spots—areas where things are going well—in schools, homes and the community in order to approach their work from a strengths-based perspective rather than a deficit-based one and to focus on protective factors and resilience. The study centers community members and their wisdom in the work by honoring and listening to members’ lived experiences. As one community member noted, “The antidote to trauma is resilience.”



**“Our clean water future can be found where science and community meet.”**

## The Pittsburgh Water Collaboratory

Pittsburgh is a city of three intersecting rivers, and water flows through all we do here. Not many people think more about water in Pittsburgh than Emily Elliott, professor in the Kenneth P. Dietrich School of Arts and Sciences Department of Geology and Environmental Science and director and co-founder of the Pittsburgh Collaboratory for Water Research, Education, and Outreach. Elliott has been connecting universities, local governments, nonprofits and community groups across the region to respond to real needs in water research, governance and action as well as health, education and engineering.

**The collaboratory was awarded the 2022 ARIS Impact Goals Award from the Center for Advancing Research Impact in Society (ARIS) for its capacity-building impacts.**

Aiming to advance the region’s sustainability and create opportunities for researchers, citizens and governments to connect, the Southwestern Pennsylvania Water Network was formed over the last three years through conversations facilitated by the Water Center at the University of Pennsylvania with funding from the Heinz Endowments. Network members voted to make the Pittsburgh Water Collaboratory the host of the network, alongside Pitt’s Congress of Neighboring Communities (CONNECT) and the Western Pennsylvania Regional Data Center.



The Parents Promoting Early Learning Lab is partnering with the Pittsburgh Public Schools, the Allegheny Intermediate Unit and Holy Family Institute to study how parents help their children learn and develop through everyday activities. Led by Elizabeth Votruba-Drzal, professor in the Dietrich School’s Department of Psychology and a Learning Research and Development Center senior scientist, the project informs programs and policies aimed at reducing income disparities in child achievement and behavior.



The Kids’ Thinking Lab, led by Melissa Libertus, professor in the Dietrich School’s Department of Psychology and a Learning Research and Development Center research scientist, is working with Westmoreland Community Action’s Head Start program on an intervention study to support early math skills for school readiness.



# Rethinking School Discipline



**James Huguley,**

associate professor and associate dean for diversity, equity and inclusion, School of Social Work

For years, we’ve known that suspending and expelling students does not improve their behavior or performance in school and can even set them on a path of interaction with the criminal justice system. But how can we change the culture of school discipline to improve student behavior and school performance?

Huguley leads initiatives seeking to train teachers to create that culture. Based on the principles of community-driven restorative practices to prevent and resolve conflicts, the Just Discipline Project works with students, teachers and research staff in Pittsburgh and Cleveland to study the impact of restorative practices on student disciplinary and academic outcomes, among other study areas.

At the heart of the initiatives is the effort to reduce racial disparities and promote positive school climate. One study, the Implementation Study and Regional Impact Model, looks at the dramatic inequalities in school discipline in the Pittsburgh region and offers remedies designed to serve as a national model, evaluates their implementation and performs a cost/benefit analysis of restorative practices in urban school contexts.

Elizabeth McGuier, assistant professor of psychiatry and pediatrics in the School of Medicine, and Ming-Te Wang, professor in the School of Education, also led Just Discipline Project initiatives. The projects are funded by the Institute of Education Sciences of the U.S. Department of Education, among other institutions.

# Connecting the World through Geography, Thought and Culture: The World Historical Gazetteer

Ruth Mostern, professor of history and director of Pitt's World History Center, spearheads the ambitious digital World Historical Gazetteer (WHG). Begun with a National Endowment for the Humanities grant in 2017, the award-winning WHG creates content, standards and the digital infrastructure for an index of world historical place names within a network of linked data and user tools to support collaborative research on a global scale—research focusing on cross-regional exchanges, connections and comparisons.

"The system assists quantitative and empirical historical research," says Mostern. "The gazetteer is a two-way platform for scholarly communication that improves people's own research while researchers also contribute to a growing shared resource." Researchers can upload data sets of place records drawn from historical sources and share data while augmenting their own data and discovering other work being done concerning their own places of interest.

The gazetteer includes a timeline of every recorded reference to a place in the database. For example, the record for Bosnia displays a dense plateau of references in the years surrounding World War I. References spike again in the 1990s, when Bosnia was a battleground in Yugoslavia's civil wars.

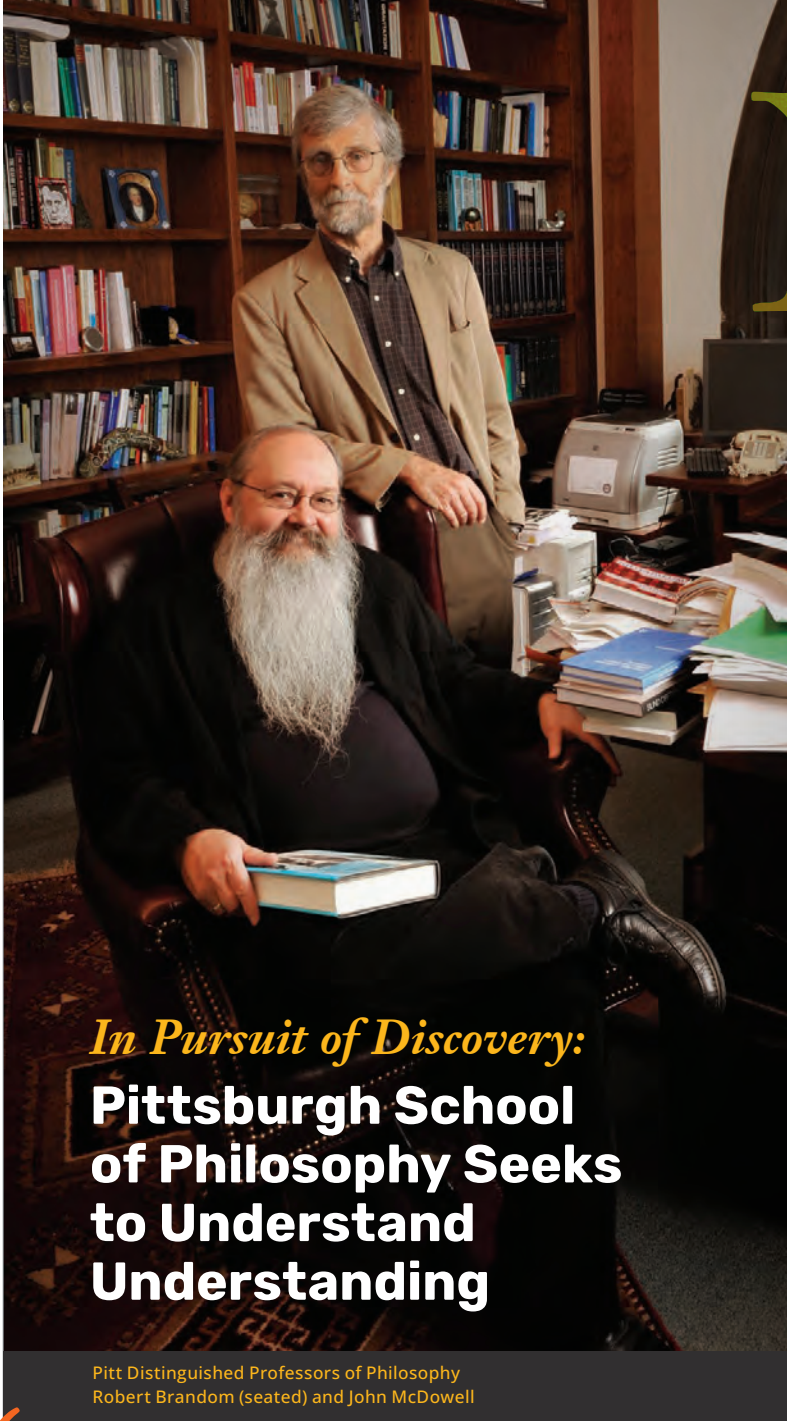
Mostern is grateful for the ways that Pitt provides technical resources for humanities and social science researchers without large grants and labs. "The WHG project is impossible without that support. We only use a small amount of computing resources, but with that computing, we can collaborate in creating new historical knowledge. Without that support, our platform would not exist."

**"The gazetteer is a two-way platform for scholarly communication that improves people's own research while researchers also contribute to a growing shared resource."**



**The World Historical Gazetteer:  
2021 Best Digital Humanities Tool  
Digital Humanities Awards**





*In Pursuit of Discovery:*  
**Pittsburgh School  
of Philosophy Seeks  
to Understand  
Understanding**

Pitt Distinguished Professors of Philosophy  
Robert Brandom (seated) and John McDowell

“We must acknowledge the human norms we use to understand each other as talking creatures. And to understand that is to understand us as thinking creatures.”

**N**ot many cities have a school of philosophical thought named after them. Pittsburgh does—though it could justly be called the University of Pittsburgh School of Philosophy. That would reflect the decades-long legacy of work that has made Pitt’s Department of Philosophy nationally and globally recognized. In the 2022 QS World University Rankings by Subject, the department was ranked fifth globally, ahead of the University of Oxford.

This philosophical heritage and the ongoing excellence of the Department of Philosophy rank among the most valuable treasures of the University of Pittsburgh.

That heritage includes work examining the relationships between mind and language and between the real and theoretical worlds. The department’s work builds on a methodology known as pragmatics, established in the 1950s and 1960s by Pitt professor Wilfrid Sellars. The methodology has come to be known as the Pittsburgh School.

Robert Brandom, Distinguished Professor of Philosophy, offers some necessary history: “Administrators at Pitt realized in the late 1950s that they couldn’t compete with schools like Harvard University and the University of Pennsylvania in the ‘best of’ lists. They decided to build just one department that would be on the list. They brought Wilfrid Sellars from Yale University and immediately became one of the most highly rated departments in the country.

“Universities all over the country adopted the model of building a department around one prominent scholar, and now there are world-class departments spread out all over the country. Pitt was the very first to create that model and is the envy of the world,” he says.

One could sum up the Pittsburgh School like this: the interactions with the world that cause humans to act, believe and feel are crucial for understanding knowledge, thought and language. Is it not possible to understand them as abstractions.

As Brandom explains, “Language is the concrete foundation of what 19th-century German philosopher Georg Hegel called ‘Geist’ or thought. Our task is to understand ourselves as rational creatures—in other words, to understand understanding. To do that, we must acknowledge the human norms we use to understand each other as talking creatures. And to understand that is to understand us as thinking creatures.”



## *World Minded:* **Music Gives Voice to Resistance**

On a day in early June, three months into the invasion of Ukraine, Adriana Helbig finishes her first call of the morning, with the Ukrainian embassy in Washington, D.C. She was able to help secure a visa for a 17-year-old Ukrainian student to study at a Pitt regional campus. It was one of many calls she would be on that day.

“After the invasion [of Ukraine by Russia] on Feb. 24, I couldn’t be silent,” says Helbig, chair of Pitt’s Department of Music and an authority on the folk and pop music that has become an integral part of the Ukrainian resistance.

Helbig describes Ukraine’s position in terms of postcolonial theory, which is usually thought of as pertaining to peoples and diasporas of Africa, Latin America and Asia who are emerging from control of Western imperialist structures.

“The theme is the same,” she says. “Whose land is this? How do you create a truly independent state? Now young Ukrainians are united in a narrative of breaking fully away from the empire and from the oligarchy that inherited—or stole—the economy of the empire.”

Helbig’s music scholarship could not be more of the moment. The Ukrainian group Kalush Orchestra won the Eurovision Song Contest 2022 and exposed the world to the folk- and rap-blended Ukrainian pop music that has been part of her field of study since the early 2000s.

“All my research is human rights based—making sure every voice is heard. Music is tied to resistance—in this case, folk music weaving in Carpathian rhythms and instrumentation that was suppressed for decades under the Soviet Union as part of destroying the rhythms of rural life and a national identity, which includes the Romani music made by the marginalized communities once referred to as ‘Gypsy.’”

Music has been uniquely integral to the Ukrainian resistance. “The attention on music has added confidence to people,” explains Helbig. “I feel like my work has to be public facing and applied where musical ethnography is part of a power struggle.”

# Geography of Philosophy

Edouard Machery, Distinguished Professor and director of Pitt's Center for Philosophy of Science, leads a global network of scholars exploring the world of thought and culture. The Geography of Philosophy Project, funded by the John Templeton Foundation, allows teams of researchers in Eastern Europe, Ecuador, India, Japan, Morocco, Peru, South Africa and South Korea to explore philosophical ideas by asking a set of questions regarding subjects like truth and decision making.

"We're concerned with the fact that philosophers have mostly assumed that concepts of knowledge, understanding and wisdom are universal," says Machery. "We know those concepts

are of central importance in Western culture. But it is not clear whether this is universally true and whether people in other cultures conceive [of] these concepts similarly."

"Our research may identify the conceptual differences that contribute to instances of miscommunications between religions and cultures," Machery explains. "Misunderstandings are sometimes based on what we believe to be default concepts—people assuming everyone thinks like them.

**"By mapping what is universal and what is not, we can begin to improve communication across groups."**

## Ties to Ukraine: A Language Program, Regional Connections and Engaged Researchers



Pitt is one of few American universities with a program in the Ukrainian language, historic regional ties to the area and researchers engaged in studying topics related to the country and its history.

Pitt economics associate professor Tymofiy Mylovanov, president of the Kyiv School of Economics and deputy chair of the Council of the National Bank of Ukraine, has been teaching his Pitt classes remotely from Ukraine. Featured in media around the world, his Twitter feed is an authoritative source for firsthand news on the war.

Adriana Helbig offers four Ukrainian songs to learn the story of Ukraine's resilience. Listen, she says, to a folk song, a pop hit, a hip-hop ode to feminism and a techno dance jam. The songs are linked in a March 1, 2022, Pittwire article that explains the power behind each track.

Jennifer Brick Murtazashvili, director of Pitt's Center for Governance and Markets (CGM) and a nonresident scholar at the Carnegie Endowment for International Peace, frequently studies the Ukrainian government. After the Russian invasion of Ukraine, Murtazashvili and her team at CGM partnered with colleagues in Ukraine to help support scholars there or in nearby countries. Due to conscription rules, Ukrainian men are not allowed to leave the country. Many scholars chose to remain in the country. Although many universities sought to resettle Ukrainian scholars in the United States, Murtazashvili realized that many Ukrainians believed that these efforts were driving a "brain drain" from the country. She was able to generate support from the Mercatus Center at George Mason University to start a fund to support university scholars in Ukraine and in nearby countries.



## Rethinking Research Under Threat



**Jennifer Brick Murtazashvili,** director, Pitt Center for Governance and Markets, and nonresident scholar, Carnegie Endowment for International Peace

Over the past 20 years that Murtazashvili has been conducting research in Afghanistan, she has witnessed an academic community grow from almost nothing to the most vibrant in the region. Afghan scholars advocated for academic freedom to form a diverse community in response to the region's most crucial issues. After the Taliban took over Afghanistan in August 2021, Murtazashvili worked to bring six Afghan scholars and their families to the University of Pittsburgh, with several more on the way. She gained needed support of key partners, including the Institute of International Education's Scholar Rescue Fund, Atlas Network and donors.

Recognizing the success of the rapid response, the prestigious Open Society University Network invited the center she leads, the Center for Governance and Markets, to join it, ensuring longer-term support of these scholars.

"Scholarship does not happen alone. It happens in communities. This effort is Pitt's effort to preserve threatened intellectual communities so they can thrive into the future," Murtazashvili says.

# As Seen from Above: Seeing the Trees, the Forest and Space

Pitt is home base for some of the most advanced projects in the technology of space travel. In late 2021, the National Science Foundation Center for Space, High-performance, and Resilient Computing (SHREC) within Pitt's Swanson School of Engineering launched the team's third groundbreaking system of space computers and sensors on a SpaceX rocket. Two weeks later, they were in operation on the International Space Station (ISS).

Part of the system features sensors that can produce unprecedented, detailed views of both Earth and the space around ISS. A telescope camera the size of a toaster can view Earth at the level of individual trees, while another sensor faces the direction ISS is moving. Earlier, the SHREC team created a supercomputer that was flown to ISS; it's now one of the station's main tools for space-based experiments on computing, sensing, image processing and machine learning.

Alan George, director and founder of SHREC, says that Pitt researchers understand how to design for the harsh, high-radiation environment of outer space.

**"Most university technologies fail when deployed in space. So far, ours are working exactly as hoped."**



Alan George, director and founder of SHREC



At left, Pitt's SHREC-designed sensor, while still on earth; above, the sensor installed on the International Space Station



## Making Sense of What Webb Beams Back to Earth

Now that National Aeronautics and Space Administration (NASA) James Webb Space Telescope has launched and is in position a million miles from Earth, four Pitt astronomers are among the first to use the world's most advanced telescope. Its 21-foot-wide mirror takes in infrared starlight to look farther out into space—and farther back in time—than any other space telescope.



Assistant Professor Rachel Bezanson studies some of the oldest phenomena: how evolving stars assemble to form galaxies. Her team plans to point the Webb at a particular patch of space for 30 hours, creating images of distant galaxies with faint objects surrounded by a foreground of brighter, closer galaxies. "We're basically using that foreground collection of mass to boost the brightness of the things behind it and see even fainter objects than we otherwise would," she says.



Assistant Professor Evan Schneider will look back to the creations of galaxies, focusing on galactic winds, the gas that evolving galaxies shoot out from the force of exploding stars. Schneider received a Packard Fellowship for Science and Engineering in October 2022.



Associate Professor Carlos Badenes will take multiple short peeks throughout Webb's first year in space, hoping to catch a supernova in action.



Professor Jeffrey Newman will collect data on a broad cross-section of early galaxies in many different wavelengths of light across two patches of sky.



# Pitt Faculty Honors and Awards

248 AAAS Fellows

100 NSF CAREER Awards

39 Sloan Fellows

45 Guggenheim Fellows

10 NAI Fellows

3 National Book Award Finalists/Winners

52 National Academy Members (Medicine, Science and Engineering)

2 MacArthur Fellows

22 American Academy of Arts & Sciences Members

2 National Medals of Science/Technology and Innovation

**Initialisms:**

AAAS: American Association for the Advancement of Science  
NSF: National Science Foundation  
NAI: National Academy of Inventors

*Timeframe includes all years prior. Some organizations have not announced their 2022 winners.  
Source: Official websites of organizations giving out each award*



Lillian Chong, associate professor of chemistry, and her graduate student, Anthony Bogetti,

were part of a team that received highly prestigious recognition from the Association for Computing Machinery with its Gordon Bell Special Prize for High Performance Computing-Based COVID-19 Research. The Gordon Bell Prize is commonly known in the scientific community as the “Nobel Prize of supercomputing.” They generated atomically detailed views of how the spike protein of the coronavirus opens up before latching onto cells during infection with a resolution that is impossible to achieve experimentally.



Christopher J. Nygren, associate professor

of Renaissance and Baroque Art, won the 2022 Phyllis Goodhart Gordan Book Prize for the best book in Renaissance studies from the Renaissance Society of America for his book, “Titian’s Icons: Charisma, Tradition, and Devotion in Renaissance Italy,” about Titian, one of the greatest painters of the Renaissance, focusing on his status as the creator of a miracle-working icon.



Of the 45 Guggenheim Fellowships awarded to Pitt faculty members, two were awarded in 2022: to Yona Harvey (left), associate professor of English, and Keisha N. Blain (right), then associate professor of history.



During her 50-year career, poet

Toi Derricotte has won many awards, including being named a finalist for the National Book Award for her 2019 collection “I: New and Selected Poems.” But Derricotte, at Pitt since 1996 and now professor emerita in the Department of English, is in the pantheon of American poetry. She received the 2020 Frost Medal from the Poetry Society of America for distinguished lifetime achievement in poetry, an award previously won by notables such as Wallace Stevens, Marianne Moore, Gwendolyn Brooks, Allen Ginsberg, Adrienne Rich and John Ashbery.



Xu Qin, assistant professor of research methodology in the School of Education, was named a Spencer fellow by the National

Academy of Education with support from The Spencer Foundation. Qin has developed statistical methods and software for investigating the total impact of changes to any part of the student experience.



## Rethinking Black Banjo Heritage

**Maya Brown-Boateng,** PhD student in ethnomusicology, Department of Music

The banjo has been expropriated from its African roots, first exploited in American popular culture in minstrel shows, then appropriated in white music styles such as bluegrass. As part of reclaiming the banjo as an instrument, a music and a history, Brown-Boateng studies how to recenter and rethink race in the erasure of Black banjo performance and the efforts of Black banjoists today to perpetuate Blackness through banjo histories and sounds.

Brown-Boateng, a teaching fellow in ethnomusicology, received a 2021 Fulbright fellowship to conduct research in Jamaica.

An accomplished banjo player herself—she won an ALL FRETs foundation grant in 2019 for her playing—Brown-Boateng studies coalition building among Black banjoists and the changing meanings of Blackness and banjo performance in the United States and Jamaica.

“My dissertation is titled ‘Following the Sounds of the Banjo,’ reflecting the significance of this instrument,” she explains. “It has taken me on a journey through peculiar moments in history, curious performance spaces and critical discourses regarding difference and meaning making.”



# Rankings

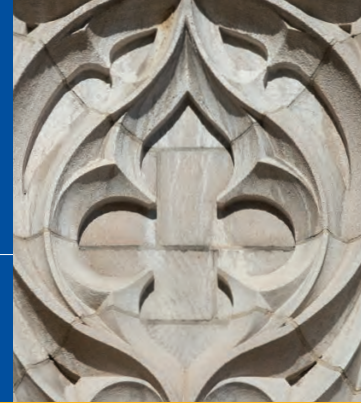
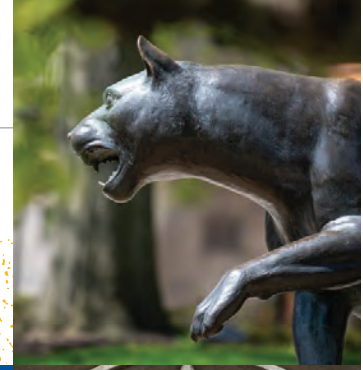
## University Ranking by the Academic Performance Center

**#8** **TOP 50**  
Nationally Internationally

Pitt is eighth among U.S. public schools nationally, and in the top 50 internationally, out of more than 3,000 higher education institutions based on academic performance indicators that reflect the quality and quantity of its scholarly publications.



**#5** by Subject, 2022  
**PHILOSOPHY**



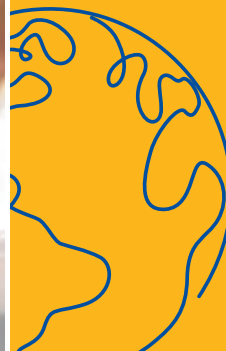
## ShanghaiRanking's 2022 Global Ranking of Academic Subjects

**Biomedical Engineering**

**#7** **#18**  
Nationally Internationally

### Pitt is in the top 50 in the world in 10 other subjects:

business administration, clinical medicine, dentistry and oral sciences, education, human biological sciences, library and information science, pharmacy and pharmaceutical sciences, psychology, public health and statistics



## Biomedical Engineering

**#7** **#12**  
Nationally Internationally







**U.S. News & World Report**

**Best Global Universities, 2022 Subject Rankings**

**#11** Infectious Diseases **#4** Surgery

**U.S. News & World Report Best Graduate Schools, 2022**

**#1**

**Best Online Master's in Nursing Programs**

**#15**

**Best Online Finance MBA Programs**

**#7**

**Best Psychiatry Programs**

**#10**

**Best Surgery Programs**

**#7**

**Doctor of Nursing Practice**

**#5**

**Medical Schools: Research**

**#8**

**Global Policy and Administration Programs**

**#10**

**Medical Schools: Primary Care**

**#14**

**Doctor of Nursing Practice Administration/Management**

**#7**

**U.S. News & World Report Best Colleges, 2022**

**Best Bachelor of Science in Nursing Programs**

**#9**

**In fiscal year 2021, Pitt was ranked ninth in awards received from the National Institutes of Health.**



# Rethinking Credit Scores



**Stefania Albanesi,**

professor, Department of Economics

Albanesi is overturning conventional wisdom about debt, credit and women's employment. In 2017, she analyzed an enormous data set of credit scores and mortgage defaults to upend the story of the 2007-09 credit crisis by showing that borrowers with higher credit scores—not lower-credit subprime borrowers—accounted for an outsized percentage of mortgage defaults.

Her model using artificial intelligence to predict default was better than existing credit rating agency models.

Researching the effects of the COVID-19 pandemic on women's employment, she testified in March 2022 before the U.S. House Committee on the Budget about job losses for women, which were nearly twice as high as men's during the pandemic and have yet to return to prepandemic levels, especially for women of color. Without family leave, flexible work schedules and childcare, Albanesi explained, women's participation in the workforce may continue to decline in the United States.

"The expansion of women's participation in the workforce boosted aggregate economic performance, increasing productivity and the standard of living for all," she testified. "This important economic engine of economic growth has stagnated in the last 30 years and is now falling. The concern is that the setback for women may be long lasting."

## Answering Big Questions through Collaboration

# Pitt Momentum Funds: A Game Changer



In 2019, Pitt restructured its internal grant funding to motivate the development of large-scale innovative, interdisciplinary projects for maximum impact in research, scholarship and creative endeavors. Momentum Funds help researchers to engage—at the early stages of collaborative projects; then, when building capacity; and at the scalable level.

**32** In 2022, 32 research projects received Momentum Funds awards. Among them are the following:

- Michelle Reid-Vazquez, associate professor in the Department of Africana Studies, is working with collaborators in Africana Studies, the University Library System, the School of Education and the School of Public Health on the project Race, Migration, Education, and Healthcare to address historical and contemporary struggles of Black and Brown communities and to enhance the visibility and knowledge of Western Pennsylvania’s ethnic communities of color—African American, African diasporic, Asian American and Latinx. Researchers are gathering, analyzing and sharing data to create digital resources. The study aims to offer potential interventions in the present and future that are informed by these communities’ intersecting geographies and linked social experiences in the region.
- School of Computing and Information faculty led a project with colleagues in the Departments of History and Philosophy of Science, Psychology and Anthropology to explore concerns over fairness, accountability and transparency in applying artificial intelligence (AI) applications, asking how cultures perceive AI principles and acceptable ground rules for global AI governance.
- Researchers in the Department of Industrial Engineering, University Center for International Studies, School of Social Work, Joseph M. Katz Graduate School of Business and School of Education are adapting marketable, high-demand skills in targeted areas to meet workforce needs at sites in Titusville, Pennsylvania; Lagos, Nigeria; and Tuver, India.



“

This is why we’re here as a university ... negotiating the present, creating a just and vibrant future and scaling up to achieve a worldwide positive impact. Making a concept bigger might mean making it different.

”

Pitt Chancellor Patrick Gallagher



- Faculty from the School of Dental Medicine, Department of Orthopaedic Surgery, Department of Bioengineering and Department of Pharmaceutical Sciences are creating a 73-member consortium on bone and mineral research on musculoskeletal disorders, bone injuries, osteoporosis, cancer and regenerative medicine.



## Pitt's Unique Tech Resources Power Research

Left to right are Center for Research Computing co-directors Adam Hobaugh and Kim Wong.

Pitt researchers have unparalleled technology resources through the globally recognized Pittsburgh Supercomputing Center (PSC) and Pitt's Center for Research Computing. Both centers provide cutting-edge hardware and software and—importantly—experience, training and guidance.

PSC is a pioneering computational research collaboration between Pitt and Carnegie Mellon University, created decades ago to apply unprecedented supercomputing power to solving the largest and most challenging problems in science and medicine. PSC's recent collaborations include studying genetic mutations in disease, designing advanced materials to reduce pollution and improve industrial processes and digitizing historical documents about regional development.

Since 2011, PSC has been at the heart of the National Science Foundation (NSF) Extreme Science and Engineering Discovery Environment (XSEDE), a global system enabling scientists to share computing resources, data and expertise. The XSEDE program funded and enabled research on a dizzying range of topics, from cancer and COVID-19 to predicting earthquakes and analyzing Twitter.



900 PROJECTS

\$1.5B IN RESEARCH ACTIVITY

PSC is poised to play an even more vital role in leading a new generation of democratized computing. In 2022, PSC was tapped to serve as one of the lead institutions in XSEDE's successor program, Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support. NSF awarded PSC a five-year, \$7.5 million award to develop and support infrastructure to make computational time accessible for investigators from fields that have not traditionally used advanced computing, such as the humanities.

PSC is helping to lead a collaboration providing computing, software and data infrastructure as part of the international network in National Institutes of Health's HuBMAP project to create tools for a cellular Google Maps of the human body (see page 10).

In addition to having strong relationships with federal agencies, PSC is supported by the Commonwealth of Pennsylvania and private industry. By any measure, PSC is an excellent return on investment, as it supports more than 900 projects representing approximately \$1.5 billion worth of research activity across the country.



## Rethinking Sustainability



**Eric Beckman,**

Distinguished Service Professor,  
Swanson School of Engineering

In his three decades at Pitt, Beckman has been the center of creating innovative materials and products, from researching to patenting to founding startups. He cofounded the company Cohera Medical, Inc., based on his development of the surgical adhesive TissuGlu, an Edison Awards Gold winner. He cofounded Pitt's Mascaro Center for Sustainable Innovation and helped to develop the center's circular economy program, the first U.S. graduate program to teach designing sustainability into new products to address the challenge of global waste.

"The current linear consumption economy of 'take, make, waste' is wholly unsuited for exponential global growth," says Beckman. "Principles of a circular economy, however, improve efficiency and eliminate waste by designing sustainability into a product, from its base materials and construction to packaging, delivery and life expectancy." His team aims to alter the chemical structure of polyethylene through nano-engineering to create a recyclable material that maintains conventional plastic's valuable qualities, such as maintaining freshness by keeping out water and oxygen.

# University of Pittsburgh: Five Campuses, One University

Since its founding in 1787, the University of Pittsburgh has never stopped pushing the edge of what's possible. With multiple discoveries, Pitt is recognized as a world-class research university, one of the most innovative in the world. Pitt is focused on the impact and the relentless pursuit of change for good.

**Pitt comprises five campuses: Pittsburgh, Bradford, Greensburg, Johnstown and Titusville.**

Pitt is a hub for creativity, research, artistic expression, critical thinking and debate about the world's most pressing issues, such as climate change, poverty and health care. Pitt opens the door to an internationally and nationally ranked university experience that provides access to excellence for promising students from all backgrounds. In 2021, Pitt conferred more than 8,600 bachelor's, master's, doctoral and professional degrees, and awards more than 1,300 certificates annually.

## The impact of Pitt's research in Pennsylvania, 2021:

**\$1.9B** / **9.2K** / **\$53.8M**

- Generated \$1.9 billion in economic impact
- Supported and sustained more than 9,200 jobs
- Produced \$53.8 million in state and local taxes

## The impact of Pitt's research nationally:

**\$207.8M** / **607**

Federal and nonfederal research-related goods and services expenditures exceeded \$207.8 million during Fiscal Year 2021 and included transactions with vendors in 607 U.S. counties.

*Source: Institute for Research on Innovation and Science, University of Pittsburgh  
Federal Research Funding: Spending Report, FY21*



Pittsburgh Campus



Pitt-Bradford



Pitt-Greensburg



Pitt-Johnstown



Pitt-Titusville



# Rethinking Materials and Nature



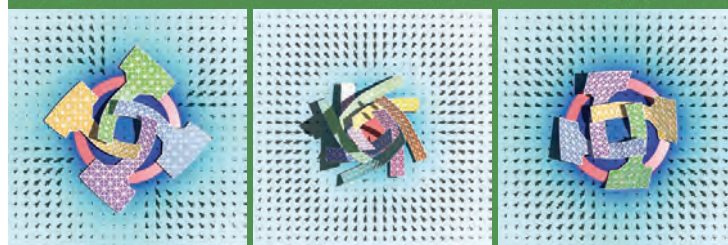
**Anna Balazs,**

Distinguished Professor and  
John A. Swanson Chair of Engineering,  
Swanson School of Engineering

Balazs, elected to both the National Academy of Sciences and National Academy of Engineering, a first for a Pitt faculty member, is renowned for her creative and imaginative pioneering work in the field referred to as biomimicry or soft robotics, in which synthetic materials in computational models display behavior similar to that of living creatures, with multiple materials interacting in cooperative and coordinated ways, representing unprecedented possibilities for creating entirely new materials for a vast range of applications.

With colleagues from Princeton University, she is researching the potential to induce two-dimensional polymer sheets to form spiral patterns under their own power without outside direction, a project inspired by the Henri Matisse painting “La Danse.” Such spirals are fundamental patterns of biological and physical organization, from the DNA double helix to spiral galaxies. Using computational modeling, multiple sheets of passive, uncoated polymer assembled themselves autonomously into a structure looking like a tower that collapsed into an interwoven, rotating pattern.

“The whole thing resembles a thread of twisted yarn being formed by a rotating spindle, which was used to make fibers for weaving,” Balazs explains, “except there is no spindle; the system naturally forms the intertwined, rotating structure.”



**DRIVEN**

EXPLORE INNOVATE

INNOVATOR WONDER

POSSIBILITIES **BY**

CONNECTIONS DATA

PURPOSE LEADER

FORGE **THE** INSIGHT

COLLABORATION

DISCOVERER ACT

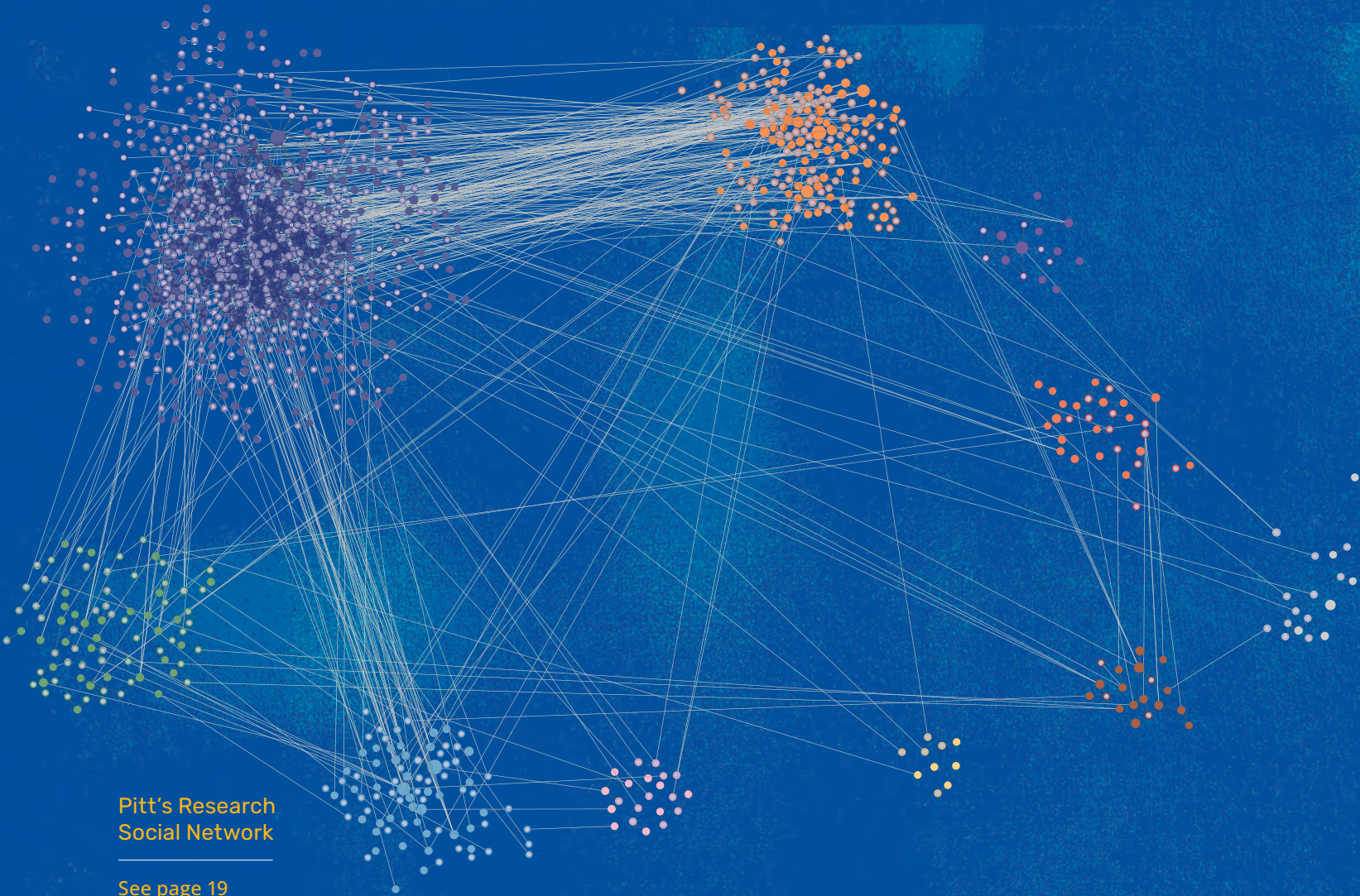
THRIVE **SEARCH**>

APPLICATION WORK



Colorful, enlarged images of microorganisms serve as backdrops in Pitt's Center for Vaccine Research (pictured at left).

Some of the artwork is featured on this report's inside front and back covers.



**Pitt's Research  
Social Network**

See page 19



University of  
**Pittsburgh**

Office of the Senior Vice  
Chancellor for Research

710 Cathedral of Learning  
4200 Fifth Ave.  
Pittsburgh, PA 15260

[research.pitt.edu](http://research.pitt.edu)