

Carnegie  
Mellon  
University

MAKE  
**POSSIBLE**

THE CAMPAIGN FOR  
CARNEGIE MELLON UNIVERSITY

SEE WHAT WE'LL  
MAKE POSSIBLE  
*together.*



SEE WHAT WE'LL  
MAKE POSSIBLE  
*together.*

*What will the* **NEXT GREAT PHILANTHROPIC**  
**INVESTMENTS** *in* **CARNEGIE MELLON UNIVERSITY**  
**MAKE POSSIBLE?**

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**SINCE OUR FOUNDING,  
CARNEGIE MELLON  
UNIVERSITY AND  
OUR PEOPLE HAVE  
ENVISIONED AND  
SEIZED OPPORTUNITIES  
BEFORE ANYONE ELSE.**

We've been unafraid to take the risks — to make the bold choices that revolutionize industries and change lives for the better.

The first degree-granting drama program.  
The first school devoted to computer science.  
The first academic program in robotics.

Data-driven public policy for good.  
Business paradigms that embrace collaboration, technology and analytics.  
Transition design for a changing planet.  
Artificial intelligence and automation with ethics at their core. Humanities and social sciences with real-world applications.

These daring investments in our future have paved the way for Carnegie Mellon to lead at the intersection of technology and humanity. It's at this nexus where we make the advances that become a critical part of every corner of society.

**THIS IS ABOUT  
MORE THAN THE  
THINGS WE MAKE.**

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**THIS IS ABOUT**  
*what we*

**MAKE  
POSSIBLE.**

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Society stands at a new frontier of what's possible.  
And it begins at Carnegie Mellon University.

This is a unique moment for CMU to build on our  
momentum. To create new innovations in the arts,  
sciences, technology, business, the humanities  
and policy. To shape the future.



FROM THE CAMPAIGN CHAIR



**At Carnegie Mellon University, we're used to placing big bets.**

We have been the pioneer in creating, transforming and leading the fields that have defined modern industry,

culture and humanity because we were willing to make the leap at just the right moment in history. This vision has allowed us to grow at an unprecedented velocity to take our position among the most highly regarded institutions of higher education.

Today is another important moment in CMU's history. *Make Possible: The Campaign for Carnegie Mellon University* is about more than the investment we are committing toward our future. It's about the impact we will have on this institution, on our talented students, faculty and staff, and on the world around us. It's an impact that may be a once-in-a-generation opportunity to place CMU at the forefront of innovation and education that our world critically needs.

For the Tartans of today and those who will be the leaders of tomorrow — and for our global community — join me in making a brighter future possible.

David Coulter (TPR 1971)  
CMU Trustee, Campaign Chair and Alumnaus

FROM THE PRESIDENT



**Carnegie Mellon has always responded to society's greatest challenges with a trademark fearlessness.**

Here, we have gathered the most intelligent, inventive and collaborative researchers, educators and creators on the planet.

Our students, faculty, staff and alumni are relentless in their pursuit of what's next for humanity. They seek not only to identify the most pressing issues, but to work together to solve them, and then to ensure that their benefits are shared by all in society.

At our core, we ask: How can we make the impossible possible?

*Make Possible: The Campaign for Carnegie Mellon University* will bring those possibilities to reality. Together, we will build the resources that accelerate our community's vital work. We will educate and prepare students to become future leaders. And we will tackle the challenges whose solutions lie at the nexus of technology and humanity — just where CMU has developed leading expertise.

This is our moment. If we are very intentional, if we are unapologetically bold, and if we commit to taking risks, Carnegie Mellon will take the lead in writing the story of this century.

I'm excited to see what we'll make possible, together.

Farnam Jahanian  
President  
Henry L. Hillman President's Chair

**Together, we will:**

Accelerate advances in technology that enhance the human condition.



Fuel artistic expression and creative inquiry to shape modern culture.



Achieve breakthroughs in discovery by transforming how scientific inquiry is pursued.



Foster a dynamic experience that enables our students to thrive throughout their lives.

This bold vision begins today with what we'll

**MAKE POSSIBLE.**



TECHNOLOGY AND HUMANITY

CHANGING THE WAY WE LIVE, WORK  
AND CONNECT *to one another*—

**FOR GOOD.**

As our daily lives become increasingly interwoven with and enhanced by technology, the world needs experts who can ensure that progress in the digital realm leads to prosperity across the world, benefiting people from all walks of life.

**At Carnegie Mellon, we're not only up for the challenge; we're ready to lead the charge.**



# INNOVATING for the GOOD of ALL.



Faculty in the Block Center's cross-disciplinary team include **David Danks**, philosophy department head and L.L. Thurstone Professor of Philosophy and Psychology; **Amelia Haviland**, associate professor of statistics and health policy; **Tom Mitchell**, E. Fredkin University Professor of Machine Learning and Computer Science; **Rahul Telang**, Block Center director and professor of information systems and management; and **Lee Branstetter**, professor of economics and public policy.

**Smart homes. Biometric authentication. Automated vehicles. Inventions like these not only bring greater efficiencies and convenience, but also raise concerns about privacy and whether the workforce has adequate skills for the jobs that these advances will create.**

With the foresight to see these issues before they arise and the expertise to address them, Carnegie Mellon is equipped like no one else to solve these challenges.

Based in the Heinz College of Information Systems and Public Policy, the Block Center for Technology and Society has the momentum to do just that. Established through a gift from CMU Trustee Keith Block and Suzanne Kelley, the Block Center examines the societal consequences of technological change and creates meaningful plans of action. Its key areas of focus include the Future of Work, which investigates the impact of technologies on workers and develops policy interventions that ensure the benefits of innovation are widely shared; and AI and Analytics for Good, which aims to ensure that technologies are harnessed to measurably strengthen our social fabric and improve quality of life.

While the Block Center addresses how emerging technologies will shape our day-to-day lives, another initiative supported by the K&L Gates Endowment for Ethics and Computational Technologies — which includes funding for faculty members,

doctoral and undergraduate students as well as a biennial conference — explores the ethical implications of new technologies.

And in the Dietrich College of Humanities and Social Sciences, philosophers examine the human impacts of developing robotic systems, while historians and statisticians collaborate to rigorously study how technologies can monitor and advance human rights throughout the world.

As our faculty, students and researchers push the boundaries of AI, the augmentation of human abilities and autonomous technologies, they are keenly concerned with examining how humans actually use these innovations and ensuring that new discoveries are harnessed to benefit all of society.

We are in the midst of revolutionary, worldwide change. With additional support, CMU will ensure that technology doesn't leave people behind — but instead improves their lives.

**“Innovation delivers powerful advancements that will have a profound impact on everyone. CMU sits at the intersection of technology and policy — uniquely positioned to bring together the public and private sectors to make the world a better place.”**

**KEITH BLOCK** (DC 1984, HNZ 1984)  
CMU Trustee and Alumnus

# HERE'S WHAT WE'RE *making* POSSIBLE.



**1 CMU is leading a revolution in manufacturing at an abandoned steel mill.** We are at the center of Mill 19, home of public-private partnerships bringing innovation to industry and expanding opportunities for workers, a few miles from our Pittsburgh campus. There, the nonprofit Advanced Robotics for Manufacturing and the Manufacturing Futures Initiative are harnessing CMU's world-leading research in areas such as automation, big data and 3D printing to bring about a new era of industrial manufacturing.

**2 CMU is leading the transformation of the financial services industry through its financial technology research.** In one project, Carnegie Mellon faculty and students are examining the vast potential for applications of blockchain by creating a localized cryptocurrency, CMU Coin. Faculty in the Tepper School and Heinz College are using the project as a living laboratory to evaluate the economic and social impact of emerging blockchain technologies.

**3 We're on our way to printing a beating heart.** CMU researchers in additive manufacturing — commonly known as 3D printing — are developing processes that could one day print human organs, potentially eliminating shortages for transplants. Bioprinting has so far created individual components such as functioning heart valves, but recent advances by pioneers in the College of Engineering hold the promise of printing entire replacement hearts and lungs.

## MORE HEALTHY INFANTS.

New moms value their maternity leave as a time of bonding and recovery. For Katie Whitehead, associate professor of chemical engineering, it was also a spark for a new area of research. Specifically, she is exploring how to genetically engineer the human cells in breast milk to revolutionize oral drug and RNA delivery, as well as gene therapy, for sick babies — something no one has done before. In 2018, Whitehead received a National Institutes of Health Director's New Innovator Award for her research, which could lead to noninvasive therapies for infants, such as delivering vaccinations orally instead of in a series of shots, tolerizing babies to allergens like peanuts, or treating a host of genetic disorders.

## FEWER FALLS FOR THE ELDERLY.

Hae Young Noh, associate professor of civil and environmental engineering, develops building vibration sensors that not only detect a person's movement, but also characterize that movement's intent — determining, for example, whether the individual is exiting the bed or experiencing a potentially devastating fall.

Eventually, Noh hopes to implement her sensors in smart buildings, where they could help seniors maintain their overall health and live more independently.

"Helping the elderly keep their independence really comes down to how much they can walk, handle personal tasks and cook for themselves," she says. "These kinds of devices will help them do that."



# FOR THE SECURITY OF **OUR DATA.**

**In today's wired world, people rely on technology in every aspect of their lives: shopping online, sharing stories on social media, and even inviting tech into their homes with smart devices and appliances. With these modern amenities, however, comes the issue of trust. Is our data really safe?**

Enter CyLab, CMU's security and privacy research institute and one of the largest centers of its kind in the world. Led by Director Lorrie Cranor, CyLab brings together experts from across the university, all fueled by a shared goal of creating a world in which technology can be trusted.

Cranor and her colleagues are expanding the boundaries of technology and, at the same time, protecting people when that technology — or the people using it — pose a threat. From biometrics and cryptography to network and password security and a host of other cybersecurity areas, CMU isn't just leading the future of technology; we are inventing the future of technology. Thanks to initiatives like CyLab and researchers like Cranor, Carnegie Mellon is at the forefront of cutting-edge research — while educating the next generation of security and privacy professionals — to make an increasingly digital world safe and trustworthy.



## FUELING ENTREPRENEURSHIP AND INNOVATION.

From nurturing the next big business idea to fueling an industry disrupter, CMU's Swartz Center for Entrepreneurship creates an environment where budding entrepreneurs grow and ideas thrive.

Made possible by a transformational gift from alumnus Jim Swartz (TPR 1966), the center builds on its adjacency to the Tepper School of Business at the dynamic Tepper Quad to give momentum to developing organizations through education and support.

Designed to be an ecosystem for students, faculty and alumni, the Swartz Center accelerates entrepreneurship at CMU by providing resources that include classes, mentorship, incubator space and access to funding. From designers to programmers, from engineers to data scientists, entrepreneurs from all of CMU's colleges are laying the foundation to launch new enterprises through this interdisciplinary initiative.

The Carnegie Mellon community has launched more than 300 startups in the last decade. By championing innovation and sparking collaboration, the Swartz Center is bringing the next great ideas to market.

## With your support, we will:

Create and inform technologies that will change societies, communities and individuals by accelerating CMU's leadership in artificial intelligence, machine learning, automation and other leading-edge fields of study.



Shape how humans will trust, limit and depend on future technologies by mobilizing our deeply interdisciplinary and collaborative culture and our world-leading faculty in computer science, engineering, ethics, policy, design, economics and business.



Ensure that technology advances the human condition and the health of our planet by expanding the study of how it impacts the environment, economic landscape, businesses, workers, income inequality and the way communities are governed.

## FOR THE SHARED PROSPERITY OF OUR FUTURE.

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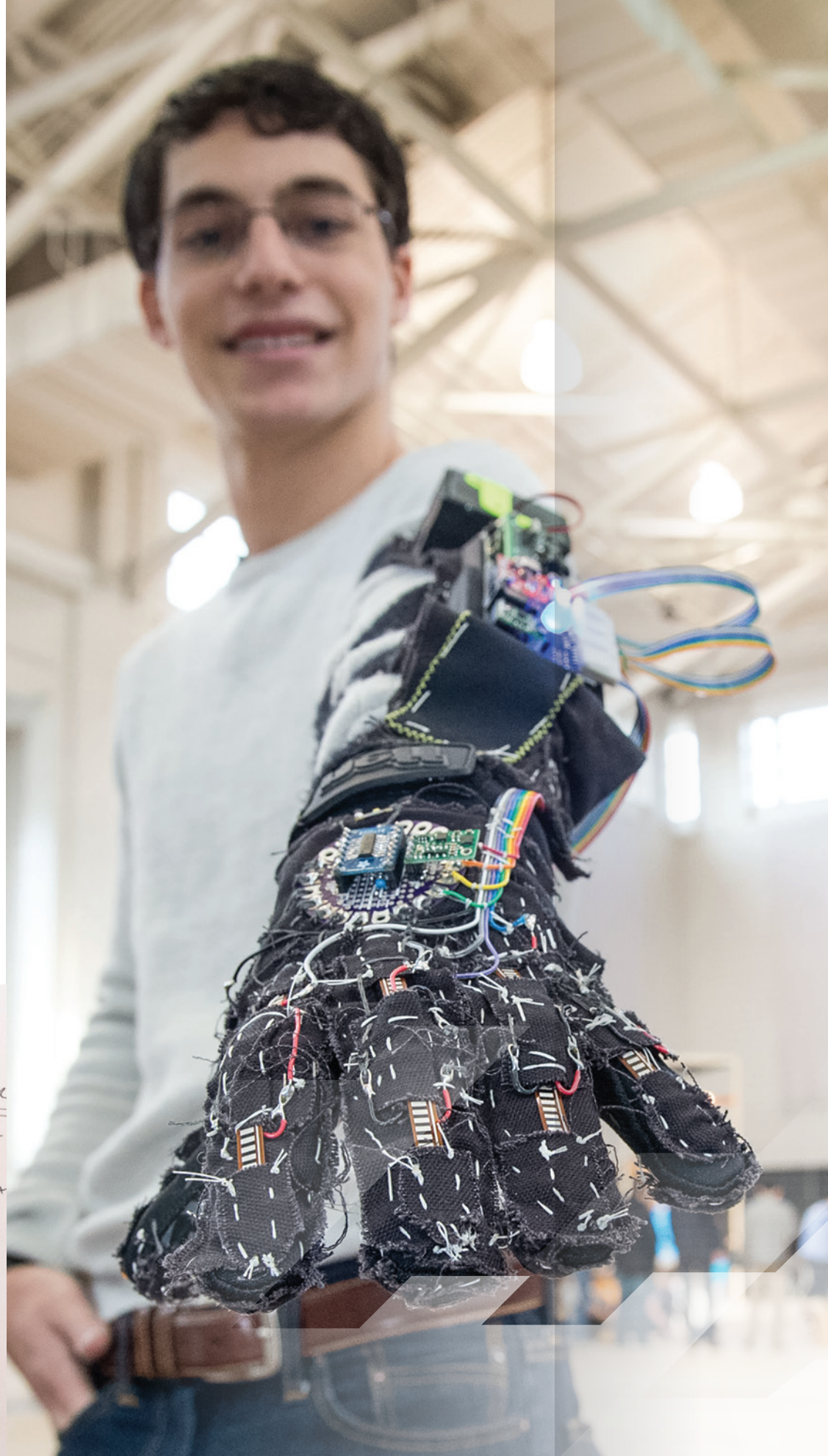
**By advancing our work in strategic areas of expertise, we'll deliver revolutionary innovation and ensure that both technology and society can transform for the greater good.**

## HIS RESEARCH COULD AFFECT EVERY BREATH WE TAKE.

Nicholas Muller, associate professor of economics, engineering and public policy, uses the lens of economics to reveal the damage that air pollution does not just to human health, but to the human condition as well.

Researchers have calculated the costs of pollution on our health. But Muller, a faculty member with appointments in the Tepper School of Business and College of Engineering, goes deeper, looking at the community costs of air pollution — which heavily impacts low-income groups — and how market-based policy can be shaped to reduce that impact.

His work demonstrates that environmental policy may be an especially effective tool to address income inequality. In the end, reducing pollution benefits everyone, but it can significantly improve the lives of the very poor.



*You can*  
**ADVANCE  
TECHNOLOGY  
FOR THE BENEFIT  
OF ALL PEOPLE.**

Your support will accelerate our work at the nexus of technology and humanity to better our society. Help us make it possible through:

**PROFESSORSHIPS**

Fuel faculty with funding that empowers their research, creative and teaching goals, and assist CMU in recruiting the brightest minds.

**FELLOWSHIPS AND SCHOLARSHIPS**

Secure a CMU education for students regardless of their financial circumstances, and help build a talented student body.

**SEED FUNDS AND FACULTY RESEARCH FELLOWSHIPS**

Support critical startup funding to accelerate promising areas of research.

**UNDERGRADUATE AND GRADUATE RESEARCH FUNDS**

Empower undergraduate and graduate students with the hands-on research experience that will prepare them to become leaders in their fields.

**CONFERENCE SUPPORT AND RESEARCH PRIZES**

Catalyze faculty and student research by facilitating connections with peers and providing awards that lay the foundation for the next round of discoveries.

**CURRICULUM INNOVATION FUNDS**

Foster innovation by CMU faculty to envision, test and implement advances that transform education for a rapidly evolving future.

TECHNOLOGY FOR  
THE GREATER GOOD:

THIS IS  
WHAT  
WE'LL  
*make*  
POSSIBLE.

“We’re currently living through a technological revolution. Things are going to be different — but there are tremendous opportunities. As an institution that has been at the forefront of many of these technologies, Carnegie Mellon faculty and students are well positioned to lead the way.”

**JOSÉ MOURA**

Philip L. and Marsha Dowd  
University Professor of Electrical  
and Computer Engineering

In 20 years, the earth’s population will top 9.6 billion people. Researchers in CMU’s FarmView initiative are collaborating with agricultural leaders and plant scientists to develop and deploy a unique, comprehensive system of sensors, robotics and AI technologies to solve the emerging global food crisis through improved plant breeding and crop management practices.

## ARTS AND CREATIVITY

EMPOWERING ARTISTS *and*

# IGNITING CREATIVITY.

The arts are essential to the human experience. And the thinking, challenging and questioning that they inspire are at the core of a Carnegie Mellon education. Our conservatory programs — integrated within a major research university and combined with a vibrant and unique interdisciplinary environment — spur creativity in our students and faculty, which leads to achievements on stage and screen; in galleries and communities; in the structures where we live, work and play; and in the very fabric of our culture.

**Just imagine what these creative visionaries will do.**



*All the*

# WORLD'S A STAGE.

And with expanded and enhanced performance and production spaces, CMU artists and designers will push the boundaries of their fields, creating work that generates conversation, defines new forms of art and sparks change.

## THE ARTS AND ENTERTAINMENT ARE IN THE MIDST OF A VAST SHIFT.

With on-demand access and user-generated content, professionals must now be versed in the latest technology as well as fluent in performance, writing, directing and design across media. Carnegie Mellon's College of Fine Arts — and its Schools of Architecture, Art, Design, Drama and Music — are widely recognized for educating creative leaders who shape their fields. Our graduates have produced some of the most compelling works that have transformed culture in the modern era.

CMU's continued leadership in the education of future artists requires inventive spaces that inspire students to create the connected, innovative experiences that today's audiences demand.

"Our creative facilities have served us well," says Peter Cooke, professor and head of the School of Drama. "It's just that the world — and technology — has changed. The stage is like a battleship. It has so much technology on it, under it, around it and above it, and we've got to keep right at that cutting edge."

CMU has already begun envisioning what artists of the future need now. The recently renovated Posner Hall has given flexible classrooms and studio space to the Master of Fine Arts program, the School of Music and the BXA Intercollege Degree Programs, allowing them room to collaborate and grow, while also expanding space for the School of Design in Margaret Morrison Carnegie Hall.



The next step in the university's vision is a campus arts center, with performance spaces, galleries and state-of-the-art laboratories dedicated to new technologies and educational programs in scenic costume, lighting and sound design, as well as music and video and media.

True to Carnegie Mellon's interdisciplinary approach, the facility would foster collaboration between disciplines — not just within the arts, but also with educators and researchers across campus.

These partnerships, in conjunction with advanced tools, programs, resources and technology, will deliver to students an unparalleled education — so they're prepared not just for what comes next, but to envision it and bring it to life.

"There's a revolution going on," Cooke says. "We've got to be able to prepare students for it. When students leave, I want them to leave with a portfolio of work that shows what they're capable of. When the opportunity comes, will they be prepared and ready to run with it?"

With your support, the answer to that question will be a resounding yes.

**"From Hollywood to New York and virtually all over the world, I have worked with and encountered and admired the remarkably talented CMU alumni on stage, on screen and behind the scenes. I'm so proud to be part of a university whose graduates inspire, entertain and enrich society with their creative achievements."**

**PAULA WAGNER** (A 1969)  
CMU Trustee and Alumna

## THEIR COLLABORATION IS REFRAMING ARCHITECTURE.

A partnership between two researchers is creating sustainable materials that improve building performance.



In the School of Architecture, associate professors Joshua Bard and Dana Cupkova are producing a novel hybrid process for printing and casting concrete — and it could only happen at a place like Carnegie Mellon.

“CMU’s uniqueness lies in the fact that we can combine artistic, creative thinking with technology and sciences,” Cupkova says. “Because we have these two pillars of art and science, we’re able to bring both of those into the School of Architecture. That’s an incredibly rare place to be.”

Called Profile-3D-Printing, this manufacturing process combines additive and subtractive techniques, integrating art and function to generate a more sustainable form of concrete for building components like those commonly used in the architectural precast industry.

While the research was led by Cupkova and Bard, the pair worked with a team of experts from CMU’s School of Architecture, Robotics Institute and Materials Science Lab — an unusual combination spurred by the university’s culture of collaboration across disciplines.

“We’re interested in the intersection of high-performance building design and advanced manufacturing — and understanding that the implications of how we design and construct the built environment are massive,” Bard says. “This process will have a direct impact on material usage, energy usage and, ultimately, the built environment’s effect on human happiness and quality of life.”

Cupkova and Bard’s work is sure to transform the built environments of the future — and their innovation is possible because there are no barriers to collaboration at Carnegie Mellon.

## HERE’S WHAT WE’RE *making* POSSIBLE.

- 1 CMU will literally launch the first museum to the moon.** In 2021, MoonArk will be aboard the first private delivery to the lunar surface by CMU spinoff Astrobotic. Designed and curated by CMU, the MoonArk is filled with visual narratives that combine the arts, humanities, sciences and technologies. This collaborative collection shares the narrative of humankind and sparks wonderment for future generations. Containing hundreds of images, poems, music compositions, nano-objects, mechanisms and earthly samples, it’s built to last for thousands of years.
- 2 Dietrich College’s Department of English is embracing technology to advance creative expression.** Faculty members have developed new digital tools available to any CMU student to improve writing technique. The department hosted its first TripTech, a three-day teaching, coding and hip-hop event. And it recently unveiled a “story dispenser” machine in the Cohon University Center, where anyone can be transported by the written word, simply by pressing a button to receive a randomly selected short story or poem from a faculty member.
- 3 CMU students are using a game to teach kids empathy toward their autistic peers.** The game, called Prism, earned the gold medal at the International Serious Play Awards. Gaming has transformed personal interactions into meaningful learning moments. CMU’s Entertainment Technology Center and Center for the Arts in Society are revolutionizing the industry, developing games that have goals like teaching the fundamentals of physics, creating cultural dialogue and addressing conflict management.

## FURTHERING OUR MISSION TO SUPPORT ARTISTIC EXPRESSION AND CREATIVE INQUIRY.

By advancing our work in strategic areas of creativity, we'll ensure that artistic expression at CMU is even more collaborative and inventive.

### With your support, we will:

Spark new collaborations among artists, scientists, humanists and engineers.

Enable artists, performers and designers to create the next generation of great works within a modern built environment.

Foster the integration of design thinking across the university.

Make a CMU education accessible for exceptional student artists, architects, designers and performers, no matter their financial circumstances.

Increase opportunities for the CMU community to engage with the arts and take the lead in expressing, designing and advancing the human story.

## REIMAGINING ART *at the edge of* TECHNOLOGY.

Recently, students in CMU's Integrative Design, Arts and Technology (IDeATe) network produced a one-night-only presentation called *Pushing Air*. The event brought together music, soft sculpture and textile robotics for an immersive experience that combined visual and performing arts with technology.

During the evening, musicians were joined on stage by robotic sculptures, a light installation used plants as sensors, and audience members interacted with inflatable large-scale works. Launched in 2014, the IDeATe network connects technology and arts expertise from diverse Carnegie Mellon disciplines to advance education, research and creative practice.

# INCREASING REPRESENTATION *through* UNEXPECTED CHANNELS.

Born and raised in Miami, Master of Fine Arts student Nathalie Moreno was surrounded by and immersed in the culture, tastes and sounds of Cuba — and struggled with the often stereotypical representations of the Latinx body she saw in society.

Carnegie Mellon's School of Art has been the perfect place for Moreno, an interdisciplinary artist with a background in graphic and costume design, to hone her performance art and give a larger voice to the Cuban-American community. A fellowship made her ambition a reality — and support like this allows Carnegie Mellon to increase opportunities for artists from all backgrounds to have their voices heard.

Moreno's work might involve wigs, costumes and humor, but its goal is serious: exploring the Cuban identity and sharing stories about the pain of migration, losing home, and the ways that culture and personal histories travel through families.

"For those of non-Cuban descent, especially non-Latinx people," Moreno says, "I hope that watching another person tell their truth serves as an exercise of compassion."

*You can*

# INSPIRE ARTISTIC EXPRESSION

THAT EXPLORES THE HUMAN STORY.

Your support will build the collaborations that spark the next generation of exceptional creators, dynamic arts leaders and great works. Help us make it possible through:

#### PROFESSORSHIPS

Provide faculty with funding that empowers their creative endeavors and teaching goals, and assist CMU in recruiting the most talented artists and designers.

#### FELLOWSHIPS AND SCHOLARSHIPS

Open a CMU education to all students regardless of their financial circumstances, and help build a student body that challenges and fuels creative endeavor.

#### RENOVATED AND TRANSFORMED FACILITIES

Develop spaces for learning, making, creating and performing that enable students and faculty to do their best work and prepare them to enrich a rapidly evolving world.

#### SEED FUNDS FOR INTERDISCIPLINARY PROJECTS

Support projects that push boundaries and cross disciplines to create work that tells humanity's stories in new ways.

#### PROGRAM SUPPORT

Advance the genre-defying innovation in programs like IDeATe, BXA Intercollege Degree Programs, the Design Center and the Entertainment Technology Center.

EXPRESSION THAT MOVES  
THE WORLD FORWARD:

**THIS IS  
WHAT  
WE'LL  
*make*  
POSSIBLE.**

SubSurface: Site-Specific Sight and Sound — an interdisciplinary festival held in an inactive limestone mine in Armstrong County, Pennsylvania — brings together students and faculty from across campus to rethink performance spaces and how art and music are presented.

“It is a joy to watch our music students flourish into capable and confident individuals, many of whom have gone on to win jobs in major orchestras or direct their own ensembles. How fortunate I am to work in an environment where students can evolve and fulfill their unique potential.”

**LORNA MCGHEE**

Artist Lecturer, School of Music  
Principal Flute, Pittsburgh Symphony Orchestra



THE FUTURE OF SCIENCE

REDEFINING SCIENTIFIC  
DISCOVERY *to*

# BENEFIT HUMANITY.

We are in the midst of a global transformation, driven by a rapid acceleration in the scope, scale and ubiquity of digital and automation technologies and the availability of vast new sources of data. As this revolution marches on, Carnegie Mellon is positioned to lead it: harnessing our scientific prowess with our expertise in engineering and computer and data sciences to elevate human well-being.

PUTTING THE WORLD'S  
**BRIGHTEST  
MINDS** *to work*  
ON THE HUMAN BRAIN.

Eric Yttri, assistant professor of biological sciences; Barbara Shinn-Cunningham, professor of psychology, biomedical engineering, and electrical and computer engineering; and Pulkit Grover, associate professor of electrical and computer engineering and biomedical engineering, are some of the faculty from across CMU working to unlock the mysteries of the brain.

**CMU's Neuroscience Institute aims to unlock the brain's biggest mysteries. This cross-disciplinary initiative is accelerating our strengths, forging new connections across campus, and attracting new talent, ideas and resources for the betterment of humanity.**

Carnegie Mellon's interconnected ecosystem is uniquely positioned to bring revolutionary understanding to the human brain and behavior. Our collaborative faculty founded the fields of artificial intelligence and cognitive psychology. We helped develop Watson, the computer that bested the top "Jeopardy!" champions. We invented some of the world's first cognitive tutors.

Today, partnerships among neuroscientists, biologists, psychologists, statisticians, computer scientists and engineers at CMU are paving the way for similar groundbreaking achievements. Spanning the Mellon College of Science, Dietrich College, the College of Engineering and others, the Neuroscience Institute will advance the work of these partnerships.

Led by Director Barbara Shinn-Cunningham, the institute brings together the university's resources to expand collaborative research across the biological sciences, cognitive neuroscience, engineering and

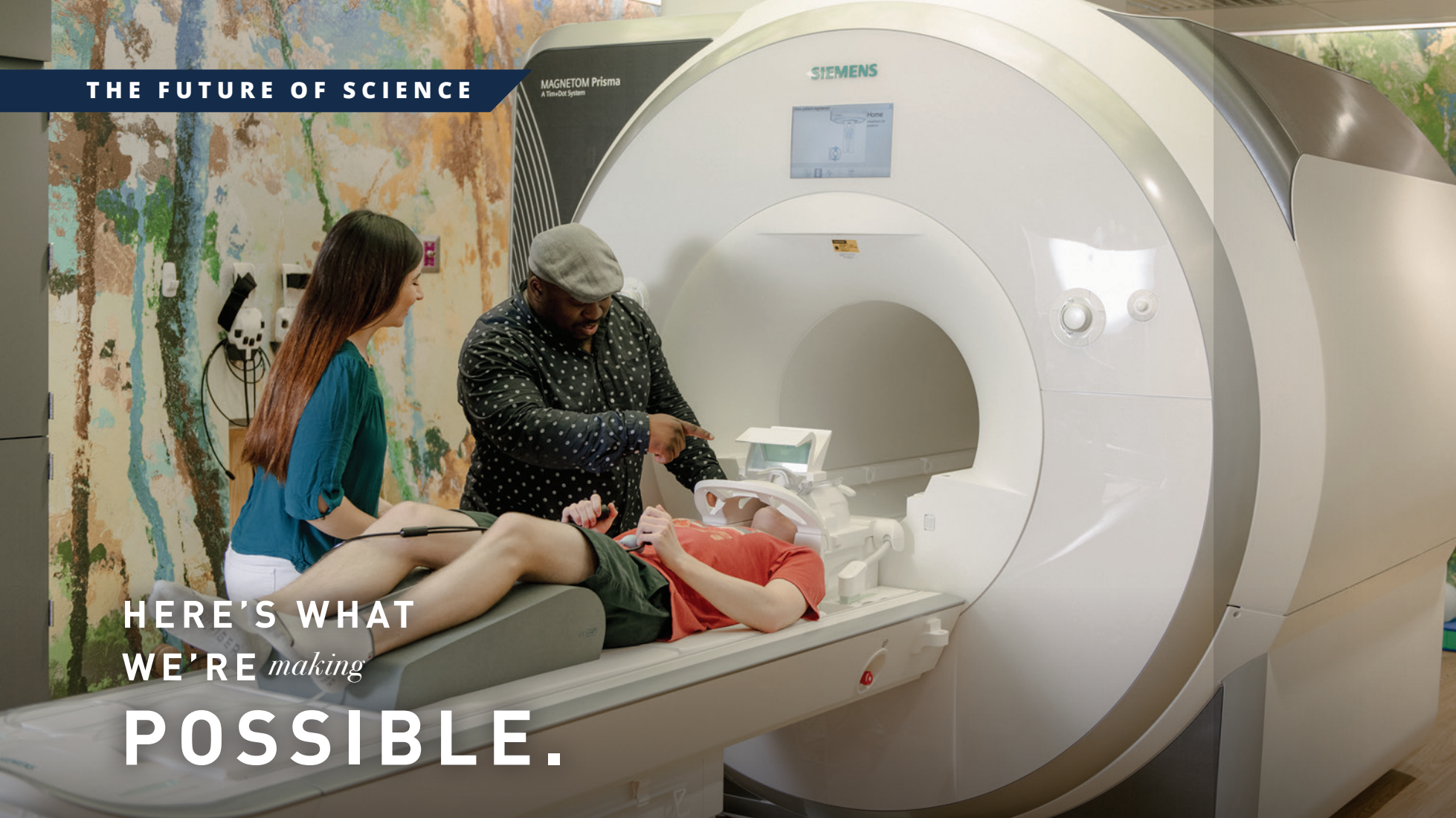
psychology, and to deepen connections to CMU's strengths in other disciplines. The goal: harnessing CMU's core competencies to conduct research that helps us to understand and improve brain function in both healthy and diseased brains.

Projects now underway could achieve brain-computer interfaces to circumvent paralysis and neurological disease, next-generation devices to aid people with hearing loss and other sensory issues, and breakthroughs in brain imaging and data analysis.

How do we get there? According to Shinn-Cunningham, the answer actually lies with both scientists and non-scientists: "At CMU, we have extraordinary engineers and mathematicians and theoreticians," she says. "And that's what's needed in neuroscience. Because of the collaborative spirit of this institution, we're in a perfect place and a perfect time to really make a name in neuroscience. And a melding of technology, engineering, innovation and collaboration around neuroscience is what will make that possible."

**"Philanthropic investment could help us find even more ways to assist people with neurological disorders, so they can become more integrated into society and live a full life."**

**BARBARA SHINN-CUNNINGHAM**  
Director, Neuroscience Institute



HERE'S WHAT WE'RE *making* POSSIBLE.

1

**What could researchers see if they were able to “step inside” their data at a microscopic level?**

A team from the Mellon College of Science has developed technology that first physically multiplies a biological sample to 100 times its original volume, then utilizes specialized virtual reality technology to manipulate the 2D microscopy images in 3D. Researchers are then able to literally view vast, complex sets of data from every angle, opening up for exploration new details of disease processes.

2

**The secrets of the universe are closer to being revealed — through lines of computer code and data science.**

CMU physicists are collaborating with statisticians and data scientists, using cutting-edge analytical techniques to decipher the massive amounts of data generated by modern cosmological experiments. The results could lead to revelations about dark energy and dark matter. And computer simulations of galaxies finally match our observations of the heavens — those developed at Carnegie Mellon were the first to include black holes.

3

**What if the human body could spark the solution to creating clean water?**

At the university’s cross-disciplinary Institute for Green Science, researchers have pioneered an oxidation process that mimics how the human body breaks down micropollutants to produce safer, cleaner water. This critical milestone in environmental sustainability could lead to widespread innovations in how this valuable resource is treated.

# EVOLVING OUR LABS *to* ADVANCE OUR RESEARCH.

Imagine reducing the time needed for an experiment from months down to just days. Robotics, artificial intelligence and big data are bringing about this new frontier of scientific research.

The convergence of the foundational sciences, machine learning and artificial intelligence, engineering, data analytics and computation — some of the many fields where Carnegie Mellon excels — will revolutionize scientific inquiry and lead to breakthrough discoveries. The next generation of laboratories will advance science at an unprecedented pace.

At CMU, that future is rapidly becoming reality. From a multi-million-dollar neuroimaging research facility, to state-of-the-art nanotechnology labs, to the powerful Pittsburgh Supercomputing Center, we’re amplifying the impact of our faculty and student researchers with the tools, spaces and equipment they need to

do cutting-edge work. With more data available than ever — more than any human can keep up with — an automated lab space in the Mellon Institute that will be used by researchers from different disciplines is key. Just one example: With robots that dispense chemicals, conduct multiple simultaneous reactions and analyze those reactions, scientists from the chemistry department could spend less time on repetitive lab work and focus their efforts on solving complex issues like fighting climate change through solar fuel creation.

By connecting our people with next-generation facilities, we’ll bolster multidisciplinary collaboration that leads to real-world solutions.

CREATING NEW  
PARTNERSHIPS  
TO ACHIEVE  
**GREATER  
BREAKTHROUGHS.**

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Science is on the threshold of a rapid revolution. With collaboration built in our university's DNA and strengths in computation, engineering and data analytics, CMU scientists will lead groundbreaking discoveries that affect all of humankind.

**With your support, we will:**

Advance new paradigms in scientific discovery, driven by interdisciplinary research and the convergence of disciplines.



Generate new breakthroughs by drawing on our strengths in data-intensive approaches and computational methods.



Create a physical environment that inspires innovation and accelerates scientific discovery.

**“There are things that we need to make better, things we need to fix about our civilization, our planet and our health.**

None of that happens without foundational science. Without foundational science, we can't change the environment. We can't change our health. We can't change the trajectory of our society. I see my investment in Carnegie Mellon as an investment in that future.”

**GLEN DE VRIES** (S 1994)  
CMU Trustee and Alumnus

## DOING THE WORK FROM DAY ONE.

Learning by doing and real-world problem-solving have always been at the core of a Carnegie Mellon education. And undergraduate research can have an incredible impact on a student's experience.

Undergraduates contribute meaningfully to research, explore areas of career interest and develop vital skills while learning about themselves in the process. It's a particular focus for the Mellon College of Science, where more than 70 percent of undergraduates participate in research. Funding like Summer Undergraduate Research Fellowships (SURF) and Small Undergraduate Research Grants (SURG), among others, puts these invaluable opportunities within the reach of students regardless of their financial situation.



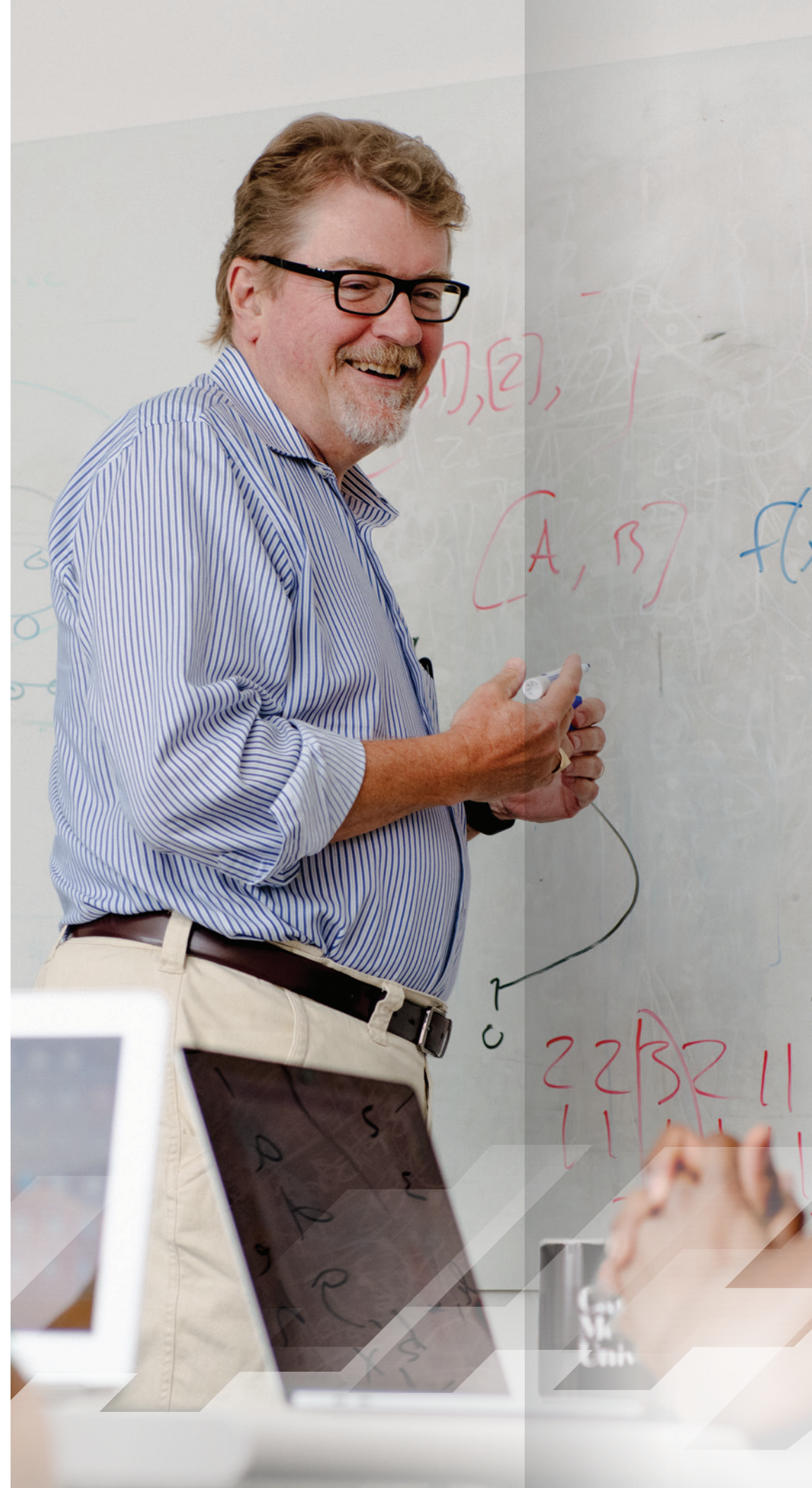
## HIS STUDIES OF PAST PATTERNS WILL HELP PREDICT THE FUTURE.

The goals of science are endless — and so are the potential outcomes. By using machine learning and artificial intelligence, CMU researchers accurately make predictions that lead to faster results.

Scientific discovery and medical interventions with real-world implications would leap forward if we knew which genes were responsible for a particular behavior, what sequence of genetic changes led to a particular disease, or how alterations in cell organization could influence cell behavior.

To get that data, researchers might have to perform thousands or even millions of experiments, exploring every possible path and analyzing the results. This could take years, if not decades. But with a method called predictive modeling, scientists can determine the most promising paths to pursue, exponentially faster.

Robert F. Murphy, founding head of CMU's computational biology department and professor of computational biology, biological sciences, biomedical engineering and machine learning, is a leader in advancing the new field of automated science. This combines predictive modeling with artificial intelligence to iteratively decide which experiments should be done and automated instruments to perform them. His methods are being used for problems as diverse as drug interactions, cell organization and cancer diagnosis. And because he and his team have automated the process of sorting through all of the potential consequences, the world will know safer drugs, better diagnostics and much more.



## *You can* ADVANCE NEW FRONTIERS OF SCIENTIFIC DISCOVERY.

Your support will augment foundational science with CMU's strengths in computation, engineering and data analysis to the benefit of humanity. Help us make it possible through:

### PROFESSORSHIPS

Support faculty with funding that empowers their research and teaching goals, and assist CMU in recruiting and retaining scientists with the vision to make breakthroughs and transform their fields.

### FELLOWSHIPS AND SCHOLARSHIPS

Ensure a CMU education for students regardless of their financial circumstances, and help prepare our students to become the next generation of pioneering scientists.

### FACULTY RESEARCH AND EDUCATION FELLOWSHIPS

Provide critical funding to accelerate promising areas of interdisciplinary research and to explore new scientific lines of inquiry.

### STATE-OF-THE-ART FACILITIES AND EQUIPMENT

Accelerate foundational science and new fields of discovery with enhanced spaces that revolutionize faculty and student research through automation and other advanced technology.

### UNDERGRADUATE AND GRADUATE RESEARCH FUNDS

Empower undergraduate and graduate students with hands-on research experience that will prepare them to become leaders in their fields.

### CURRICULUM INNOVATION FUNDS

Help the university envision, test and implement innovative advances that will transform education for a rapidly evolving future.

**“Today’s research generates massive amounts of data that we need to be able to cope with. Carnegie Mellon is positioned like nowhere else to advance this research, because we have developed extraordinary capabilities in machine learning, engineering, automation and statistical analysis.”**

**MARLENE BEHRMANN**

Thomas S. Baker University Professor of Psychology and Cognitive Neuroscience

A RADICALLY DIFFERENT  
APPROACH TO RESEARCH:

**THIS IS  
WHAT  
WE’LL  
*make*  
POSSIBLE.**

The Robotics Institute’s Panopticon Studio, a geodesic dome fitted with 480 synchronized video cameras that can capture fine details of the people they film, creates a mountain of data about human interaction — a full terabyte every two minutes. It’s an invaluable tool for faculty like John O’Brien, associate professor of accounting and experimental economics in the Tepper School of Business, who worked with robotics doctoral student Hanbyul Joo (CS 2016, 2018) and others to conduct mock trading exercises in the dome. The studio helped the team zero in on the facial expressions, eye contact and body language displayed by successful negotiators.

A young man in a yellow Brazil soccer jersey is running through a tunnel of cheering students. The students are holding hands and forming a human tunnel. The man is smiling and looking towards the camera. The background is a grassy area with trees.

THE CMU EXPERIENCE

REINVENTING THE  
UNIVERSITY EXPERIENCE  
*to invest in the*

# NEXT GENERATION OF SCHOLARS.

The greatest thinkers, researchers, creators and makers in the world inhabit our campuses. And when you join us in offering them support from every angle, there's no limit to what they'll make possible.

*Dynamic.*  
**ACCESSIBLE.**  
*Supportive.*  
**DIVERSE.**

This is the experience we strive to cultivate for each and every Carnegie Mellon student, from the day they apply, through their time on campus and throughout their lifetimes as alumni.

Education is at the heart of meeting the challenges we face as a society. At Carnegie Mellon, we attract some of the greatest minds from across the globe, and we supply them with knowledge, connections and opportunities that enable them to address those challenges. But benefiting from a life-changing CMU education is their first step.

Educational access is a top priority at CMU. Scholarships, fellowships and other financial aid are our most powerful tools to ensure that students from all backgrounds have the chance to begin their journey at Carnegie Mellon. For us, a vibrant student body includes diversity of race and ethnicity, gender, socioeconomic status and perspective. Scholarship support builds this diverse student body by reducing financial barriers.

Ensuring student success is also critical. We're evolving the CMU experience to meet students where they are — no matter where they're coming from — and give them additional support as they pursue their degrees.

Physical, emotional and educational support are crucial. Wellness programming and counseling services help students who are away from home

for the first time to manage stress. Professional and personal development is also a key focus, as experiences outside the classroom add to what students are learning in the classroom. That might mean providing funds for internships for students who can't afford to complete them without pay, supporting horizon-expanding travel or service projects, offering flexible spaces where students can study independently or collaborate with others, and harnessing instructional technologies to enhance their learning.

The solutions of the future will come from teams of diverse voices. When we make a Carnegie Mellon education more accessible and inclusive, and ensure that students have the support they need to prepare for careers and complete their degrees, we create future leaders who reflect this diversity.

And so the intentional recruitment and support of students and faculty members from a broad range of backgrounds doesn't just benefit those individuals. It benefits all of us.



**“Our world is diverse, and we want the university to reflect that diversity. By doing so, we shall best prepare all of our graduates for success.”**

**ANNE MOLLOY**  
CMU Trustee

**“Our mission as a university is to attract and retain the best and brightest minds in the world and to help them thrive at Carnegie Mellon, regardless of their socioeconomic status.”**

**JAMES H. GARRETT, JR.**  
(E 1982, 1983, 1986)  
Provost

# UNITING VARIED PERSPECTIVES IN THE PURSUIT OF EXCELLENCE.

## **There is no typical Carnegie Mellon student.**

Each student contributes unique strengths to our campus community, enabling CMU to better deliver on our mission of education and research that changes the world. This diversity of voices is how we will innovate in exciting new ways, and how we will ensure that the solutions we bring to fruition will leave no group behind.

This is why diversity and inclusion are core values at Carnegie Mellon. By cultivating diverse perspectives and promoting inclusion, we sustain the intellectual vitality that is so critical to our work and to our future. One way we do that is through the Center for Student Diversity and Inclusion.

The center is a hub for students of all backgrounds and experiences. It offers space for meetings, study and socialization. It provides support services and resources for success, creates a positive campus climate, and fosters dialogue between different groups. And it's a place where historically under-represented students and first-generation college students can find the support that helps them build the path to their futures.

## HELPING STUDENTS FULFILL THEIR POTENTIAL BY MAKING WELLNESS A PRIORITY.

Through academic rigor, exceptional faculty, and their own desire and aptitude for learning and growth, CMU students are positioned to become innovative leaders. Our vision for helping students develop their whole selves means we are increasingly focused on enhancing our health and wellness resources.

In order to thrive, our talented students benefit from finding a critical work-life balance. We empower them to do so through programming that addresses their academic, social and wellness needs.

CMU's holistic approach includes increased physical and mental health services, access to modern fitness facilities and classes, building community through new and renovated residence halls, and support programs that teach stress management and mindfulness.

"We are impacting our students in their day-to-day experiences and helping them build a foundation for well-being throughout their lives," says Gina Casalegno, vice president for student affairs and dean of students. "Carnegie Mellon is visionary in its approach to this work, and support is how we will fulfill this promise for our students."

These important elements outside the classroom complement students' education in the classroom, lab and studio — preparing them to be concerned citizens who have an impact on their communities and succeed in their careers.

CMU's investment in the student experience has been significant, but this is just a down payment on what we aim to achieve in this area. With your support, we will meet the urgent need to develop spaces and programs that enhance the welfare of our student body, so they live healthier, richer and well-balanced lives, and develop an even deeper sense of purpose and pride.



## HERE'S WHAT WE'RE *making* POSSIBLE.

**1 CMU has built a safety net to help promising students navigate life's obstacles and economic barriers.** The Tartan Scholars program provides students from limited-resource backgrounds with a support system that includes social, academic, emotional and financial assistance. The aim is to help them thrive as students, confidently advance through their college years and become leaders among their peers.

**2 Our students can stroll down the streets of France or interact with the people of Cuba, all without leaving the Pittsburgh campus.** They can travel the world through interactive experiences in the Askwith Kenner Global Languages and Cultures Room, an initiative of the Dietrich College. Using videoconferencing and virtual reality technology, the lab can prepare Tartans to study abroad or pursue a career in another country — or bring overseas cultures and sites to students who may not have the resources to travel internationally.

**3 Carnegie Mellon students make their ideas a reality.** Learning by doing, inside and outside of the classroom, is integral to the CMU experience. The College of Engineering's Tech Spark is a place where members of the CMU community come together to design and innovate. The state-of-the-art making facilities in Hamerschlag Hall and ANSYS Hall include design, machining, woodworking and 3D printing, as well as a large high-bay assembly space. Tech Spark will enable new manufacturing technologies, creative processes and innovative solutions that will stretch beyond our collective imaginations into the future.

**"This is a place that fosters constructive dialogue, and produces conscientious and socially aware people who are able to understand different cultural, political and social viewpoints. Receiving a scholarship has been crucial for my education. It's what allowed me to even apply to Carnegie Mellon, and I'm so thankful."**

**LUKE DEASY**

Dietrich College of Humanities and Social Sciences, Class of 2020

# SUPPORTING THE ENTIRE STUDENT JOURNEY.

By amplifying strategic areas of the student experience, we'll make each student's time at Carnegie Mellon more productive, more engaging and more enriching.

## With your support, we will:

### Innovate Learning

Grow CMU's leadership in learning science and in technology-enhanced discoveries that transform higher education.



Increase opportunities for students to make use of educational technology and take part in real-world experiences — from making and creating in the lab and studio, to studying and service in Pittsburgh and throughout the world.



Empower students with innovative 21st-century library spaces and expanded resources that will promote collaboration and accelerate educational initiatives.



Technology-forward, bright and inspiring libraries of the future, like CMU's Sorrells Library, will help learners explore new fields, knowledge and ideas.



### Build Community

Develop new opportunities and spaces for students to engage, and incorporate professional development and personal growth goals into the learning experience from the first semester.



Create residential neighborhoods where students can live, socialize, collaborate, exercise and recharge, with access to mentoring, advising and community support resources at their fingertips.



Expand support services for physical and mental health, and increase facilities for recreational fitness.

### Increase Access

Cultivate the pipeline of students who are prepared for a CMU education.



Grow endowed and expendable scholarship and fellowship support to increase accessibility and make our student body even more diverse.



Amplify academic support structures that prepare students for the next stage of their lives and careers.

## OUR EFFORTS WILL CREATE THE EDUCATION INNOVATIONS OF TOMORROW.

When educators incorporate practices from learning science into their teaching, they better meet the needs of 21st-century students, who come away with deeper understanding and greater ambitions.

At CMU, education itself is the subject of research and learning. The Simon Initiative harnesses learning science, educational practice and data analysis to create tools and shape methods that impact student learning outcomes on campus and around the world.

One way is through the Eberly Center for Teaching Excellence and Educational Innovation, which connects learning science and technology experts with CMU faculty and graduate students to design and disseminate new paradigms for teaching and learning. The center empowers educators with resources and support that include curriculum planning, teaching consultations, observations and analysis of student learning data.

Marsha Lovett, associate vice provost for teaching innovation and learning analytics, works in one of the Eberly Center's technology-enhanced classrooms.

Another way is by developing software and other tools that improve teaching and student performance. Recently, the university released a suite of digital programs, developed at a cost of more than \$100 million, that educators, researchers and organizations can adopt and further evolve for free. By providing open-source access to learning technologies, CMU is engaging the global community in an education revolution.

The Simon Initiative and Eberly Center are just a few of the vehicles through which CMU is advancing the science and practice of education, and maximizing the classroom experience. With increased support, we will give educators the tools and support that will make their work even more relevant and rewarding.



*You can*

## CREATE A CAMPUS ENVIRONMENT THAT ACCELERATES STUDENT SUCCESS.

Your support will reinvent the university experience to enhance intellectual development, professional growth and personal well-being. Help us make it possible through:

### CAMPUS INFRASTRUCTURE

Enhance the CMU community with new and renovated residence halls; dynamic instruction and making spaces; and comprehensive, state-of-the-art facilities that promote health and wellness and bolster athletics and recreation programs.

### PROGRAM SUPPORT AND FUNDS

Augment critical programs and services in student health, counseling, wellness, athletics, service learning, career preparation and advising — all of which greatly impact the CMU student experience and ensure classroom success.

### FELLOWSHIPS AND SCHOLARSHIPS

Increase access to a CMU education for students regardless of their financial circumstances, and help build a diverse, talented and inclusive student body.

### EXPERIENTIAL LEARNING AND SEED FUNDS

Fuel students' journeys as leaders, citizens and scholars through hands-on learning opportunities and technology-enhanced learning initiatives.

### UNIVERSITY LIBRARIES

Grow and transform CMU's library spaces to meet the needs of our students and faculty and to advance research, learning and knowledge sharing throughout our community of scholars.



## OPENING THE DOOR TO A BRIGHT FUTURE.

**The Tepper Quad is the model for how physical spaces can advance a new vision for higher education.**

CMU Trustee and alumnus David A. Tepper (TPR 1982) had long advocated for a new home for the Tepper School of Business, and he backed his idea with the lead gift to make it possible. The Tepper Quad building is a campus anchor, bringing together innovative spaces devoted to education, collaboration, campus life and wellness — where the open, light-filled design encourages new ideas and unexpected partnerships between colleagues. More than 1,200 supporters joined David Tepper to make the vision a reality and achieve its promise.

Opened in 2018, the Tepper Quad sits purposefully at the heart of Carnegie Mellon's campus — the ideal spot to facilitate these interactions. This emphasis on interconnectedness reflects the Tepper School's model for 21st-century business education and research, which convenes faculty, students and industry leaders for interdisciplinary initiatives that address critical issues such as health care and sustainability.

Along with the Tepper School, the building houses the Coulter Welcome Center, Rohr Commons, the Swartz Center for Entrepreneurship, and the Eberly Center for Teaching Excellence and Educational Innovation, among others. The Tepper Quad is fulfilling David Tepper's aspiration for a hub where people from across campus can learn, connect and challenge each other to create our shared future.

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**EMPOWERING THE  
AMBITIOUS PEOPLE,  
PROGRAMS AND  
INNOVATIONS THAT  
WILL TRANSFORM  
WHAT'S NEXT FOR  
HUMANITY...**

**THIS IS  
WHAT  
WE'LL  
*make*  
POSSIBLE.**



“CMU leads the world in research, innovation, creativity and education because we have been fearless in our choices. Today we are benefiting from those choices. Now is the time to make possible our sweeping vision by making the next bold investment in Carnegie Mellon. A bold investment for our students, faculty and staff. A bold investment for humanity.”

**JAMES E. ROHR**  
Chair, CMU Board of Trustees



THE FUTURE CAN'T WAIT.  
AND NEITHER CAN WE.

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Our charge has never been clearer.  
Our potential has never been more promising.  
Our work has never been more vital.

JOIN US.

TOGETHER, *we will make this* **BOLD FUTURE**  
*for* **CARNEGIE MELLON** *and* **OUR WORLD**

**POSSIBLE.**

# **Carnegie Mellon University**

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