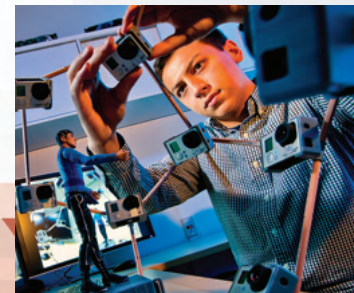




UNIVERSITY OF MARYLAND
STRATEGIC PARTNERSHIP
MPOWERING THE STATE



2022



CELEBRATING 10 YEARS OF COLLABORATION AND IMPACT

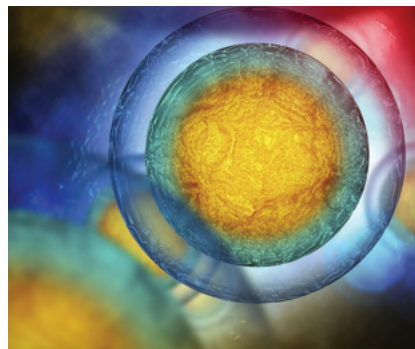
Ten years ago in March 2012, an innovative, structured collaboration was formed to connect world-class strengths in research, technology, and education at the University of Maryland, Baltimore (UMB) and the University of Maryland, College Park (UMCP). This forward-thinking action became known as *MPowering the State* or simply *MPower*. Several years later in October 2016, the alliance was strengthened by legislation, which further outlined the partnership as the University of Maryland Strategic Partnership.

Today, the *MPower* partnership is a thriving, powerful education-research enterprise: a statewide resource, a focused ecosystem, and a model of collaboration in research, economic development, education, and service to Maryland's citizens.

Primed to meet the challenges of the future, *MPower* is well positioned for sustained and significant impact in the years ahead.



***MPower*: A powerful model for successful collaboration.**



RESEARCH POWERHOUSE

A catalyst for research, *MPower* uses collaboration as its most powerful tool to make transformative change on the challenging issues facing the state and the nation. Maryland has national standing as a powerful and flourishing research engine. Last year, the University of Maryland attracted more than \$1.3 billion in federal, state, and local research grants and contracts, and was ranked 16th overall nationally and 10th among all public universities in research and development spending by the National Science Foundation. The 2016 law paved the way to combine research offices, aligning research initiatives, infrastructure, and leadership.

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ENHANCED EDUCATION

MPower connects students to accomplished faculty and academic resources at both UMB and UMCP. A global world requires new skills bridging a range of disciplines. *MPower's* interdisciplinary programs tap into complementary academic offerings at both campuses to expand opportunities and better train a high-tech workforce for a future in practice and research.

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ECONOMIC FORCE

MPower significantly increases innovation and commercialization of university research findings through its joint enterprise, UM Ventures. Since its inception in 2012, technology transfer activities have increased dramatically, including the launch of 133 startups, with many high-profile successes. New funding will strengthen targeted, strategic, economic development priorities across the state — like job creation and retention efforts in Baltimore City and Prince George's County.

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SERVICE CHAMPION

MPower challenges its collaborative research teams to tackle the critical issues of the 21st century: mitigating the public health and economic crises brought on by COVID-19 as well as preparing for future pandemics; addressing racial and social justice; combating the opioid epidemic; expanding outreach to victims of human trafficking; exploring novel approaches to traumatic brain injury; or delivering legal support to the state's farmers.

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To learn more about our impact and our future, please visit mpower.maryland.edu.

NEW INITIATIVES

SEED GRANT CHALLENGE PROMOTES IMPACTFUL STRATEGIC RESEARCH

This year, targeted collaborative research programs are launching with a new \$3 million *MPower* seed fund investment. Selected teams, led jointly by UMB and UMCP researchers, demonstrate collaboration and high potential to provide a significant influence in six research areas of paramount importance to the state and the nation:

- ▶ Artificial Intelligence and Medicine
- ▶ Cybersecurity and Homeland Security
- ▶ Neuroscience and Aging
- ▶ Pandemic Readiness, Resilience, and Mitigation
- ▶ Racial and Social Justice
- ▶ Violence and Crime Reduction

PROFESSORSHIP PROGRAM STRENGTHENS FACULTY COLLABORATION

In November 2021, eight professors, four from UMB and four from UMCP, were named ***MPower Professors*** and awarded \$150,000 each, over three years, to recognize, enable, and foster strong collaborations between faculty who work together on the most pressing issues of our time. This annual recognition is designed to accelerate the pace of research and impact on the lives of Marylanders. The inaugural cohort includes leaders recognized for their significant collaborations who represent the fields of behavioral and social sciences, engineering, medicine, nursing, pharmacy, and public health.



Luana Colloca, MD, PhD, MS
University of Maryland School of Nursing



Rao P. Gullapalli, PhD, MBA, MS
University of Maryland School of Medicine



Christopher M. Jewell, PhD, MS
A. James Clark School of Engineering



Deanna L. Kelly, PharmD, BCPP
University of Maryland School of Medicine



Cheryl L. Knott, PhD, MA, FAAHB
University of Maryland School of Public Health



Donald K. Milton, MD, DrPH
University of Maryland School of Public Health



Joseph Richardson, PhD, MA
University of Maryland College of Behavioral and Social Sciences



Yihua Bruce Yu, PhD
University of Maryland School of Pharmacy

RESEARCH POWERHOUSE

The University of Maryland Strategic Partnership: *MPowering the State* creates and supports focused, strategic research collaborations that ignite innovation and high-impact discoveries, and make Maryland more competitive. UMB and UMCP cultivate partnerships with governments and businesses, creating jobs and underscoring Maryland's distinction as a top research innovator in the nation.

UNIVERSITY OF MARYLAND RESEARCH RANKINGS

No. 10

AMONG ALL PUBLIC U.S. RESEARCH
UNIVERSITIES

No. 16

IN THE NATION

FOR RESEARCH AND DEVELOPMENT SPENDING

*National Science Foundation / Higher Education
Research and Development Survey
Fiscal Year 2020, Released December 2021*

\$1.3 BILLION

FY21 UMB AND UMCP COMBINED AWARDS
FROM FEDERAL, STATE, AND LOCAL
RESEARCH GRANTS AND CONTRACTS



SELECTED RESEARCH PARTNERSHIPS



Luana Colloca, MD, PhD, MS, conducts research on the mechanism of pain and pain management.

COVID-19 CARDIAC REGISTRY:

Researching COVID-19's link to student-athletes' heart health.

The University of Maryland is part of a consortium of Big Ten colleges conducting important national research about COVID-19's effect on student-athletes. Schools are working collaboratively to collect data on athletes who have been stricken by COVID-19. With funding support from MPower, College Park's expertise in sports medicine, kinesiology, and epidemiology is joined with Baltimore's proficiency in cardiology, radiology, and epidemiology. Maryland's team is leading the effort to perform core laboratory readings of cardiac magnetic resonance studies and to analyze that data. Results provide critical information about the seriousness of the illness, which may be used to predict which athletes will have severe cardiac consequences from COVID-19.

CENTER FOR BRAIN HEALTH AND HUMAN PERFORMANCE AT COLE FIELD HOUSE:

Cutting-edge center focuses on the advanced study of the brain and nervous system. New research collaborations will explore the neurobiology of aging and age-related neurodegeneration.

As the first shared research facility created by the strategic partnership, the center brings together leading researchers in neuroscience, genomics, biomechanics, and other fields. The Advanced Genome Technologies Core was opened in March 2021 to provide state-of-the-art transcriptomic analysis to researchers. Also in 2021, the center funded five seed grants totaling more than \$400,000 for innovative new UMB and UMCP collaborations in brain injury and the neuroscience of aging.

THE INSTITUTE FOR BIOSCIENCE AND BIOTECHNOLOGY RESEARCH (IBBR):

Discovering and accelerating the development of and manufacturing of therapeutics, modern medicines, and vaccines for patients in Maryland and throughout the world.

Located in Montgomery County, in the heart of Maryland's biotechnology corridor, IBBR continues its strong partnership with UMB, UMCP, and the National Institute of Standards and Technology (NIST). IBBR's leadership in the use of state-of-the-art analytical and structural biology instrumentation and high-end computation is accelerating the discovery, development, and manufacture of therapeutics, modern medicines, and vaccines.



Ongoing research on novel antimicrobials at IBBR.

MARYLAND CENTER FOR ADVANCED MOLECULAR ANALYSIS (M-CAMA):

Advancing the research and development of new drugs and medical treatments for disease.

Located within IBBR in Rockville, the center positions the University of Maryland as a national leader in the use of cryo-electron (cryo-EM) technology to drive scientific innovation and discovery. Recognized as a breakthrough tool in developing drugs and medical treatments, cryo-EM impacts biomedical research through its ability to deliver imaging that transforms understanding of biology and drug interactions in the human body at atomic resolution. The center's cutting-edge instruments have provided an important research tool throughout the global pandemic for studying the coronavirus and how it infects human cells, to block its entry with the use of novel therapeutics. Working in partnership with NIST, the center offers scientific leadership with deep expertise with this technology, to guide and assist users from any University System of Maryland (USM) school, as well as industry partners.

ROBERT E. FISCHER INSTITUTE FOR BIOMEDICAL DEVICES:

Bringing together skilled scientists, medical doctors, health practitioners, and bioengineers to research, design, and build lifesaving biomedical devices and train the next generation of innovators.

The institute catalyzes the transformation of basic research into clinical practice and commercial success. The staff and a network of experts facilitate prototyping and manufacturing, as well as venture creation, intellectual property creation, and successful passage of a product through various clinical, regulatory, and reimbursement hurdles. The institute has a UMCP innovation space for students, entrepreneurs, faculty, and staff, and opened a Medical Device Development Lab at UMB in 2021.

FUNDING SUPPORT FOR CLINICAL AND TRANSLATIONAL RESEARCH COLLABORATIONS:

New MPower investment helps researchers access resources for clinical training, engage in pilot research, and strengthen bioinformatic infrastructure.

A new three-year MPower grant supports clinical and translational research collaborations at UMB and UMCP. It gives researchers in College Park access to resources at UMB's Institute for Clinical and Translational Research (ICTR), as a partner institution. Investigators can tap resources through ICTR, including expert patient- and community-centered services; biostatistical support for study design, implementation, and interpretation; and pre- and postdoctoral training awards. The MPower funding also upgrades the bioinformatic infrastructure at UMB to support a seamless, clinical research partnership between the campuses.

ECONOMIC FORCE

The University of Maryland Strategic Partnership: *MPowering the State* fuels the state's reputation as an international, intellectual, and commercialization leader by consistently bringing scientific discoveries and inventions to market.

The **UM Ventures** collaboration combines the entrepreneurial resources at UMB and UMCP to help researchers and inventors license, patent, and commercialize their university-invented creations, and launch university startups. Faculty-invented products and services include agricultural products, software, clean technology, nanotechnology, sensors, medical devices, diagnostics, and therapeutics. In Fiscal Year 2021, UM Ventures tallied 489 potential inventions from faculty with 66 licensed to companies, **generating more than \$4 million in licensing revenue to UMB and UMCP.**

	FY21	Growth FY11 to FY21
Invention Disclosures	489	136%
Licenses	66	136%
Startups	17	240%

133

STARTUPS LAUNCHED SINCE 2011

66

INVENTIONS LICENSED
TO COMPANIES IN FY21

500+

JOBS CREATED OR RETAINED IN BALTIMORE
CITY BY THE CENTER FOR MARYLAND
ADVANCED VENTURES SINCE 2017

UM Ventures manages the **Center for Maryland Advanced Ventures (CMAV)**, created by law in 2016 to strengthen commercialization of high-potential, university-based discoveries, and to create jobs in Baltimore City by encouraging university-created or -sponsored technology companies to locate in the city. CMAV funds have been committed to 23 university-affiliated or -sponsored technology entities, **creating or retaining more than 500 jobs in Baltimore City**. The President's Entrepreneurial Fellowship program provided six graduate students the opportunity to learn firsthand the unique challenges of commercializing life science technologies.

CMAV also staffs the **Maryland Momentum Fund (MMF)**, a \$10 million USM early-stage investment fund that invests in Maryland-based, USM-affiliated startup companies. CMAV funds a full-time director of MMF, based at UMB, and it partially funds additional staff based at UMCP. In Fiscal Year 2021, MMF reviewed 75 companies seeking investments, and it invested in eight companies. **The MMF investment helps companies bridge from early success to the next stage of growth, which is often a large investment, commercial launch, or commercial expansion.**



President's Entrepreneurial Fellows



Sponsored, Industry Events

RECENT UM VENTURES SUCCESSES

Breethe, a UMB startup developing a portable artificial lung, was acquired by Abiomed in late spring 2020. UM Ventures was an early investor in the company, and Breethe marks the fourth UM Ventures-backed startup to have a successful exit via acquisition. After the acquisition by Abiomed, Breethe's headquarters has remained in Baltimore City, where it employs 32 individuals.



CoapTech, a UMB startup, developed a medical device called the PUMA-G System, the world's first and only ultrasound

gastrostomy system that allows physicians to place gastrostomy tubes at the point of care, using solely ultrasound imaging. The system is being sold in Europe and was cleared for use in the U.S. by the Food and Drug Administration.

Hazel Analytics, a startup founded on technology and by students and faculty from UMCP and the University of California, Los Angeles, is moving the needle on food safety and public health by building innovative software products for food service and retail operators, delivery companies, and other industry providers. Hazel's award-winning products transform diffuse and disparate local health department data into actionable intelligence. Over 250 major brands and counting — spanning 300,000 individual food service and retail locations — use Hazel's

platform, including notable national and global brands such as Amazon, Cheesecake Factory, Target, Starbucks, Uber Eats, and Yelp.

IonQ, a UMCP startup, celebrated becoming the first publicly traded company focused solely on quantum computer hardware and software (NYSE: IONQ). Headquartered in College Park's 150-acre research park, Discovery District, IonQ plans to develop within the next three years rack-mounted,



Photo: NYSE

room-temperature quantum computers, a little bigger than an Xbox, which can be networked together.

Mblue Labs, a startup that originated in the Cellular Biology Labs at UMCP, launched its first anti-aging skin technology based on the novel ingredient methylene blue in 2019. Since then, the company has grown its patented products into a full anti-aging skincare portfolio called Bluelene® that sells multichannel through partners like Amazon and Macy's. In 2021, Mblue Labs added several significant global distributor relationships that broaden its reach to 42 countries. Also in 2021, the company published its research in *Nature Scientific Reports* on methylene blue as a new sunscreen ingredient. The report went viral on Reddit, and Mblue Labs is poised to release its first anti-aging sunscreen in the first quarter of 2022.

RNA Disease Diagnostics (RNADD) secured an exclusive global license to a cutting-edge sensor technology jointly owned by UMB and the University of Maryland, Baltimore County (UMBC). RNADD's first product is a rapid point-of-care COVID-19 test with accuracy, sensitivity, and specificity that is comparable to the gold standard RT-PCR lab diagnostic. Dipanjan Pan, MSc, PhD, and his teams at UMB and UMBC developed the sensor technology, which will be used to support RNADD's development and manufacture of proprietary molecular disease diagnostic testing kits, enabling the company to quickly and accurately detect multiple infectious diseases, helping to lead to the prevention of their transmission and spread.



Medcura, a startup based on joint technology between UMCP and UMB, developed an antibacterial gel able to stop bleeding in seconds called Rapid-Seal™. Rapid-Seal™ is the first commercially available consumer

product from Medcura and was made available in CVS Pharmacy stores and online at Amazon in 2021. The company raised \$10 million in private equity to support its growing product line and development of its game-changing hemostatic and wound treatment products including Rapid-Seal™, LifeFoam™, and LifeGel™.

ENHANCED EDUCATION

Through the University of Maryland Strategic Partnership: *MPowering the State*, joint educational offerings fuse the strengths and complementary missions of UMB and UMCP to attract talented students, create a pipeline for student advancement, and meet workforce demands and students' needs for flexible training.

20+

Joint Academic Collaborations at UMB and UMCP, including dual-degree offerings, new degrees and certificates, guaranteed pathways to admission, and student enrichment programs.

797

Bioengineering undergraduates have worked with UMB medical faculty in capstone and clinical experiences courses.

169

Master of Science in Law degrees have been conferred in specialties including cybersecurity law and health care law.

1,142

UMCP students have participated in the **MLAW: Undergraduate Programs in Law**, taught by faculty at UMCP and UMB Carey School of Law.

SELECTED EDUCATIONAL COLLABORATIONS

Bioengineering Joint Academic Programs

- ▶ UMB and UMCP's leadership in bioengineering and medicine creates tremendous opportunity for learning for students and faculty at both institutions.
 - UMCP undergraduates team with faculty physicians at UMB to experience firsthand the robust link between engineering and human health.
 - Students are exposed to the medical field and clinical settings, see the direct application of medical devices in a hospital setting, and then imagine and create their own engineering designs from concept to product.
 - A joint PhD program in Bioengineering — the MPower Graduate Fellowship — spans both institutions and offers students an opportunity to create and deliver engineering solutions to challenging clinical problems related to medicine, pharmacy, or dentistry.

Policing and Public Safety Administration

- ▶ Launched in fall 2020, this new master's degree and certificate program in public safety leadership and administration targets personnel in law enforcement, first response, social services, and other public safety professions.

MLAW: Undergraduate Programs in Law

- ▶ The MLAW programs offered at College Park give students early exposure to ideas, mentors, and professional opportunities in law not normally available to undergraduates.
 - Faculty from the UMCP College of Behavioral and Social Sciences as well as the UMB Carey School of Law — including the dean — teach a variety of subjects such as immigration and crime, global environmental law, health law, and structural racism and housing.

University of Maryland Center for Economic and Entrepreneurship Development (UMCEED)

- ▶ Established by law in 2016, UMCEED increases workforce readiness by creating educational degree programs in high-impact fields such as neuroscience, virtual and augmented reality, biomedical devices, data analytics, and cybersecurity.
 - In 2021, the newly launched Visiting Fellows in Neuroscience Program offered cross-campus training in neuroscience to graduate students at UMB and UMCP. Two students worked with research groups at the opposite campus to acquire new techniques and broaden their training.
 - In 2020, the Colleges of Behavioral and Social Sciences and Computer, Mathematical and Natural Sciences

(CMNS) launched a new undergraduate neuroscience major at UMCP to train students interested in health care, allied health careers, biomedical industries, and clinical psychology. In 2021, more than 200 students enrolled in this new major.

- In 2021, UMCP's Colleges of Arts and Humanities and CMNS launched the new bachelor of science and bachelor of arts degree in immersive media design. A unique collaboration between science, technology, engineering, and math (STEM) fields and the arts and humanities, the degree prepares students to be leaders in production of augmented reality, virtual reality, and immersive media design disciplines.

UM Scholars

- ▶ This dynamic 10-week research program connects students from UMB and UMCP to faculty mentors to work on projects designed to expand students' knowledge and open their eyes to other fields.
 - Summer 2021 programs included four student placements at the Office of Population Health Improvement at the Maryland Department of Health.
 - More than 200 students have reaped the benefits from tailored faculty mentoring in topics such as health science, public health, law, and social work.

IN THEIR OWN WORDS

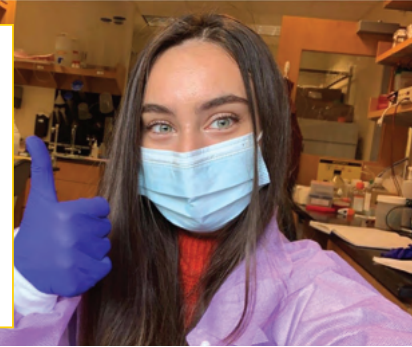
Since 2012, more than 200 students have conducted a summer research project, connecting to accomplished faculty at the opposite campus.

*This project was instrumental to understanding the extent to which power dynamics exist in a practitioner-client relationship. **I will carry this experience into practice beyond this internship.***

— Mariana de Matos Medeiros, School of Social Work, expected graduation May 2022

*The community within UMSOM **inspired, challenged, and pushed me** to ask puzzling questions as well as emerge from the program with an appreciation for the excitement and challenges associated with a career in the field of scientific research.*

— Antonia Papadimas, School of Public Health, expected graduation May 2022



*The internship provided me with **real-world interviewing, focus group, and coding experience** and allowed me to gain confidence with my research skills.*

— Christian Hilland, School of Social Work, expected graduation May 2023

*The internship increased my knowledge on public health, **especially on rural health and underserved communities.***

— Nathan Rashti, School of Public Health, expected graduation May 2023



*Working directly with senior policy advisors, attorneys, and technical experts from academia and the Department of Defense provided great insight into **how I may use my law degree to serve our nation.***

— Michael McLaughlin, School of Law, expected graduation May 2022

*I was thrilled to discover UM Scholars because it embodies exactly what I hope to accomplish in my dual-degree master's program — **applying real-world skills and rigorous research to make a difference in the world.***

— Jacqueline Smith, School of Public Policy and School of Social Work, expected graduation May 2023

***I am now an empowered public health change agent** and very optimistic for my future.*

— Taylor Palmer, School of Public Health, expected graduation May 2023

SERVICE CHAMPION

The University of Maryland Strategic Partnership: *MPowering the State* brings together top thinkers from multiple branches of expertise in health, science, law, and social science to redefine challenges and devise solutions that make a positive impact in Maryland and on society at large.

AGRICULTURE LAW EDUCATION INITIATIVE (ALEI):

Educating and serving Maryland family farmers through expert information and training that help navigate complex legal issues such as estates and trusts, regulatory compliance, farm food safety, and other aspects of agriculture law.

ALEI reaches the state's agricultural community through publications, social media, trainings, and formal classroom education. ALEI hosts a popular annual conference on agriculture and environmental law that addresses current legal issues impacting Delmarva's communities. In response to COVID-19, the virtual conference and trainings moved online and reached an even larger audience. Undergraduate students at UMCP and law school students at UMB benefit from classes taught by legal specialists on agriculture and law.



SUPPORT, ADVOCACY, FREEDOM, AND EMPOWERMENT (SAFE) CENTER FOR HUMAN TRAFFICKING SURVIVORS:

Combating human trafficking through direct services, research, advocacy, and training.

The SAFE Center is the **first systematic, university-based program** to serve victims of human trafficking with comprehensive legal, social, economic empowerment, mental health, and medical services. Since its founding in 2016, it has **served several hundred survivors of human trafficking** and their families. The center receives substantial funding from federal, state, and local government grants, as well as from private sources. Grants have included contracts with the U.S. Department of Justice, Prince George's County Police Department, and the Maryland Governor's Office of Crime Control and Prevention. Ten UMB and UMCP schools and colleges are engaged, and over 100 students have served internships at the center, helping to provide client services, develop programs and curriculum, conduct outreach, and provide research. The SAFE Center has leadership roles on state and county human trafficking task forces, and is an essential partner to Maryland government agencies, law enforcement, private industry, and nonprofit organizations.

MPOWER AT A GLANCE

LEADERSHIP



Bruce E. Jarrell, MD, FACS
PRESIDENT, UMB

Darryll J. Pines, PhD, NAE
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Roger J. Ward, EdD, JD, MSL, MPA
PROVOST AND EXECUTIVE VICE PRESIDENT,
AND DEAN, GRADUATE SCHOOL, UMB

RECENT PROGRAMS AND INITIATIVES

Agriculture Law Education Initiative (ALEI)

Bioengineering Capstone Design Course

Bioengineering Clinical Experiences for Undergraduates

Bioengineering Joint PhD

Center for Brain Health and Human Performance at Cole Field House

Clinical and Translational Research Collaboration Support

COVID-19 Cardiac Big Ten Collaboration

COVID-19: Seed Grants and Medical Device Challenge

Cross-Institution Academic Degree Pathways to Multiple Schools and Colleges

Institute for Bioscience and Biotechnology Research (IBBR)

Joint Research and Innovation Seed Grant Program

Maryland Center for Advanced Molecular Analysis (M-CAMA)

Maryland Center of Excellence in Regulatory Science and Innovation (M-CERSI)

MLAW: Undergraduate Programs in Law

MPower Professorships

National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL)

Policing Partnership: Master of Professional Studies in Public Safety Leadership and Administration

Robert E. Fischell Institute for Biomedical Devices

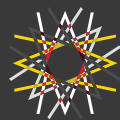
SAFE Center for Human Trafficking Survivors

Social Work Program Expansion at Shady Grove

University of Maryland Center for Economic and Entrepreneurship Development (UMCEED)

UM Scholars

UM Ventures/Center for Maryland Advanced Ventures (CMAV)



UNIVERSITY OF MARYLAND
STRATEGIC PARTNERSHIP
MPOWERING THE STATE

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