



INNOVATION PARTNERSHIPS  
UNIVERSITY OF MICHIGAN

# 2023 IMPACT REPORT



Dear Colleagues,

I am pleased to share with you Innovation Partnerships' annual report for fiscal year 2023, which contains highlights of our office's performance, as well as stories of impact from across the University of Michigan's research enterprise.

U-M had a record-breaking year for research commercialization, with 580 new invention reports created and 311 commercialization agreements executed. Innovation Partnerships also supported the launch of 25 new startup companies - our second highest year to date. Thank you to our incredible faculty and staff for entrusting us with your innovations, and to the many companies, entrepreneurs and investors that partner with our office to move groundbreaking research discoveries to the marketplace.

As extraordinary as this past year has been, I am confident that our next fiscal year will present even more news to celebrate as U-M's innovation ecosystem continues to gain momentum.

Sincerely,

[Kelly Sexton, Ph.D.](#)

Associate Vice President for Research - Innovation Partnerships and Economic Impact



**U-M continues to translate innovative research and discoveries from its laboratories and studios to society so that individuals outside of our campus walls can truly benefit from our collective work. This is our responsibility as a public research university."**

**-Rebecca Cunningham, M.D.**  
Vice President for Research and Innovation,  
William G. Barsan Collegiate Professor of  
Emergency Medicine, University of Michigan



“Innovation Partnerships amplifies the impact of research and advances ideas that move the world, save lives and connect and transform. Their dedicated team enables the translation, commercial development and licensing of groundbreaking research discoveries and technologies created by U-M researchers.”  
- **Dr. Santa J. Ono,**  
President, University of Michigan

## || ABOUT INNOVATION PARTNERSHIPS

Innovation Partnerships, a unit based in the Office of the Vice President for Research, serves as the primary gateway for researchers seeking to increase the impact of their work. We provide this service to U-M faculty by connecting with the private sector through corporate-sponsored research collaborations, licensing discussions and connections with entrepreneurs and investors to support startup company formation. Our team of licensing, business development, corporate research and ventures professionals provides comprehensive, step-by-step services to faculty—from invention assessment and intellectual property support, business mentoring, translational research funding and early-stage capital from the Accelerate Blue Fund.

Our team also helps faculty create new research collaborations, allowing us to leverage strong relationships with industry partners, investors and entrepreneurs to positively impact society and drive economic growth. We support the broad dissemination of scholarly output by providing open-access channels and open-source licensing models. We provide support to faculty and researchers from all schools and colleges across the three U-M campuses (Ann Arbor, Dearborn and Flint).

Our team enables the translation, commercial development and licensing of groundbreaking research discoveries and technologies. We are inspired to redefine how world-class research can fuel a region and solve the world's greatest challenges.

## Areas of Service

Innovation Partnerships' team of professionals brings business, scientific and legal expertise to amplify the impact of U-M research. We center our efforts around three areas of service:



### ALLIANCES

- ▶ Develop new corporate research relationships
- ▶ Strategy and negotiation support for corporate-sponsored research agreements
- ▶ Connect faculty with commercial research opportunities
- ▶ Manage ongoing research alliances



### LICENSING

- ▶ Invention intake support
- ▶ Intellectual Property strategy and funding
- ▶ License agreement negotiation



### VENTURES

- ▶ Translational research funding
- ▶ Business mentorship
- ▶ Venture capital connections
- ▶ Connections to entrepreneurial talent

# 2023 IN REVIEW

## ALLIANCES

**\$25M**

NEW CORPORATE SPONSORED RESEARCH AWARDS SUPPORTED

**110**

NEW CORPORATE SPONSORED RESEARCH AGREEMENTS SUPPORTED

U-M faculty had another strong year of industry collaboration, with **\$179.9M** in corporate sponsored awards. The Corporate Research Alliances team within Innovation Partnerships strengthened this campus effort by providing direct relationship and negotiation support for 110 new corporate sponsored research awards totaling \$25M.

## LICENSING

**580**

INVENTION DISCLOSURES

**311**

LICENSE/OPTION AGREEMENTS

**\$22.9M**

LICENSING REVENUE

**517**

U.S. PATENT APPLICATIONS FILED

**354**

PATENTS ISSUED

## VENTURES

**25**

STARTUPS LAUNCHED

**\$786M**

RAISED BY STARTUPS

### FY23 STARTUPS

ABCON THERAPEUTICS

ARBOR BATTERIES

ARBORMED CO.

ARKADIEN SOLUTIONS

AURICLE

BLU BIOTECH

DECIMAL CODE

ESANIK THERAPEUTICS

ESPEROVAX

FOURTH STATE

GRAHAM-BERMANN PROGRAMS

h-BAR INSTRUMENTS

KINESID THERAPEUTICS

LEMX HEALTH TECHNOLOGY CO.

LOW CARBON FUEL SYSTEMS

MDI THERAPEUTICS

MSCREEN

PALLADIUM BIOLABS

PATHWAYS GI

PRO THERAPEUTICS CO.

SONOVASCULAR

TENSIXTEEN BIO

TUEBOR ENERGY

VOICEBOX 3D

WATSON CARBON

# U-M Startup, BlueConduit, Addresses Nationwide Water Crisis with Ingenuity



JACOB  
ABERNETHY



ERIC  
SCHWARTZ

There is an issue of lead-contaminated water in this country, endangering those who drink it. In the United States, there are countless lead service lines, or LSLs, and it can be incredibly expensive and time-consuming to correctly identify where LSLs are located so they may be replaced.

BlueConduit, a small but mighty operation of 15 employees, is harnessing the power of data science to address this nationwide problem. Launched in 2019 with the help of Innovation Partnerships, BlueConduit's work is felt across the country, working with more than 250 municipalities and supporting the delivery of safe water to more than 5 million people.

The brainchild of U-M's Eric Schwartz and Georgia Tech's Jacob Abernethy (formerly of U-M), BlueConduit came to life in 2016 when they decided to look at data tools to solve problems impacting local communities. They began conversations with the city of Flint on how their data skills could be applied to issues the city was facing in the aftermath of the water crisis.

"BlueConduit's data-driven approach empowers city officials to proactively address the lead pipe issue by simplifying a complex process and giving water utilities clear ways to communicate risk to residents, including interactive maps. Additionally, our technology saves taxpayers and utilities money," said Schwartz.

It was through their work with the city of Flint that Schwartz and Abernethy realized that their tool could be widely used to help other communities facing similar problems. The fact that their tool was more efficient and cost-effective, as well as the first of its kind, only strengthened their desire to commercialize their system.

This realization led to them connecting with Innovation Partnerships. By collaborating with Innovation Partnerships, Schwartz and Abernethy were able to focus on what they love most: teaching and research.

"We love our lives as academics and appreciate the privilege of being faculty at research institutions. That includes benefits like working with groups like Innovation Partnerships, who encourage real-world impact of our work. This allows us

to build a business as a social enterprise that is genuinely mission-driven," said Schwartz.

Through their incredible work, BlueConduit has joined The Get the Lead Out Partnership, led by the White House. This public-private initiative aims to expedite the removal of lead in drinking water.

Additionally, BlueConduit has made contributing to increased equity in society a primary mandate of the company and its work. Outside of aiding communities with identifying lead pipes for removal more quickly, BlueConduit has influenced drinking water policy at the state and national levels. They are looking ahead to when the lead water crisis is resolved and will continue to use their service for good with a focus on issues impacting the underserved in our country.



**We love our lives as academics and appreciate the privilege of being faculty at research institutions. That includes benefits like working with groups like Innovation Partnerships, who encourage real-world impact of our work. ”**

- Eric Schwartz,  
Co-Founder, BlueConduit



To learn more about  
BlueConduit visit  
[blueconduit.com](https://blueconduit.com)

# Funding The Next Generation of Innovation

The Accelerate Blue Fund (ABF) is an early-stage venture fund that exclusively invests in U-M startups. The goal of Accelerate Blue is to bridge the funding gap between initial launch and angel/venture capital funding for startups based on U-M intellectual property.

ABF supports and invests in U-M startups to accelerate their growth and success. As an evergreen fund, all investment returns roll back into the fund for future investments in promising U-M startup companies.

In fiscal year 2023, ABF invested in **9 new portfolio companies**, bringing the portfolio to **14 U-M startups**. Through philanthropy and U-M support, Accelerate Blue has grown to **\$15.1M under management**.



To learn more about the Accelerate Blue Fund visit [acceleratebluefund.com](https://acceleratebluefund.com).

## CELEBRATING TWO YEARS OF INVESTMENTS

In the spring, Innovation Partnerships celebrated the second anniversary of the launch of the Accelerate Blue Fund (ABF). The event was hosted at the Blue Llama Jazz Club. CEOs of ABF portfolio startups were in attendance, along with supporters of ABF, entrepreneurs, investors, local business leaders and members of the U-M community.



W ASPIRING TO IMPACT

# Closing the Gap in Commercialization and Entrepreneurship

In March 2023, Innovation Partnerships launched [Aspiring to Impact](#), a networking group designed to bring together faculty and researchers interested in closing the gap in women's leadership in entrepreneurial communities. During fiscal year 2023, Aspiring to Impact hosted multiple networking events highlighting important topics in entrepreneurship, including decoding venture capital, best practices in pitching an invention and connecting with DEI-focused investors. These discussions were hosted by local innovators, entrepreneurs and investors, including Innovation Partnerships' mentor-in-residence [MJ Cartwright](#), [Invest Detroit's Patti Glaza](#) and [Women Founders Network's Serena Glover](#).

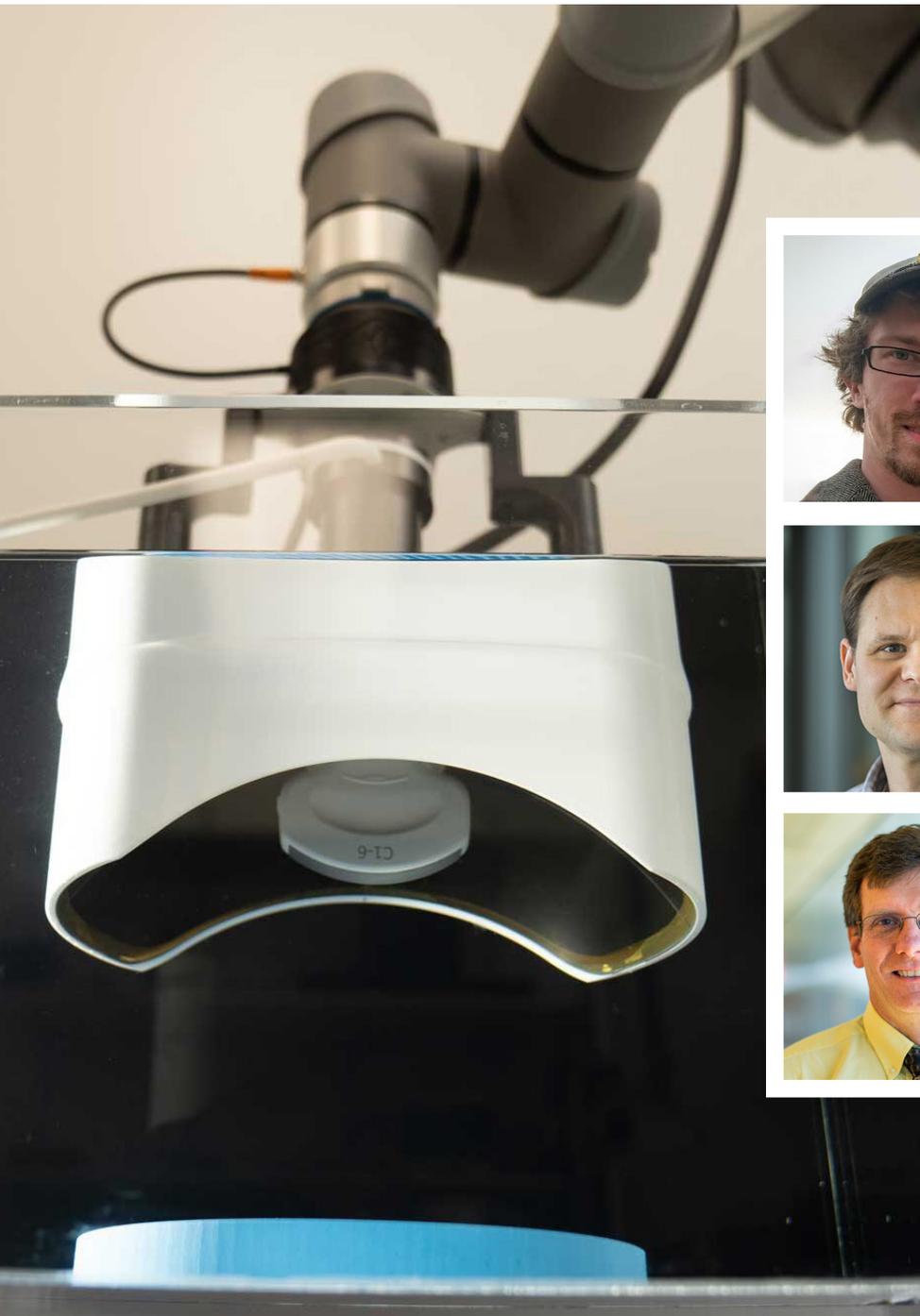
W SOFTWARE & CONTENT THOUGHT-LEADERSHIP SERIES

# Sharing Insights from Across the Software Ecosystem

Throughout fiscal year 2023, Innovation Partnerships continued its [Software & Content Thought Leadership series](#) with key topics, including ChatGPT best practices, FDA regulation of clinical decision support software (Software as a Medical Device or SaMD) and academic considerations for open source software companies. These webinars had a combined audience of more than 500 people. This series will continue in fiscal year 2024 with topics presented by subject matter experts across a variety of domains including intellectual property law, software commercialization and emerging considerations in artificial intelligence.

W DISTINGUISHED UNIVERSITY INNOVATOR AWARD

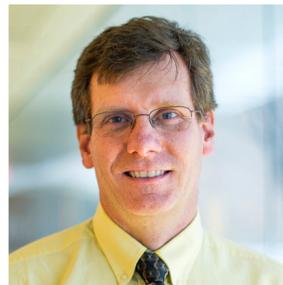
# Research team that developed noninvasive surgical treatment named Distinguished University Innovators of the Year



JONATHAN  
SUKOVICH



TIMOTHY  
HALL



J. BRIAN  
FOWLKES



ZHEN  
XU



WILLIAM  
WOODRUFF  
ROBERTS

Histotripsy, a term coined by University of Michigan researchers, is a technique that uses sound waves to break down diseased tissue. Designed as a noninvasive alternative to surgical procedures, the novel technology uses focused ultrasound to mechanically disrupt target tissue, as opposed to thermal ablation.

The technology holds promise to permit patients with diseased tissue, such as cancerous tumors, to obtain treatment with less discomfort and faster recovery times than traditional surgery.

A team of U-M researchers, led by Professors Zhen Xu, Timothy Hall, Jonathan Sukovich, J. Brian Fowlkes and William Woodruff Roberts from Michigan Engineering and Michigan Medicine, invented and developed histotripsy.

Their efforts to bring histotripsy to the clinic to address human disease earned them this year's [Distinguished University Innovator Award](#), which is the highest honor for U-M faculty members who have developed transformative ideas, processes or technologies and shepherded them to market for broad societal impact. The award was established in 2007 and is supported by endowments from the Office of the Vice President for Research (OVPR) and the Stephen and Rosamund Forrest Family Foundation.

"What distinguishes the University of Michigan as a leading public research university is our shared perpetual pursuit of innovative solutions to the greatest challenges impacting communities across the globe," said Rebecca Cunningham, vice president for research and innovation and the William G. Barsan Collegiate Professor of Emergency Medicine.

"Together, we are persistent in our mission to serve the people of Michigan and the world, and as part of this collective commitment, we will continue to support our research discoveries and help translate them into real-world tools and services. What the histotripsy team has developed is a prime example of innovative research that needs to be shared broadly with the world."

OVPR selected this year's award recipients based on the recommendation of a diverse

faculty selection committee that reviews a pool of nominees. The histotripsy team received the award September 14 at the annual [Celebrate Invention](#) event.

### CHANGING THE LANDSCAPE OF SURGICAL TREATMENT

"This highly collaborative team has developed a breakthrough idea with innovative hardware and software to enable the histotripsy process," said Mary-Ann Mycek, William and Valerie Hall Department Chair and professor of biomedical engineering.

"They've published a tremendous amount of data showing histotripsy's disruptive and transformational potential, created a new subfield and formed a company that is making outstanding progress toward clinical translation and commercialization. The contributions they've made are substantial and I look forward to seeing the team's future innovations."

 **This highly collaborative team has developed a breakthrough idea with innovative hardware and software to enable the histotripsy process [...] They've published a tremendous amount of data showing histotripsy's disruptive and transformational potential. "**

- Mary-Ann Mycek,  
William and Valerie Hall Department Chair,  
Biomedical Engineering; Professor, Biomedical Engineering

A startup company based on histotripsy, HistoSonics, was launched in 2010 with support from Innovation Partnerships, a unit based in OVPR that serves as a central hub to lead U-M research commercialization efforts.

While minimally invasive and noninvasive technologies are routinely used in the clinic, they have limitations such as bleeding, infection, radiation and heat-induced complications. HistoSonics developed the Edison System, which is the first noninvasive, non-ionizing and non-thermal procedure to destroy targeted tissues that is guided by real-time imaging, alleviating the limitations of earlier versions. They have accomplished what has been out of reach for others—to successfully utilize sound wave energy to mechanically obliterate diseased tissue. In the fall of 2023, HistoSonics received FDA clearance for its Edison System in the use of non-invasive destruction of liver tumors, including unresectable liver tumors.

“We are grateful for the support we received from the University of Michigan on our journey to invent histotripsy and develop it into a platform that can be leveraged broadly to treat patients,” said Xu, a professor of biomedical engineering.

“We would not have accomplished all that we have and come as far as we have

without Innovation Partnerships—they have been with us every step of the way to go from an inventor mindset to commercialization.”

HistoSonics now employs more than 100 people and has raised more than \$200 million. With a presence in Ann Arbor, HistoSonics embodies what the university strives for in its research commercialization efforts; it not only delivers a product or service that positively impacts patients, it also contributes to the growth of the region’s economy.

“One of the best parts about science is turning the impossible to possible,” Xu said.

“What our team has accomplished by providing an incisionless, non-toxic, painless way to destroy disease tissue via sound wave energy is incredible. I’m excited about the potential of histotripsy to change the field of medicine and cancer treatment, and eventually extend to treat many other disease types beyond cancer, such as stroke, neurological diseases, cardiovascular diseases and skin diseases.”



To learn more about histotripsy visit

<https://myumi.ch/n7n1N>

To learn more about HistoSonics visit

[histosonics.com](https://histosonics.com)

## GLOBAL EPICENTER OF MOBILITY COLLABORATION

Innovation Partnerships is a proud participant in the federally funded Global Epicenter of Mobility’s (GEM’s) Mobility Acceleration Innovation Network (MAIN).

Led by TechTown, MAIN is accelerating the growth of mobility startups that drive innovation and fill gaps in the mobility value chain. GEM is designed to create a smart, secure, sustainable and inclusive advanced-mobility industry in Southeast Michigan, made possible by a four-year U.S. Economic Development Administration Build Back Better Regional Challenge grant award.



# Celebrate the Impact of Michigan Innovation

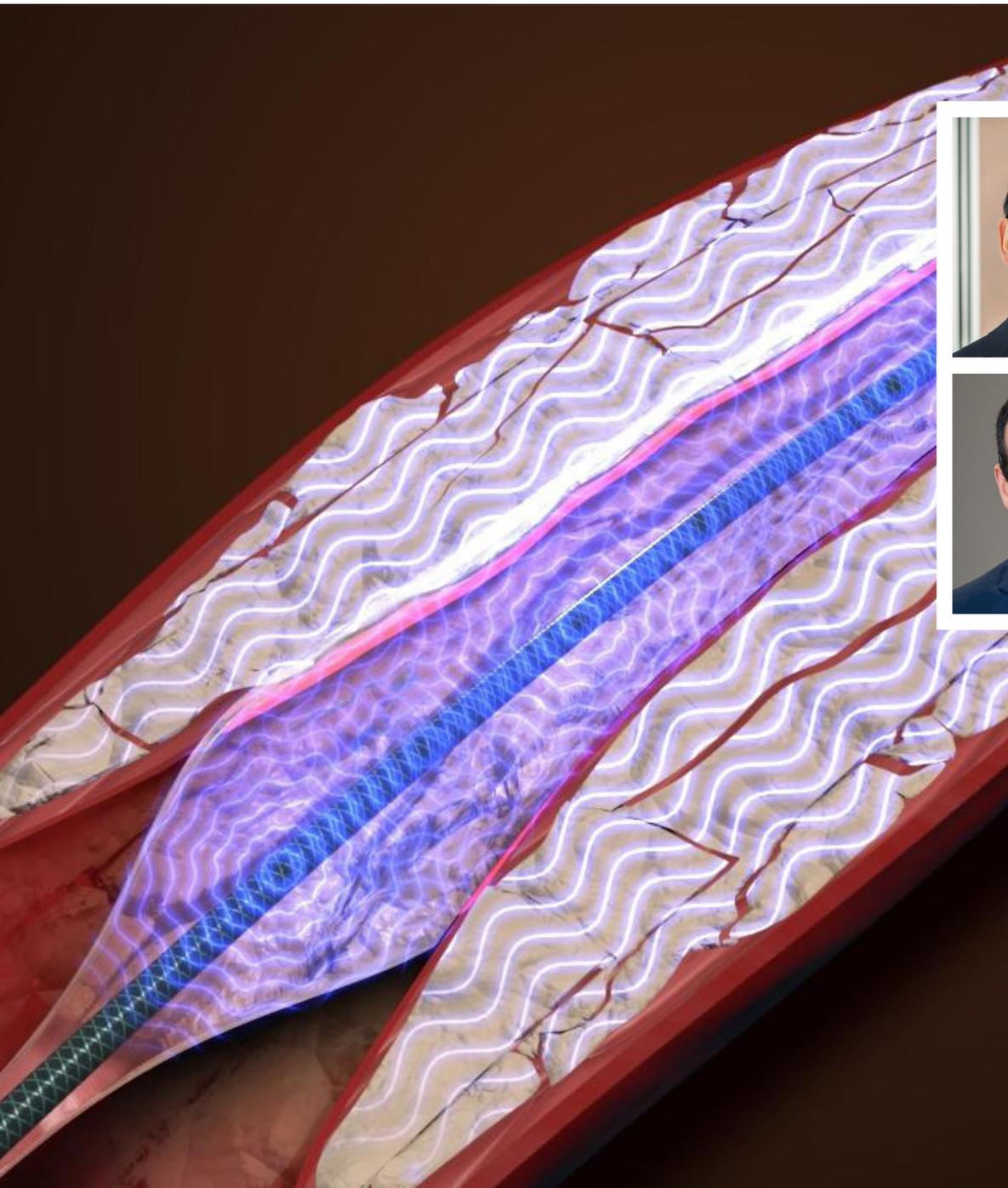
On September 14, Innovation Partnerships hosted more than 300 attendees at its annual [Celebrate Invention](#) event. Members of the U-M community and the broader entrepreneurial ecosystem gathered together to honor campus innovators and the societal impact of their discoveries.

The event began with the Distinguished University Innovator Award panel and presentation. Xu presented on histotripsy, the team's research and how they came to discover and develop the promising technology. After Xu's presentation, Innovation Partnerships convened a panel discussion titled "Histotripsy: Non-invasive Cancer Treatment From Discovery to the Clinic." Moderated by Kelly Sexton, associate vice president for research - innovation partnerships and economic impact, the panel included Jim Adox, executive managing director, Venture Investors and chairman of the Board of Directors, HistoSonics; Vikas Gulani, Fred Jenner Hodges, professor of radiology, chair, department of radiology, professor of radiology, Michigan Medicine; Ganesh Palapattu, department chair, George F. and Sandra G. Valassis professor of urology, Michigan Medicine; and Zhen Xu.

Following the panel, doors opened for the Celebrate Invention networking reception and technology demonstrations. The dynamic U-M startups and technologies showcased at Celebrate Invention included: [Grasp Robotics](#), [HistoSonics](#), [I-Gym](#), [Model Performance Diagnostics](#), [Pathways GI](#), [Robotic 3D Printing in Architecture and Construction](#), [TRAILS](#) and [Zakuro](#). Welcome remarks were provided by President Santa J. Ono, with remarks by Sexton and Vice President for Research and Innovation Rebecca Cunningham, who presented the Distinguished University Innovator Award to the histotripsy team.



# Banner Year for Amplitude Vascular Systems (AVS); Increases Strength in Fight Against Severely Calcified Arterial Disease



HITINDER  
GURM



ROBERT  
CHISENA

Amplitude Vascular Systems, or AVS, is an early-stage medical device company focused on developing minimally invasive treatments for severely calcified arterial disease. The calcification of arteries is a key issue for practitioners with patients experiencing cardiovascular distress, as the buildup of calcium deposits in the arteries can increase one's risk for major cardiac events, including heart attacks and strokes.

Fiscal Year 2023 proved to be a banner year for the company. During the past year, AVS raised \$28.8 million in Series B funding for their pulsatile intravascular lithotripsy (PIVL™) therapy. Much of this funding was provided by BioStar Capital and CUE Growth Partners, an investment group and private equity firm, respectively, each interested in the furthering of healthcare and medical device innovation. This funding will go directly towards supporting AVS's continued study and preclinical work in peripheral arterial systems and coronary applications.

This funding came on the tail of AVS's POWER PAD I, a first-in-human clinical trial of its PIVL™ therapy. The trial proved highly promising for PIVL™, showing a reduction in symptoms in patients experiencing calcification of the femoropopliteal arteries, the arterial system containing the largest blood vessel of the leg.

AVS's operations also achieved many updates throughout the past year. First, AVS approved the appointment of Sean Gilligan, the former Vice President of Program Management and Research & Development at Boston Scientific, as the company's new Chief Operating Officer. AVS also went on to open a new global headquarters in Boston, Massachusetts. This 9,365-square-foot facility will support AVS in its growth and will provide new space for research and development, as well as product testing, assembly and packaging.

In a BusinessWire feature on AVS, Chairman of the Board Mark Toland stated, "As [AVS] continue[s] to build momentum toward regulatory approval in the U.S., the new space will support the company's growth to bring the next generation of intravascular lithotripsy therapy for both peripheral and coronary artery disease."

AVS was founded in 2019 by Hitinder Gurm, M.D., Interventional Cardiologist and Chief Clinical Officer at the University of Michigan and Robert Chisena, Ph.D., Chief Technical Officer at AVS, from research performed in partnership with Albert Shih, Ph.D. and his Biomedical Manufacturing and Design Lab (BMDL) and with support from Innovation Partnerships. Their flagship device, the Pulse IVL System, uses a balloon-based structure to gently expand the affected artery and provide pulsatile intravascular lithotripsy (PIVL) therapy, a series of high-frequency waves that break apart calcium plaque build-ups all within a single device. AVS's novel PIVL™ therapy device provides both an increased quality of care for patients afflicted with severely calcified arterial disease and a simplification of treatment for practitioners.

With a combination of promising preclinical trials, a successful series of funding and the expansion of their operations, the future of AVS looks bright as they continue development and commercialization of their PIVL™ treatment.

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**AVS's novel PIVL therapy device provides both an increased quality of care for patients afflicted with severely calcified arterial disease and a simplification of treatment for practitioners.**

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To learn more about  
AVS visit

[avspulse.com](https://avspulse.com)

# Thank You to our National Advisory Board

Innovation Partnerships' National Advisory Board (NAB) was founded in 2002 to provide advice and connections to enhance technology transfer performance. Composed of industry, venture, government, university and community leaders, the NAB has transformed the university and the state of Michigan with several initiatives, including Ann Arbor SPARK, the Tech Transfer Talent (T3N) Network and the Accelerate Blue Fund.

Thank you to our National Advisory Board Members for their expertise and support.



Welcome new board member

**Quentin L. Messer, Jr.**

*Chief Executive & Economic Competitiveness Officer at the Michigan Economic Development Corporation;  
Chair of the Michigan Strategic Fund*

## National Advisory Board Members

**Jim Adox**

Venture Investors  
Ann Arbor, MI

**Bill Brinkerhoff**

EVOQ Therapeutics  
Ann Arbor, MI

**Wendell Brooks**

Snowcloud Capital  
Santa Clara, CA

**Jeff Donofrio**

Business Leaders for Michigan  
Detroit, MI

**Richard Douglas**

Genzyme Corp - Retired  
Southborough, MA

**Patti Glaza**

Invest Detroit Ventures  
Detroit, MI

**Serena Glover**

Angel Investor, Advisor  
Redmond, WA

**Paul Krutko**

Ann Arbor SPARK  
Ann Arbor, MI

**Kirsten Leute**

Osage University Partners  
Bala Cynwyd, PA

**Jose Mejia**

Merlin Mentor Capital  
Palo Alto, CA

**Quentin L. Messer, Jr.**

Michigan Economic Development Corporation  
Lansing, MI

**Chris Rizik**

Renaissance Venture Capital  
Ann Arbor, MI

**Mira Sahney**

Medtronic  
Boston, MA

**Rich Sheridan**

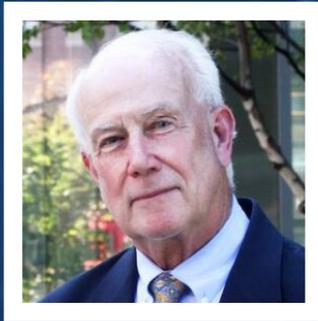
Menlo Innovations  
Ann Arbor, MI

**Maria Thompson**

Arsenal Growth  
Superior Township, MI

# Thank You Jack Turner

We would like to thank Jack Turner for his service on our National Advisory Board as his tenure is complete. His years of dedication and service have left an indelible mark on how the NAB supports the community of U-M innovators.



**Jack Turner**

*National Advisory Board Member*

*From 2004 - 2023*



## **THE REGENTS OF THE UNIVERSITY OF MICHIGAN**

Jordan B. Acker, Michael J. Behm, Mark J. Bernstein, Paul W. Brown, Sarah Hubbard, Denise Ilitch, Santa J. Ono (ex officio), Ron Weiser, Katherine E. White

U-M has a financial interest in some of the companies featured in this report through licensing agreements.

### **University of Michigan Nondiscrimination Policy** (effective June 2022)

The University of Michigan, as an equal opportunity/affirmative action employer, complies with all applicable federal and state laws regarding nondiscrimination and affirmative action. The University of Michigan is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, national origin, age, marital status, sex, sexual orientation, gender identity, gender expression, disability, religion, height, weight or veteran status in employment, educational programs and activities and admissions.

Inquiries or complaints may be addressed to the Equity, Civil Rights and Title IX Office (ECRT), 2072 Administrative Services Building, Ann Arbor, Michigan 48109-1432,



# INNOVATION PARTNERSHIPS

UNIVERSITY OF MICHIGAN

[INNOVATIONPARTNERSHIPS.UMICH.EDU](https://innovationpartnerships.umich.edu)

[INNOVATIONPARTNERSHIPS@UMICH.EDU](mailto:INNOVATIONPARTNERSHIPS@UMICH.EDU)

1600 HURON PARKWAY, 2ND FLOOR, ANN ARBOR, MI 48109-2590 | 734.763.0614

