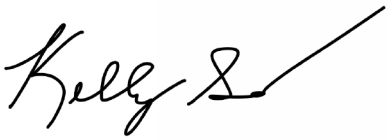
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

2022 IMPACT REPORT

At Innovation Partnerships, we have the honor of serving U-M's amazing community of innovators as they work to see their research discoveries make a positive difference in the world. I am pleased to share this year's annual impact report which shows just how truly incredible this past year has been for innovation at the University of Michigan. The Innovation Partnerships team worked with U-M inventors on 438 new invention disclosures, 278 license and option agreements with industry, and the launch of 16 new startup companies.

The ongoing work of our startups and licensees is vital to amplifying the impact of the research created on our campus. Last year alone, U-M startups raised $760 million in capital through investments, mergers and acquisitions and IPOs. Our new corporate research alliances team also supported the creation of new research awards totaling over $37M - a significant contribution to the university's total of $218M in new corporate research awards. We are excited to continue to support the University of Michigan's legacy of successful technology commercialization as we continue to redefine how world-class university research can fuel a region and solve the world's greatest challenges.



KELLY SEXTON, Ph.D.

Associate Vice President for Research and Innovation Partnerships

"As the nation's leading public research university, it remains incredibly important that society realizes the benefits of our research and scholarship. That means translating ideas, discoveries and technologies from the lab to the marketplace."

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

FY22 STARTUPS

APT Solar Solutions

Blockchain Triangle Systems

ChromX Health

EIQ

GeneToBe

GrayRain

iReprogram

Optigrate

MBrace

Mineurva

NOTA Laboratories

NX Fuels

Taza Aya

The Swift Fly Fishing Company

Trails

Vortex Hydro Power

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:

- Strategy and negotiation support for corporate sponsored research agreements
- Connecting faculty with commercial research opportunities
- Managing ongoing research alliances

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

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

2022 IN REVIEW

ALLIANCES

$37.4M

NEW CORPORATE SPONSORED RESEARCH AWARDS SUPPORTED

94

NEW CORPORATE SPONSORED RESEARCH AGREEMENTS SUPPORTED

U-M faculty had another strong year of industry collaboration, with **$220M** in corporate sponsored awards. The Corporate Research Alliances team within Innovation Partnerships strengthened this campus effort by providing direct relationship and negotiation support for 94 new corporate sponsored research awards totaling $37.4M.

LICENSING

433

INVENTION DISCLOSURES

278

LICENSE/OPTION AGREEMENTS

$20.4M

LICENSING REVENUE

409

U.S. PATENT APPLICATIONS FILED

143

PATENTS ISSUED

VENTURES

16

STARTUPS

$759.5M

RAISED BY STARTUPS

GENOMENON

University of Michigan Startup, Genomenon, Raises $20M Series B Financing

MARK J. KIEL

MIKE KLEIN

STEVE SCHWARTZ

On March 10, 2022, University of Michigan startup Genomenon Inc., an AI-driven genomics data company, announced the completion of a $20 million Series B financing round led by Farmington Hills-based Beringea. Genomenon leverages AI to organize the world's genomic knowledge to help doctors and clinicians more accurately diagnose patients with rare genetic disease and cancer, and to help researchers better target precision medicines at molecular drivers of disease.

The funds will be used to expand the company's commercial operations and the development of its genomic data hub, which serves genetic testing labs, hospitals, pharmaceutical, and biopharma companies. To date, Genomenon has raised a total of $35 million from investors and grants.

"Coming on the heels of a successful 2021 where the company once again more than doubled its revenue and customer base, Genomenon will use the new funds to grow its commercial team to reach new customers around the world," says Mike Klein, Genomenon CEO and former Mentor-in-Residence with Innovation Partnerships at U-M. "Our AI-driven technology enables genomic insights to support clinicians in patient diagnosis and scientists developing precision medicines."

The company's Mastermind® Genomic Search Engine is used by more than 2,000 genetic testing labs and hospitals worldwide to provide clinical insight into the scientific literature on genomic data.

Mastermind uses Artificial Intelligence (AI) to index millions of scientific journal articles and medical publications for genomic associations. The goal of this AI is to providing faster insights to drastically reduce the time pathologists and geneticists spend examining medical data.

Klein explains that the software uses algorithms to comb through the entire corpus of medical literature and determine the relationship between specific diseases and gene mutations. Mastermind then organizes the data into clinical categories prioritized by the strength of those relationships.

Genomenon's Prodigy™ Genomic Landscapes are used by top pharma and biopharma companies to deepen understanding of the genetic drivers and clinical attributes of any genetic disease, from rare disorders to cancer. These datasets enable pharma companies to accelerate target discovery, identify genetic biomarkers for clinical trial stratification, and develop companion diagnostics for regulatory approval.

A comprehensive understanding of genomics is essential to advancing precision medicine, and Genomenon uniquely meets that need in ways that have led to quick adoption in the market. The company makes Mastermind freely available to a broad range of scientists, academics, and clinicians. Its user base of over 20,000 extends to more than 140 countries.

"As proliferation of sequencing drives exponential growth in the new frontier of genomics-informed precision medicine, Genomenon's AI-driven technology platform is the ideal solution to bring life-changing therapies to patients while enabling Pharma to more efficiently discover and develop new targeted therapies," says Michael Gross, managing director at Beringea. "We are excited to partner with Genomenon's world-class management team to continue to drive industry-wide adoption of this transformational platform."

To learn more about Genomenon visit **genomenon.com.**

CORPORATE RESEARCH ALLIANCES

Bridging Academia and Industry

Innovation Partnerships introduces Corporate Research Alliances, the university's first stop for corporate partners seeking research collaborations. We provide a launchpad to support converting faculty and industry relationships into successful sponsored research engagements.

We specialize in facilitating industry collaborations that commercialize the novel work of researchers. From initial discussions and framing deal terms to final execution and alliance management, we support and streamline the establishment, implementation and ongoing management of research collaborations.

Some of Our Current Collaborators Include

Ford

CISCO

GREAT LAKES DISCOVERY

DOW

TOYOTA RESEARCH INSTITUTE

P&G

THE ACCELERATE BLUE FUND

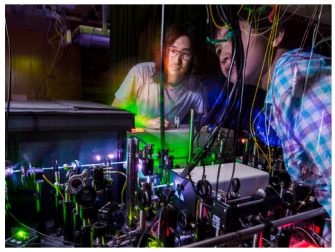
Funding The Next Generation of Innovation

The Accelerate Blue Fund (ABF) is an early stage venture fund that exclusively invests in University of Michigan (U-M) licensed startups.

The goal of Accelerate Blue is to bridge the funding gap between initial launch and angel/VC funding for startups based on University of Michigan intellectual property.

LOCAL

The Fund activity and support of startups will have a significant community impact in Ann Arbor and Southeast Michigan.



INNOVATIVE

The Fund invests in U-M startups in all sectors including healthcare, physical sciences and software technologies.

DEFINED PIPELINE

Investing exclusively in startups spinning out of U-M's research enterprise.

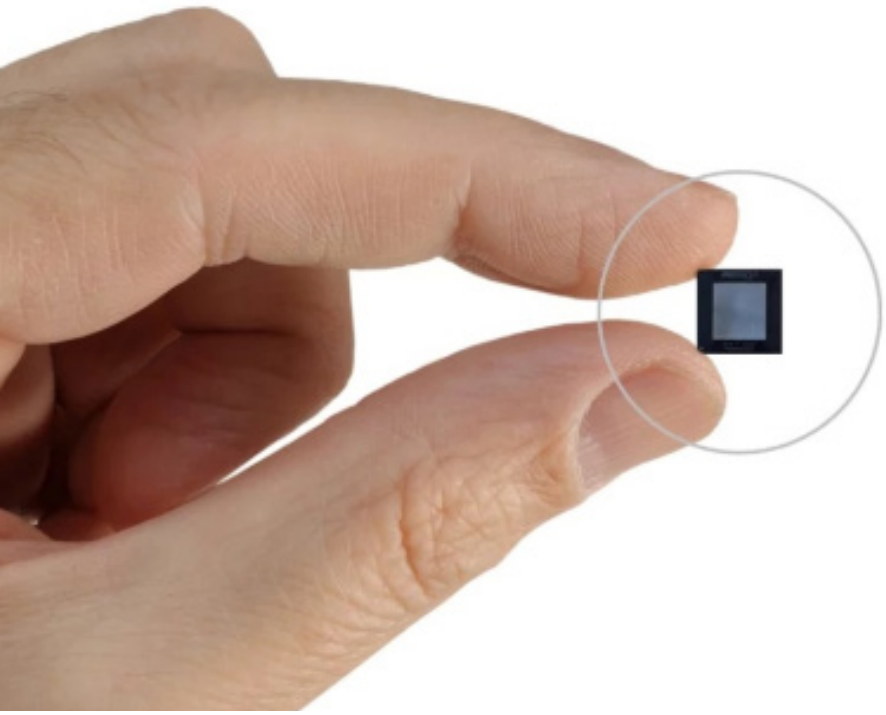
EVERGREEN

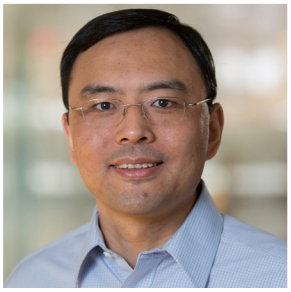
The Fund is evergreen, all investment returns are rolled back into the fund to invest in future U-M startup companies.

> **The Accelerate Blue Fund will help ensure that innovations developed on our campuses achieve broader use to help solve challenging societal problems and enhance the quality of life."**
>
> - **Rebecca Cunningham, M.D.**, Vice President for Research, William G. Barsan Collegiate Professor of Emergency Medicine, University of Michigan

To learn more about The Accelerate Blue Fund visit **acceleratebluefund.com.**

Engineering Professor Wei Lu Named Distinguished University Innovator of the Year





WEI LU

The world is becoming more and more reliant on Artificial Intelligence (AI). Smartphones, smart homes, social media, cars and many more modern devices are utilizing AI, and innovations created by University of Michigan Professor Wei Lu are leading the way in the creation of more powerful and efficient AI systems.

For his pioneering efforts in the development and commercialization of novel electrical devices, Lu, professor of electrical engineering and computer science, has earned this year's Distinguished University Innovator of the Year Award.

The Distinguished University Innovator of the Year Award, established in 2007 and supported by endowments from the Office of the Vice President for Research (OVPR) and the Stephen and Rosamund Forrest Family Foundation, honors faculty members who have developed transformative ideas, processes or technologies and shepherded them to market.

"First and foremost, we are a public research university, and so we all have a unique responsibility to ensure that our discoveries and innovations are not siloed to our laboratories and studios," said Rebecca Cunningham, vice president for research and the William G. Barsan Collegiate Professor of Emergency Medicine.

"As a research community, we must translate our work to positively impact the world around us. Professor Lu truly embodies the university's broader vision to develop and implement innovative products and solutions for the betterment of society."

OVPR selected this year's recipient based on the recommendation of a faculty selection committee that reviews a pool of nominees. Lu received the award on October 13th at U-M's annual Celebrate Invention event.

DESIGNING FOR THE NEXT GENERATION OF AI

Lu understood early on that the future of computing was reliant on the ability to develop improved computer memory devices that were powerful enough to support AI enabled applications. Upon joining U-M in 2005, Lu began working with a research team to tackle this problem.

Traditional computers are built with separate memory and processor chips, and the cost of constant data transfer between them severely limits their overall efficiency. Lu and his research team developed a new type of computer memory device that could be used to both store and efficiently process data in the same device.

"The way we live, work and socialize has been fundamentally changed by recent advances in semiconductors," said Mingyan Liu, professor of electrical engineering and computer science and the Peter and Evelyn Fuss Chair of Electrical and Computer Engineering, who nominated Lu for this year's award.

"Central to these developments is the ability to efficiently store enormous amounts of data, and the ability to efficiently process the data to produce useful information. Professor Lu has made significant contributions in both areas, including the invention of fundamentally new memory devices and computing circuits, leading to their successful commercialization."

In 2018, Lu and Zhengya Zhang, both professors of electrical engineering and computer science, co-founded MemryX Inc., a U-M startup company with a focus on commercializing these in-memory computing solutions. Prior to founding MemryX, Lu co-founded Crossbar Inc. in 2010 and led their efforts to transfer device technology from university research to commercial manufacturing.

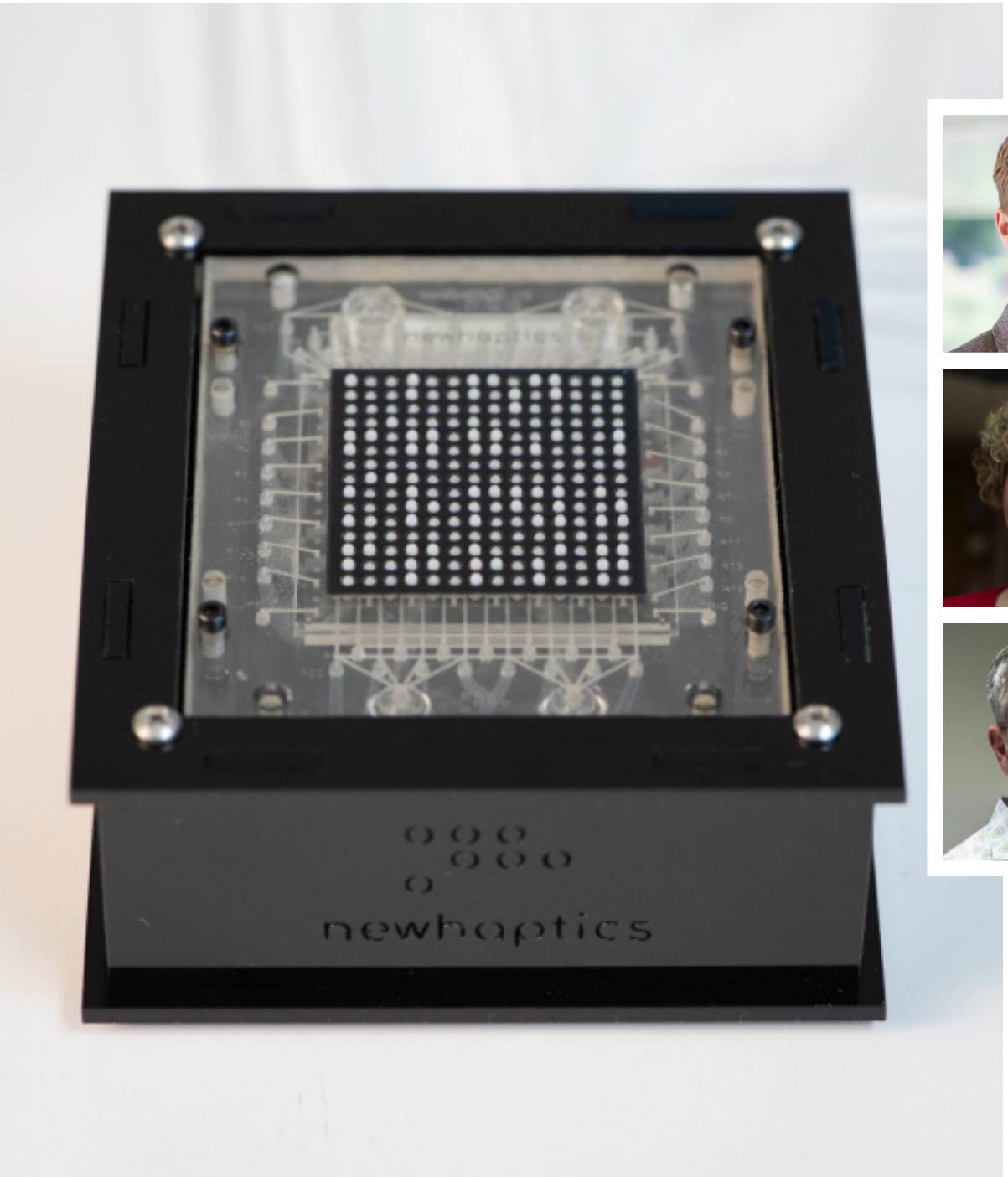
"Through our research and commercialization efforts, we hope to bring about transformative change that will allow us to seamlessly incorporate AI applications across many industries," said Lu. The AI Accelerator chips developed by MemryX are already being tested by customers, while Crossbar has established several product lines through its innovative ReRAM technology.

On the commercialization process, Lu had this to say about his experience at U-M: "I'm grateful for the support I received at the University of Michigan in launching both of my companies. Innovation Partnerships has always been available to help me navigate the commercialization process, and I'm also grateful for the matchless contributions of my U-M faculty, student, and alumni collaborators."

> **"I'm grateful for the support I received at the University of Michigan in launching both of my companies. Innovation Partnerships has always been available to help me navigate the commercialization process, and I'm also grateful for the matchless contributions of my U-M faculty, student, and alumni collaborators."**
> **- Dr. Wei Lu, Co-Founder, MemryX**

To learn more about MemryX visit **memryx.com.**

NewHaptics Works to Commercialize Multiline Braille and Graphical Tactile Display, Nicknamed the “Holy Braille” Project



ALEX RUSSOMANNO

SILE O’MODHRAIN

BRENT GILLESPIE

When Alex Russomanno began to study microfluidics he never expected his research would be so important to so many people. Then Alex met Sile O'Modhrain, Associate Professor of Performing Arts Technology, and his life and research became mission driven to improve the lives of blind or visually impaired people.

Alex realized that he could create Microfluidic chips that could raise pins, creating a breakthrough in packaging for braille devices. Alex started working with Sile and Brent Gillespie, Professor of Mechanical Engineering and Robotics, to create a full sized braille tablet, initially named the "Holy Braille" project. After some initial research and customer discovery, a startup company, NewHaptics, was founded by Alex, Sile and Brent with the mission to unlock the power of the internet for the blind.

The company's patented tactile display technology enables the creation of a compact, portable, and large-area tactile "screen." Unlike the state-of-the-art technology for existing refreshable braille displays, NewHaptics' technology can scale up to a large-area display supporting a grid of thousands of small tightly-packed tactile dots. Like pixels on a computer screen, the dots can be selectively raised and lowered to render multiple lines of braille and tactile graphics in real time on the surface of the device. This novel approach solves major hurdles related to size and cost that have prevented the scaling up of existing technology to support a multiline braille display device. The Company's tactile display components are batch manufactured in a process similar to how computer chips are made; thousands of tiny tactile dots are fabricated together in a single component. A small set of components, rather than thousands of individual parts, support enough dots for a large-area tactile screen in a low-profile form factor.

The roots of the "Holy Braille Project" go back to early funding from the National Science Foundation so it was logical that the NewHaptics team would look to "America's Seed Fund" for Business Innovation Research (SBIR) Funding. The team also applied for funding from the National Institute of Health (NIH). Both projects were awarded leading to major advancements in the technology. Since the success of both grants, NewHaptics has received follow-on funding from both organizations ensuring that the company will be able to successfully commercialize this technology.

Since its founding in 2018, NewHaptics has worked closely with Innovation Partnerships to file patents, and develop its company and business model. Today NewHaptics has an office in Ann Arbor that houses a small development team led by Ph.D. Alex Russomanno.

NewHaptics was founded with the goal of improving the lives of people who are blind by enabling true digital interaction using the sense of touch. The company has its roots in the "Holy Braille Project" funded by the National Science Foundation that focused on developing novel technology to enable the creation of a large-area tactile display for the blind. Since spinning off from the University of Michigan in 2018, NewHaptics has raised funding from federal and state grants to support research and development.

To learn more about NewHaptics visit **newhaptics.com.**

National Advisory Board

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

Welcome new members!

Jeff Donofrio,
President & CEO
Business Leaders
for Michigan

Patti Glaza,
Executive President,
Invest Detroit
Managing Director,
ID Ventures

National Advisory Board Members

Jim Adox
Executive Managing Director,
Venture Investors

Bill Brinkerhoff
CEO, EVOQ Therapeutics

Wendell Brooks
Founder and Managing
Partner, Snowcloud Capital

John Denniston**
Executive Chairman, SharedX

Jeff Donofrio*
President, Business
Leaders for Michigan

Richard Douglas
Board Chair
Genzyme Corp.- Retired

Larry Freed**
CEO, Give and Take Inc.

Patti Glaza*
Invest Detroit Ventures

Serena Glover
Angel Investor, Advisor

Paul Krutko
President and CEO,
Ann Arbor SPARK

Kirsten Leute
Partner, University Relations,
Osage University Partners

Jose Mejia
Co-Founder, Merlin
Mentor Capital

Chris Rizik
Founder and CEO, Renaissance
Venture Capital

Mira Sahney
President, Pelvic Health
at Medtronic

Rich Sheridan
Entrepreneur, Leader,
Author, Menlo Innovations

Maria Thompson
Venture Partner, Arsenal Growth

Jack Turner
MIT, Retired

**New Member*
***Board Term Ends 2022*

Thank You Larry and John

We would like to thank John Denniston and Larry Freed as they complete their tenure as NAB members. Their years of dedication and service have left an indelible mark on how the NAB supports the community of U-M innovators.

Larry Freed

National Advisory Board Service
2008–2022

John Denniston

National Advisory Board Service
2002–2022




INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

INNOVATIONPARTNERSHIPS.UMICH.EDU

INNOVATIONPARTNERSHIPS@UMICH.EDU

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