

# 2021 IMPACT REPORT





I'm pleased to share this year's annual impact report where we showcase the success of the university's research commercialization efforts during Fiscal Year 2021 and provide you with an overview of our organization's new brand and expanded mission and services. The formation of Innovation Partnerships follows a comprehensive assessment of the university's approach to corporate research partnering as well as feedback and ideation sessions with faculty, campus stakeholders, University leaders, community organizations, and industry partners about the future of technology transfer. The result of these efforts is the creation of Innovation Partnerships - a modernized organization to facilitate both research commercialization and corporate research collaborations.

The name Innovation Partnerships declares our team's commitment to provide enhanced faculty support as their trusted partner throughout their innovation journey. The Innovation Partnerships team is excited to build on 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 B. SEXTON, Ph.D.

Kelly S.

Associate Vice President for Research and Innovation Partnerships

As the nation's leading public research university, we have an obligation to ensure that our innovative research and scholarship endeavors address emerging problems, spur new technologies and drive the economy. Over the past fiscal year, the University of Michigan elevated its national reputation as a topranked technology transfer office. With the recent launch of Innovation Partnerships, we look forward to even stronger results in the years ahead. Innovation Partnerships signals the university's commitment to ensure that society is able to realize all of the positive benefits of U-M research and scholarship activity by creating forward-looking partnerships with the private sector to facilitate translation and commercialization.

REBECCA CUNNINGHAM, M.D.

Vice President for Research

# Meet the new Innovation Partnerships.

A bold development born out of a desire to increase support for the University of Michigan research community. Enabling the commercial advancement of ideas that forward our world. Technologies and research that save lives. Innovations that connect and transform. The mission of Innovation Partnerships is broader and more impactful than ever before.

We connect your research with those who need it, create companies that pioneer solutions, or simply provide counsel to broaden opportunities.

Innovation Partnerships is the primary gateway for U-M researchers seeking to increase the impact of their work by connecting with the private sector — through corporate-sponsored research collaborations, licensing discussions, or connections with business mentors, entrepreneurs, and investors to support startup company formation.

Our experts champion the creation of corporate research ALLIANCES and collaborations to accelerate the development of promising research. We enable the translation, commercial development, and LICENSING of groundbreaking research discoveries and technologies. We help create new VENTURES to usher in change.







# INNOVATION PARTNERSHIPS UNIVERSITY OF MICHIGAN

AMPLIFYING THE IMPACT OF RESEARCH

**ALLIANCES** LICENSING | **VENTURES**  **502** 

4,195

TECHNOLOGIES
UNDER MANAGEMENT

# INVENTION DISCLOSURES

**205** Michigan Engineering

204 Medical School

**58** LSA (College of Literature, Science and the Arts)

**27** College of Pharmacy

**16** School of Dentistry

12 Life Sciences Institute

**12** U-M Dearborn

**9** School of Public Health

**7** School of Nursing

**5** SEAS (School for Environment and Sustainability)

4 Ross School of Business

**4** School of Information (UMSI)

**3** SOE (School of Education)

Taubman College of Architecture and Urban Planning

**2** Michigan Law

School of Kinesiology

416

U.S. PATENT APPLICATIONS FILED

169

PATENTS ISSUED

\$42.9M

LICENSING REVENUE

**297** 

LICENSE/OPTION AGREEMENTS

subtotal of invention by college is higher than the overall total due to interdisciplinary sollaboration involving multiple colleges giving rise to a single invention.

N 2021 IN REVIEW

\$1.5B

RAISED BY STARTUPS

23

STARTUPS



U-M STARTUP EXITS

MERGERS / ACQUISITIONS / IPOs



19

# COMPANIES

IN THE INNOVATION PARTNERSHIPS STARTUP INCUBATOR (IPSI)

Arborsense iReprogram ActiveMEMS Labyrinth Creathadh Mekanistic Cubeworks MemryX

Endectra **NX Fuels** 

**EVOQ** OGB1/ Asalyxa

Opsidio Greenmark

**GHMRC** 

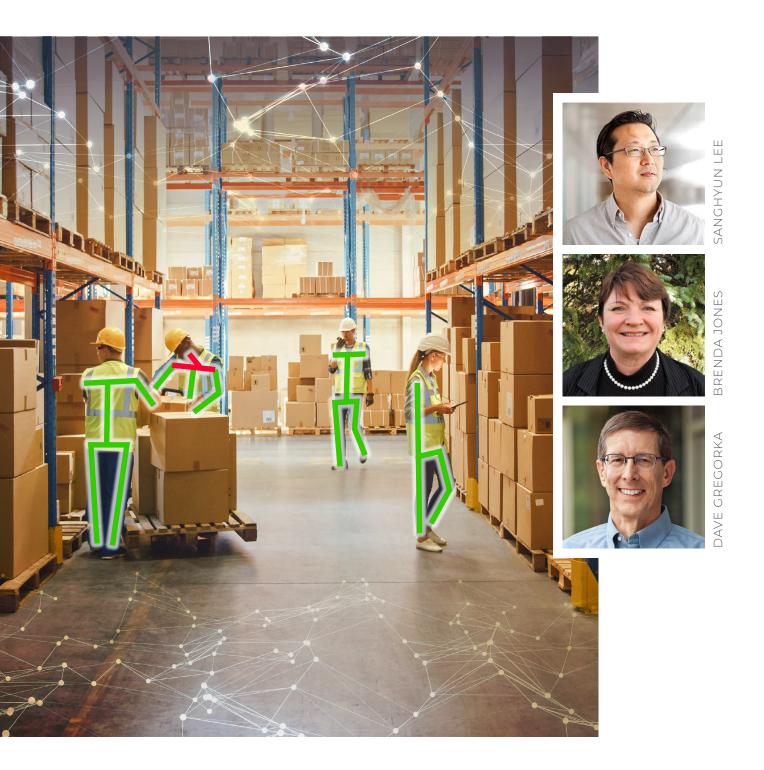
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**Phrixus** 

Taza Aya

# **| KINETICA LABS**

# Revolutionizing Workplace Safety with Ergonomic Motion Capture



University of Michigan (U-M) startup Kinetica Labs is revolutionizing the workplace safety market with a trio of motion capture applications launched in July 2020. The combination of a high-value technology platform and stringing together the right local resources and networks positioned the company for success.

Kinetica Labs develops motion capture software that translates videos into posture data without requiring a sensor on the body. That posture data can then be used to determine the risk of work-related musculoskeletal disorders (MSD). Organizations can then proactively modify equipment, workplace layout and processes in order to reduce the chance that a worker is injured.

The technology is the brainchild of Kinetica Labs Founder and Chief Technology Officer **SangHyun Lee**, who remains a professor and associate department chair of research in the Department of Civil and Environmental Engineering at the University of Michigan.

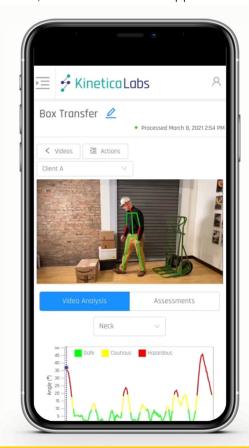
Historically, human movement mapping required manual measurements and physical sensors attached to the body which made the process too time-consuming and cost-prohibitive to conduct on a large scale, explained **Dave Gregorka**, a mentor-in-residence at U-M Innovation Partnerships who worked with Kinetica Labs and serves as a strategic advisor for the startup.

"The front end really had never been computerized until this invention," Gregorka said. Lee's technology makes it possible to analyze more movements from more workers to help employers keep their employees safe.

Lee launched Kinetica Labs in 2016 to bring the technology to market, and the startup penned a distribution deal in 2018 with Ann Arbor-based and nationally recognized ergonomic software company Humantech. Kinetica Labs's motion capture capabilities have become a significant competitive advantage for Humantech's product offerings.

"About a week after we signed the agreement, Humantech was acquired by VelocityEHS and our opportunity to reach more potential industrial organizations was increased nearly 100-fold," said **Brenda Jones**, CEO of Kinetica Labs. VelocityEHS is a giant in the environmental health and safety (EHS) field, with over 19,000 customers.

VelocityEHS became the distribution partner for Kinetica Labs's initial technology, and in July 2020, Kinetica Labs launched its own trio of web, iPhone and Android apps.



Kinetica Labs develops motion capture software that translates videos into posture data without requiring a sensor on the body.

Kinetica Labs' journey from academic innovation to commercial business is a textbook example of leveraging all the resources available to academic founders both nationally and particularly in the Ann Arbor area. In 2017, Lee began working with U-M Innovation Partnerships to protect his technology, and navigate the distribution deal with Humantech. Gregorka and other members of the Innovation Partnerships team also helped Kinetica Labs develop their

National Science Foundation's (NSF) Partnership for Innovation (PFI) funding. Lee's team also participated in both the regional and national I-Corps programs to develop the technical and business aspects of his body movement software.

Through customer discovery involving over 120 interviews via the NSF's I-Corps, Lee pivoted the initial focus of his technology from construction to industrial settings like manufacturing and distribution. "It turned



We want to tell people that there is help out there. If you string things together in the proper order, you can transform an initial idea into a commercial product that can impact the world."

- Brenda Jones, CEO Kinetica Labs

business model and secure important non-dilutive funding and human resources. Ann Arbor SPARK provided critical early stage funding through its Michigan Economic Development Corporation's (MEDC) funded Business Accelerator Fund (BAF) and provided other critical support during the early stages of Kinetica Labs.

Prior to Kinetica Labs's formation, Lee also secured the MEDC Michigan Translational Research and Commercialization (MTRAC) Advanced Transportation Innovation Hub funding and out the value proposition wasn't strong enough in construction," Jones explained.

With the focus on industrial applications, Lee was able to attract Humantech as a partner. After initially meeting with Humantech in 2016, the teams remained in contact until the timing was right to move forward with a partnership that has continued to grow.

After leveraging MTRAC, NSF and Ann Arbor SPARK funds to develop the motion capture software both in the





lab and in the early days of the startup, Jones turned to the local ecosystem to find funds that would help Kinetica Labs integrate its technology with Humantech's platform and develop its own commercializable iPhone app. Jones highlighted the Ann Arbor SPARK Business Accelerator Fund, the Economic Growth Institute's First Customer Program and Michigan Women Forward business plan competition as being crucial to supporting both activities.

Another way the ecosystem supported Lee was with talent including introducing him to his current CEO Brenda Jones. "I knew Dave Gregorka through the entrepreneurial ecosystem and heard he was looking for a startup founder for one of the companies he mentored. Dave introduced me to [Lee]," Jones said. She met Lee at the The James and Anne Duderstadt Center on U-M's campus, listened to his founder's journey and saw the application he'd created,

at which point Jones was sold and began helping navigate the Humantech and Kinetica Labs agreements with the support of Innovation Partnerships.

Because Jones had been an active participant in the local entrepreneurial ecosystem through events and mentorship programs; she knew about all the resources available to support startups and how to access them.

Ultimately, Kinetica Labs was able to launch web, iPhone and Android motion capture applications in July 2020, informed by feedback from Kinetica Labs's early clients of a pilot iPhone application released in April 2019.

"We want to tell people that there is help out there. If you string things together in the proper order, you can transform an initial idea into a commercial product that can impact the world," said Jones.



To learn more about Kinetica Labs visit **kineticalabs.com.** 



# INNOVATION PARTNERSHIPS

Dave Gregorka, Mentor-in-Residence gregorka@umich.edu

Dave Gregorka is an operations executive who has been part of multiple successful start-up teams. He has raised over \$20 million in venture capital and grants, and has expertise in new ventures leadership, fund raising, M&A, corporate administration, technology management, financial leadership, client services, and operations management.

# \\\ INHERET

# Finding At-Risk People Before They Become Cancer Patients



U-M startup InheRET is making an impact on patients and care centers with its tool that more accurately identifies which people are at risk for developing inherited cancers than standard family histories. It arms patients and their clinicians with information that enables careful monitoring and earlier intervention.

The Inherited Risk Evaluation Tool (InheRET) applies an algorithm based on National Comprehensive Cancer Network (NCCN) guidelines and other recognized standards to a patient's detailed family history to determine the likelihood that the patient inherited a gene that predisposes them to cancer. The latest NCCN guidelines also include recommendations for testing and those have been incorporated into the algorithm along with risk assessment. Clinicians are alerted to patients with a high likelihood so that they, alongside the patient and a genetic counselor, can decide the best course of action.

According to InheRET Founder and CEO **David Keren**, "One out of five people are at an increased risk [to develop cancer] by family history. That's more than 60 million people in the U.S. And more than 90% of them don't know that they're at increased risk." Keren began his career as a U-M faculty member in the Department of Pathology in 1978, served as Medical Director of Warde Medical Laboratory, a clinical laboratory testing company, from 1989-2011, and returned to the U-M faculty in 2012.

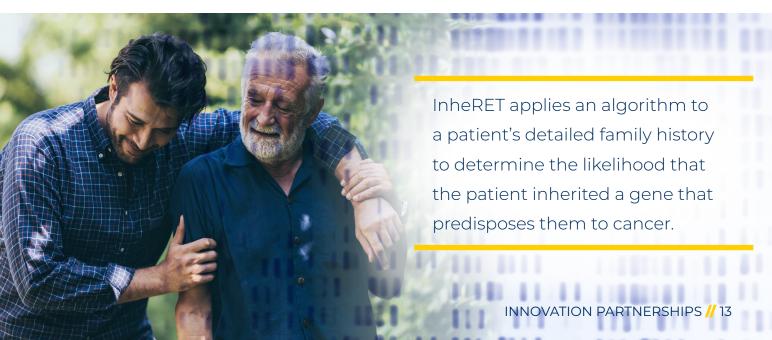
A unique aspect to InheRET's platform is that its family histories are designed to maximize the information a patient can provide.

Genetic predictions are optimal when the family history goes back three generations, but it's difficult to collect and provide that information in the few minutes before or during a doctor's appointment. InheRET's histories can be done from anywhere, are self-paced and online, giving patients time to collect information about family members' illnesses.

In InheRET's current business model, care providers pay a monthly subscription to provide InheRET to an unlimited number of patients. Patients benefit by receiving appropriate care including genetic testing and diagnostic or intervention procedures, while clinicians and their medical center benefit through increased staff efficiency, and the ability to schedule more patients and prioritize those at higher risk.

## **BUILDING THE PLATFORM**

Keren and team spoke with clinicians throughout Michigan and found there was no thorough or systematized method of identifying patients that would benefit from genetic testing.



The problem is two-fold: patients that should get genetic testing don't, preventing early intervention; and patients that aren't at a high risk for inherited cancers do, uncovering genetic variants that aren't linked to disease but none-the-less cause distress and sometimes unnecessary medical interventions. InheRET's platform addresses both scenarios.

In a U-M pilot study, InheRET evaluated the effect its platform had on genetic counselors with backlogs of 400 hundred patients waiting for initial appointments, during which they would normally fill out family histories on paper to determine if there were in fact genetic predispositions of concern. Patients took 4 to 6 weeks to return their documentation and more than 30% never returned it and were never seen. With InheRET's patient-friendly interface, detailed histories were returned in an average of 72 hours, with a 90% completion rate. "Their backlog was reduced to almost nothing" using InheRET, Keren said.

Another positive effect was that U-M's genetic counselors could see 1–2 more patients a day because having a family history filled out and analyzed ahead of time via InheRET shortened pre-appointment preparation time and appointment lengths.

InheRET will soon pilot its latest version of the platform, InheRET 3.0, which has significant upgrades.

From the outset, Keren wanted the company's product to be accessible for everyone. Based on early feedback, the team developed the user interface of the platform at a 4th grade reading level, an improvement from a 9th grade level in the first prototypes.

InheRET 3.0 alerts clinicians to the exact genetic tests a patient needs, cutting out delays in determining which test to order. Additionally, InheRET is working towards contracts with testing companies so that clinicians can visit InheRET's website to see the list of companies providing the genetic test, select and order it, while providing the insurance company with the pre-authorization information needed to cover the cost of the test.

InheRET is also expanding its commercial strategy with the help of new hire **Kelly Hall**, VP of Business Development. Hall was most recently VP of Commercial Strategy at CancerlQ and VP of Business Development at InformedDNA.





THE ACCELERATE BLUE FUND

# Funding The Next Generation of Innovation

The University of Michigan is the nation's largest public research university. U-M's vast research enterprise is constantly giving rise to incredible new innovations — innovations that spark new industries, improve human life, and help solve society's most pressing challenges.







# LOCAL

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

# **BROAD FOCUS**

Cybersecurity, social impact, mobility, hardware, AI, climate tech, legal, big data, sports tech, and more.

# **DEFINED PIPELINE**

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



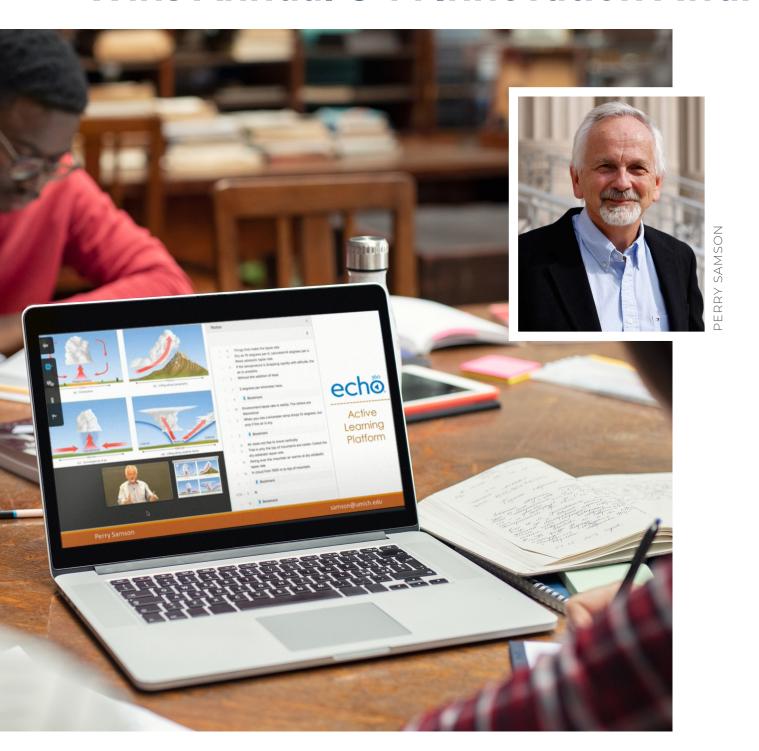
The Accelerate Blue Fund will help ensure that innovations developed on our campuses achieve broader use to help solve challenging societal problems and enhance the quality of life."

- 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.** 

# Professor Behind Breakthrough Tools for Weather Data, Education Wins Annual U-M Innovation Award



For developing a series of pioneering learning and weather-related tools and technologies and launching successful companies around them that serve millions of people, University of Michigan professor **Perry Samson** has earned this year's Distinguished University Innovator Award.



Samson, a professor of atmospheric science, will receive the award Oct. 6. The Distinguished University Innovator Award honors faculty who have developed transformative ideas, processes or technologies and shepherded them to market.

Samson's list of breakthrough innovations includes initiating the creation of the Blue Skies application for allowing K–12 students and later the public to access live weather data with rollover map functionality before the existence of the internet. That led to co-founding the Weather Underground, the first online commercial weather company, which was eventually sold to the Weather Channel and later IBM and used by millions of people daily.

He also led the development of the LectureTools learning platform that allowed students to ask and answer questions interactively via laptops and phones during class. This tool helped advance equity and inclusion in the classroom by allowing students to ask questions in a way that was anonymous to each other but not to the instructor.

This tool has been shown to produce dramatic increases in student inquiry during class.

Moreover, students who self-report discomfort

with asking verbal questions in class participate in inquiry at rates at or above the rest of the class, thus giving more students a voice, he said.

The software was bought by Echo360, for which he remains an adviser, and integrated into its Active Learning Platform. That platform is now used by 2 million students worldwide.

His latest, LearningClues, uses artificial intelligence to analyze and index what is said or visually presented in classes and identifies words it deems important to each class session. With this tool, students will be able to search videos from their courses to find specific moments related to their search. The system will also automatically create study guides for students for a time period of their choosing based on what was discussed and visually presented in those classes.

A prototype of the technology is now available via U-M's CAEN Lecture Capture system and soon will be commercially available for other campuses.

Enrico Landi, a colleague, said in his nomination letter that Samson "is one of those rare personalities capable of devising breakthrough

# I consider the commercialization process a capstone laboratory both for the technology and for entrepreneurship, and my efforts have been buoyed by the enthusiasm and commitment of the students who have participated."

- **Perry Samson**, Arthur F. Thurnau Professor of Atmospheric Science and Distinguished University Innovator Awardee

innovations in different, apparently unrelated fields, and to transfer them to the market, shaping those fields for decades."

"His creativity in devising profoundly innovative ideas is paralleled only by his ability to transform them into reality first, and then into a marketable product; and by his perseverance in making them wildly successful in the market," wrote Landi, an associate research scientist of climate and space sciences and engineering.

For his part, Samson said all of his innovations grew out of needs he perceived in delivering classes: The Weather Underground was created because he wanted to know what the weather was around the country before his 9 a.m. class. LectureTools came about because he wasn't satisfied with the range of question types he could ask using clickers. And LearningClues was born "because students wanted study guides for exams and I'm too lazy to create them."

"While I totally understand colleagues' reluctance to start or even get involved in the commercialization process, I have found there are many students who are interested and enthusiastic about entrepreneurship," Samson said. "I consider the commercialization process a capstone laboratory both for the technology and for entrepreneurship, and my efforts have been buoyed by the enthusiasm and commitment of the students who have participated."

Samson also said he sees a common thread in his innovations: democratization. For instance, he

said, LectureTools, and now Echo360 technology, has expanded classroom communication options to all students just as The Weather Underground broadened access to weather information.

The vice president for research selects recipients of the Distinguished University Innovator Award based on the recommendation of a selection committee that reviews a pool of nominees. The award was established in 2007 and is supported by endowments from the Office of the Vice President for Research and the Stephen and Rosamund Forrest Family Foundation.

"The University of Michigan has solidified itself as a global leader in research and scholarship, but our strong reputation is not solely based on expertise and experience," said Rebecca Cunningham, vice president for research and the William G. Barsan Collegiate Professor of Emergency Medicine.

"The research community here at Michigan has genuinely embraced the concept of translating research from the lab to the marketplace so that our communities can benefit from their tremendous work. Professor Samson is someone who truly embodies this overall commitment to translation and innovation."

Samson credits U-M's Innovation Partnerships, based in the Office of the Vice President for Research, for its help in guiding his technologies into startups.

"They have provided business-minded mentors for my projects that have been a godsend," he said.

# U-M professor Alison Narayan named Novartis Institute for Biomedical Research (NIBR) Global Scholar

After U-M was selected to participate in the prestigious Novartis Institute for Biomedical Research (NIBR) Global Scholars Program, FY21 saw Innovation Partnerships work with faculty to submit over 40 proposals. U-M professor Alison Narayan was announced in January as an inaugural winner of the highly competitive award. Only six researchers were selected as awardees from more than 700 proposals across 38 institutions globally.



Narayan is a Research Associate Professor in the U-M Life Sciences Institute, an Associate Professor in the Department of Chemistry at U-M LSA and Co-Director of the Michigan Life Sciences Fellows Program. As a NIBR Global Scholar, Narayan is eligible to receive up to \$1 million in funding over three years and gains access to NIBR's drug discovery and development expertise.

Narayan harnesses naturally occurring enzymes to alter the structure and function of small molecules with a speed, precision, and sustainability not achievable with widely-used synthetic chemistry approaches.

These attributes make Narayan's system particularly valuable in drug discovery, where it can not only create thousands of versions of a lead small molecule drug in a single assay, but also enables immediate functional testing of those newly-created small molecules.

This exciting new research collaboration with NIBR offers the opportunity to accelerate the important research in the Narayan Lab.

Thanks to the support and guidance I received from Innovation
Partnerships – from creating an intellectual property strategy to
finding synergies between my lab's work and the NIBR team – the
Narayan lab has a unique opportunity to collaborate with Novartis."

 Alison Narayan, Ph.D., Associate Professor, Department of Chemistry, U-M College of Literature, Science, and the Arts, Research Associate Professor, U-M Life Sciences Institute, Co-Director, Michigan Life Sciences Fellows Program

# \\ 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**

















# **FY21 STARTUPS**

aLight Sciences, Inc.

Amphionics, LLC

Creathadh Energies, LLC

Crimson

Technologies, LLC

Dvant Pharma, Inc.

EMPOWR-ME, LLC

Flux Technology, Inc.

Good Business Analytics LLC Growing Forward Together, Inc.

InspireRx LLC

Kirisolar, Inc.

Lympharma, LLC

M-Vision, Inc.

Matsaki Technologies, Inc.

MiOmics, Inc.

Mynerva, Inc

NitriCap Medical Inc.

Precision Trauma LLC

Rich Earth, LLC

S2A Technologies, LLC

Silicon Kidney, LLC

Vasaragen, Inc.

Xondas, Inc.

# **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 Talent Network, and the U-M Startup Incubator.

Their latest initiative is helping to launch the Accelerate Blue Fund, a philanthropic investment fund to provide early-stage capital for U-M tech startups. The goal is to raise \$20 million from donors who share our vision of increasing the economic, educational and societal impact from the University's research discoveries.

# **National Advisory Board Members**

# Jim Adox

Managing Director, Venture Investors

### **Bill Brinkerhoff**

CEO, EVOQ Therapeutics

### **Wendell Brooks**

Managing Partner, Snowcloud Capital

## **John Denniston**

Chairman of Shared-X

# **Richard Douglas**

Advisor, Red Sky Partners, LLC

# **Larry Freed**

CEO, Give and Take, Inc.

# Serena Glover

Angel Investor, Advisor

# **Paul Krutko**

President and CEO, Ann Arbor SPARK

### **Kirsten Leute**

Partner, University Relations, Osage University Partners (OUP)

### Jose Mejia

Merlin Mentor Capital, Founder

## **Chris Rizik**

CEO and Managing Partner, Renaissance Capital Venture Fund

# **Mira Sahney**

President and CEO at Hyalex Orthopaedics, Inc.

## **Richard Sheridan**

CEO and Chief Storyteller, Menlo Innovations

## **Maria Thompson**

Entrepreneur-in-Residence, Arsenal Venture Partners

# **Jack Turner**

MIT, Technology Licensing Office, Retired



# THE REGENTS OF THE UNIVERSITY OF MICHIGAN

Jordan B. Acker, Michael J. Behm, Mark J. Bernstein, Paul W. Brown, Sarah Hubbard, Denise Ilitch, 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 April 16, 2014)

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 Senior Director for Institutional Equity, and Title IX/Section 504/ ADA Coordinator, Office for Institutional Equity, 2072 Administrative Services Building, Ann Arbor, Michigan 48109-1432, 734-763-0235, TTY 734-647-1388, institutional. equity@umich.edu. For other University of Michigan information call 734-764-1817.



