WAYNE STATE UNIVERSITY

Faculty Impact

Spring 2019

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About Us:

The Provost is committed to the development and success of faculty, academic staff, and students in Wayne State's 13 schools and colleges and views student and faculty/staff success as inextricably linked. With this vision in mind, Faculty Impact is aimed at celebrating faculty successes and encouraging interdisciplinary collaborations that inspire junior colleagues and students to persist and be successful in their endeavors.

Faculty Impact

Publisher: Office of the Provost
Provost: Keith E. Whitfield
Faculty Curator: Annmarie Cano
Editors/Designers/Contributers: Kelsey Husnick, Keena Neal

Contact Us:

Provost Keith E. Whitfield
(313) 577-2433
Email: provost@wayne.edu

Innovation and Entrepreneurship

Stock Image; Courtesy of Pexel

As we welcome Spring to campus, it is fitting that the theme of this Faculty Impact newsletter is Innovation and Entrepreneurship. Wayne State is an exciting place to be these days with so many innovative projects, spurring student, faculty, staff, and community entrepreneurial activities.

It is my hope that you will see that innovation and entrepreneurship can be fostered among all disciplines and that a mindset of creativity and collaboration can promote new ideas that benefit not just the career growth of the innovators.

Innovation and entrepreneurship has a collective impact on our students, peers, and community. Enjoy this issue of Faculty Impact!

- Keith E. Whitfield, Provost and Senior Vice President for Academic Affairs

The First Step for Entrepreneurs: "Finding the Right Problem"

By Keena Neal

College of Engineering students and faculty interested in entrepreneurship need only visit Wayne State's Anderson Institute for guidance when they are ready to turn their research into an innovative, business idea.

"Talk to us; that's our job," said Sorin Draghici, professor of Computer Science and Director of the James and Patricia Anderson Engineering Ventures Institute.

Embedded within the college, the Institute's mission is to foster a culture of entrepreneurship among its faculty and provide engineering students the opportunity to learn best practices in applied research, technology commercialization, and business creation.

ENTREPRENEURS

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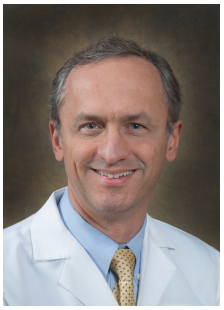

"The most important thing is to find a good problem," said Draghici. "If you find an important problem that people face and you can solve that, you are on your way to success."

Once faculty and students have an idea, Draghici and the Institute staff help students navigate all things entrepreneurship and innovation. The Institute partners with the Business School and offers courses in entrepreneurship. The Institute also connects students with lawyers, accountants, mentors, and venture capital managers.

"So, for students we are offering courses, we are offering mentorship, and we are offering support," said Draghici.

For Draghici, the goal is to help aspiring entrepreneurs refine their business models and take them to the next stage. This includes providing funding. "We have a rolling deadline," said Draghici. "So, anyone can apply for funding at any time during the year."

Draghici said funding ranges from $5,000 to $300,000. In the past three years, the Institute has worked with about 25 teams, both led by faculty and students. Teams receive fundng in various stages of project development, and teams may apply for additional funding once a stage is completed.

"We see this as a pipeline," said Draghici.

Translating research into an innovative idea has its challenges. Draghici said the most pressing task is to help scientists understand the difference between a research project and something that is applicable in the real world.

"If you want to take something into the real world, that point is just the beginning," said Draghici. "[there's] a lot of work to be done to understand the problem that a particular technology can solve."

Draghici learned to discern the difference between being a scientist and an entrepreneur first hand. In 2005, he founded Advaita Bioinformatics, a leader in the interpretation of biomedical data. The company was born out of research that Draghici and his team developed at Wayne State.

As a computational biologist, he develops and applies computational methods (e.g. algorithms or computer models) to analyze large collections of biological data. His field is a marriage between computer science and life science, where computational biologists develop tools that help scientists process large quantities of biological data using statistical and computational tools. The Anderson Institute did not yet exist when Draghici turned his research at Wayne into what is Advaitia today.

"So at that time, there was very little support ….for entrepreneurial activities. So that was a struggle to be honest. But that is exactly why I think the Dean asked me to lead this effort of the college in this area. Because I had been there. I have experienced some of the difficulties that an entrepreneur needs to face when--they start a company."

Now Draghici uses his own experiences to help Engineering students and faculty traverse a similar road. He thinks students and faculty are receptive to the Anderson institute's mission and goals. And unversity support is key; the Provost has made entrepreneurship and innovation a priority for the university.

"And it's much easier to reach out to the faculty and get them engaged with us if they know that this is a type of activity that is a priority for the university."

Sharing Stories of the Past

By Kelsey Husnick

When one thinks of an archaeologist, one might think of someone uncovering ancient Mayan ruins or analyzing Egyptian hieroglyphics. To some extent, Krysta Ryzewski, an associate professor of anthropology, does fit this image. She spends most of her summers in Montserrat, an island in the Caribbean on which an active volcano has caused massive shifts in population dispersion and settlement.

"On Montserrat, my Survey and Landscape Archaeology on Montserrat project uses archaeological evidence to understand how people from different cultures used and transformed the island's environment over the course of its 4000-year human history," Ryzewski said of the project she's been co-directing since 2009 with a colleague at Brown University.

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"We've conducted in-depth excavations at previously unrecorded archaeological sites, including a post-emancipation schoolhouse from the 1850s, a site of European-Amerindian trade from the 1600s, an Amerindian settlement from around 1300 A.D., and a stone toolmaking workshop that dates to the earliest human occupation of the island around 2800 B.C.," she said.

Ryzewski also developed the Time Jumpers on Monserrat, an innovative educational outreach program designed to teach the scientific principles of archaeology and the local archaeological history to grade-school children there. In 2012, she brought Time Jumpers to Detroit and Metro-Detroit schools; the program remains active today.

"We use archaeology as a gateway for engaging children in the sciences. Sometimes the hard sciences can be daunting, but archaeology puts a human face on them and is a relatable way for students to think about more technical or complicated research that might involve chemistry, physics, biology or computer science," she said.

The rest of the year, Ryzewski focuses on her Unearthing Detroit project, an overarching research initiative that includes the many local historical archaeological projects she's conducted with her students and community partners.

"Like on Montserrat, we are faced with a fast-changing landscape in Detroit. There are unquantifiable ruins in both places, and so it can be a bit overwhelming to prioritize where to conduct research. But my research questions are big picture enough that they can be flexible and respond to local situations as need be."

Krysta Ryzewski (center, with hat) poses with Hamtramck Mayor Karen Majewski, the Hamtramck Fire Department and Wayne State students Carly Slank and Hannon Hylkema at the public open day at the Old Hamtramck Center site. Over 100 visitors came to see their work in October 2018.

Some of her Detroit projects are long-term research projects based on excavations at sites such as Roosevelt Park in Corktown. This site, in front of Michigan Central Train Station, is where her team uncovered the remains of a 19th century working class community which was displaced to create the station and the park in the 1910s.

"From the excavations of 16 different former house sites, we recovered over 30,000 artifacts from Roosevelt Park," she said. "This gives us unparalleled insights into the unwritten histories of Detroit's immigrant and working class communities at the time when the automobile industry was in its infancy."

Telling stories like these sheds light on Detroit's history of entrepreneurship and innovation. The main focus of Ryzewski's work is to emphasize public-facing scholarship.

"I'm doing traditional archeological research surveys and excavation and artifact analysis, but asking broader questions of that work," she said. "So it intersects with community histories and political issues and social justice issues, and essentially telling stories from archeology that shed light on different segments of the population that have not received much recognition from history."

A major problem Ryzewski and her Michigan Tech collaborators are working to solve is how to make all of the artifacts, landscape data, and historical records they've collected a publicly accessible resource for researchers and citizens interested in Detroit's history and heritage. This big data challenge is part of her current digital humanities-based research.

The goal is "to tell the story of how the city evolved… the highs and lows of the city, so what happened when urban renewal came through or what happened when a neighborhood was designated a slum. How did it transform? How were people impacted?"

She and her colleagues are working on a proposal to build a historic spatial data infrastructure, which will be an interactive atlas of 200 years worth of archaeologically-informed history in three Detroit neighborhoods.

One Step Closer to Curing Blindness

By Kelsey Husnick

For almost two decades, Zhuo-Hua Pan has been working to restore vision in patients who have lost their sight caused by retinal degeneration, such as retinitis pigmentosa and aged related macular degeneration.

As a professor of ophthalmology in the Visual and Anatomical Sciences—the branch of medicine that focuses on eye surgery and eye disorders— and the scientific director of the Ligon Research Center of Vision, Pan developed an innovative technique called optogenetics in which makes neurons from the brain sensitive to light.

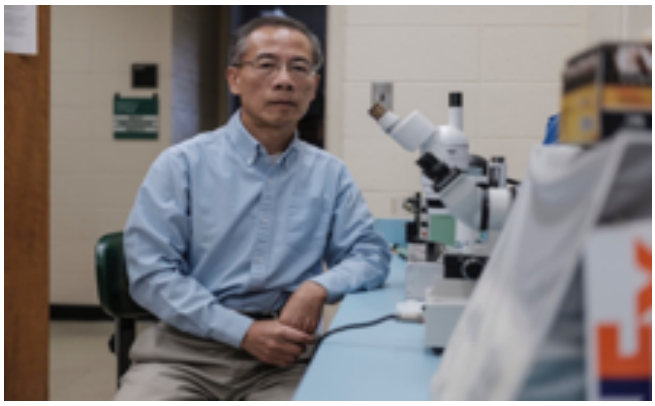
"This work is very promising and of course very exciting," Pan said. "We started the project in 2003-2004, and now the technology has been licensed to a company and is already in a phase I/II(a) clinical trial. So we are waiting to hear the exciting outcome."

People become blind because of a loss of photoreceptors in the retina, Pan said, and these photoreceptors respond to light, which is what allows you to see.

One can become blind because of degenerative diseases that destroy these receptor cells, leaving no more cells in the retina that can process light. But because the retina has layers of cells, non-light sensitive cells down-stream to photoreceptor cells still preserve in the retina. That's where Pan's optogenetic technique comes in.

"We use viral vector-based gene therapy to deliver a gene that encodes a light-sensitive protein,-called channelrhodopsin (ChR) found in the green algaeinto the retinal neurons that before were not light sensitive. Basically we convert them to new photoreceptors that can respond to light, and that's the way we can restore vision," he said.

The clinical trial phase Pan's work is in means it has a potential to develop a treatment for blind patients. He said it's rewarding to see the technology leave the lab, but that doesn't mean the work in the lab is done. As of now, the technology in clinical trial is in the first generation, meaning there are improvements that still need to be made.



Pan in his lab at Wayne State University in 2016.
Photo taken by Sean Proctor for a feature on Pan that ran in STAT.

First, the light sensitivity of the ChR currently used in the clinical trial is very low, so it can only work under conditions of very bright light. Pan says they have recently developed more light-sensitive ChR that can be used for the next generation product.

Also, the current approach is just tried to put ChR in all the retinal cells. Pan says they will need to determine the best retinal cell type(s) to target ChR in order to product the most effective outcome. With more research, his lab could figure-out the most effective optogenetic technology for vision restoration.

"The first generation has very low sensitivity and we just tried to target everything [all the cells], and I still believe that this will restore some useful vision, but in order for this approach to be really effective, I believe we still have more work to do."

Pan's approach is still favorable, in his view, to alternative approaches that are also working to restore vision.

Other labs have experimented with retina implants which are more invasive than his approach

If all goes well, Pan said his innovative technique could make it to market within the next four years. Once that major milestone is accomplished, Pan might take a step back from science to pick up an old hobby—painting.

"I worked on the farm [in China] during the time before college and I tried to find something else I could do for myself. I tried to learn painting," he said. "But then later when I went to college I got too busy, so I dropped it. But I still think maybe later I will pick it up again."

Until then, you can still find him tirelessly working in his lab with his dedicated graduate students.