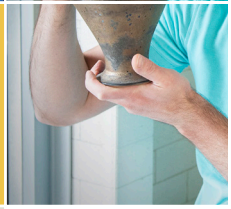




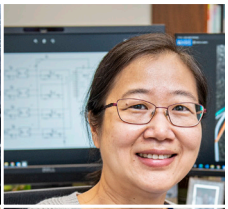
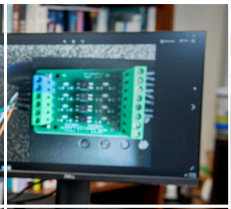



TO CREATE

A BETTER TOMORROW

IT TAKES RESEARCH











OFFICE OF SPONSORED PROGRAMS
2020-2021

PURDUE UNIVERSITY®
FORT WAYNE

TOWARD THE

FUTURE

The pursuit, advancement, and application of knowledge—the lifeblood of universities big and small—is essential to the success of Purdue University Fort Wayne, northeast Indiana, and beyond. Fueled by external funds, faculty and student research projects push the bounds of knowledge.

The benefits of externally funded research are vast. Discoveries from research projects lead to innovation, improve society, and support business and industry. These projects connect the university with the community and the world, laying the groundwork for immediate and future improvements. Students who take part in experiential-learning opportunities help increase the university's rates of engagement, retention, and graduation. Research projects also create different teaching opportunities, expanding the learning experience for students and improving the community as a whole.

Embracing the Unexpected: Bringing a Remote Environment to Manufacturing

CHAO CHEN
ASSOCIATE PROFESSOR OF COMPUTER ENGINEERING

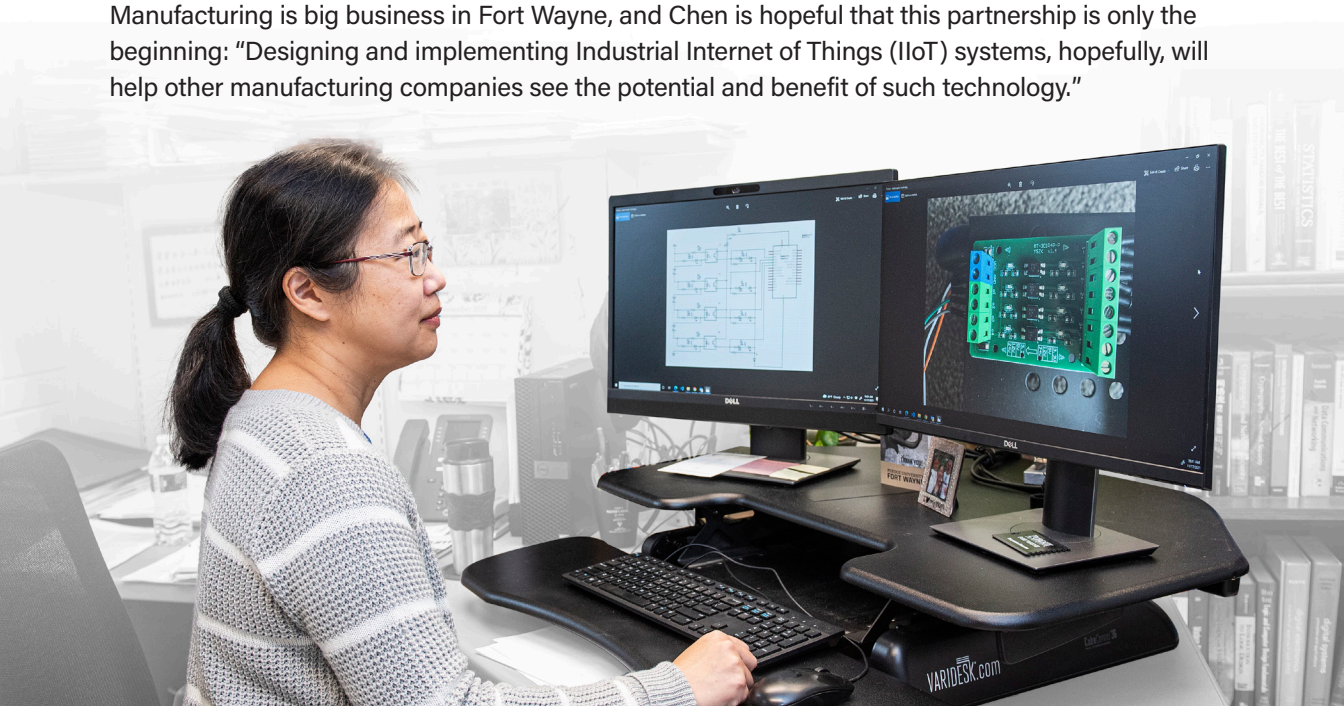
It's no secret that remote environments are booming, but what about areas that aren't yet conducive to remote work? Well, you design a system that makes it possible.

A local company that specializes in providing preventive maintenance services for industrial machinery and equipment, Guardian Machine Protection, needed to adapt to the 2020 environment. (Under normal operating conditions, engineers would travel to customer sites to complete tests and diagnostics.) Enter Chao Chen, associate professor of computer engineering, who understood that a solution for Guardian would require an interdisciplinary approach, calling on expertise from the fields of electrical and computer engineering, as well as computer science. Teaming up with Zesheng Chen, associate professor of computer science; three Purdue Fort Wayne students; and Guardian employees, she created what would become the Guardian Internet of Things (IoT) Remote Machine Monitoring System.

Chen explained the process:

> In this project, we built an IoT prototype system, showing a low-cost design that is able to remotely monitor machine status and control signals through noninvasive sensors. The system can be further enhanced with intelligence additions on the application software. For example, when a machine goes down or generates abnormal signals, the data collected in real time can automatically trigger a service request and pinpoint where the issue is. Moreover, by reading and analyzing collected data, engineers can predict when a machine will likely break down or enter a dangerous operating condition before it happens, thus improving safety and reducing maintenance cost.

Manufacturing is big business in Fort Wayne, and Chen is hopeful that this partnership is only the beginning: "Designing and implementing Industrial Internet of Things (IIoT) systems, hopefully, will help other manufacturing companies see the potential and benefit of such technology."



Understanding Nature through a Mathematical Lens

ALESSANDRO MARIA SELVITELLA
ASSISTANT PROFESSOR OF DATA SCIENCE AND APPLIED STATISTICS

The world is vast, and new discoveries are made every day. It's this drive to uncover the unknown that fuels the most intriguing research. And Alessandro Maria Selvitella, assistant professor of data science and applied statistics, is seeking to bridge a gap between the underdeveloped relationship of mathematics and biology in an extraordinary way with an equally extraordinary subject—mourning geckos.

Math and nature. At first, the two areas seem fairly dissimilar; however, as Selvitella explained, "there are some mathematical structures which at an abstract level appear almost identically in chemistry, neuroscience, and biomechanics."

In collaboration with Kathleen Lois Foster, assistant professor of biology at Ball State University, Selvitella set out to "use abstract mathematical tools from geometry and analysis jointly with statistical and machine learning methods to understand the biology of growth and form of the mourning gecko, a species of lizard."

Selvitella more specifically explained, "[The project] aims at determining with quantitative methods how morphology and locomotor biomechanics change during growth, through a data-driven development of mathematical laws that govern biomechanics and morphology through ontogeny and how shape and mechanics are linked in the mourning gecko."

Understanding the laws of nature through a mathematical lens can lead to impactful advances in the medical field. Selvitella said, "Speculatively, this research can have medical application to orthopedics and prosthetics, as the methodology that we will produce to uncover patterns in the locomotion and morphology of mourning geckos will have generality coming from the abstract mathematical framework that we will develop. This will help crossing bridges of far-apart fields to potentially inform physicians and biomedical engineers that could, in turn, build better prosthetic devices that mimic limb function and direct rehabilitation."

Looking for principles that underpin natural phenomena. Gaining a greater understanding of the mathematical laws that rule nature. It's all in a day's work for Selvitella.

Firing Up the Ceramics Program

SETH GREEN
ASSOCIATE PROFESSOR OF CERAMICS

From dinnerware to beautiful works of art, kilns are an essential part of our lives, and they have been since nearly 6000 BC. Because of the extreme temperatures kilns are subjected to, they require a lot of upkeep, and sometimes it's just time for a new one.

That's exactly the predicament Seth Green, associate professor of ceramics, found on campus when he began at Purdue Fort Wayne in 2016. "I took a visual survey on the condition of the electric and gas kilns," Green said. "I learned that many of the kilns needed to be replaced. Knowing these are expensive, I began searching for grant funding."

Green's search was aided by a mentor and friend who introduced him to the Windgate Foundation, which supports contemporary craft and visual arts throughout the United States, particularly in education. Green was successful in securing funding from the foundation to use toward replacing the kilns.

While the new gas and electric kilns are in place, now Green is anxiously waiting for summer 2022. That's when the University of Oklahoma's Doug Casebeer, artist in residence and kiln-building master, is coming to campus to help build a hybrid wood soda kiln. This kiln is unique in that it will also decorate and create beautiful, spontaneous works of art. It works by introducing soda (sodium bicarbonate and sodium carbonate) near the end of the firing process, which is then vaporized and carried on the flame throughout the kiln. These vapors create a one-of-a-kind glaze when they land on each piece.

Green is excited to see the ceramics program grow, thanks to these new kilns. "The kilns provide further research opportunities for students and faculty," he said. "This project has also allowed us to offer additional classes in ceramics and has aided in expanding our continuing studies courses for the community."

SPONSORED PROGRAMS FUNDING
BY SOURCE AND RECIPIENT

JULY 1, 2020–JUNE 30, 2021

Grant Sources

Foundations	$1,749,006	(44%)
Federal	$1,332,180	(33%)
State and Local Government	$543,871	(14%)
Industrials and Applied Research	$201,724	(5%)
Purdue Fort Wayne	$166,425	(4%)
TOTAL	$3,993,206	

Funding for Academic or Administrative Unit

College of Arts and Sciences	$1,961,423	(49%)
Office of Diversity, Equity, and Inclusion	$881,090	(22%)
Office of Academic Affairs	$560,662	(14%)
College of Professional Studies	$303,298	(8%)
College of Engineering, Technology, and Computer Science	$275,433	(7%)
College of Visual and Performing Arts	$9,000	(<1%)
Office of Enrollment Management and the Student Experience	$2,300	(<1%)
TOTAL	$3,993,206	

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