

OFFICE OF SPONSORED PROGRAMS
2019-2020



TO CREATE
**A BETTER
TOMORROW**
IT TAKES RESEARCH.

PURDUE UNIVERSITY.
FORT WAYNE

TAKING THUNDEROUS STEPS

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.



Beneath the Surface: The Pursuit to Study the Unseen

FAWAD SULAMAN NIAZI | ASSISTANT PROFESSOR OF CIVIL ENGINEERING

It's no secret that it takes a strong foundation to build something lasting. Fawad Sulaman Niazi, assistant professor of civil engineering, is dedicated to giving students a solid educational foundation coupled with projects that immerse them in the fascinating and practical world of geomaterials—known to most as rocks and soils.

Geotechnical engineers have a tough task. They must understand the delicate relationship between structures and their foundational rocks or soils. "Geomaterials deform under the applied structural loads," Niazi explained, "[but] their degradation due to immediate and prolonged interactions with groundwater strongly impacts the sustainability and design life of structures resting on them." According to Niazi, there's one glaring problem: "These processes occur below the ground surface, far from direct observation."

This challenge inspired projects, in partnership with both the United States Universities Council on Geotechnical Education and Research and the National Science Foundation, that resulted in the development of apparatuses and experiments that allow students and engineers to, as Niazi said, "witness true manifestations of soil- and rock-water-structure interactions and experimentally quantify the process of their deterioration and deformation." Being able to see what was previously unseen allows engineers to design alternative foundations for certain structures that may, in turn, reduce the occurrence and/or impact of many natural hazards on the infrastructures and buildings.

It's Niazi's hope that projects like this will not only impart enhanced understanding to future civil engineers but will also generate enthusiasm for the geotechnical engineering profession.

FAWAD SULAMAN NIAZI (RIGHT)
WORKS WITH ONE OF HIS STUDENTS
ON HIS RESEARCH PROJECT.





SCOTT BERGESON (RIGHT)
EXPLAINS THE IMPORTANCE
OF BAT HOUSES STATIONED
AROUND CAMPUS.

Keeping the Night Life Alive: A Professor's Research to Save an Endangered Bat Species

SCOTT BERGESON | ASSISTANT PROFESSOR OF ANIMAL BIOLOGY

In 2019, Scott Bergeson, assistant professor of animal biology, captured something he never thought possible in Fort Wayne, Indiana—an adult female northern long-eared bat.

"I was thrown for a loop when we captured that northern at Fox Island Nature Preserve," Bergeson said. "They are considered deep forest bats and are rarely found near urban areas. They're also federally threatened and state endangered in Indiana. I haven't captured one for several years, due to their massive population decline as a result of the fungus driven white-nose syndrome." White-nose syndrome, which likely lurks in their hibernacula caves, is currently incurable, untreatable, and unstoppable—scientists believe it may inevitably drive some bat species to extinction.

Something rather fascinating came to light during Bergeson's research—the northern long-eared bat he captured used a tree roost that looked exactly like those used by the federally endangered Indiana bat (yes, that's the actual name of a bat species). This spurred his project to "determine what day roosts this colony of endangered bats selects and how it uses daily torpor (single-day bouts of hibernation)."

In collaboration with Fox Island Nature Preserve, the Little River Wetlands Project, his research team, and others, Bergeson is working to provide crucial information on northerns. Bergeson said that "if optimal roosting habitats can be provided to and conserved for these bats, they may build up enough energy reserves before they hibernate to allow them to survive white-nose syndrome. It may also help them produce well-developed young. All of this would help stabilize the nationwide population of northern long-eared bats and possibly help them rebound from their massive die-off."

Through this project, Bergeson is able to provide training and field experience to his students, all while helping with conservation efforts of an endangered species.

Advancing the Manufacturing Industry

BEHIN ELAHI | ASSISTANT PROFESSOR OF INDUSTRIAL ENGINEERING TECHNOLOGY

Jobs in manufacturing have been the livelihood of many Americans for decades, and the industry serves as the economic backbone of northeast Indiana. The development of artificial intelligence has resulted in fascinating advances in manufacturing systems, paving the way for what have been coined *smart factories*.

When Columbia City's Reelcraft Industries Inc. was seeking creative and effective solutions to improve efficiencies regarding its hose-reel assembly line, the company was attracted to the expertise of Behin Elahi, assistant professor of industrial engineering technology, and a new research project was launched.

Elahi said the project focused on "using Industrial Internet of Things tools to improve the detection of parts and components in assembly lines, making operators' work easier, and optimizing the cycle time." With the aid of two senior students, Elahi proposed and implemented three solutions, including the installation of optical sensors, the use of augmented reality, and the use of additive manufacturing to make 3D-printed parts. The results showed that these methods can have positive effects on the cycle time, as well as the efficiency of the entire system.

Elahi is hopeful about what this partnership could mean for the future. "Using engineering design and advanced manufacturing technology to solve problems can empower our community," she explained. "We will be able to build an upskilled workforce, advance a thriving manufacturing industry, and create a sustainable learning environment that is modularized, open, and upgradeable to integrate next-generation technologies for long-term teaching and research endeavors."

**BEHIN ELAHI (LEFT) AND
HER STUDENT DISPLAY THE
3D-PRINTED PARTS PRODUCED
FOR THIS PROJECT.**



SPONSORED RESEARCH FUNDING BY SOURCE AND RECIPIENT

JULY 1, 2019-JUNE 30, 2020

Grant Sources

Federal	\$1,734,206	(71%)
Foundations	\$250,804	(10%)
State and Local Government	\$155,645	(7%)
Purdue Fort Wayne	\$154,515	(6%)
Industrials and Applied Research	\$102,975	(4%)
Purdue University	\$55,600	(2%)
TOTAL	\$2,453,745	

Funding for Academic or Administrative Unit

Vice Chancellor for Academic Affairs	\$1,137,986	(46%)
College of Arts and Sciences	\$893,011	(37%)
College of Engineering, Technology, and Computer Science	\$186,248	(8%)
College of Professional Studies	\$172,027	(7%)
Vice Chancellor for Student Affairs	\$31,398	(1%)
College of Visual and Performing Arts	\$22,305	(1%)
Doermer School of Business	\$10,770	(< 1%)
TOTAL	\$2,453,745	

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