WPI

R1 TOP-TIER RESEARCH UNIVERSITY

2025 ANNUAL REPORT

Discovery and Innovation with a Purpose

Dear Colleagues,

FY2025 was another strong year for research and innovation at WPI, marked by an important milestone: WPI's recognition as an R1 institution and its inclusion among the nation's top-tier research universities for the first time. This designation—awarded to 187 institutions with 'very high research spending and doctorate production'—reflects a decade of sustained efforts to grow research and innovation at the university.

Our research community continues to be committed to pushing boundaries, asking bold questions and making discoveries that have great impact. Despite challenges in the federal funding landscape, our researchers, staff and students continued to do extraordinary work across and at the intersection of many disciplines, such as the expanding fields of artificial intelligence (AI) and data analytics, robotics, advanced materials and manufacturing, and biotechnology and life sciences.

This is also reflected in the numbers: Expenditures were at an all-time high, and our award volume also remained stable when measured against the federal fiscal year.

I would like to take a moment to express my gratitude to the teams that support our research initiatives. Their efforts play a crucial role in enabling the impactful research conducted by our colleagues. They are dedicated to supporting our community of researchers, innovators, and entrepreneurs as they expand the impact of WPI locally, nationally, and globally.

Despite a few challenges, our researchers, staff and students continued to deliver critical insights and solutions — as detailed in the following pages.

I encourage you to explore this report and join us in developing new partnerships.

Bogdan Vernescu
Vice President & Vice Provost for Research and Innovation

Research Performance and Impact

Advancing Research with Purpose

WPI's research enterprise continues to evolve—growing in size, scope, and impact. Over the past five years, faculty across all schools (**Arts & Sciences, Business, Engineering, and Global**) have expanded proposal activity, secured new awards, and strengthened collaborations that align with national and regional priorities. This growth reflects not only faculty excellence but also the coordinated efforts of WPI's research administration and development teams under the Office of the Vice President and Vice Provost for Research and Innovation, whose shared mission is to help research ideas move efficiently from concept to impact.

From Proposals to Awards and Outcomes

Growing Proposal Activity

WPI faculty continue to expand their research reach, pursuing ambitious, interdisciplinary projects that align with national priorities and emerging technologies.

Proposal activity continues to be led by WPI's School of Engineering, with notable growth also across the life sciences, computer science, and business disciplines. Increasing collaboration between schools underscores the university's commitment to solving complex challenges through interdisciplinary research.

Awards

Federal agencies (Figs. 2 and 3) remain WPI's largest research partners, reflecting the university's strong competitiveness in research areas such as artificial intelligence, biotechnology, and sustainable manufacturing. Alongside this foundation, proposals to and awards from state, foundation, and corporate sponsors demonstrate diversification and regional engagement.

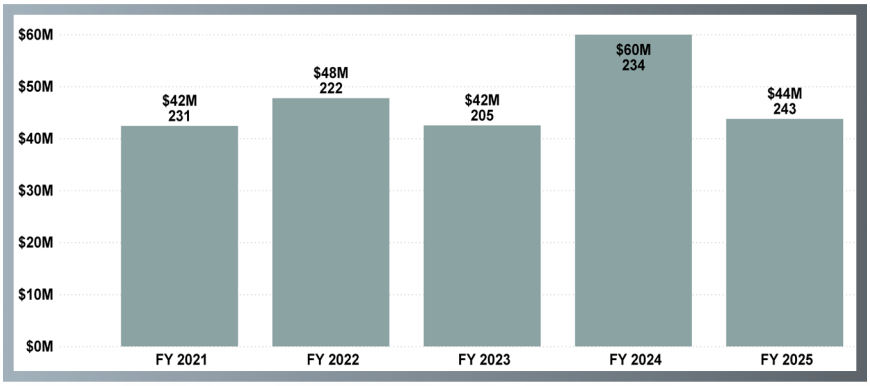


Fig. 1: An overview of awards received.

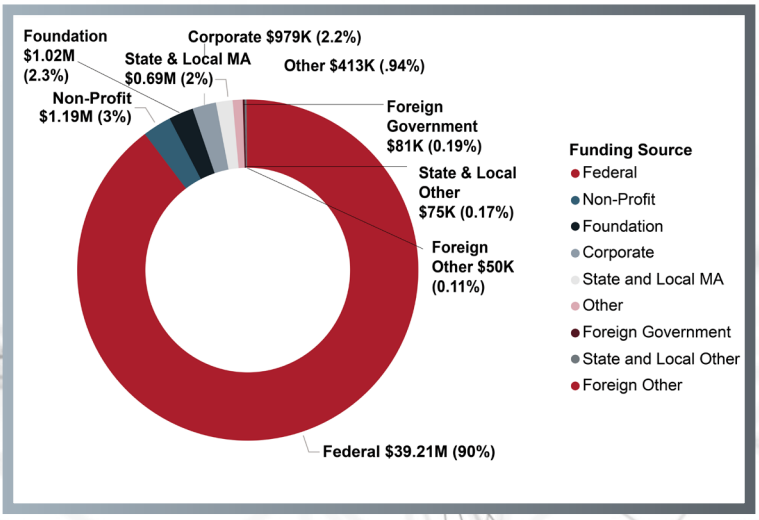


Fig. 2: Awards by funding source.

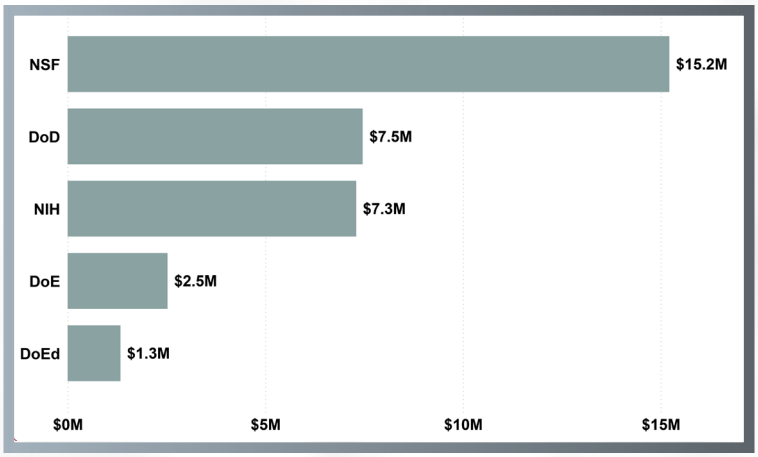


Fig. 3: Awards by top federal sponsors.

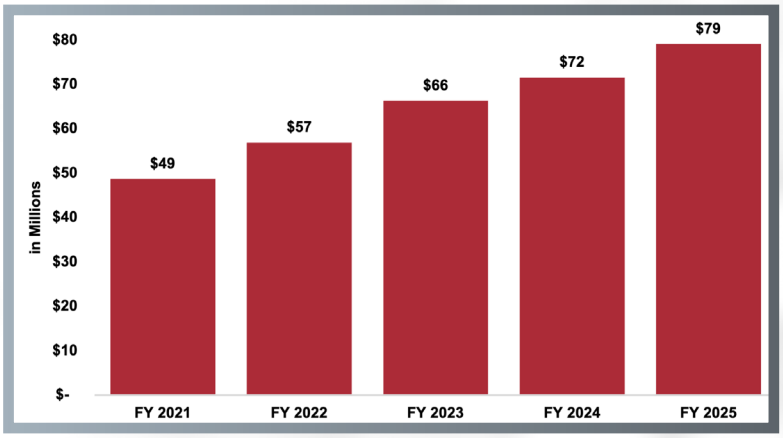


Fig. 4: An overview of expenditures.

Expenditures and Personnel Supported

External funding provides critical resources for research projects and supports faculty, staff, and students engaged in discovery and innovation. Figures 4 and 5 summarize total expenditures on grants and the number of individuals supported in the last five years. Expenditures have grown steadily from $49 million in 2021 to $79.1 million in 2025 (Fig. 4), reflecting sustained investment in research. Graduate student support has increased significantly, rising from 284 in 2021 to 397 in 2025, while support for non-faculty researchers and administrative staff has also expanded, underscoring the growing complexity and scale of funded projects.

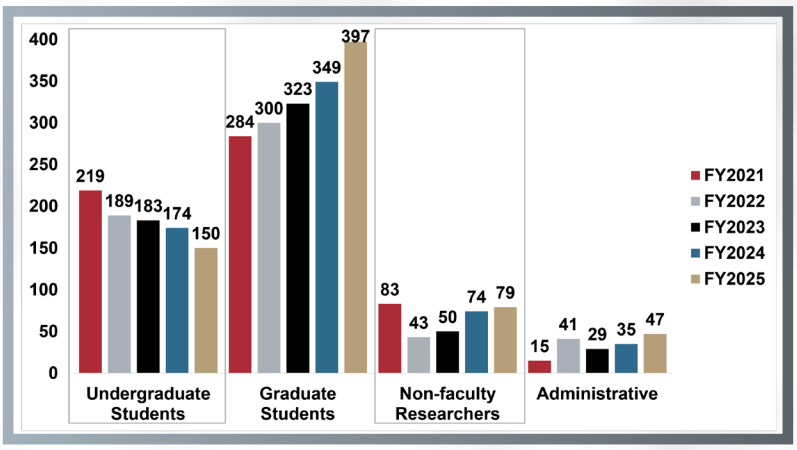


Fig. 5: Students and staff supported on awards.

Innovation Output: Strong and Broad-Based

WPI disclosed 63 new inventions in FY25 (Fig. 6), an impressive recovery to pre-pandemic levels and a continuation of the strong innovation trend seen over the last several years. The innovation pipeline remains vibrant and well-distributed across departments. Disclosures reflect a convergence of engineering ingenuity, AI-powered solutions, and sustainable technologies—all designed to solve pressing real-world challenges. WPI faculty, students, and collaborators are advancing technologies that promise to improve lives, strengthen industries, and foster global resilience.

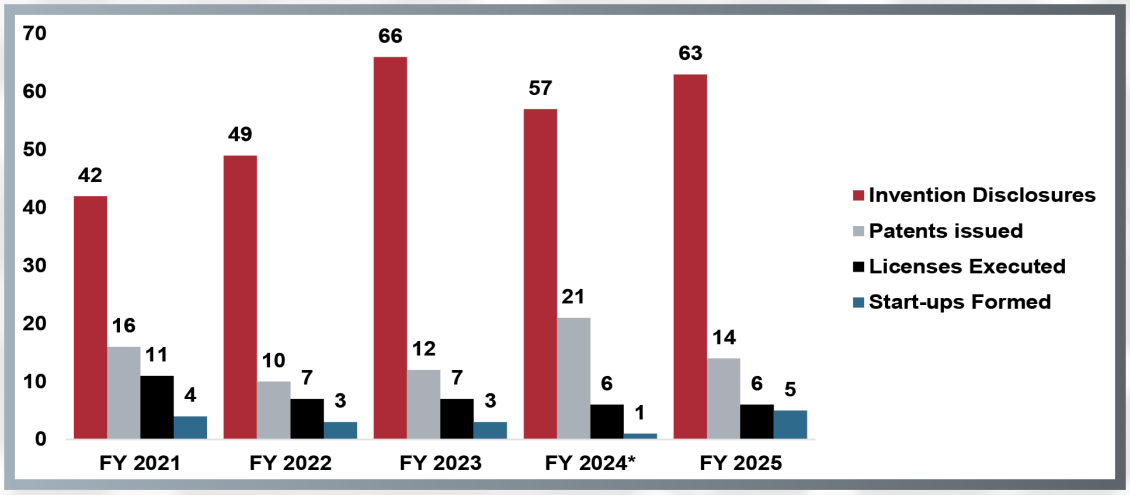


Fig. 6: Tech Transfer activity trends.

At-a-Glance

15
NSF CAREER Awards received by faculty in last 5 years

~$75M
In Expenditures

$44M
In Awards received

Tough Tech Startups: Turning Research into Real-World Impact

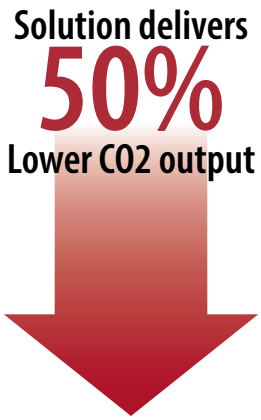
WPI is home to a growing ecosystem of "tough tech" ventures—startups tackling global challenges at the intersection of materials, energy, and sustainability. These companies are examples from WPI labs and faculty research that are advancing cleaner manufacturing, resilient infrastructure, and a sustainable planet.

Clean Magnesium from the Sea. Stronger Industry at Home.

Restoring America's magnesium supply chain with low-carbon innovation.

Thalon Materials

Thalon, co-founded by WPI's **Adam Powell** and **Travis Hampton**, is revolutionizing metal production through a patented process that extracts high-purity magnesium directly from seawater—without chlorine or toxic emissions. Their solution delivers 50% lower CO_2 output and cost-competitive production, enabling secure, domestic supply for defense, aerospace, and automotive sectors. Recognized by MassCEC and FedTech, Thalon is charting the course for America's clean manufacturing future.



Destroying "Forever Chemicals." Creating Power and Water.

Turning toxic PFAS waste into clean resources.

River Otter

Founded by **Amelia Thomas** and WPI Professor **Michael Timko**, River Otter Renewables' ECLIPSE system uses radical hydrothermal liquefaction to break down PFAS—the toxic "forever chemicals" found in firefighting foams—converting waste into reusable water and renewable oil. Proven to remove 99.9% of PFAS within minutes, the technology is attracting government and industry contracts. River Otter is redefining waste management as a clean energy opportunity.

Top 7%

Best colleges in the U.S.

Princeton Review (2025)

Concrete That Heals Itself. Infrastructure That Lasts.

Biotechnology meets the built environment.

ENZYMATIC

Enzymatic, led by **Jeff Andersen** with WPI Professors **Nima Rahbar** and **Suzanne Scarlata**, is pioneering EC3—a biological additive that enables concrete to self-heal and last twice as long. Their enzyme-driven formula seals cracks, strengthens structures, and reduces carbon emissions, tackling the U.S.'s $21 billion infrastructure repair burden. Backed by EPA and Air Force SBIR grants and lauded by Fast Company, Enzymatic shows how bio-innovation can transform concrete from static to regenerative.

1 cubic yard of ECM consumes 115 lbs of C02, whereas 1 cubic yard of concrete emits 400lbs of C02.

Building the next-generation metal-air batteries to power a safe, affordable, and resilient future.

Breathing Batteries for a Safer Energy Future.

Zinc-air technology powering resilience and security.

respire energy

WPI's **Dave Hsu** and **Xiaowei Teng** are developing Respire Energy's dendrite-free zinc batteries—safe, low-cost, and built entirely from U.S.-sourced materials. Unlike lithium systems, Respire's aqueous chemistry is non-flammable and free of critical minerals, ideal for microgrids, hospitals, and defense bases. Positioned in a $150 billion market, the company is powering the clean-energy transition with safety and sustainability at its core.

People, Process, and Partnership: Advancing Research and Innovation Through Integrated Support

Behind every research project is an ecosystem of collaboration—among faculty, students, and the professional teams that support every stage of the research and innovation lifecycle. **The Offices of Sponsored Programs (OSP**), **Research Integrity and Compliance (ORIC), Technology Innovation & Entrepreneurship (OTIE),** the **Research Solutions Institute (RSI)**, and WPI's **Core Research Facilities** work together to support WPI's researchers—from idea generation, proposal development, review and submission to award negotiation and management as well as compliance, technology transfer and start-up formation.

Strengthening Competitiveness and Capacity

RSI has continued to advance WPI's research competitiveness through proposal development, faculty training, and strategic guidance. With a small team, RSI supported faculty across 15 departments—helping to shape $36.17 million in new proposal submissions, a 30 percent increase from the prior year. RSI-assisted projects resulted in 14 funded awards totaling $4.26 million. RSI also expanded its capacity through an innovative Research Graphic Design Apprenticeship, supported by the Massachusetts Executive Office of Labor and Workforce Development's GROW program. This first-in-the-state registered apprenticeship in research graphic design bridged WPI and Quinsigamond Community College, enabling a design apprentice to gain more than 150 hours of hands-on design experience in a research-intensive university and produce over 20 research graphics.

RSI supported faculty across 15 departments helping to shape $36M in new proposal submissions — a 30% increase from FY24

Training and Faculty Development

All units under the VPRI have increased their training and resources for WPI researchers. Together, they presented their teams and services at a research-focused session of the New Faculty Orientation in September.

OSP Pre-Award held two workshops for new faculty and new principal investigators. These workshops reviewed the WPI internal proposal process, assisted faculty in registering in sponsor systems, affiliate their accounts, and answered any questions they may have. OSP Pre-Award also participated in the NSF CAREER Bootcamp and attended academic department meetings to review internal proposal timelines and to promote the new OSP Sharepoint site developed during the previous year. That site is a resource with links to proposal submission documents, internal templates, and past training resources. Lastly, Pre-Award team members continued to be available for individual trainings on federally mandated systems.

The Office of Research Integrity & Compliance (ORIC) is responsible for WPI's research compliance training. ORIC manages a suite of online compliance training programs, which cover the IRB, IACUC, COI, etc., and provide in-person training tailored to projects with specific concerns such as export control and Controlled Unclassified Information. In addition to these ongoing training activities, ORIC held two faculty workshops on risks and best practices for international research collaborations. These workshops focused on emerging research security concerns, international sanctions, and enhanced federal disclosure requirements. ORIC

also implemented a new online Research Security Training program, which is becoming mandatory for all senior personnel on federal grants in FY2026.

RSI facilitated nine education and training events that reached over 100 researchers, including workshops on proposal competitiveness, messaging, and sponsor alignment. Collaborative programming with UMass Chan Medical School's Investigator Career Advancement Program introduced joint writing groups that fostered new cross-institutional partnerships. Additional panel discussions connected faculty with funding agencies to explore applied research opportunities in areas such as IUCRCs, Manufacturing Innovation Institutes, and state initiatives. The NSF CAREER Bootcamp, now in its fourth year, doubled participation to 20 faculty and continues to yield successful CAREER awards. Following feedback from previous iterations of this program, last year's program was divided into two series: Idea Scoping (for those thinking about the CAREER for the first time) and Grantsmanship (for those who wanted to submit their new/revised proposal in July 2025).

Internal Funding and Strategic Partnerships

WPI continues to invest in research excellence and collaborative innovation through targeted internal funding opportunities and strategic partnerships. These initiatives not only accelerate groundbreaking ideas but also strengthen connections with industry and government to address complex global challenges.

In FY25, RSI administered the third round of the internal grant competition supported by the Gapontsev Family Foundation, and the Research Development Council awarded three projects (Table 1):

Table 1: Gaptonsev Fund Awards

Project Title	PI	Amount
The Glass with Sass: Flavylium-Coated Windows Fighting Energy Loss	Mattson, Anita	$63,457
Photonic Chemical and Biological Sensing at Your Fingertips	Petkie, Doug	$70,000
Hybrid Biomimetic Materials for Light-Activated Drug Delivery	Coburn, Jeannine	$70,000

In addition, RSI collaborated with Graduate Studies and Corporate Relations to further develop the partnership with Draper, which started in FY24 when WPI was invited to join the Draper Scholar's Program. Draper visited Campus again in the fall of 2024 to listen to short presentations by faculty matching the Draper thematic focus. This match-making effort resulted in five new Draper Scholar awards (Table 2).

Building on this foundation, Draper visited WPI again in March 2025 to establish relationships between Draper Subject Matter Experts and WPI

Table 2: Draper Scholar Awards

WPI Advisor	WPI Departmentt	Student Name	Degree	Draper Department	Approved Research Proposal
Schaumont, Patrick	ECE	Geenty, John	PhD	GCB5 - Computer System Security	Top-down Hierarchical Analysis of Hardware Security Vulnerabilities
Wyglinski, Alexander	ECE	Mukunthraj, Srivatsan	PhD	GBB2 - High Reliablity Systems	Open Wireless Network Emulation Platform Integrating Space, Aerial, and Ground Operating Environments
Ganji, Fatemeh	Applied Mathematics	Peeler, Lil	MS		Delivering Physical Security to Microelectronics via AI
Young, Eric	Chemical Engineering	Petersen, Nicky	PhD	GHD1 - Synthetic Biology	Alternative Hosts for Saltwater Sensing and Fermentation
Bhada, Shamsnaz	Systems Engineering	Patel, Krish	PhD	GAB9 - Navigation Aids	Mission Effectiveness of AI based System of Systems: Integration, Test and Evaluation of Autonomy

faculty with related expertise in Robotics Engineering, Cybersecurity & Microelectronics Assurance, Sensors, and Assured Position Navigation. That meeting was intended to lead to the exploration of federal and other R&D funding in research areas of shared interest and expertise.

In addition to the collaboration with Draper, WPI continues to strengthen its position in research and innovation through a diverse set of strategic partnerships that advance technology and sustainability. From pioneering work with the U.S. Army DEVCOM Natick Soldier Center in robotics, AI, and biotechnology for combat feeding, to fostering regional collaboration in climate technology, WPI is driving solutions that address critical global challenges.

Led by WPI, the Central MA ClimateTech team established and grew a consortium of academic, industry, and government partners, hosting convening events in Fall 2024 and a ClimateTech Summit in April 2025. This day-long event explored climate tech research, technology innovations, education, and workforce training, with participation from higher education institutions, corporations, startups, and local and state officials.

WPI also expanded its collaboration with Saint-Gobain, a global leader in building materials manufacturing, focusing on sustainability. Saint-Gobain is a member of CARD, an NSF-funded Industry-University Collaborative Research Center and is joining WPI's newest IUCRC in Fire Protection Engineering. They have sponsored student projects, collaborated on grant proposals, and are exploring a long-term partnership supported by their nearby R&D campus.

ClimateTech Summit Fireside Chat with President Grace Wang and panelists Yvonne Hao (former Secretary of the Executive Office of Economic Development, Commonwealth of Massachusetts), Dr. Jenn Le Blond (Managing Director of Emerging Climatetech – Massachusetts Clean Energy Center), and Todd DiNoia (Vice President, Innovation and R&D – Saint-Gobain Research North America).

Core Research Facilities

In FY25, WPI's Core Research Facilities team made significant strides in enhancing visibility and accessibility of shared instrumentation and services. Through collaborative efforts with IT and Finance, the team launched innovative tools and initiatives designed to streamline equipment discovery and foster collaboration across campus and beyond. These efforts reflect WPI's commitment to supporting cutting-edge research by providing investigators—both internal and external—with the resources and expertise needed to accelerate innovation.

The Committee assigned to the creation of an on-line searchable database for research instrumentation, was pleased to GO LIVE with Phase I, which includes 70 assets primarily located within Service Centers. This unique tool allows both internal and external investigators to search for and locate equipment at WPI.

To further market WPI's research facilities to potential internal and external users, the team held their first ever Open House in September. The event was designed to foster collaboration, spark innovation, and chart paths for future growth. It aimed to showcase the capabilities and expertise of WPI's five service centers and to provide a venue to connect with external stakeholders. The event also highlighted the value of each core research facility and the potential for driving innovation using the instrumentation and expertise available. It brought together about 70 individuals from 26 companies.

Core Research Facilities Open House

At-a-Glance

70
Scientific instruments available in shared facilities

26
Companies represented at 1st Open House

63
Invention Disclosures

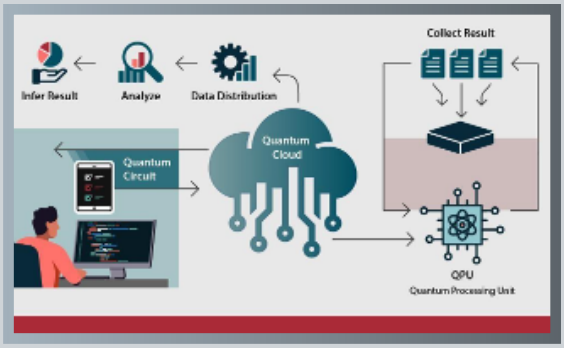
397
Graduate students supported on Awards

451
Proposals submitted

100+
Education & Training event attendees

Award Highlights

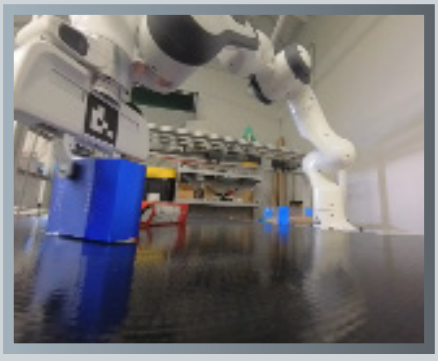
AI, Data, Robotics, Autonomy



Tian Guo, Computer Science, has received three new awards from the NSF in FY 25. One project focuses on advancing quantum cloud computing by developing systems and algorithms to support quantum machines and build a strong research and education community. Another explores how edge computing can better support AI-powered Internet of Things (AIoT) devices, such as drones, by optimizing performance despite limited computing power and battery life. The third investigates security risks in immersive multimedia, showing how 3D video could be used to fool facial recognition systems and proposing defenses that preserve video quality while preventing misuse.

Cagdas Onal, Berk Calli, and **Loris Fichera**, Robotics Engineering, have received funding from the NSF for developing a framework for the design, modeling, and control of soft continuum robotic arms, which are more flexible than traditional robot arms. Inspired by origami, these robotics engineering researchers are developing a lightweight, flexible robotic arm that will enable a wheelchair user to safely grasp, lift, and carry objects that would otherwise be out of reach.

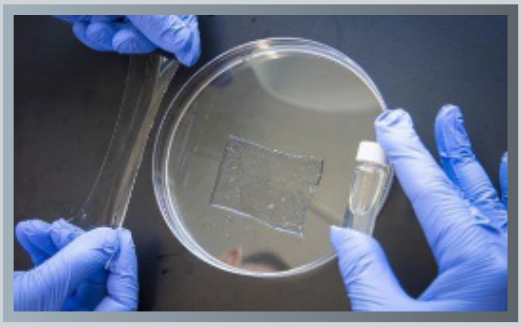
Berk Calli, Robotics Engineering has also been awarded a CAREER Award from the NSF. Calli's research focuses on the object manipulation capabilities of robots and is geared toward enabling robots to operate in human environments such as homes, offices, and hospitals. During his five-year CAREER project, he will also collaborate with the faculty members in WPI's Environmental Engineering Program to establish an environmental robotics track for undergraduates and develop environment-focused technologies such as recycling robots—shown in the image.



The DOD (through its DURIP program) has awarded **Patrick Schaumont**, Electrical and Computer Engineering, and his colleagues in Hardware Security funding to purchase a high-precision milling and polishing machine to help inspect and test integrated circuits (ICs) used in critical systems like military navigation and communication equipment. This tool will allow researchers to safely expose and study the inner layers of chips, helping detect vulnerabilities and verify authenticity—especially important given the global nature of electronics manufacturing. The new equipment will support cutting-edge research in hardware security, and will be integrated into graduate and undergraduate education as well as professional training programs for government and industry partners.

WPI students and faculty attending the training session on using the new polisher

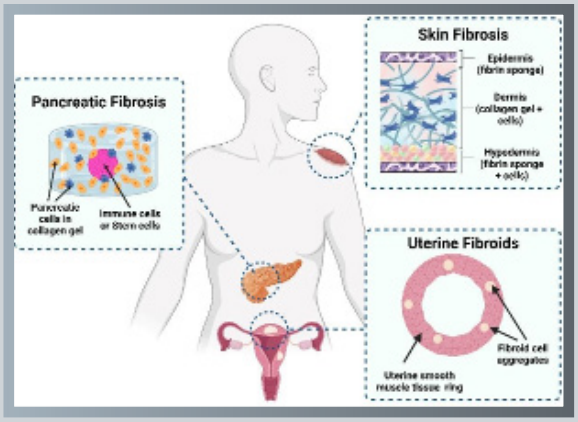
Life Sciences and Biotechnology



The bioadhesive implant integrates a tissue-mimetic hydrogel and a liquid adhesive.

Jiawei Yang, Mechanical and Materials Engineering and affiliated with Biomedical Engineering, has received an NSF CAREER Award to develop a new class of bioadhesives that combine hydrogels and glue-like polymers to securely attach therapeutic implants—such as pacemakers, insulin pumps, and artificial joints—to human tissue. The project, titled Modular Design of Bioadhesives for Implantation, aims to create next-generation adhesives with tissue-matching elasticity for safe, long-term use. It also includes outreach efforts to engage youth in biomaterials research and raise public awareness of hydrogel technologies.

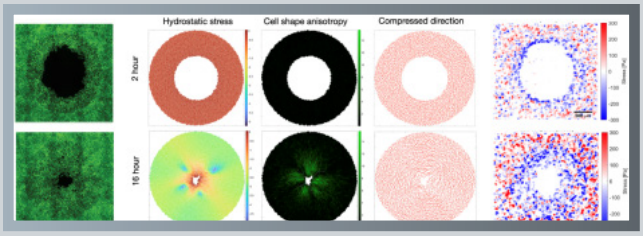
Catherine F Whittington, Biomedical Engineering, has received an NSF CAREER Award for her work to develop three lab models that simulate fibrosis in the pancreas, skin, and uterine fibroids—conditions caused by excessive tissue scarring that can impair organ function or impact disease progression. Whittington is planning to create models using collagen and human cells to better understand how fibrosis develops and how it might be prevented or reversed in various tissues. These models will be tested under various conditions, such as hormone exposure and mechanical stress, to uncover cellular-level insights that could lead to improved treatments for conditions with significant levels of fibrosis.



Modeling approaches to recreate aspects of pancreatic fibrosis (pancreatic cells, immune cells, and stem cells embedded within collagen gels), skin fibrosis (three skin layers with combinations of cells within collagen gels or fibrin sponges), and uterine fibroids (fibroid cell aggregates embedded within uterine smooth muscle tissue rings). Schematic created with BioRender.

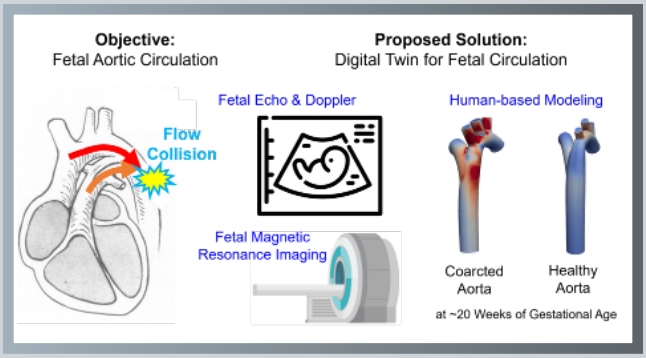
Min Wu, Mathematical Sciences, has received an R01 award from the NIH for a project that explores how tissues transition between liquid-like and solid-like states—a property known as fluidity—that is essential for healing, development, and disease progression. Unlike traditional studies

that focus on well-structured tissues, this research examines partial epithelial-to-mesenchymal transition (EMT), where cells are less organized and more mobile, as seen in wound healing, early development, and cancer. By combining innovative physical models with laboratory experiments (co-investigators: Qi Wen, Physics, WPI and Yubing Sun, Mechanical and Industrial Engineering, UMass Amherst), the team aims to understand how cellular movement and fluidity are regulated across large tissue areas, offering potential insights into tissue repair and other biophysical processes.

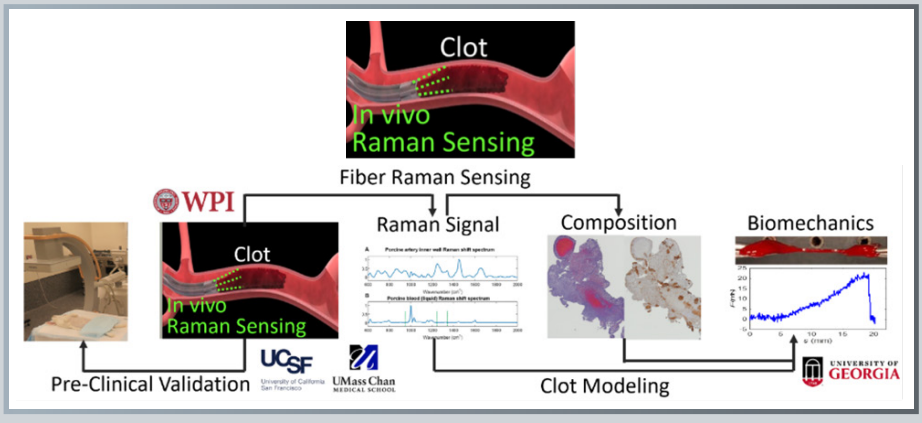


Theory- experiment integration studies large-scale wound closure flow for partial EMT monolayers. Left: Wound closure snapshots during experiment (from Sun Yubing Lab at UMass Amherst). Middle three columns: Model simulation of cell and tissue mutls-cale dynamics and mechanical states (from Min Wu group at WPI). Right: Traction force measurement (from Qi Wen Lab at WPI).

Zhenglun "Alan" Wei, Biomedical Engineering, has received an NIH Trailblazer R21 grant to develop a new "digital twin" technology that can help diagnose congenital heart disease before a baby is born. His work focuses especially on coarctation of the aorta - a narrowing of the main artery that carries blood from the heart. It's one of the most serious heart conditions present at birth, yet current prenatal imaging often misses it or flags it when it's not actually there. Dr. Wei's project aims to build a highly accurate, human-based digital model of fetal blood flow using the same routine ultrasound images that clinicians already collect. The long-term vision is to detect coarctation of the aorta earlier and more reliably, improving care during pregnancy and leading to better outcomes for newborns. This collaborative effort has the potential to reshape prenatal heart diagnostics and open the door to future advances in treating congenital heart disease.



Yihao Zheng, Mechanical and Materials Engineering, has been funded by the NSF to lead a project titled Thrombus Assessment via Raman Spectroscopy and Neural Operator Learning to advance treatment for ischemic strokes. The research team is developing a fiber-optic probe that uses Raman spectroscopy and machine learning to assess the physical properties of blood clots—such as stiffness and strength—in real time. This information will help clinicians determine the most effective approach for clot removal during stroke interventions. By combining expertise across engineering and biomedical sciences, the project aims to improve patient outcomes and contribute to the development of precision-guided stroke therapies.



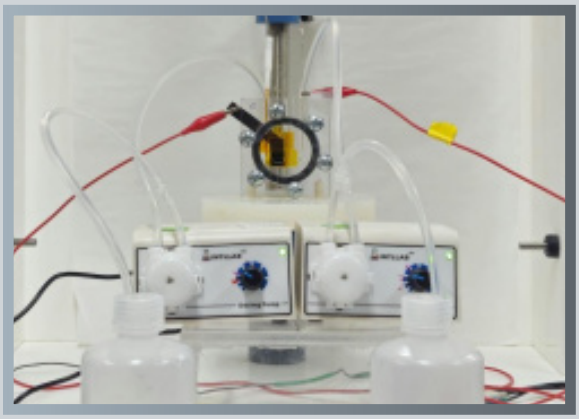
Transdisciplinary research on in-vivo assessment of clot mechanical properties using fiber Raman sensing and machine learning for stroke treatment.

Sustainable Materials and Advanced Manufacturing

Danielle L Cote, Mechanical and Materials Engineering, has received an award from DARPA for a pioneering project called "Rubble to Rockets," which aims to revolutionize additive manufacturing by enabling the rapid creation of strong, reliable components from scrap metal. This approach uses machine learning and AI to identify and predict how mixed materials behave before being melted and 3D-printed, making it possible to produce essential parts in resource-limited settings like battlefields or remote rescue sites. The project will also test the structural integrity of these materials through a proof-of-concept rocket, potentially transforming how manufacturing is done in unpredictable environments.

Kateryna Friedman, Physics, received an NSF award for a new REU Site: Center for Early Research Experiences in Functional Materials at Worcester Polytechnic Institute The ten-week program will host ten undergraduates for mentored, interdisciplinary research in materials science, including projects related to wearable electronics, biomedical materials,, and technologies for energy generation and storage. A major component is hands-on materials characterization using advanced techniques such as Raman and transient optical spectroscopy, THz spectroscopy, atomic force and scanning electron microscopy, and NV-center diamond microscopy for sensitive magnetic imaging. The research experience will also integrate theoretical and computational approaches, including density functional theory (DFT) modeling, to complement experimental investigations. The program provides a rigorous, multidisciplinary training environment that prepares students to contribute to advances in functional materials research and applications.

Xiaowei Teng, Chemical Engineering, received an award from the U.S. Department of Energy (DOE) to study the recovery of critical minerals like uranium from industrial wastewater—work spurred in part by a growing demand for nuclear fuel as the world's capacity for nuclear power increases. The International Atomic Energy Agency's "high case scenario" estimates world nuclear power capacity will increase by 2.5 times the current level by 2050. Given the momentum of this global growth, researchers are working to identify unconventional sources of uranium, like highly toxic industrial wastewater from mining and milling operations. The efforts are intended not only to recover uranium for use, but also to minimize the amount of uranium in the environment.



The prototype fluidic cell developed by Prof. Teng's research group is used for the electrochemical recovery of critical materials

Congratulations

PIs and Co-PIs who received initial awards in FY25

Department	PI	Originating Sponsor	Project Title	Total Award
Academic Affairs	Bogdan M Vernescu	Department of the Army	Testing and evaluation for soldier-device teaming compatibility, vulnerability, and durability in emergent situations	$88,522.00
	Terri A Camesano	National Science Foundation	Graduate Research Fellowship Program (GRFP) 2439031	$318,000.00
Aerospace Engineering	Jagannath Jayachandran	American Chemical Society	Dynamics of Cool Premixed Flames	$125,000.00
	Nikolaos A Gatsonis	Massachusetts Space Grant Consortium	Summer Opportunities for Aerospace Research (SOAR) 2025	$28,000.00
	Ye Lu	Wells Fargo Trust Philanthropic Services	Research and Education of Guidance, Navigation, and Control of Hypersonic Vehicles	$150,000.00
		National Aeronautics & Space Administration	PLASMA rapid mission architecture tool	$34,991.00
	Zhangxian Yuan	National Science Foundation	ERI: Elucidating the nonlinear mechanics of slender beams with localized curvatures using a hybrid high-order model	$199,973.00
Biology & Biotechnology	Amity L Manning	Department of Education	GAANN Fellowships in Biology and Biotechnology	$224,132.00
	Floyd Brownewell	Massachusetts Life Sciences Center	High School Apprenticeship Challenge Program	$8,160.00
	Karl-Frédéric Vieux	National Institutes of Health/NIH/DHHS	Studying the modulators and the physiological functions of RNA tailing in the C. elegans oocyte	$249,000.00
	Lauren M Mathews	Davis Educational Foundation	Global & Intercultural Competency Across the Curriculum	$80,860.00
	Longkuan Xiang	Full Circles Therapeutics	Full Circle Therapeutics	$2,892.00
		Florey Biosciences	BPC Lab MRSA with Florey Biosciences	$3,043.50
	Luis Vidali	National Science Foundation	Collaborative Research: Tools4Cells: An Inducible Degron Tool for Plant Cell Biology	$259,157.00
	Natalie Farny	National Institutes of Health/NIH/DHHS	Structure, Function, and Dynamics of Non-Canonical Stress Granules	$445,873.00
	Reeta P Rao	Defense Health Agency/ DOD	PHASE II Multiplexed Diagnostic Platform for Invasive Fungal Infection	$74,155.00
	Scarlet Shell	Potts Memorial Foundation	The role of TrpG in artemisinin activity and resistance	$30,000.00

Department	PI	Originating Sponsor	Project Title	Total Award
Biomedical Engineering	Catherine F Whittington	National Science Foundation	CAREER: Investigating Biophysical and Biochemical Drivers of Fibrosis Progression and Regression Across Diverse Engineered In Vitro Platforms	$629,998.00
	Haichong Zhang	National Institutes of Health/NIH/DHHS	Enhanced imaging and treatment of aggressive subtypes of prostate cancer	$79,315.00
	Shijie Zhou	American Heart Association	Developing and Evaluating MAP-VT: A Novel Approach for Non-Invasive Targeting of Ventricular Tachycardia Substrates	$231,000.00
			Innovative Personalized AI for Automated, Non-invasive VT Exit Site Localization Without QRS Onset Selection	$99,999.00
	Yonghui Ding	American Heart Association	3D-Printed Pro-healing Bioresorbable Vascular Scaff olds Promoting Endothelialization	$104,339.00
		National Institutes of Health/NIH/DHHS	3D Bioprinting of Strong Living Scaffolds	$210,423.00
			Tunable Surface Coatings to Control Protein Dynamics and Attenuate the FBR	$5,660.00
	Zhenglun Alan Z Wei	Geisinger Clinic	Engineering Analysis of Patients with Heart Disease	$71,334.00
		National Institutes of Health/NIH/DHHS	A Novel Personalized Flow Modeling Paradigm for Fetal Aorta and Its Validation with Fetal Cardiac MRI	$516,556.00
Chemical Engineering	Andrew R Teixeira	MassVentures	Unlocking Carbon-Negative Concrete with Municipal Solid Waste	$36,000.00
	Christina M. Bailey-Hytholt	Massachusetts Life Sciences Center	Lithium-loaded lipid particles for treating bipolar disorder during pregnancy and breastfeeding	$50,000.00
		National Science Foundation	EAGER: Engineering preeclamptic trophoblast spheroid models to investigate placental cell invasion	$259,570.00
	Eric M Young	Evonik Corporation	Understanding Dipeptide Transporter Expression in Mammalian Cell Lines	$150,000.00
		National Science Foundation	BioFoundry: Center for Robust, Equitable and Accessible Technology and Education (CREATE) for Next Generation BioFoundries	$247,819.00
	Xiaowei Teng	Department of Energy	Mechanistic Understanding of Electro-Chemo-Mechanical Interplay for Selective and Intercalative Extraction of Uranyl Ions using Disordered Metal Oxides	$293,688.00
		Massachusetts CEC	Prototyping Iron-Air Battery Using Earth Abundant Materials for Microgrid Application	$39,650.00

Department	PI	Originating Sponsor	Project Title	Total Award
Chemistry & Biochemistry	Rong Wang	National Science Foundation	Beginnings: Sensor technology as a vehicle to cultivate experiential learning for emerging and novel technologies	$773,951.00
	Shawn C Burdette	National Institutes of Health/NIH/DHHS	Analytical Tools for Light-Initiated Zn2+ Signaling in Neurodegenerative Disease	$180,999.00
Civil, Environmental & Architectural Engineering	Mingjiang Tao	National Science Foundation	PFI-RP: A Novel Technique for Sustainable and Resilient Enhancement of Coastal Soils	$1,000,000.00
	Shichao Liu	National Science Foundation	Promoting Collaborative Learning in Architectural Engineering Design with GenAI-empowered AR	$399,978.00
Computer Science	Craig A Shue	Washington Headquarters Services/DOD	2024 DoD CySP Scholarship Program 2024-2025	$116,398.00
	Elke A Rundensteiner	National Institutes of Health/NIH/DHHS	The Center for Accelerating Practices to End Suicide through Technology Translation (CAPES)	$88,030.00
	George T Heineman	Department of the Air Force	2024 Implementation of a WPI Project Center at MIT Lincoln Laboratory	$14,334.00
		Department of the Air Force	MT/LL MQP Project Center	$7,383.00
	Jacob R Whitehill	Gates (Bill and Melinda) Foundation	LEVI and Education R&D Ecosystem Supports	$87,996.00
	Jun Dai	National Science Foundation	Collaborative Research: EAGER: NAIRR Pilot Expansion: FA1: Advancing AI Research with NAIRR Workshop Series on Cybersecurity, Edge AI, and Autonomous Driving	$149,951.00
		National Security Agency	2024 NCAE-C Grant - Oakland University	$749,994.00
	Kyumin Lee	National Science Foundation	PACSP TOOLS: Strengthening conservation partnerships by advancing molecular and analytic tools for disrupting illegal wildlife trade	$817,942.00
	Lane T Harrison	Department of Defense	EvalOps: Advancing Human-Machine Teaming though Rapid, Scalable Evaluation	$52,774.00
	Neil Heffernan	National Science Foundation	Using Artificial Intelligence to Personalize Mathematics Instruction to Students' Interests	$299,199.00
			Mid-scale RI-2: A National Research Infrastructure for Large-Scale Learning Science and Engineering	$1,149,297.73
		Department of Education	Building a Statewide Model for Scaling ASSISTments	$999,995.00
	Roee Shraga	National Science Foundation	CRII: III: Improving the Utilization of Humans in Data Integration and Discovery	$174,995.00

Department	PI	Originating Sponsor	Project Title	Total Award
Computer Science	Tian Guo	National Science Foundation	Collaborative Research: CIRC: Planning-C: ExpAR: Scalable and Controllable AR Experimentation	$50,000.00
			Collaborative Research: CSR: Medium: Offloading Heterogeneous Distributed Workloads with Diverse Computation Models	$234,631.00
			ExpandQISE:Track 1:Education and Research of System and Network Supports for Quantum Cloud	$799,995.00
			Collaborative Research: SaTC: CORE: Small: Towards the Security of Immersive Multimedia Systems	$134,303.00
	Xiaoyan Sun	National Security Agency	2024 NCAE-C	$278,523.00
			Establishing National Cybersecurity Teaching Academy program at WPI	$81,000.00
	Xiaozhong Liu	Wellness Mind AI Ltd	Understanding Real-Time Vital Signs Using Large Language Models (LLMs)	$142,000.00
Electrical & Computer Engineering	Alexander Wyglinski	National Science Foundation	Workshop on Open & Integrated Network Testbeds for Research & Translation	$99,302.00
		National Aeronautics & Space Administration	MOSAIC: 5G Mission-Critical Sidelink for Autonomous and Interoperable Communications in Lunar Networks	$130,817.00
		Department of Defense	Securing Future 5g Connectivity (Supplement 2024)	$139,781.00
	Bashima Islam	National Institutes of Health/NIH/DHHS	Mindfulness Training and Respiration Biosignal Feedback	$81,979.00
			Automated Assessments of Infant Sleep/Wake States, Physical Activity, and Household Noise Using a Multimodal Wearable Device and Deep Learning Models	$101,484.00
	Gregory Noetscher	Teradyne Inc	Teradyne Scanning Array- Student Research 2024	$35,999.00
	Patrick Schaumont	Department of the Navy	DURIP Sample Preparation for IC Security Assessment	$295,552.00
		Purdue University	Hierarchical Side-channel Leakage Assessment for Post-Quantum Cryptographic Accelerators	$60,000.00
	Sergey N Makaroff	National Institutes of Health/NIH/DHHS	Brain and Human Body Modeling Conference (BHBM) – from Fast and Accurate Computational Modeling to Clinical Practice	$17,500.00
	Shahin Tajik	Silicon Valley Community Foundation	SPARTACUS: Secure, Private, and Tamper Resistant Technologies for AI Chips made in U.S.	$139,000.00
	Shamsnaz V Bhada	Draper Laboratory	Technical Debt Tracking for Systems Engineering Decision Making using Arficial Intelligence	$25,051.00

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Electrical & Computer Engineering	Ulkuhan Guler	National Institutes of Health/NIH/DHHS	Computational Models for Smart Transcutaneous CO2 Monitoring	$180,717.00
			The Center for Advancing Point of Care in Heart, Lung, Blood and Sleep Diseases	$102,278.00
	Ziming Zhang	Tectonic Operating Company, Inc	Antibody discovery using point cloud representations	$106,554.00
Fire Protection Engineering	Albert Simeoni	Forest Service/Department of Agriculture	Developing Understanding of Firebrand Dynamics using Laboratory Field and Modeling Studies	$550,000.00
			Developing detailed Emission Source Terms for Next-Generation Wildland Fire and Smoke Modeling Tools using improved near-field fire measurements	$129,761.00
		National Institute of Standards & Technology/ Technology Administration/ DOC	Enhancing Wildland-Urban Interface Resilience: A Tiered System for Fire Shelter Development and Standardization	$453,120.00
	Muthu Kumaran Selvaraj	San Jose State University	NSF IUCRC WIRC: Fire models inter-comparison and systematic benchmarking framework	$12,590.00
Humanities & Arts	Jennifer Rudolph	Carnegie Corporation of New York	Mapping Global China (web-based project)	$600,000.00
Integrative & Global Studies	John-Michael Davis	Sociological Initiatives Foundation	Supporting Community-Driven Adaptive Reuse of Puerto Rico's Abandoned Schools	$24,900.00
	Kathleen Head	Department of State	Accessible Horizons: Expanding Access for Students with Disabilities in WPI's Global Projects Program	$34,968.75
	Sarah Stanlick	National Science Foundation	CIVIC-PG Track B: Leveraging the SWAP Resource Sharing Platform for both Long-Term Mutual Aid and Responsiveness to Emergent Needs	$74,675.00
	William San Martín	National Science Foundation	Accelerating coordination across research and policy networks to halve nitrogen waste (iN-Net)	$13,495.00
Mathematical Sciences	Burt S Tilley	Air Force Office of Scientific Research	Macroscale modeling of electromagnetic absorption in zeolite-dielectric composites	$50,517.00
	Francesca Bernardi	American Mathematical Society	Girls Talk Math at WPI 2025	$7,500.00
	Min Wu	National Institutes of Health/NIH/DHHS	Multiscale modeling of fluidity in partial EMT (pEMT) planar tissues	$305,426.00
	Randy C Paffenroth	Department of the Air Force	Estimation of Chemical Toxicity from Chemical Sensor Spectra	$43,500.00

Department	PI	Originating Sponsor	Project Title	Total Award
Mathematical Sciences	Zsolt Adam Wagner	National Science Foundation	Synergy of Machine Learning and Automated Reasoning to Solve Math Challenges	$349,986.00
Mechanical and Materials Engineering	Ahmet C Sabuncu	National Science Foundation	BSCER: Capacity Building for Developing a Troubleshooting Learning Environment	$350,000.00
	Aswin Gnanas-kandan	National Science Foundation	Collaborative Research: Elucidating the role of cavitation in demulsification of water-oil emulsion through a combined experimental and numerical study	$250,431.00
	Brajendra Mishra	Department of Energy	Commercial Removal of Fe and Mn from molten aluminum scrap melts	$225,000.00
	Cosme Furlong-Vazquez	Department of Energy	In-Situ Inspection of AM of Energetics: Digital Fringe Projection (DFP) (Option 2)	$342,030.00
	Danielle L Cote	Defense Advanced Research Projects Agency	RUBBLE TO ROCKETS (R^2)	$760,748.00
		Department of the Navy	AMAMTSEC PHASE V: Additive Manufacturing and Advanced Materials Technology for Sustainment and Environmental Compliance	$250,000.00
	Jiawei Yang	National Science Foundation	CAREER: Modular Design of Bioadhesives for Implantation	$117,562.00
	Mehdi Mortazavi	Massachusetts CEC	Clean Hydrogen Production Enhancement: Anode Electrode Oxygen Bubble Management	$75,000.00
		National Science Foundation	ERI: Oscillatory patterns in sessile droplets induced by shear flow of surrounding gas phase	$199,000.00
	Pratap M Rao	Department of the Army	On-textile integration of power, control and communications for advanced wearables	$66,941.00
	Robert Hyers	AM Batteries LLC	M2I2 Capital Matching Grant Agreement	$100,000.00
		National Aeronautics & Space Administration	Project Tethys: Extracting Water from the Martian Environment (Lydia Tonani)	$83,694.00
			Development of a Novel Process for Refractory Metal Powder Production (Amanda Smith)	$83,694.00
			Unified Support for Thermolab-ISS, ICOPROSOL, and PARSEC	$288,941.00
			Thermophysical Properties and Transport Phenomena Models and Experiments on Photorefractive Materials in Reduced Gravity	$100,000.00
	Yan Wang	Massachusetts CEC	H2CIRC (third party cost share)	$282,423.00
		Department of Energy	H2CIRC (Circular Recycling for the Hydrogen Economy)	$578,185.00

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Mechanical and Materials Engineering	Yihao Zheng	National Science Foundation	SCH: In-Vivo Real-Time Assessment of Thrombus in Stroke Treatment via Fiber Raman Spectroscopy and Multi-Physics Neural Operator Learning	$1,199,991.00
		National Institutes of Health/NIH/DHHS	Magnetic Rotational Platform for Coronary Lesions	$20,388.00
	Yu Zhong	Department of Energy	BIL - Highly Stable Engineered Oxygen and Fuel Electrodes for Solid Oxide Electrolysis Cells	$126,475.00
		Department of the Air Force	Additively-Manufactured, Refractory Metal, Oxidation-Resistant (ARMOR) Alloy for High Temperature Aerospace Applications	$56,139.32
		Department of Energy	Highly-reliable Ruggedized Solid-Oxide Steam Electrolyzer	$195,832.00
	Zhu Mao	Department of Energy	Structural Dynamics Modeling and State Awareness Enhanced by Deep Learning (Y2)	$151,577.00
Physics	Kateryna Friedman	National Science Foundation	REU Site: Center for Early Research Experiences in Functional Materials	$465,895.00
Research Solutions Institute	Priscilla Vazquez	Commonwealth of Massachusetts	E3 Pilot Program: Research Graphics Design Apprenticeship @WPI	$19,972.00
Robotics Engineering	Berk Calli	National Science Foundation	CAREER: Leveraging Collective Power of Robotic Grasping Algorithms via Meta-Learning and Active Perception	$549,559.00
	Cagdas D Onal	National Science Foundation	FRR: Unified Design, Modeling, and Control of Extensible Continuum Robots for Operation in Human Workspaces	$1,314,792.00
	Constantinos Chamzas	National Science Foundation	CRII: Towards Real-World Robotic Manipulation: Learning Abstract State and Action Representations from Visual and Execution Data	$174,998.00
	Haichong Zhang	Medtronic plc	Robot-assisted Laparoscopic Photoacoustic Imaging	$50,000.00
	Jing Xiao	Department of the Army	Liquid Hydrogen Autonomous Refueling System 2	$504,000.00
	Kevin Leahy	Office of Naval Research	Graph Learning for Distributed Situational Awareness with Limited Communication and Localization	$250,000.00
		Department of the Air Force	Safe and Adaptive Swarm Coordination	$18,750.00

Department	PI	Originating Sponsor	Project Title	Total Award
Social Science & Policy Studies	Erin R Ottmar	Institute of Education Sciences/Department of Education	From Here to There: Preparing an effective game-based algebra intervention for scale	$78,136.00
STEM Education Center	Kathy C Chen	Massachusetts Executive Office of Education	Central MA STEM Network (CMSN) - Year 9	$35,000.00
STEM Education Center	Mia Dubosarsky	Massachusetts Executive Office of Education	STEM Week 2024 - I am STEM Lesson Library Extension (FC 10SD - STEM Design Challenge - COMP CON_FY25)	$41,906.25

A special thank you to the individuals who — through their hardwork — have contributed to the successes reported in this annual report.

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This report, published annually by the Office of the Vice President & Vice Provost for Research and Innovation, aims to provide a summary of key data related to WPI's extramural funding activities, including proposals submitted, awards received, and funds expended. As with prior years, this report includes only those proposals and awards administered by OSP. Gifts, internal funding, individual fellowships, and MQP/IQP project funding are not included here.

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