2021

Sponsored Research Activities

Office of Vice Provost for Research

WPI

HIGHLIGHTS 2021

$42.3M

Awards

$36.7M

Expenditures

499

Proposals Submitted

Introduction

We have ended a successful year of activities. Despite the ongoing challenges of the pandemic, FY2021 was the second highest year in the value of awards received. WPI researchers received, through the Office of Sponsored Programs, $42.4 million in government, corporate, and private funding. In addition, 20 patents were issued on WPI faculty and student inventions, another record for the university.

FY21 also marked the highest year both in number and dollar value of proposals submitted: 499 proposals, for a total value of almost $339 million (FY2020 numbers were 445 proposals for $265M, which was our previous record).

Our top funder is the National Science Foundation ($17.9 M, almost 50%), followed by the Department of Defense (19.14%), the National Institutes of Health (14.43%), the Department of Education (5.37%) and the Department of Energy (4.02%).

Research expenditures have increased from $31.83M in FY20 to an all-time high of $36.7M in FY21. Expenditures are the best indicator for actual research activities on campus, and this increase of expenditures/activities is even more impressive given that FY21 was impacted by the effects of COVID.

I would also like to thank our colleagues in the Offices of Sponsored Programs (OSP), Sponsored Programs Accounting (SPA), Office of Technology Commercialization (OTC) and the Research Solutions Institute (RSI), as well as our technical staff, for providing crucial support to WPI's researchers.

It is too early to tell what FY22 will look like, with the pandemic still a challenge for all. However, the first 6 months of the new fiscal year have already brought us to more than $28 million in new awards and award increments. A great start!

I would like to thank our faculty and staff for their contributions to solving impactful research problems, for engaging undergraduate and graduate students in research projects and for supporting them on their grants. Combining education and research is what we do best.

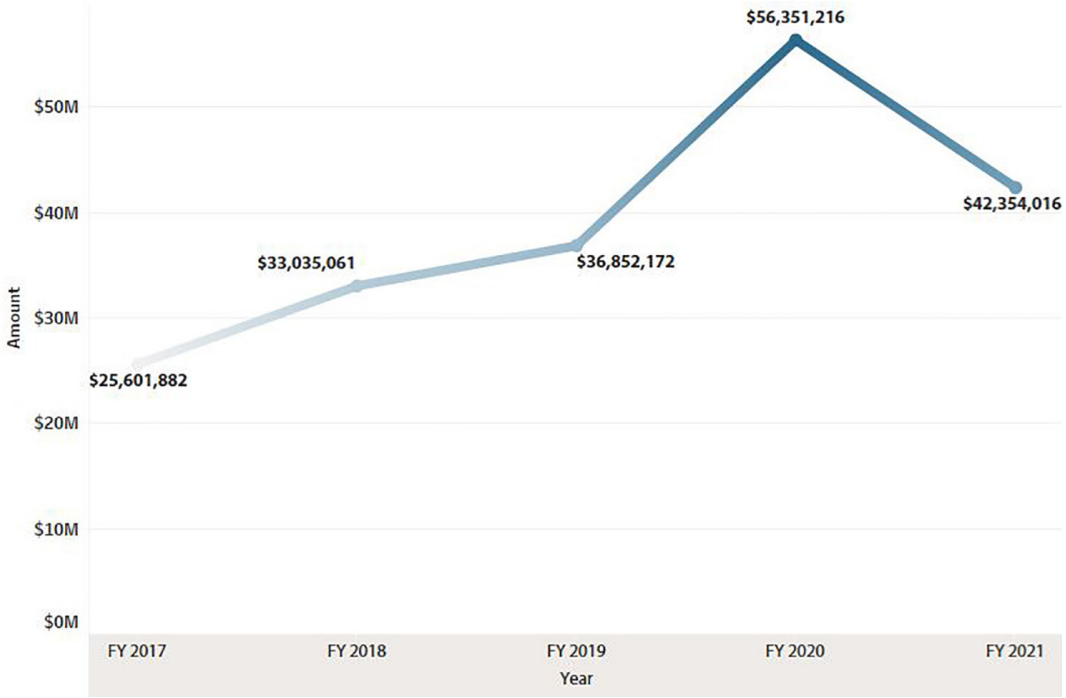
Bogdan M. Vernescu,
Vice Provost for Research

Contents

5 Year Summary

Awards

WPI received $42.3M in new awards in FY2021 – an amount reflecting the difficult funding year due to the COVID pandemic. Awards are funds which have been fully obligated and released by the sponsor. In cases where a grant is funded in yearly increments, only those increments received by WPI are counted as awards.



Funding Spotlight

GLOBAL INITIATIVES and LOCAL COMMUNITIES

WPI's Institute of Science and Technology for Development (InSTeD) became US AID's newest partner on its Resilient Food Security Activity in Ethiopia. InSTeD is the technical lead for sanitation and charged with projects related to Microflush toilets, women and youth empowerment, and food security. **Robert Krueger** and **Terence McGoldrick** are leading this effort for WPI.

John Galante and his team in Humanities & Arts received an award for the introduction of courses in Spanish Literature, History, Culture, and Development related to Latin America and the Caribbean as well as the creation of a Minor in Latin American and Caribbean Studies. The team is collaborating with colleagues within WPI and plans to work with Latinx community organizations in Worcester and build partnerships with universities and institutions of civil society in Latin America and the Caribbean.

Laureen Elgert, Integrative and Global Studies, and **Yunus Telliel**, Humanities & Arts, received an award from the New America Foundation, which supports faculty/student projects that represent diverse iterations of public interest technology (PIT). It further provides funding for workshops designed to build community and engagement with PIT and two major events showcasing and disseminating the projects to the wider WPI campus and the Worcester community.

WPI

FY2021

Awards by Sponsor

AWARDS BY SCHOOL

$19M
Arts & Sciences

$19.5M
Engineering

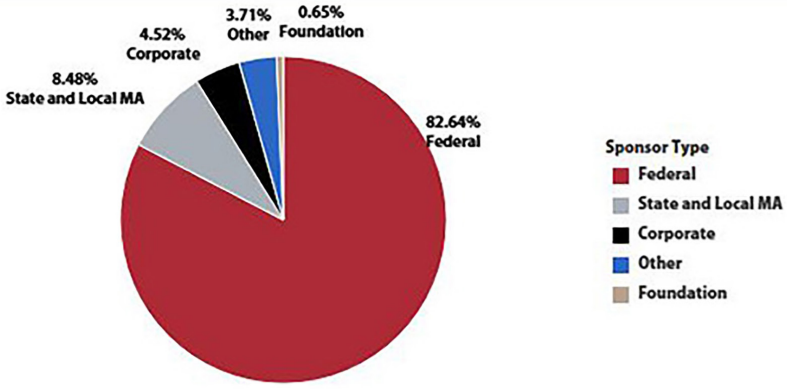
$1.9M
Business

$25K
Global

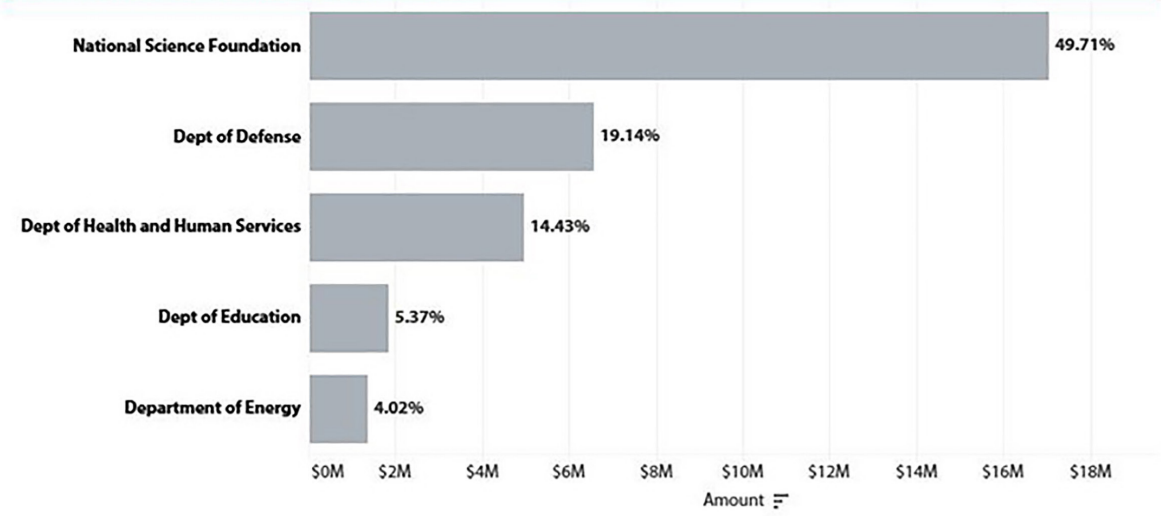
$1.7M
Other

Elizabeth Long Lingo *in WPI's Business School has been awarded an ADVANCE grant from the NSF for a collaboration with the College of William and Mary, which examines the systemic biases that undermine the efforts of women and under-represented minorities to advance to full professor of information technology at colleges and universities. The model can serve as a role model for other associations seeking to increase the number of women promoted to full professor in higher education.*

Awards by Sponsor Type



Awards by Top Federal Sponsors



WPI

5 Year Summary

Project Highlights and Awards by School

Renata Konrad *(Business School) and* **Kyumin Lee** *(Computer Science) have received an award from the NSF for a collaboration with the University of Maryland to develop approaches and tools aimed at detecting and thwarting wildlife trafficking. This research converges engineering, computer and data science, and social science in a deliberate fashion to improve understanding of illicit supply network operations and strengthen ability to detect, disrupt and dismantle them. Although the team will focus on wildlife, the applicable methodology and research questions are transferable to other problems such as human trafficking.*

Awards by School

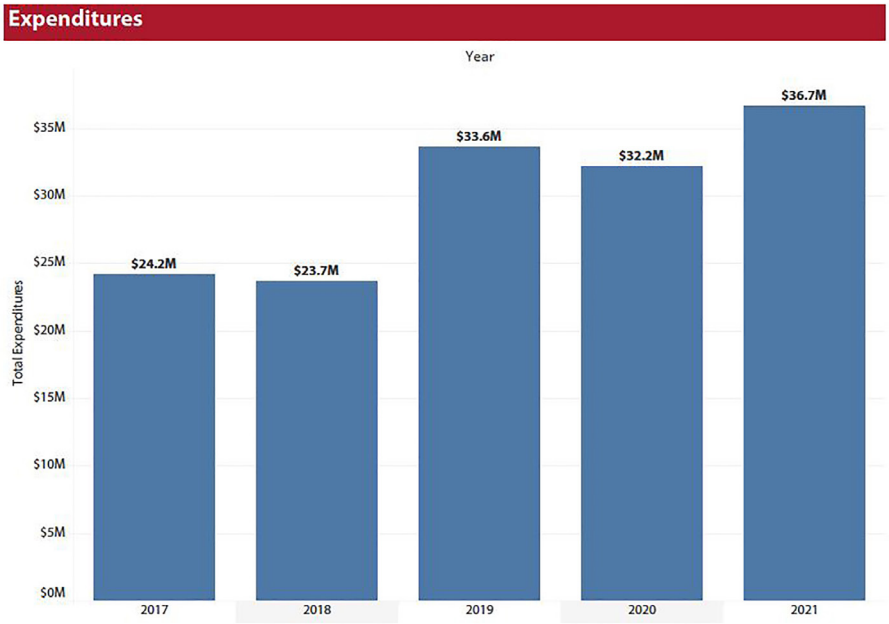
	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Arts & Sciences	**$9,818,759**	**$16,964,998**	**$16,002,966**	**$23,401,978**	**$19,071,651**
Business	**$365,835**	**$219,895**	**$659,530**	**$672,457**	**$1,985,492**
Engineering	**$13,536,922**	**$14,140,673**	**$18,783,250**	**$30,566,966**	**$19,555,376**
IGSD		**$68,448**	**$75,175**	**$259,245**	**$25,232**
Others	**$1,880,367**	**$1,641,047**	**$1,331,251**	**$1,450,569**	**$1,716,266**
Grand Total	**$25,601,882**	**$33,035,061**	**$36,852,172**	**$56,351,216**	**$42,354,016**

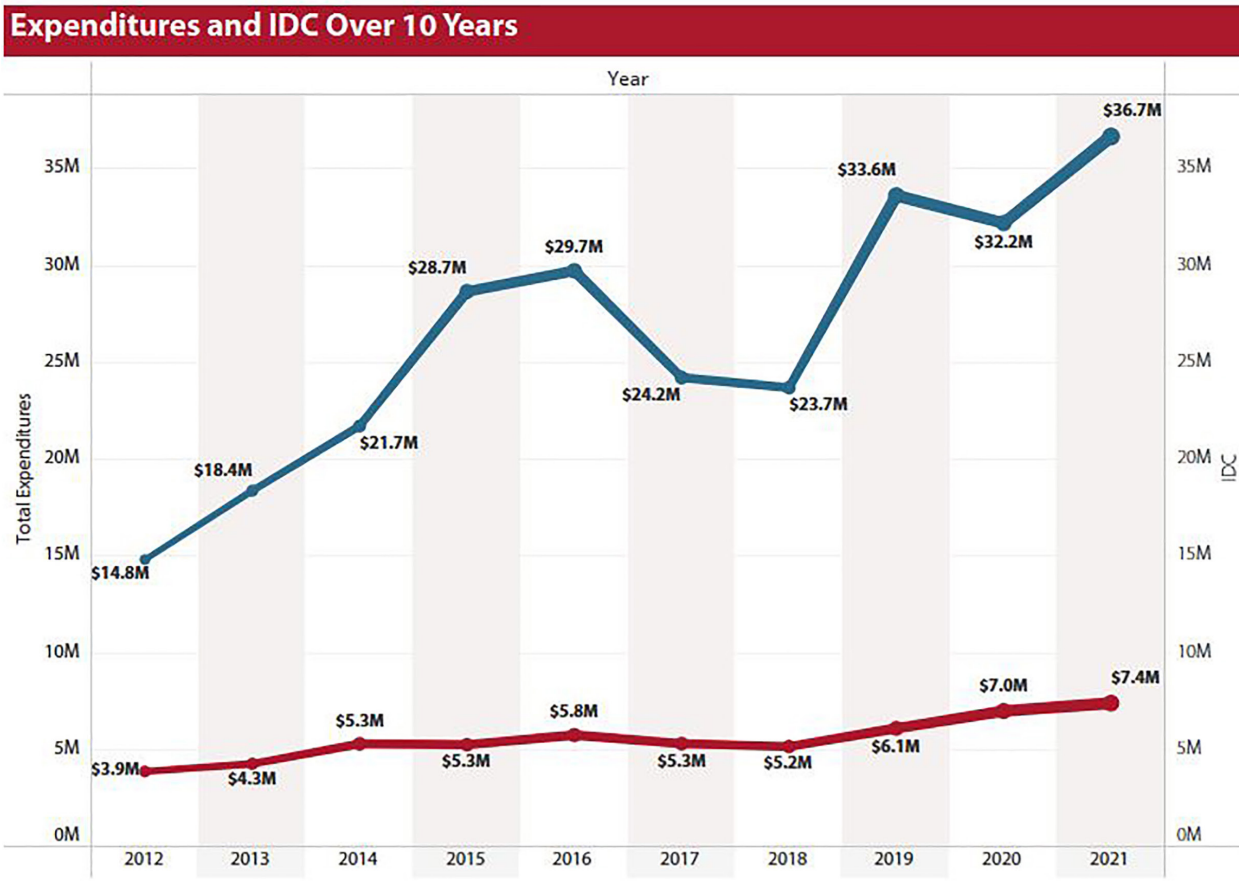
Shari Weaver, *Director of the Teacher Preparation Program at WPI's STEM Education Center, leads a team of researchers who received a five-year grant from the NSF's Robert Noyce Teacher Scholarship Program. The grant supports their efforts to recruit and train WPI students from diverse backgrounds to teach science, technology, engineering, and mathematics (STEM) in urban school districts with a large percentage of economically disadvantaged students. This project at includes partnerships with community-based organizations, such as the Worcester EcoTarium Museum and Worcester Parks & Recreation Department, and two local high-need schools. The goal of the project is to recruit, prepare, and support STEM undergraduates from a range of diverse backgrounds to successfully teach in urban, high-need schools with diverse student populations.*

5 & 10 Year Summary

Expenditures

Expenditures are the actual costs paid for by WPI's external funding in a given year. These costs are recorded in real-time as the research is taking place, unlike awards which are recorded as a lump sum. As such, expenditures provide the most consistent year-over-year measure of funded research activity at WPI and partner institutions.





WPI

FY2021

Expenditures

Expense by School

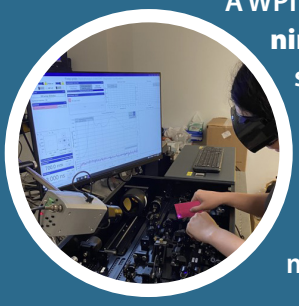
	Arts & Sciences	Engineering	Global School (Previously IGSD)	Other Departments	School of Business
Benefits	$710,617	$848,657	$2,790	$31,718	$27,177
Equipment	$1,387,967	$2,138,226	$0	$0	$0
Faculty Salary	$1,282,437	$1,183,163	$10,000	$140,723	$4,070
Graduate Support	$2,087,628	$2,821,389	$0	$111,860	$190,573
Graduate Tuition	$939,061	$764,362	$0	$71,592	$49,447
Indirect Costs	$2,957,486	$4,218,470	$3,754	$42,825	$182,121
Other Expenses	$485,584	$810,591	$1,648	$73,877	$52,479
Participant Support Costs	$1,192,674	$317,181	$0	$60,229	$11,700
Supplies	$336,400	$965,445	$0	$6,801	$0
Subcontracts	$2,749,583	$3,951,446	$0	$17,820	$79,836
Undergraduate Support	$1,207,591	$2,006,240	$0	$38,090	$95,748
Total	$15,337,026	$20,025,171	$18,191	$595,533	$693,150

Funding Spotlight

MatR: Materials Reimagined

Yan Wang received an award for the project entitled "A Closed Loop Process for the End-of-Life Vehicle Li-ion Batteries, Phase III" from the Department of Energy (DOE). The overall objectives of the program are: 1) to lower the cathode cost by >30% relative to commercial equivalent material 2) to develop high Nickel cathode materials from the spent EV batteries; 3) to alleviate the supply chain issues of lithium-ion battery industry.

Nikolaos K. Kazantzis and his team in Chemical Engineering have received an award from the NSF for a project addressing ocean plastics and mitigation of their environmental impacts. The project examines the thermodynamic feasibility and subsequent implications of hydrothermally converting this waste into a fuel to enable self-powered cleanup.

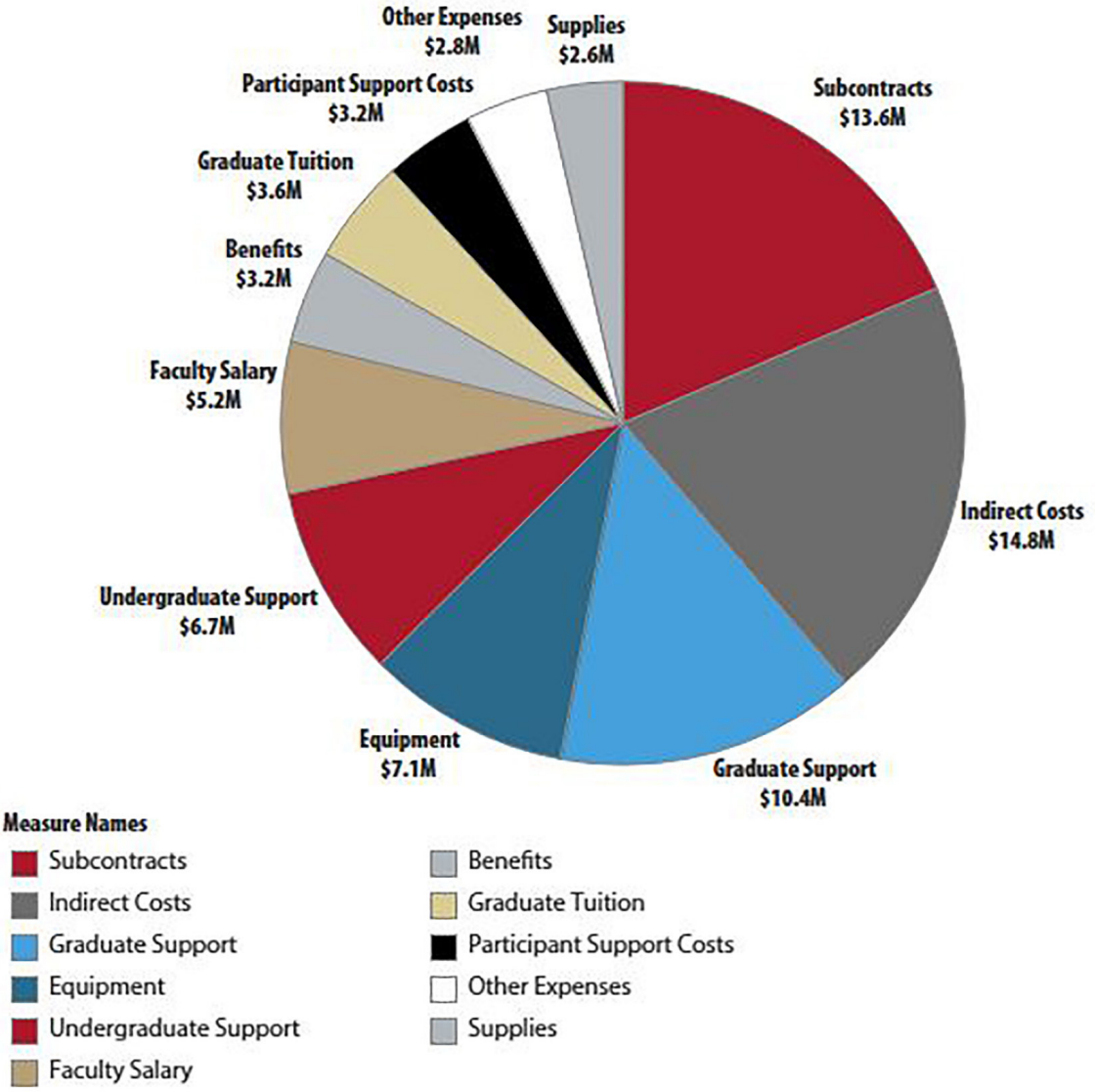


A WPI team led by **Lyuba Titova**, and including **Ronald Grimm, Wole Soboyejo, Jeannine Coburn** and **Christopher Lambert**, was awarded an NSF Major Research Instrumentation grant to acquire a broadband time-resolved spectrometer spanning ultraviolet to terahertz spectral range. It allows constructing a more complete understanding of photoexcitation in emerging photonic, photovoltaic, photoelectrochemical, flexible optoelectronic and biologically inspired materials. This work benefits research efforts by WPI scientists and regional partners in these fields and fosters unique collaborations as a result of bringing this multidisciplinary expertise together.

FY2021

Expenditures

Expense Breakdown



5 Year Summary

OSP Proposal Submissions

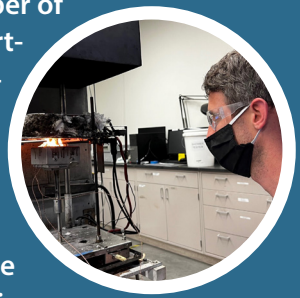
Submitted Proposals by School

School	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Arts & Sciences	$118,067,207	$109,590,744	$114,604,684	$107,532,150	$181,991,609
Business	$7,795,124	$6,415,282	$1,404,014	$5,050,532	$4,138,270
Engineering	$85,886,071	$84,161,007	$116,567,646	$142,986,123	$131,866,996
IGSD	$221,955		$372,371	$918,458	$1,065,902
Other	$2,562,483	$2,583,290	$2,054,068	$9,437,850	$20,123,737
Grand Total	$214,532,840	$202,750,323	$235,002,783	$265,925,113	$339,186,514

Funding Spotlight

SMART WORLD

Elke Rundensteiner and an interdisciplinary team of WPI faculty received a training grant from the NSF for a research-based graduate traineeship program--Data-Driven Sustainable Engineering for a Circular Economy--, which builds on WPI's existing interdisciplinary programs in data sciences, chemical sciences, engineering, social sciences, and business. This Traineeship model champions convergence in scholarship and communication, encourages graduate students from across disciplines to move beyond current economic models, and advances circular economies using data science techniques to solve thorny sustainability challenges plaguing our society on a local, national, and global scale.



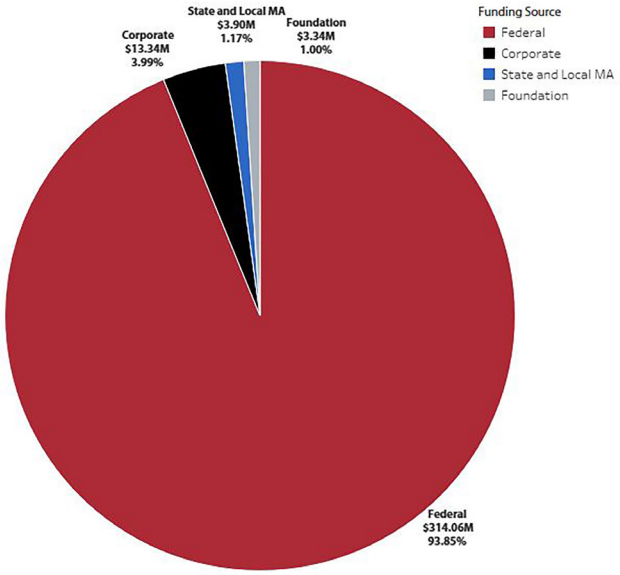
Albert Simeoni and his team in Fire Protection Engineering have received an impressive number of awards from a variety of federal sponsors, including Environmental Protection Agency, Departments of Defense and Justice and the Coast Guard. The projects funded by EPA and DOD contribute to understanding the linkages between fuel characteristics, fire dynamics, and air quality necessary to develop and validate risk-reducing fire models, which will directly benefit DoD fire managers manage wildfire risk. The DOJ-funded project addresses the need in wildland fire and arson investigation to better and more reliably pinpoint the area and point of origin. The Coast-Guard-funded project investigates the potential difference in fire resistance of composite walls in ships, using experiments aimed at determining the flammability of different wall coatings and simulations investigating the heat transfer through a composite wall when one side is submitted to a fire.

Jacob Whitehill, an assistant professor in Computer Science, received an NSF CAREER award for a project that harnesses artificial intelligence (AI) to improve both the quality of classroom teaching and the precision of educational research by providing teachers and scientists with new methods of observing the inter-personal dynamics between teachers, students, and their peers. The project will result in contributions to the fields of computer vision, speech analysis, machine learning, and education, and will offer new insights into automatic speaker diarization, person tracking, sentiment analysis, and classroom observation analysis. The scientific and educational agendas provide opportunities for inter-disciplinary training of research assistants; they will also enable and benefit from collaboration between the research team and teachers in Massachusetts and Virginia.

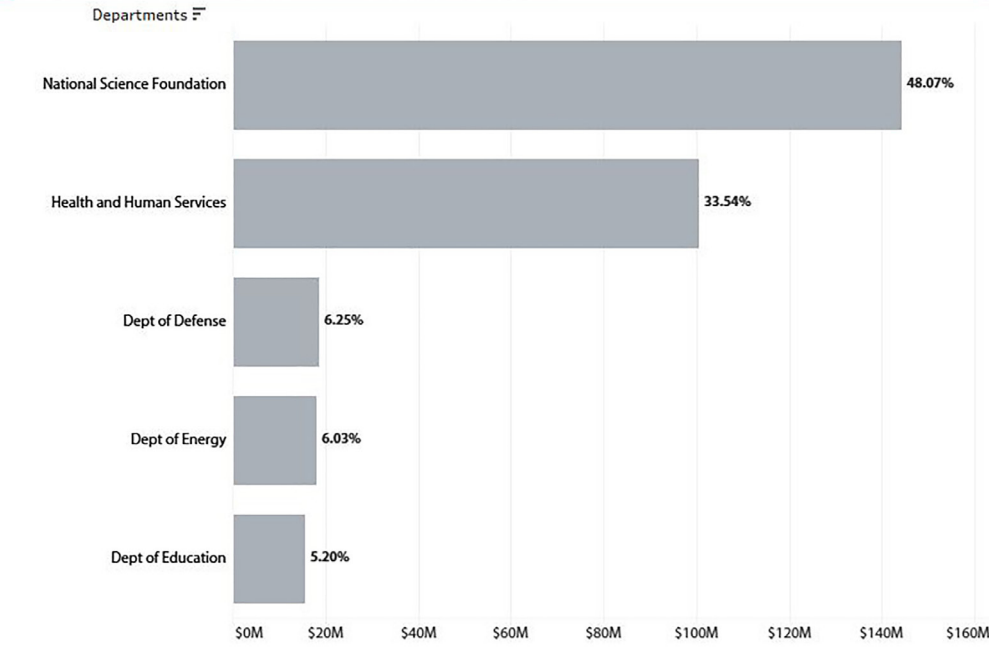
FY2021
OSP Proposal Submissions

In FY21, there were 499 proposals submitted, totalling a request of $265M. Almost 94 percent of the proposals were submitted to Federal sponsors, totalling $314M. Of the Federal sponsors, most proposals (48 percent) were submitted to the National Science Foundation totalling $144M.

Submitted Proposal Amounts by Sponsor

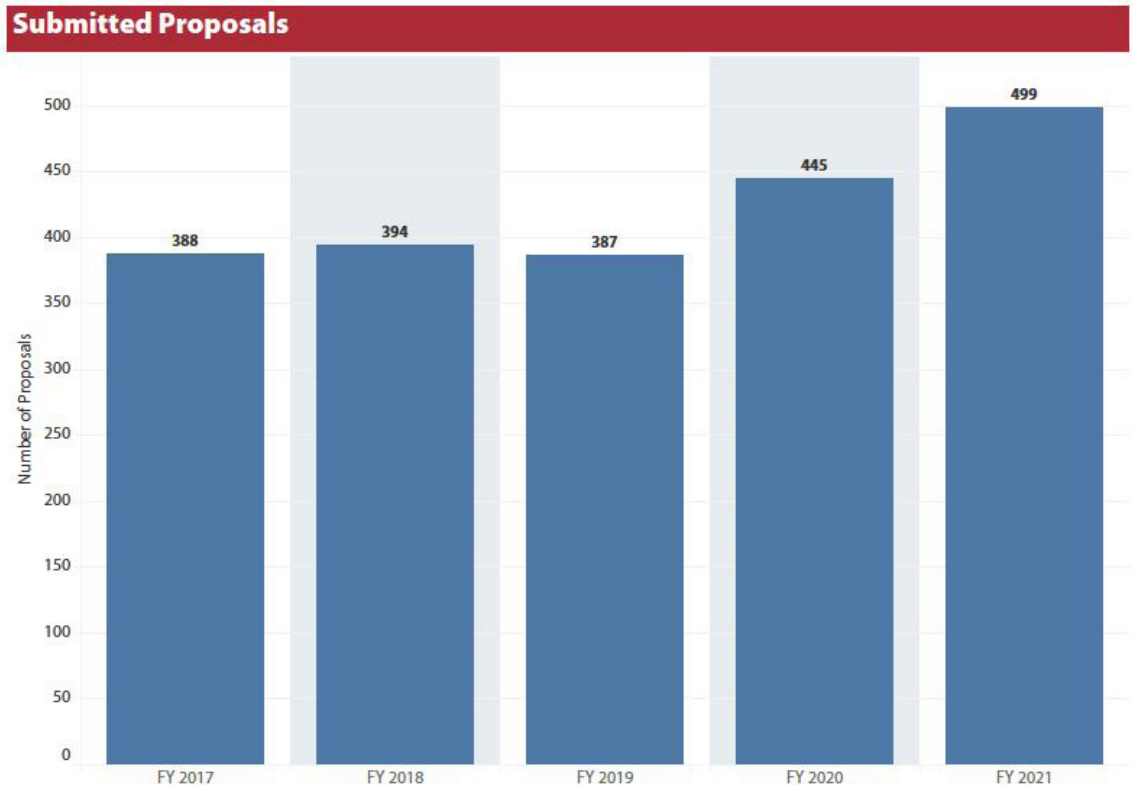


Submitted Proposals to Top Federal Sponsors



5 Year Summary

OSP Proposal Submissions



Funding Spotlight

BIOPOINT

Amity Manning, in Biology and Biotechnology was awarded a grant by the American Cancer Society for to determine the role a critical tumor-suppressor protein plays in chromosome errors that arise during cell division in cancer cells. The four-year project will lead to a better understanding of how an absence of retinoblastoma protein (pRB), which regulates cellular processes, contributes to mis-sorted genetic information in tumor cells.

Another BBT faculty, **Scarlet Shell,** received an award from the National Institutes of Health for a project investigating mycobacterial sRNA biology. The proposed studies will provide foundational knowledge needed to facilitate development of more effective treatments for mycobacterial diseases, such as tuberculosis and lung disease in cystic fibrosis patients.

Kun-ta Wu in Physics has received an NSF CAREER award for his work on mixing dynamics and kinematics in active fluid systems. The research will increase efficiency in chemical engineering, biological engineering, and pharmaceutical manufacturing by advancing microfluidic technology. Microtubule-kinesin active fluid is biocompatible and thus can enhance mixing in microchannel networks used for organic synthesis reactions in drug discovery and process development

WPI

Research Solutions Institute (RSI)

RSI PROPOSAL SUPPORT 2021

5
Proposals over $3M

17
Proposals $1M-$3M

7
Proposals $500K-$1M

32
Proposals $250K - $500K

14
Proposals <$100K

Proposal Development and Training

The proposal development support services offered by the RSI have been in high demand throughout FY21 and continue to see strong growth. In FY21, RSI assisted research faculty in a total of 75 proposals.

The RSI offers different levels of proposal development services from basic proof reading to intensive project management, review, team facilitation etc. In FY21, approximately 40% of requests were for intensive level of service including multiple in-depth reviews of drafts for flow, narrative structure and content including alignment with funder objectives.

In addition to proposal development services, RSI continues to provide a comprehensive set of training opportunities. In FY21, RSI organized its first ever workshop on identifying and preparing successful proposals focused on Education research. The Workshop was very well attended with 34 registrants. The NIH High Risk High Reward funding opportunity seminar organized by the RSI was another well attended event with over 35 registrants. This event included seminars by program officers from the NIH Director's Office and introduced WPI faculty to various funding opportunities relevant to research that aligns with the NIHs' mission. Also, for the first time in FY 21, RSI organized the Grant Writing Group workshop aimed at providing early career faculty with peer-review opportunities to sharpen their writing techniques. In FY22, RSI plans to expand its training and workshop series.

Manufacturing USA Institutes

RSI coordinates an active portfolio of research and education initiatives in advanced manufacturing through WPI's memberships in twelve federally sponsored Manufacturing USA Institutes, which are consortia of industry and academic members collaboratively focusing on applied R&D challenges in particular sectors of advanced manufacturing technology.

Synergies resulting from Manufacturing Innovation Institute (MII) Engagements among and beyond the MIIs continue to take shape leading to additional funding avenues, cross-team interactions, and expanded impact of MII investment.

Center for Advanced Biomanufacturing Innovation (CABI) and CERES@WPI (Cell Engineering Research Equipment Suite)

Led by **Marsha Rolle** and **Eric Young**, CABI leverages the facilities, industry partnerships and workforce development expertise of the Biomanufacturing Education and Training Center (BETC) to develop new research and training programs in biomanufacturing, cell therapy and tissue engineering. CABI-related projects have been funded by two of the MIIs (NIIMBL and ARMI BioFabUSA) as well as project and equipment grants from MLSC. WPI was also awarded an Open Capital Grant to build the CERES@WPI, a fee-for-service cell analytics facility that will accelerate cell engineering research across WPI and regional startups, such as those housed in the Massachusetts Biomedical Initiatives (MBI) incubator. A major focus of CABI will be industry partnerships and training programs aimed at innovation and training in process design and control, sensing, and automation/scale up.

The LEAP Facility

Led by **Doug Petkie** and **Jim Eakin**, and in collaboration with QCC, they finalized equipment purchases and set-up of the facility. The WPI LEAP team helped host **Lyuba Titova's** REU sum-

Research Solutions Institute (RSI)

mer clean energy program. Lyuba Titova was further awarded an NSF MRI grant for a laser spectroscopy system, which is housed at the LEAP and is another example of broadening impact of the MII investment. This equipment supports a wide range of research and educational activities in materials science, photonics, optoelectronics and functional biomaterials, and will enable multiple cross-disciplinary research. Ph.D. student **Erika Colin Ulloa** has been trained in transient optical absorption, one of the modes of operation. She has been doing experiments on films provided by scientists at Natick Soldier Center as well as on perovskite solar cell materials fabricated by the Soboyejo group. More recently, graduate students from the Grimm and Coburn groups have been trained on the instrument.

COVID related Activities

WPI received funding from MassTech for a project in support of the Commonwealth's Manufacturing Emergency Response Team's ("M-ERT") effort to fight COVID-19. Led by **Greg Fischer**, the funds were designed to develop and manufacture a low-cost Automated Bag-Valve-Mask system to meet increased need for ventilation among COVID-19 patients in Massachusetts and around the globe.

In a follow-up project, MassTech awarded funds to Greg Fischer's team to develop the technology and know-how needed to utilize surplus components (made available to MassTech through the Manufacturing Emergency Response Team program) to produce effective and economical ventilators that can improve patient care, communication, and outcomes under varying economic and social conditions. The program is co-creating and delivering ventilators to a group of at least 20 institutions that are working with WPI on the co-creation and testing of ventilators that can be used in the hospital care of Covid-19 patients in Africa

WPI (**Sara Saberi, Joe Sarkis, Doug Petkie, and Greg Fischer**) is also part of an industry-academic effort that will help a network of Massachusetts manufacturers collaborate, communicate, and pivot quickly to produce vital products during future crises such as pandemics. Funded with a five-year grant from the National Science Foundation, the project is analyzing the issues faced by manufacturers that offered to shift their production during the COVID-19 pandemic and developing tools and exercises to improve emergency manufacturing responses in the future. Known as the Rapid Execution for Scaling Production of Needed Designs network, or RESPOND, the project is bringing together small businesses, large corporations, universities, government agencies, and independent organizations in Massachusetts.

OTC HIGHLIGHTS 2021

27

New WPI Start-up Companies

107

New Jobs

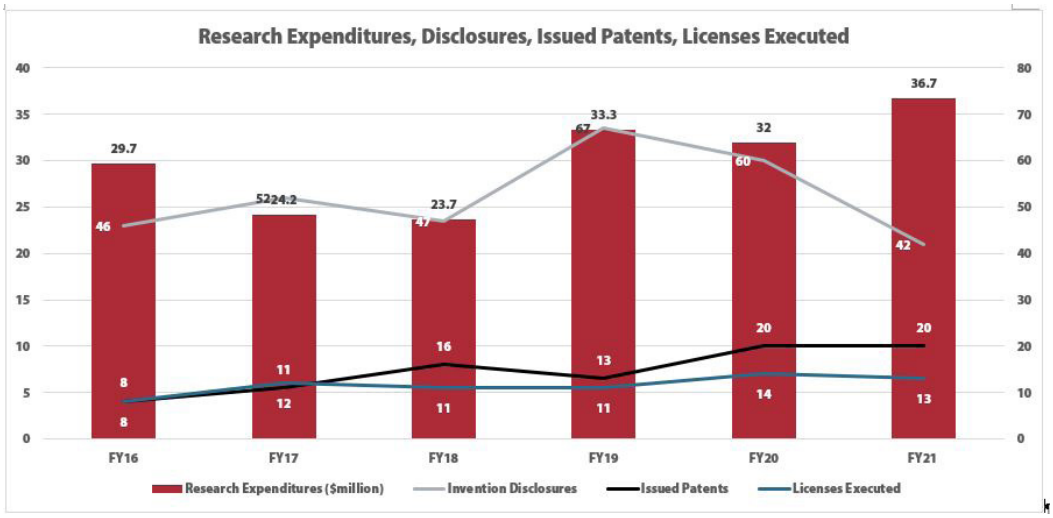
$130M+

Raised

Office of Technology Commercialization (OTC) Overview

In FY21 the number of issued patents and executed licenses remained steady from FY20. Invention disclosures dipped slightly (we believe due to COVID-19 disruptions), however, OTC is currently on track in FY22 to again hit pre-COVID-19 number of invention disclosures.

New FY21 and previous active licenses have resulted not only in increased income via the reimbursement of patent expenses, but also in the creation of 21 new WPI start-up companies. These companies, located primarily in the Worcester area, have created 107 new jobs and collectively raised over $130M. Several are now getting closer to getting their products on the market, resulting in a steady royalty stream for WPI and their inventors.



Several of the companies mentioned last year have made significant progress. Most prominent is Battery Resourcers (soon to be Ascend Materials). They have now raised $90 million and are targeting another $300 million shortly. They are currently at 40 FTE's and hope to be over 60 by January, 2022. They are forecasting their first full production plant to be up and running by the end of March, 2022. The full production plant will be next to a customer who have committed to a major contract to recycle their spent batteries. They expect to employ 100 FTEs at this plant by July, 2022.

In addition to the licensing activity, OTC has two other important programs it runs. The first is the National Science Foundation I-Corps program. This program is funded by NSF and focuses on two parts of the startup process; 1. how to come up with their "hypothesis" or value proposition and, 2. how to conduct customer discovery to test that hypothesis. OTC is starting its 7th year of the program (the first three years were before WPI received the NSF grant supported by TAN advisors). 70 teams have gone through the program since the first cohort in 2016. 7 startups have been created and 2 licenses to companies have been signed after the teams went through the program.

The second program is WPI's Commercialization Fund. This is an internal investment vehicle that is funded by donations to WPI. This Fund remains active with three more investments this last fiscal year. Roadgnar, Flexxbotics, and Nemedio all received $25k investments for equity in their companies. Roadgnar was founded by recent WPI grads and is mapping the roads in Worcester to give feedback on which ones need repair. They have raised their seed round and the students have quit their day job to devote full time to this effort.

WPI

CONGRATULATIONS

to PIs and Co-PIs who received initial awards in FY2021

Dept	PI	Sponsor	Project Title	Anticipated Total Award
Academic Affairs	Camesano, Terri A	National Science Foundation	Graduate Research Fellowship Program (GRFP)	$322,000
Biology & Biotechnology	Dominko, Tanja	New Harvest Inc.	Scaling the Production of In Vitro Bovine, Avian, and Fish Meat Using Edible Scaffolds in Suspension Reactor Systems	$136,068
	Manning, Amity L	American Cancer Society, Inc.	Defining epigenetic sensitivities of pRB loss	$792,000
	Shell, Scarlet	National Institutes of Health/ NIH/DHHS	Defining the RNA processing and degradation pathways of Mtb	$134,707
	Shell, Scarlet	National Institutes of Health/ NIH/DHHS	The mechanistic basis of Artemisia annua activity against Mycobacterium tuberculosis	$434,787
	Shell, Scarlet	National Institutes of Health/ NIH/DHHS	The roles of sRNA in the physiology and pathogenesis of Mycobacterium abscessus and other mycobacteria	$394,660
Biomedical Engineering	Billiar, Kristen	University of Massachusetts Medical School	Unruptured intracranial aneurysms: rupture-risk assessment by non-invasive molecular imaging	$44,443
	Coburn, Jeannine M	United Therapeutics Corporation	Local Controlled Release Delivery of Dinutuximab	$141,588
	Ji, Songbai	National Science Foundation	Organ-to-cell multiscale modeling of concussion	$350,324
	Rolle, Marsha W	Massachusetts Life Sciences Center	Open Capital Program	$877,315
	Troy, Karen	Spaulding Rehabilitation Hospital	Evaluating the relative influence of bone and foot strength to metatarsal bone stress injuries in athletes	$4,487
	Whittington, Catherine F	Pancreatic Cancer Action Network	Fibrosis-mediated transformation in pancreatic cancer risk factors in vitro	$200,000
	Zhang, Haichong	National Institutes of Health/ NIH/DHHS	Enhanced imaging and treatment of aggressive subtypes of prostate cancer	$86,478
Center For Stem Teaching	Dubosarsky, Mia	Massachusetts Department of Elementary and Secondary Education	STEM Week Design Challenge	$25,000
	Dubosarsky, Mia	National Science Foundation	Increasing Massachusetts Partnerships for Advancing Computational Thinking in PK-5 Classrooms (IMPACT PK-5)	$297,410
Chemical Engineering	Kazantzis, Nikolaos K	National Science Foundation	NSF2026: EAGER: Probabilistic Analysis of Converting Marine-Borne Plastics into Usable Fuels	$259,299
	Teixeira, Andrew R	National Science Foundation	Precise but Tunable Reactions Through Tunably Precise Surfaces	$390,000
	Timko, Michael T	National Science Foundation	NSF2026: EAGER: Nitrogen Bearing Hydrochars For Nitrogen Upcycling in a World without Waste	$277,359
Chemistry & Biochemistry	Burdette, Shawn C	National Science Foundation	Targeted Zinc Photocages for Studying Biological Signaling	$451,687
	Musacchio, Patricia	Pfizer Inc., U.S. Pharmaceuticals Group	A New Strategy for Mild Hydroxylation and Fluorination of Aliphatic Csp3–H Bonds and Its Application to Lead Diversification	$126,000
Computer Science	Claypool, Mark L	Viasat, Inc	Enhancing slow-start for improved TCP & Quic performance over satellite networks	$68,252

Dept	PI	Sponsor	Project Title	Anticipated Total Award
Computer Science	DeCarli, Lorenzo	Office of Naval Research	Automated Protocol Specialization and Diversification for Individualized Defense	$672,000
	Gennert, Michael A	National Science Foundation	Workshop on Unified Curriculum and Course Design for Mechatronics and Robotics Engineering	
	Guo, Tian	National Science Foundation	Collaborative Research: NGSDI: CarbonFirst: A Sustainable and Reliable Carbon-Centric Cloud-Edge Software Infrastructure	
	Guo, Tian	The VMware University Research Fund	Collaborative Research: NGSDI: CarbonFirst: A Sustainable and Reliable Carbon-Centric Cloud-Edge Software Infrastructure - Industry Funding of the NSF/VMware Partnership	$155,982
	Heffernan, Neil	Institute of Education Sciences/ Department of Education	Revisions to the ASSISTments Digital Learning Platform to Expand Its Support for Rigorous Education Research	$1,998,958
	Korkin, Dmitry	National Institutes of Health/ NIH/DHHS	Integration of Evolution to Avoid Resistance in Structure Based Drug Design	$79,289
	Li, Yanhua	National Science Foundation	SCC-IRG Track 1: Empowering and Enhancing Workers Through Building A Community-Centered Gig Economy	$265,989
	Rundensteiner, Elke A	National Science Foundation	NRT-HDR: Data-Driven Sustainable Engineering for a Circular Economy	$2,999,989
	Rundensteiner, Elke A	National Science Foundation	III: Small: Fair Decision Making by Consensus: Interactive Bias Mitigation Technology	$515,990
	Rundensteiner, Elke A	Department of Agriculture	FACT: Innovative Big Data Analytics Technology for Microbiological Risk Mitigation Assuring Fresh Produce Safety	$240,092
	Rundensteiner, Elke A	National Science Foundation	Collaborative Research: ELEMENTS: Tuning-free Anomaly Detection Service	$259,651
	Shue, Craig A	National Science Foundation	CyberCorps SFS Renewal: Supporting the Federal Government Workforce	$4,836,782
	Shue, Craig A	Department of Defense	2020 Worcester Polytechnic Institute DoD Cyber Scholarship Grant	$94,653
	Smith, Gillian M	Worcester Art Museum (WAM)	Mobile App Development for WAM Baseball Jersey Exhibit	$5,040
	Whitehill, Jacob R	National Science Foundation	AI Institute: Institute for Student-AI Teaming	$624,017
	Whitehill, Jacob R	National Science Foundation	CAREER: Developing New Scientific Instruments for Classroom Observation: A Multi-modal Machine Learning Approach	$691,980
Electrical and Computer Engineering	Bhada, Shamsnaz V	National Science Foundation	SCC-PG: Smart Technologies and Community Engagement to Address Data Gaps in Birth Outcomes Reporting	$32,782
	Bhada, Shamsnaz V	National Science Foundation	OVERCOME21: A Systems Approach to Scaling Rural Coop Efforts to Expand the Fiber Edge	$99,312
	Fu, Jie	Air Force Office of Scientific Research	AFOSR YIP: Towards Preference-Aware Autonomy: Specification, Synthesis, and Interactive Planning	$444,329
	Fu, Jie	Department of the Army	Verification and Synthesis of Assured Dynamic Cyber Defense with Deception and Counter Deception	$21,367
	Ganji, Fatemeh	Semiconductor Research Corporation	IP Protection through Secure and Private Function Evaluation	$108,000
	Huang, Xinming	National Science Foundation	SHF: Small: Knowledge Integrated Data-Efficient Deep Learning	$515,950
	Makarov, Sergey N	Novocure	Brain and Human Body Modeling Conference	

Dept	PI	Sponsor	Project Title	Anticipated Total Award
Electrical and Computer Engineering	Mughal, Maqsood A	Massachusetts CEC	Cloud Motion Vector System (CMVS) to Monitor and Predict Output Power of a Photovoltaic (PV) System in Real-Time	$65,000
	Schaumont, Patrick	National Science Foundation	SaTC: CORE: Small: Finding and Mitigating Side-channel Leakage in Embedded Architectures	$230,000
	Schaumont, Patrick	Defense Advanced Research Projects Agency	Side Channel Attack Testbench Emulator (SCATE)	$142,275
	Sunar, Berk	National Science Foundation	Collaborative Research: SaTC: TTP: Medium: NextGenPQ: Post-quantum Schemes for Next Generation Applications	$30,000
	Tajik, Shahin	Cisco Systems, Inc.	PCBmeter: Remote PCB Verification using On-chip IP cores	$79,477
	Wyglinski, Alexander	Zoom Telephonic	Integrated Millimeter Wave Backhaul/WiFi Last-Mile Connectivity for Broadband Networking	$298,943
	Wyglinski, Alexander	Verizon Sourcing LLC	Opportunistic Sensing, Data Fusion, Vehicular Traffic Modeling, and Security using 5G Cellular Networks	$300,000
	Zhang, Ziming	National Science Foundation	SHF: Small: Knowledge Integrated Data-Efficient Deep Learning	$515,950
Fire Protection Engineering	Simeoni, Albert	Environmental Protection Agency	Effect of Biomass Fire Dynamics on Emissions	$425,594
	Simeoni, Albert	Department of Justice	Study of the reliability of fire pattern indicators used in wildland fire investigation	$519,893
	Simeoni, Albert	Department of Defense	A Multiscale Study of the Coupling Between Flow, Fire and Vegetation – Influence of Vegetation Distribution and Flow on Fire Behavior and Plume Development for Risk Mitigation in Prescribed Burns	$1,799,216
	Simeoni, Albert	Kidde	Effects of Inert Gas Discharge Time on Class A Fires	$35,914
	Simeoni, Albert	U.S. Coast Guard	Modular Construction & Coating Fire Testing - Project Analysis, Scoping and Program Development	$119,160
Humanities & Arts	Galante, John S	Department of Education	Enhancing STEM Curriculum with Latin American and Caribbean Studies	$198,281
Global School	Doiron, Joseph	Department of State	Public Diplomacy Small Grant Program	$25,232
K-12 Outreach	Chen, Katherine C	Commonwealth of Massachusetts	Central MA STEM Network	$30,000
	Chen, Katherine C	National Science Foundation	Cultivating 2-year faculty of color with inclusive STEM teacher education in the Worcester and Central Massachusetts Region	$7,500
	Dubosarsky, Mia	Massachusetts Department of Elementary and Secondary Education	Promoting Equitable Experiential Practices in Science & Engineering (PEEPS)	$299,880
	Weaver, Shari	National Science Foundation	Cultivating university-school-community partnerships to prepare STEM undergraduates to teach in urban environments	$1,139,476
Library Services	Gold, Anna K	LYRASIS	Digital Scholarship With Purpose	$36,300
Math Sciences	Bernardi, Francesca	National Science Foundation	EAGER: Collaborative Research: Modeling Silane Spreading and Deposition for Liquid Lithography	$14,931

Dept	PI	Sponsor	Project Title	Anticipated Total Award
Math Sciences	Mangoubi, Oren Rami	National Science Foundation	CRII: AF: Optimization and sampling algorithms with provable generalization and runtime guarantees, with applications to deep learning	$174,187
	Nandram, Balgobin	National Agricultural Statistics/ Department of Agriculture (U.S.)	Bayesian Models for Cash Rents of U.S. Counties	$262,730
	Olson, Sarah D	National Institutes of Health/ NIH/DHHS	Modeling the dynamics of spindle behavior in cells with super-numerary centrosomes	$916,956
	Paffenroth, Randy C	Defense Advanced Research Projects Agency	Fata Morgana	$204,874
	Sales, Adam	Institute of Education Sciences/ Department of Education	Fully Latent Principal Stratification: A New Framework for Big, Complex Implementation Data from Education RCTs	$397,667
	Walcott, Samuel	National Institutes of Health/ NIH/DHHS	Myosin Va Cargo Transport: In Vitro Model Systems	$41,223
	Walcott, Samuel	National Institutes of Health/ NIH/DHHS	Cargo Transport by Myosin Va and Kinesin-1 Molecular Motors: In Vitro Model Systems that Build Complexity in 3-Dimensions	$213,829
	Wang, Fangfang	National Aeronautics & Space Administration	Valid time-series analyses of satellite data to obtain statistical inference about spatiotemporal trends at global scales	$174,762
Mechanical Engineering	Cote, Danielle L	ASM International	Temperature Dependent Material Flow and Thermophysical Behavior	$4,152
	Fischer, Gregory S	Boston Scientific	Motorization and Stabilization of Exalt D	$26,017
	Furlong-Vazquez, Cosme	Pratt & Whitney	rfq #1P-08936-0007	$517,442
	Jayachandran, Jagan-nath	National Science Foundation	Quantifying the Combustion Characteristics of Hydrofluorocar-bons	$410,477
	Li, Zhi	National Science Foundation	Collaborative Research: NRI: INT: Transparent and Intuitive Teleoperation Interfaces for the Future Nursing Robots and Workers	$731,329
	Liu, Yuxiang	MassVentures	Fiber Optical Moisture Sensors in Agriculture Industry: Sensor Development and Performance Testing	$15,000
	Narra, Sneha	National Aeronautics & Space Administration	A Multiscale Process-Microstructure Simulation Tool for Predict-ing Defects and Microstructure Evolution by Leveraging GPU Acceleration and Machine Learning	$0
	Powell, Adam	Department of Energy	Connecting Advanced High-Temperature X-ray and Raman Spectroscopy Structure/Dynamics Insights to High-Throughput Property Measurements	$119,958
	Powell, Adam	Department of Energy	Terves Critical Materials - Rare Earth Metal Production	$60,000
	Sabuncu, Ahmet C	Insulet Corporation	Reservoir-Sub Assembly	$29,933
	Sabuncu, Ahmet C	National Science Foundation	Quantitative Train-of-Four Monitoring Device	$50,000
	Sabuncu, Ahmet C	VentureWell	Train of Four Device	$5,000
	Wang, Yan	National Aeronautics & Space Administration	Enabling High Energy Li-on Battery Using Solid Electrolytes	$50,000
	Wang, Yan	Department of Energy	A Closed Loop Process for the End-of-Life Electric Vehicle Li-ion Batteries: Phase III	$998,090

Dept	PI	Sponsor	Project Title	Anticipated Total Award
Mechanical Engineering	Yagoobi, Jamal	Massachusetts CEC	Project Title Novel Energy-Efficient Drying Technologies for Food, Pulp and Paper, and other Energy Intensive Manufacturing Industries	$450,000
	Zheng, Yihao	Department of Veterans Affairs	Renewal of IPA Agreement with the Department of Veteran's Affairs	$24,990
	Zhong, Yu	National Energy Technology Laboratory/Department of Energy	Thermodynamic Modeling of Contaminant Interactions with SOFC Anode Materials	$400,000
	Zhong, Yu	Department of Energy	Reversible SOFC-SOEC Stacks Based on Stable Rare-Earth Nickelate Oxygen Electrodes	$78,165
Physics	Medich, David C	Nuclear Regulatory Commission	WPI Nuclear Science and Engineering (NSE) Faculty Development Program	$450,000
	Ram-Mohan, L. Ramdas	Air Force Research Laboratory	Modeling Topological Insulators and their optical properties and Phononic crystals	$118,313
	Titova, Lyubov	National Science Foundation	MRI: Acquisition of a Time-Resolved Spectrometer Spanning UV to THz Spectral Range for Investigations in Photonics, Energy, and Therapeutics	$568,262
	Titova, Lyubov	Department of the Army	Fundamental study of the charge carrier dynamics of novel 2D MXenes using terahertz spectroscopy: insight towards electromagnetic shielding applications	$270,000
	Wu, Kun-Ta	National Science Foundation	CAREER: Mixing and Vorticity Dynamics in Active Fluid Systems	$520,895
	Zekavat, Seyed	National Science Foundation	SII Planning: Broad Explorations on Spectrum Technologies for Navigation, Environment, Surveillance, and Transportation (BEST NEST)	$300,000
Robotics Engineering	Fischer, Gregory S	Massachusetts Technology Collaborative	Ventilator Project (Operating budget)	$245,690
	Fischer, Gregory S	Massachusetts Technology Collaborative	Ventilator Project (Capital budget)	$463,000
	Fischer, Gregory S	Boston Scientific	Robotic Arm Feasibility Testing for Endoscopic and Urology Applications (APPX 16)	$3,000
	Fischer, Gregory S	Boston Scientific	Robotic Arm Feasibility Testing for Endoscopic and Urology Applications & Motorization and Stabilization of Exalt D (APPX 15)	$55,536
School Of Business	Konrad, Renata	National Science Foundation	D-ISN: Track 2: Disrupting wildlife trafficking networks through convergence of physical and virtual ecosystems	$107,582
	Lingo, Elizabeth L	National Science Foundation	ImPACT IT: Increasing the Participation and AdvanCemenT of Women in Information Technology	$281,871
	Loiacono, Eleanor T	National Science Foundation	ImPACT IT: Increasing the Participation and AdvanCemenT of Women in Information Technology	$998,053
	Saberi, Sara	National Science Foundation	FMNet: A network for rapid execution for scaling production of needed designs	$120,240
	Saberi, Sara	National Science Foundation	Helpiex: Blockchain-based digital Timebank	$50,000
	Tulu, Bengisu	National Institutes of Health/ NIH/DHHS	Technology-Assisted Systems Change for Suicide Prevention (TASCS)	$319,922

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School Of Business	Tulu, Bengisu	National Institutes of Health/ NIH/DHHS	Building Habits Together: Feasibility trial of an integrated mobile and social network weight loss intervention	$233,128
SSPS	Elgert, Laureen	New America Foundation	Supporting and Showcasing PIT: Building Community through Signature Projects	$180,000
	Krueger, Robert	Intel Foundation	Innovation in e-waste materials recovering	$50,000
	Krueger, Robert	Cureatr	Improving Pharmaceutical Efficacy in Communities of Color	$20,000
	Krueger, Robert	Global Sustainable Aid Project (GSAP)	The Continuous Improvement of Microflush Toilets	$10,000
	Ottmar, Erin R	National Science Foundation	Developing Computational Thinking by Creating Multi-player Physically Active Math Games	$330,506
	Ottmar, Erin R	Psi Chi: The International Honor Society in Psychology	The Effects of Action and Self-Explanation in Worked Examples on Algebra Learning	$1,250
	Skorinko, Jeanine L	Massachusetts State Disabled Persons Protection Commission	Technology Enhanced Actions in Massachusetts Adult Protective Services (TEAM APS): Recognize, Report, and Respond (R3)	$71,623

This report, published annually by the Office of Sponsored programs, 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. We welcome your feedback on this report. Comments and suggestions can be submitted via email to Priscilla Vazquez, Research Development Specialist (pvazquez@wpi.edu).

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