



ACHIEVE

RESEARCH & GRANTS ACTIVITIES @ ROBERT MORRIS UNIVERSITY • 6th Edition Volume 2 • Spring 2021

Associate Provost's Message

Happy New Year 2021!

The Research & Grants Administration (R&GA) is pleased to share the Spring 2021 issue of the R&G Newsletter. We hope this newsletter will play an important role in showcasing research & grant activities at RMU. We also hope this newsletter will be a catalyst in initiating and pursuing research collaborations within and outside RMU.

In this issue, we feature eleven grant applications submitted by RMU faculty and staff from July to December 2020. The summaries presented here are in the Principal Investigators' or Project/Program Directors' own words. Some of these applications have been awarded and others are pending. For this period, nineteen opportunities were discussed/explored and fourteen proposals were submitted. Most grant proposals were written by our faculty and staff with support from Research & Grants Administration, and Financial Operations. As always, supporting institution data was provided by the Office of Institutional Research and Financial Aid Office.

The Research & Grants Administration encourages all faculty and staff to pursue research and participate in various research & grants related activities. The R&GA is available to help you answer questions related to grant searching, writing, budgeting, and managing. Please contact us with your questions, comments, suggestions, and concerns.

Have a wonderful Spring semester!

Sincerely,

Sushil Acharya
*Associate Provost for Research,
Global Initiatives and Development*



➤ Development of a Predictive Multiscale Model for Blast and Blunt Traumatic Brain Injury

Grant Agency: **U.S. Office of Naval Research**

Primary Institution: *University of Wisconsin-Madison*
Collaborators: *Robert Morris University, Brown University, Colorado School of Mines, University of Southern California, University of Texas-Arlington, Iowa State University, Johns Hopkins University, and Sandia National Laboratories*

There is an urgent need to develop new methods for the prevention and mitigation of traumatic brain injury (TBI), especially in the armed forces. Both blunt and blast-related TBIs can be considered a silent epidemic because the injuries often occur with no outward signs of physical trauma and may go undiagnosed. This grant supports a collaborative effort, called PANTHER, which brings together scientists from academia, industry, and federal agencies to address military-relevant traumatic brain injury. Through a synergistic multidisciplinary approach, this project aims to investigate the injury mechanisms of TBI at the cellular and subcellular level and to develop improved predictive models of both blunt and blast-induced traumatic brain injury. At Robert Morris University, we will be developing high-fidelity computational models of the head and brain that will allow us to predict the location and severity of injury following a blast or blunt trauma event. We will also be working closely with other members of the PANTHER team on the design and testing of next generation protective equipment, which will reduce the risk of brain injury.



Rika Wright Carlsen
Principal Investigator
Associate Professor of Mechanical
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Grant Proposal Activities - July to December 2020



**Grant Opportunities
Explored**



**Grant Proposals
Submitted**



Maria Kalevitch
Principal Investigator
University Professor
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Arif Sirinterlikci
Co-Principal Investigator
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Industrial and Manufacturing
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➤ **AIM Higher Consortium will advance a robust defense manufacturing ecosystem through Artificial Intelligence in Metals and Manufacturing in the Greater Pittsburgh-WV region.**

Grant Agency: **Department of Defense DMCSF**

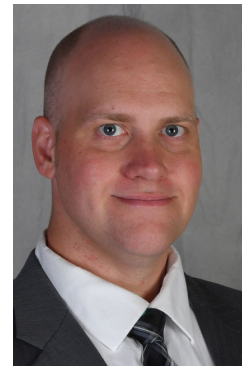
Primary Institution: AIM Higher Consortium led by Catalyst Connection

This project aims to develop a knowledge base and software tools for Design for Quality (DFQ, Quality by Design) and Design for Additive Manufacturing (DFAM) also including tooling (T) applications. These tools will help inform the defense manufacturers on quality concepts by use of design and allow them to improve their designs for high quality, reliability and costing. They will also help defense manufacturers migrate parts/products from traditional manufacturing to 3D printing and additive manufacturing (AM) or design AM parts in a more effective and efficient way. Tooling applications will also be a focus of this project in addition to relevant parts and products. A series of hands-on practically-oriented workshops will also be offered to the defense manufacturers in 3D printing and additive manufacturing, 3D scanning, and reverse engineering as well as rapid tooling.

➤ **Exploration of Laser Degating and Welding of Plastics for Commercial Opportunities**

Grant Agency: **PA Department of Community and Economic Development, Manufacturing PA Innovation Program**

This project will enhance a partnership between Robert Morris University (RMU) and MECCO (an integrator of laser marking systems) to provide the resources to jointly demonstrate the utility of lasers for plastic degating and welding to serve the needs of the plastics manufacturing industry. RMU and MECCO have been working together for three years developing the foundation to lead the domestic effort in plastic welding. With previous support from DCED, RMU and MECCO were able to design and build a portable welding system, design a universal test piece, expand on the number of plastics successfully welded, and begin to explore welding 3D printed components. This effort involved 3 faculty and 11 students, and contributed to 2 masters theses and 3 honors theses and one student has transitioned to a full time position at MECCO. The progress from this collaboration is leading to the commercial launch of a line of laser welding systems by MECCO in 2021. Through this work and conversations with customers, other opportunities for innovation were identified such as additional welding applications and utilizing lasers to degate injection molded plastic parts. MECCO will loan a CO2 laser to RMU for the degating investigation and provide other in-kind support with access to their knowledge, experience, and applications lab. With the support of the Manufacturing PA Innovation Program, RMU and MECCO will be able to involve more students in this effort and expand their ability to conduct welding and degating experiments and explore potential customers and markets for this technology.



Ben Campbell
Principal Investigator
Associate Professor of
Engineering, SEMS

> A Service-oriented Mentoring Model for Developing a Superior and Ethical Cybersecurity Workforce

Grant Agency: **National Science Foundation (NSF)**

This project is to provide scholarships and professional mentoring and support for 4 cohorts of selected students at the undergraduate Cybersecurity program at RMU. The goal of the project is to develop outstanding graduates with superior and ethical professional service qualifications to meet the needs of the cybersecurity mission for federal, state, and local governments in the U.S. The project emphasizes student success in developing cybersecurity professional and ethical service qualifications with excellence and dedication by using a comprehensive mentoring model that consists of academic mentoring, career guidance, ethical guidance, as well as extra-curricular mentoring and service learning. The project team will implement an innovative Student Recruitment Plan and Student Success Plan along with the service-oriented mentoring model for risk management to maximize the academic and professional success rates among all scholarship recipients. The learning activities and outcomes of the project are guided by the knowledge units and program criteria of the National Centers of Academic Excellence in Cyber Defense Education (CAE-CDE).



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Sushma Mishra
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> Volunteer Income Tax Assistance (VITA)

Grant Agency: **Internal Revenue Service via United Way of Southwestern Pennsylvania**

The School of Business has partnered with the United Way of Southwestern Pennsylvania to operate a volunteer income tax assistance (VITA) site for 2020 tax returns. The grant provides funding for paid internships for two students managing the overall activities of the site, and engages a group of volunteers who include students and members of the community. The program provides income tax preparations for low-income individuals and families. Staff and student interns will be trained and certified by the IRS to complete foreign student returns, military returns, and advanced individual returns.



Jacob Peng
Project Director
Associate Professor of
Accounting, SBUS

➤ Providing Remote Access to Industrial and Scientific Equipment for Engineering Technologies (PRAISE-ET)



Arif Sirinterlikci
Co-Principal Investigator
University Professor of
Industrial and Manufacturing
Engineering, SEMS

Grant Agency: **NSF Advanced Technical Education (ATE)**

Primary Institution: *Community College of Allegheny County (CCAC)*

Collaborators: *California University and Realbotics*

The proposal seeks to develop a connected platform to enable students to access RMU's automated work-cell in its Learning Factory through remote instruction, including Google Virtual Reality (VR) and cardboard features to control and jog RMU's Fanuc robots. The project partners believe this program will enable them to increase access to their target population of students seeking technical training. It will also generate a "guided pathway" to four-year institutions like RMU by exposing CCAC enrollees to some of the options and benefits of further education at a different college or university. This could come in the form of additional articulation agreements, but more importantly, it will also come in the form of exposure to faculty, researchers and resources including:

- Using some of the grant funding to enable remote access to RMU equipment, allowing collaboration between RMU and CCAC students via project-based learning.
- RMU researchers conducting one or more projects on CCAC equipment, involving CCAC students in some aspects of the experimental research or possible capstone projects.
- RMU graduate students and researchers studying the pedagogical factors behind remote technical instruction in teaching CCAC students in recorded sessions, testing a new course, or project-based learning concepts.

➤ Distance Learning and Telemedicine Grant Program

Grant Agency: **United States Department of Agriculture (USDA)**

Collaborator: *Primary Health Network (PHN)*

Community Health Workers (CHW), considered key members of the healthcare team, are trusted and respected members who reside and share the lived experience in a rural/underserved community. They are key to addressing social determinants of health, engaging individuals in their healthcare, coordinating care, and acting as the liaison between the patient and healthcare members.

"The Distance Learning and Telemedicine program helps rural residents tap into the enormous potential of modern telecommunications and the Internet for education and health care, two of the keys to economic and community development" (USDA, 2020). As such, leveraging the existing collaborative relationship between RMU and Primary Health Network (PHN), a network of 50 federally qualified health centers (FQHC), RMU department of nursing has requested funding to purchase information technology to provide rural/underserved residents access to a synchronous distance education curriculum for training CHWs. The CHW curriculum, to be developed, will adhere to PA Certification Board standards, and it will be implemented remotely, with RMU serving as the hub site, to educate community residents interested in becoming CHWs.



Terri Devereaux
Project Director
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➤ Climate Change Education: Demonstrating the Science Behind the Greenhouse Effect to Rural Communities in PA

Grant Agencies: **Department of Environmental Protection (DEP)**
Constellation E 2 Energy

Pennsylvania is one of only four states that doesn't include global warming or climate change in school curricular and has played an important role as a battleground state in national elections. This has seen proposals to amend science education curricular become increasingly politically charged. Therefore, we submitted a proposal to DEP to 1) provide experimental kits to local schools that will help science teachers cover the science behind climate change, and 2) construct a demonstration that could be taken to local events to help explain the science behind the greenhouse effect. The main demonstration (published in Buxton, G. A. (2014). *Physics Education*, 49(2), 171.) involves measuring the greenhouse effect - the increase in temperature of air containing elevated CO₂ concentrations upon the absorption of infrared radiation.



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John Michalenko
Program Director
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Office of Student Life



Sushil Acharya
Program Director
Professor of Software
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➤ The Black Male Leadership Development Institute (BMLDI)

Grant Agency: **The Heinz Endowments**

The Black Male Leadership Development Institute (BMLDI) program at RMU aims to support and encourage young African American male high school students to graduate and successfully transition to college and lead fulfilling lives of leadership, excellence, achievement, and service. This program is conducted jointly with the Urban League of Greater Pittsburgh. Since 2008, over 850 adolescent males from the Pittsburgh area have participated in the BMLDI program. As the educational achievement gap of African American young men continues to be an issue, BMLDI seeks to improve positive outcomes for African American boys by fostering leadership and networking skills, civic involvement, and academic achievement. BMLDI equips African American males with core skills necessary to be viable leaders, employees and active community participants. The program fosters an environment predicated on four important tenets: 1) Culturally centered direction is the cornerstone of sustaining and developing the African American community; 2) Working toward a common goal is an important building block for cohesion; 3) Taking action to support, build and invigorate a community is important to its societal level; 4) Promoting accountability is important for personal and organizational transformation. Together, these tenets act as the basis of the foundation of the curriculum.

The program brings in approximately 70 students from the greater Pittsburgh region and involves them in both a 7 day residency program at RMU and a yearlong Saturday institute program at the Urban League of Greater Pittsburgh.

At RMU the students are exposed to different career opportunities, and awareness about college admissions, financial aid, and the college success process. Conversations with designated faculty and student mentors also takes place to help BMLDI participants identify academic interests and career goals. In addition, the program aims to increase leadership opportunities for participants and expands their leadership skills to have an impact in their local communities. Leaders across multiple industry segments are invited to share their personal story of triumph, failure, and tenacity to motivate the participants to help aspire them to dream and execute their goals and objectives. For the 2020-21 year, conversations on racism, law enforcement, and social justice are also being introduced.

➤ **High Definition Axonal and Connective Tissue Imaging (HD-ACTI) in Porcine and Human Models of Traumatic Optic Nerve Injury**

Grant Agency: **Department of Defense -Vision Research Program**

Primary Institution: *University of Pittsburgh*

Collaborators: *Robert Morris University, Carnegie Mellon University, and Wake Forest University*

The cost of treatment and the loss of productivity from eye injuries in the military is high, around \$2.4 billion annually. Furthermore, there is a need for new diagnostic tools and treatment methods for combat ocular trauma. To address these needs, this collaborative project aims to advance our understanding of eye injuries that result from traumatic events in the military, such as from blasts, blunt trauma, and chemical trauma. Through advanced imaging and experimental techniques, the injury mechanisms of traumatic optic neuropathy (TON) will be studied, which is a condition that affects the optic nerve and can lead to long-term vision loss. At Robert Morris University, we will be developing novel experimental platforms that will allow us to simultaneously image the structure of the optic nerve while applying a mechanical load, enabling the evolution of damage to be studied. We will also develop computational models that will allow us to better understand the progression of injury. The ultimate goal of this project is to develop new non-invasive diagnostic imaging techniques that can provide evidenced-based data for return-to-action decision making in the military.



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Lisa Hernandez
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➤ **RMU's "It's On Us" Continuing Effort to Reduce/ Prevent Sex- and Gender-Based Violence**

Grant Agency: **Governor's "It's On Us" PA Grant Program**

The Title IX Office applied for and was awarded this grant in 2019, and hopes to receive funding again in 2021. The goals of this initiative are to improve awareness, prevention, reporting, and responsive systems regarding sex- and gender-based violence at RMU; to remove/reduce barriers that prevent survivors of sexual violence from reporting and accessing vital resources; and to initiate significant and sustainable positive changes to our campus culture. If the grant proposal is successful, the Title IX Office will use it to provide the following: 1) more targeted, culturally sensitive sexual harassment training to our international students; 2) a safety app for students; 3) Spring 2021 awareness programming on consent; 4) training for Title IX staff; 5) various outreach and promotional events; and 6) a partial offset of the cost of our conduct software.

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