Associate Provost's Message

The Research & Grants Administration (R&GA) is happy to share the Fall 2021 issue of the R&G Newsletter. We hope this newsletter will play an important role in showcasing research & grant activities at RMU.
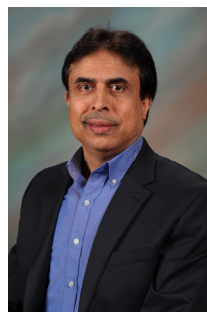
In this issue, we feature eight grant applications submitted by RMU faculty from January to June 2021. A few grant applications are not listed due to their sensitive nature. The summaries presented here are in the Principal Investigators' own words. Some of these applications have been awarded and others are pending. For this period, eighteen opportunities were discussed/explored and eleven 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.

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 great Fall semester!

Sincerely,

Sushil Acharya
Associate Provost for Research, Global Initiatives and Development

Grant Proposal Activities - January to June 2021

18
Grant Opportunities Explored

11
Grant Proposals Submitted

Reactive Approaches to Parallel Power System Restoration

Grant Agency: **Division of Civil, Mechanical and Manufacturing Innovation (CMMI) - National Science Foundation (NSF)**

The ability to quickly recover after a large-area blackout is one of the most important measurements for power system resilience. The recent Texas power crisis in February 2021 was the costliest disaster in Texas history. Damages from the blackouts were estimated at $195 billion, and at least 151 people were killed directly or indirectly. Outage costs grow rapidly as the outage duration extends to a longer time period, and this project reduces the damage by minimizing the restoration time. This project will develop computational methods to restore a large power system from the entire system blackout. A parallel power system restoration (PPSR) plan sectionalizes the entire power system into subsystems and restores the subsystems simultaneously, minimizing the overall restoration time. Each subsystem must have a black start generator which can start on itself, and must be a connected network. The restoration plan must start cranking all the non-black start generators and supply all the critical loads such as nuclear plant shutdown, traffic lights, hospitals, and police stations while keeping non-negative total capacities of the subsystems over all time periods. The PI develops reactive approaches to the PPSR problem which constructs decent restoration plans quickly responding to a large scale power outage.

Sangho Shim
Principal Investigator
Associate Professor of Industrial and Manufacturing Engineering, SEMS

WebWork Problems, Solutions, and Hints for Multi-variable Calculus

Grant Agency: **PA Goal (Pennsylvania Grants for Open and Affordable Learning)**

In an effort to make college more affordable to students, many faculty are adopting free open educational resources (OERs) to replace expensive textbooks and publisher provided homework systems. In this project Prof. Monica VanDieren will create and disseminate a new bank of mathematics exercises in WeBWorK - an OER Science Technology and Engineering and Mathematics (STEM) online homework system. Her resource will include homework, test, and discovery-based exploration problems for multivariable calculus to supplement those that are in the Active Calculus OER textbook. All problems will be designed for accessible and equitable education. Additionally, these exercises will emphasize applications to machine learning, computer vision, and structural engineering, filling a content gap in WeBWorK's open problem library.

Monica VanDieren
Principal Investigator
University Professor
of Mathematics,
SEMS

Reframing Materials: Best Practices for Inclusive and Accessible Learning in an Interdisciplinary Animation Lab

Grant Agency: **The International Animated Film Society (ASIFA) Hollywood - Animation Educators Forum (AEF)**

As media educators, we must do all we can to create safe, inclusive spaces for our students to take risks and develop as creative practitioners, with equal access to resources regardless of identity, background, accessibility needs, or prior access to media. Equity in visual media and animation in particular is not just about access to educational resources but to creative and professional outcomes. Faculty-led research and the pedagogical initiatives like EDIT Media have developed best practices for students and faculty in film production classrooms. However the unique attributes of animation pedagogy call for additional animation-specific best practices - materials and interventions that respond to the unique inclusivity and accessibility challenges of animation labs, technologies like stop-motion and projection mapping, juxtaposition of individual and collaborative practices, and wide-ranging disciplinary applications.

In Fall 2021, an undergraduate research assistant will develop self-guided exploration materials that reduce barriers to entry for participation in the animation labs, supporting students in applying these experiences in classes across the new Media Arts majors - from illustration and storyboarding to 360 degree storytelling and interactive animation - in Spring 2022. The team will also work with faculty to apply these same accessible tools and pathways tools in their own creative work, creating a student-faculty dialogue on inclusive animation practices. Finally, the fruits of those collaborations will be presented in an off-campus joint animation festival screening to share findings more widely and enhance community impact.

Tim Jones
Co-Principal Investigator
Assistant Professor of
Media Arts, SIHSS

Andrew Ames
Co-Principal Investigator
Associate Professor of
Media Arts, SIHSS

Cloud Computing and Future of the Regional Workforce Grant

Grant Agency: **Benedum Foundation**

The aim of this SEMS-led grant, funded by the Benedum Foundation, is to enhance the career perspectives of high school students by providing cloud computing and Amazon Web Services training, one of the fastest growing fields in computing. This will have an impact on future workforce development for the region. RMU faculty will provide one-on-one training and mentoring to support teachers as they progress in the online AWS Academy preparation courses and certification efforts. The faculty will also provide self-contained modules for teachers to use on a continuous basis with high school students. Through this mentorship and modeling, teachers will learn to build instructional modules and present the AWS curriculum in their high school classes. Both the teachers and their students will have an excellent opportunity to network, meet with RMU and AWS professionals, and access RMU and AWS training content.

Maria Kalevitch (Dean, SEMS; Associate Provost for Innovation and Outreach) is the Principal Investigator. Her major overarching responsibility will be to oversee the grant success by determining logistics of implementation, timeline, budget, assessment and report writing. Jameela Al-Jaroodi (Professor and Coordinator of the Software Engineering Concentration, SEMS) and Natalya Bromall (Associate Professor of Computer and Information Systems, SIHSS) being core personnel, are two senior personnel in this project overseeing the implementation details of the program. Vicki Donne (Department Head and Professor of Education in SNEHS) is the liaison and evaluator, and Cheryl Maurer (SEMS) is the project manager.

Jameela Al-Jaroodi
Core Personnel
Professor of
Software Engineering,
SEMS

Natalya Bromall
Core Personnel
Associate Professor of
Computer and Information
Systems, SIHSS

Maria Kalevitch
Principal Investigator
University Professor of
Biology, SEMS

Vicki Donne
*High School Liaison
and Evaluator*
University Professor of
Education, SNEHS

Cheryl Maurer
Project Manager
Director of Science
Laboratories, SEMS

Nathan Taylor
Principal Investigator
Assistant Professor of
Education
Multicultural education, social
studies education, gender and
sexuality studies, SNEHS

▶ Mindfulness Professional Development in a K-12 Setting

Grant Agency: **The Grable Foundation**
Primary Agency: *Cornell School District*

The mindfulness train-the-trainer professional development program will take place over an 8-week period at Cornell School District. The program will allow teachers and administrators to learn researched-based mindfulness skills and practices they can incorporate in their personal and professional lives. The training sessions will assist teachers and administrators to achieve three main goals: 1) Enhance teacher ability to handle stress in the workplace, and 2) incorporate mindfulness practices in the classroom setting to promote the academic, social and behavioral well-being of their students.

Dr. Nathan Taylor will lead the professional development program and conduct action research to understand the program's impact on teachers and administrators. The following questions will guide his research: How do program participants perceive the impact of mindfulness training on one's stress level inside and outside of work? 2. How has mindfulness affected participants teaching and classroom management strategies? 3. What impact, if any, has mindfulness practices enacted by the teacher had on students' behavior and/or academic achievement?

▶ Classroom Integration of Standards and Procedures through Curriculum Design and Development for Engineering Undergraduate Programs

Grant Agency: **National Institute of Standards and Technology (NIST)**

In this work, we will develop procedures and standards following the recommended guidelines given by NIST in courses in Engineering and Manufacturing and Testing equipment in the Engineering Laboratory that are used by Engineering students. The work produced with NIST funding will be also help the work done with our Industry partner MECCO on laser welding of plastic (thermoplastic and thermoset) materials. Procedures and standards will increase the quality of the courses taught in the Engineering Department and will help to increase the safety of the Engineering Laboratory. This experience will also help Faculty to learn more about procedures and standards that will help improve existing labs and develop new ones, as well as in their future research. Moreover, new hands-on experiences and use of standards may help the Engineering Department in its next ABET re-accreditation process. This funding will support efforts to develop and improve current standards and procedures during the academic years 2021-2022 and 2022-2023. Three Full time Faculty members are involved in this project and seven students will be offered paid internships.

Luis Monterrubio
Principal Investigator
Associate Professor of
Engineering,
SEMS

Ben Campbell
Co-Principal Investigator
Associate Professor of
Engineering,
SEMS

Sarajane Hill
Co-Principal Investigator
Lecturer of Engineering
General and Mechanical
Engineering, SEMS

► A Thermal Camera for Research, Education, and Outreach

Grant Agency: SSP College Equipment Grant Program

A proposal was submitted to the Spectroscopy Society of Pittsburgh for their college equipment grant program to request $4922.50 for the purchase of an Infrared Camera to measure temperature changes in plastics during and after laser welding. This equipment would support the ongoing collaboration between RMU and MECCO to research the process of laser welding plastics. The camera can be used by students for activities for several engineering classes, with Heat Transfer being the most obvious application. The thermal camera can also be incorporated into outreach events to show students how they look in the IR spectrum and teach about imaging outside of the visible spectrum of light. This request was not funded but will hopefully be resubmitted in early 2022.

Ben Campbell
Principal Investigator
Associate Professor of Engineering, SEMS

► Race-Conscious Caring: Leadership Ethics for Cultivating Communal Responsibility

Grant Agency: **The Spencer Foundation**
Primary Institution: *The University of Pittsburgh*
Collaborators: *Robert Morris University and the University of Illinois Urbana-Champaign*

Michael Quigley
Principal Investigator
Associate Professor of Organizational Leadership, SIHSS

Both race-consciousness and care ethics have become prominent in school leadership research and in leadership standards. Predispositions toward caring among educators are insufficient, however, because of uncritical assumptions of sameness, misplaced empathy, and the evasion of race and racism. Drawing from care ethics, Black feminism, and critical race theory, we explore the significance of race-consciousness and race-evasiveness and their relation to caring leadership. For this grant, we build upon our previous work on equity leadership. In our previous studies of K-12 school leadership work toward addressing educational inequities, we found widespread agreement on the importance of caring but broad divergence on race-consciousness and caring relations with students of color. We posit that race-conscious leaders enact genuine caring through communal responsibility built upon history, personal experience, social context, and positionality.

In this proposed project, we seek to understand more deeply how genuine caring occurs, how race-evasiveness blocks caring, how principals enact communal responsibility, and how race-conscious leaders learn from each other. We propose a three-year study with 40-50 principals in two states, starting with three-phased interviews per respondent over the first 16 months, a round of focus groups over the following eight months, and a third year of follow-up interviews and analysis. This project works at the intersection of care ethics and race-conscious leadership practice. Our project seeks a greater understanding of how caring and race-consciousness can come together. Both caring and anti-racism appear in the new leadership standards (National Policy Board for Educational Administration, 2015), but insufficient work has been done to prepare school leaders to integrate these two important aspects of practice. Lacking is an ethical theory that brings these commitments and concerns together. We are building ethical theory from interviews with leaders who are currently enacting caring and anti-racism and those who wish to be more effective but approach the work with race-evasiveness. From this project, we hope to learn how theory can help build capacity through leader preparation, professional development, and leader networking.