Message from the Director of the Office of Research & Sponsored Programs

The Office of Research and Sponsored Programs enjoyed an exceptionally successful year in serving our outstanding faculty, staff, and students for FY 2015. Our faculty and staff achieved a portfolio of new and active sponsored grants and contracts in the amount of $6,735,146. Also, the Office of Research provided internal grants and awards to the faculty in the amount of $299,467, and internal awards to students in the amount of $104,688.

Our students are successfully conducting research activities under faculty mentors where a historic high total of 154 students worked as research assistants for 61 faculty projects under the Undergraduate Research Opportunity Program (UROP). This program started in FY 2005 students with six students, and it has exponentially grown to 154 students per year in FY 2015.

We hosted the 5th Annual Student Research Conference in coordination with Graduate Programs where 79 students participated. We co-sponsored the 23rd Annual Meeting of Minds student research conference in coordination with Oakland University and UM-Dearborn where 24 students from UM-Flint participated. Kettering University has agreed to collaborate with us in the future.

We received 172 applications from faculty and students for Human Subjects Research through the e-Research system. We produced 117 posters for faculty and students who presented displays at academic conferences. We supported 30 research projects for statistical consultations with CSCR-A Ann Arbor. We supported many other educational activities, and examples include the Scholarly Writing Workshop, performances, projects, and seminars by Africana Studies; and conferences by the Center for Cognition and Neuroethics in Philosophy.

I express appreciation to everyone who has made research, innovation, and creativity at UM-Flint a glowing success.

Sincerely,  Terry W. Van Allen
Tackling Youth Concussions through Research, Education and Community Partnerships

Bara Alsalaheen, Physical Therapy

Although the numbers of concussions among high school players are staggering, adolescents lack access to comprehensive concussion management care programs. Dr. Alsalaheen explores the effects of concussion on the cognitive, balance, and visual-motor performance in adolescents, and to explore innovative ways to reduce the risks of concussions among adolescents through education and community partnerships.

Michael Babcock, Physical Therapy student, demonstrates concussion research equipment with Bara Alsalaheen.

Training of Intelligent Intrusion Detection System Using Neuro Fuzzy

Biswajit Panja, Computer Science

Intrusion detection systems, or IDS, classify computer activities into two main categories: normal and suspicious. In order to achieve the classification, Intrusion detection systems use software computing techniques including neural networks and neuro fuzzy networks to categorize network activities and specify what category of attack is being generated. Neuro-Fuzzy classifiers are used for the initial classification of the initial network traffic. Fuzzy inference systems are further used to determine whether the activity is normal or malicious. Efficient IDS systems are those capable of reducing false positives and generating high attack-detection rates.

However, fuzzy inference systems use human knowledge to create their fuzzy rule. In order to introduce a more accurate way of classifying network traffic, Dr. Panja introduces the use of Genetic Algorithms in conjunction with adaptive neuro-fuzzy inference systems. This effort will optimize data classification and obtain the best results. Genetic algorithms use a set of genetic operators such as mutation, crossover, and selection on current population to reproduce similar patterns that will be used repeatedly until a particular criterion is met.

Verbal Arts, Folklore and Literary Imagination in non-Western Pre-colonial Societies: the Evolution and Development of the Novel in African Languages

Ernest Emenyonyu, Africana Studies

Dr. Emenyonyu investigated trends in the evolution and development of literature written in African indigenous languages from its antecedents (oral performances—folklore, epics, legends, myths etc.), to the emergence of the novel. His focus was the historic emergence of OMENUKO, the first ‘African Language Novel’ (ALN) in Nigeria and possibly, West Africa. It was written in Igbo language and published in London, in 1933. The final outcome of the project was a publication entitled A Literary History of the Novel in African Languages, 1900—Present. Dr. Emenyonyu examines several questions. How did the novel in African languages evolve? How was it different from novels elsewhere? What were the trends of its development? What factors helped or impeded its development? Did it possess any linguistic or stylistic features? What made it African?
Dust Bowl Revisited
With Mike Sevick
Communication and Visual Arts

Buckham Gallery Exhibit, Fall 2014

This series of paintings – entitled “Dust Bowl Revisited” – was created during my sabbatical in the winter term of 2014. These paintings demonstrate my desire to capture, juxtapose, and share the experience of being a part of the natural world, with particular attention to nature’s vulnerability, and the emotional experience and spiritual connection between humans and the natural world, past, present, and future.

My process of making paintings involves the layering of acrylic paints (with transparent and opaque pigments) to create color and textural effects as well as implying the passing of time. It also involves seeking out a balance between creating a compelling image and capturing the emotional element. My compositions are inspired by Nature.

For me, the process of creating artworks is a way to help me put things in perspective. My hope is that it will evoke something deep within each viewer.

“I am seeking. I am striving. I am in it with all my heart.”

Vincent van Gogh
Human Subjects Research and Community Engagement

The UM-Flint Institutional Review Board provides oversight of human subjects research on the Flint campus. In addition to their regular board meetings and review of research protocols, the IRB offers an annual forum to connect with faculty, students, and local community residents. The forums address a variety of topics that involve human subjects research and research ethics, including best practices for handling confidential data with current technology, and developing mutually beneficial relationships with community members.

As an awardee of the Carnegie Classification for Community Engagement in 2010, UM-Flint demonstrates a commitment to “the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity.” For some UM-Flint faculty and community members, that partnership involves research being conducted with human subjects in and around the Flint community. In 2014, The Flint IRB and University Outreach sponsored a Community Outreach forum, highlighting the work of two research projects. “The Social Network among Flint’s Homeless Population” with Dr. Roy Barnes, and “Vehicle City Voices” with Dr. Erica Britt. The researchers and their community partners spoke on the challenges and rewards of developing a community based research project.

A model of Ethics in Community Research shows the various steps in development and implementation.

![Community-Based Research Process Diagram](image-url)
The Neighborhood Revitalization Initiative is a multidisciplinary collaboration involving university researchers, community partners, and area residents. The two-year initiative involves the UM-Flint GIS Center, UM-Flint Department of Public Health and Health Sciences, UM-Flint Department of Public Safety, Kettering University’s Computer Science and Campus Security departments, Michigan State University’s School of Criminal Justice, UM-Ann Arbor’s Michigan Youth Violence Prevention Center, University Avenue Corridor Coalition, the Flint Police, the Michigan State Police, and Hurley Hospital Security.

As part of the multi-year award from the United States Department of Justice, UM-Flint researchers are developing and implementing sustainable crime prevention strategies along Flint’s University Avenue corridor. This corridor is home to some of Flint’s largest employers but also plagued by poverty, blight, and high crime. The goal is to transform the University Avenue corridor into an attractive and crime-free community conducive to sustainable development. According to the project team, the overall strategy involves targeting law enforcement intervention, increasing community engagement, and reducing blight in the area. The project is intended to result in long-term resources that not only improve safety within the study area but are replicable and scalable to other areas of Flint.

Troy Rosencrants, Manager of the UM-Flint GIS Center, has begun analyzing existing spatial and temporal patterns of crime within the study area, constructing spatial models to verify and prioritize crime hot spots, and identifying environmental variables contributing to crime. UM-Flint’s combined GIS and Public Health expertise will be used to analyze crime patterns and offer insight into the causes behind these patterns. In addition, GIS will be used to help assess community needs and available resources, as well as to evaluate project outcomes.
Pictured from left to right: Dr. Suzanne Selig, UM-Flint Public Health and Health Sciences; Dr. Marty Kaufman, UM-Flint Geographic Information Systems Center (GISC); Troy Rosenblants, UM-Flint GIS; Ray Hall, UM-Flint Public Safety.

Photo Courtesy of William Alston, Senior in the UM-Flint Visual Arts program.
Original photography by Helen Lund, a UM-Flint senior and Layout Editor of The Michigan Times, taken outside of the Capitol Theater in Flint.
Flint Youth Media Project
Donna Ullrich
Communication and Visual Arts

Flint is enjoying an artistic rebirth; thanks in part to the growing downtown arts and business community, as well as the young adults who are finding creative ways to connect, perform and share their work.

The Flint Youth Media Project (FYMP), led by Donna Ullrich from the Communication and Visual Arts department, seeks to find and amplify the voices of youth artists (ages 13-25) in the community. Many of these aspiring artists have been creating their work on smart phones, tablets and computers, without the benefits of formal training. Their technical skills are raw and they don’t receive support in developing complementary skills such as literacy, confidence building, critical thinking and problem solving, and social networking.

So in September 2014, FYMP launched the Archway blog, http://www.thearchwayflint.org to provide these artists with a showcase for their work. This initial phase of the Flint Youth Media Project was supported by a grant from the Community Foundation of Greater Flint.

In the Spring of 2015, the project received a grant from the Ruth Mott Foundation to offer a series of free filmmaking workshops during the 2015-16 school year. The workshops will culminate in the Flint Youth Film Festival, to be hosted by the Flint Institute of Arts in August 2016. The FIA has also committed its Video Gallery for a month-long exhibition of the student productions.

The Flint Youth Media Project has long-term plans to establish summer media-making camps and an afterschool landing pad for these students. The young artists will continue to develop their technical skills, interact with their peers, receive mentoring from University students and media professionals, and showcase their work on broadcast media, the Internet, and in print.

Members of the Flint Youth Media Project, developing the Archway blog.
UM-Flint To Partner With Kettering in Fall Symposium

Building on the success of the Student Research Conference (SRC), UM-Flint will collaborate with faculty, staff, and students from Kettering University to host the first ever Flint Student Research Symposium (FSRS). This fall, FSRS (replacing SRC) will bring graduate and undergraduate students from UM-Flint and Kettering together for a day of presentations on research conducted alongside faculty mentors.

The event will take place on Friday, November 13, 2015 at the Riverfront Residence Hall and Event Center. Additional details about the event can be found at: www.umflint.edu/research/FSRS

MOM Returning to UM-Flint

After participating in the 23rd annual Meeting of Minds Undergraduate Research Conference (MOM) at the University of Michigan-Dearborn this year, UM-Flint is excited to once again host the event in 2016. Co-sponsored by UM-Flint, UM-Dearborn, and Oakland University, MOM provides a unique opportunity for hundreds of undergraduate students to present research and creative activities in a professional setting. As a charter institution, UM-Flint has played a pivotal role in the development and continuation of the event for over two decades.

The 24th annual MOM event will take place on Friday, May 13, 2016 at the Riverfront Event and Banquet center. For more information, please visit: www.umflint.edu/research/MOM
The perception of research is often stereotypically limited to the lab. But for students working on the "Peace Cranes and Peace Gardens" project, research became a transformative agent for social change.

Students Shea Draper, Jennifer Parks, Elena Woodward, Egypt Tramble and April Davis spent the year actively engaged in a UROP project evaluating the impact of Peace Cranes and Peace Gardens; an after-school program designed to strengthen children’s peace literacy. The program, sponsored by the Boys & Girls Club of Greater Flint, involved a group of children between the ages 8-12 years old who regularly participated in the program following an involved curriculum of peace studies. The project was led by Social Work professor Dr. Elizabeth Collardey.

Because the topic of children’s peace literacy is still in its formative stages, their research embraced both exploratory and descriptive goals intended to provide a detailed, highly accurate picture of the process and meanings of peace from a child’s perspective. Relying on a specific qualitative approach known as phenomenology, the students performed in-depth case studies once per week with a child with whom they were matched from the Boys & Girls Club. During these weekly sessions, the student assistants formed a mentoring relationship which including conducting one-on-one qualitative interviews with the assigned child participants about their experiences of peace. Each of the UROP students were responsible for fully recording the details of their observations and sharing those details with the rest of the team and with Dr. Collardey. The remainder of their time on the project was spent analyzing the qualitative data collected, co-authoring a scholarly article for submission and presenting their findings at events like the UM-Flint Student Research Conference.

(From left to right) UROP students Egypt Tramble, Elena Woodward, Jennifer Parks, April Davis, and Shea Draper presenting their poster at the 2015 UM-Flint Student Research Conference.
Dr. Jessica Kelts  
Assistant Professor of Chemistry/Biochemistry  
Research & Creative Activity Grant- $10,975

The Effect of Media Changes and Cell Washing on Cellular Glutathione Content and Potency of Cytotoxic Compounds

Cell culture has been used for more than a century to study human health and disease. One of its primary uses is to study the toxicity of compounds. These studies are particularly important in pharmaceutical research as toxicity is an important factor to consider in drug development. In toxicity studies, it is important that the in vitro cells mimic in vivo tissues as much as possible. To that end, the care and treatment of the cells in culture should be such that it doesn’t render the cells more or less susceptible to the toxicity of a test compound. Preliminary results from earlier research indicate that changing media and washing cells before compound treatment results in the loss of reduced glutathione (GSH) from the cells. GSH is one of the primary defense mechanisms cells possess to withstand oxidative stress. With reduced ability to handle oxidative stress, it is likely that cells will die at lower concentrations of various compounds. This may result in promising drug candidates being excluded from future studies based on data showing them to be too toxic. In reality they may not have such toxicity in cells that were not stripped of GSH. Dr. Kelts seeks to carefully quantify the amounts of GSH left in cells after washing procedures in two or three cell lines. The toxicity of a set of compounds will also be examined in the same cell lines.
Research and Creative Activity Fund Recipients

Dr. Mark Allison
Associate Professor of Computer Science
Research & Creative Activity Grant—$11,870

Automatic Control of Cyber-Physical System using Software Models

Though invisible and intangible, software systems are more complex in terms of sheer operational states than perhaps any single system built in our history. Driven by user demands and technological innovations within their operational environments, these systems are experiencing unprecedented growth in complexity and desired functionality. When required to manage complex physical systems, such as health-care systems, unmanned aerial vehicles and the electrical power distribution grid, the software assumes not only the additional complexity and constraints of the physical system it controls but also that of the gluing mechanisms. These amalgamations are termed cyber-physical systems (CPSs); engineered systems of systems based on the synergistic relationship between its computational (software) and physical (electrical/mechanical) constituent components.

Current CPSs experience a susceptibility to faults due to what is termed normal accidents, or accidents inherent within sufficiently complex systems. Driven by the economic and societal impact potential of CPSs, the growth of this engineering paradigm has challenged researchers to seek solutions whereby these systems may manage themselves under high assurance constraints by self-adaptation, with minimal human intervention. Given high level objectives the system should be capable of autonomic behavior which encompasses self-configuration, self-healing, self-optimization and self-protection. We have yet to attain sufficiently autonomic CPSs capable of taming normal accidents. One hypothesis of Dr. Allison’s research is that progress toward the goal of high assurance autonomy is hampered by approaching the problem at a too low level of abstraction. This is akin to effectively describing a psychological disorder using individualized neuron interaction; too granular.

Dr. Allison seeks to investigate the use of domain-specific models to autonomously manage CPSs. Current object-oriented development approaches are proving incapable of scaling with the complexity requirements. His position is that domain-specific models as an enabling technology, are at a sufficiently high level of abstraction as to allow for the development of fault tolerant and safe amalgamations.
Research and Creative Activity Fund Recipients

Dr. Mihai Burzo
Assistant Professor of Mechanical Engineering
Research & Creative Activity Grant-$19,542

Noninvasive Real Time Detection of Human Comfort for Increased Energy Savings in Buildings

Recent statistics indicate that over 41% of the U.S. primary energy is consumed by the buildings sector, with resident buildings accounting for 54% of this energy consumption, and the remaining 46% for commercial buildings [1]. Effective energy management in the buildings is one of the key factors impacting the overall energy consumption, and thus has important consequences on climate and the environment. The ultimate goal of Dr. Burzo’s project is to build an automatic human comfort prediction model that relies on physiological, thermal imaging, and visual signals directly collected from a building’s inhabitants, thus enabling innovative adaptive control scenarios for a built environment conditions in real time, as well as a significant reduction in building energy usage directly related to human occupancy and their desired comfort levels.

To achieve this goal, Dr. Burzo targets the following two research objectives and related activities:

(i) First, a novel dataset will be constructed, consisting of sensorial measurements of human behavior under varied comfort conditions. The change in physiological (including thermal imaging) and visual signals of the human body will be monitored for a large number of subjects, for different comfort levels in an indoor environment. A new measurement system will be built for this task consisting of thermal and visual cameras, and several physiological sensors. The environmental conditions (of room MSB 162) will be varied using a fan, a portable AC unit (with dehumidification and heating mode functions) and a room humidifier.

(ii) Second, using the dataset obtained in the first step, a model will be built to identify the relationship between human factors and environmental conditions related to comfort, and to automatically predict the level of comfort of a building inhabitant without any explicit input from the user. This human-centered comfort prediction model can enable real time and more effective control of the environmental conditions, maximizing both human comfort and energy savings.
Research and Creative Activity Fund Recipients

Dr. Seung-Jin Lee
Assistant Professor of Engineering
and Earth and Resource Science
Research & Creative Activity Grant-$15,515

Energy and Environmental Implications of Large-Scale Electric Vehicle Adoption: A Scenario-Based Life Cycle Assessment Study of the Future of Advanced Transportation in Michigan

The impacts of humanity’s intense energy use and the associated greenhouse gas emissions are one of the most pressing issues in modern society. One of the largest contributors to greenhouse gas (GHG) emissions in the United States is the transportation sector, producing 28% of the 6,526 million metric tons of carbon dioxide equivalents (CO2-equiv.) generated in the country in 2012. Transportation is the only sector whose emissions are continuing to grow. The purpose of this study is to assess the potential life-cycle energy and environmental impacts of a large-scale adoption of electric vehicles (EVs) from 2015 to 2025 in the Detroit-Ann Arbor-Flint Combined Statistical Area (CSA). These impacts will be simulated across several scenarios that incorporate factors such as improvements in the Corporate Average Fleet Economy (CAFE) standards and change in the electricity fuel mix.

Dr. Lee will use the results of the study to provide policy recommendations that might be effective at determining the environmental costs and benefits of the adoption of EVs and also incentivize the need to increase the renewable energy portion of Michigan’s electricity grid. Dr. Lee will share the results of the study with city, county and state departments including the City of Flint, Michigan Departments of Transportation and Environmental Quality. Ultimately, the overall goal is to inform transportation and energy policy, particularly in the CSA, so that efforts to develop and improve EV technology and the electricity infrastructure are done in a sustainable manner.
Dr. Charlotte Tang  
Assistant Professor of Computer Science  
Research & Creative Activity Grant-$16,025

Designing Technologies to Enhance Visitor Experiences at an Art Gallery

Dr. Tang aims to design and develop mobile applications for enhancing visitor experiences in cultural spaces such as the Flint Institute of Arts, where new multimedia devices are replacing the obsolete audio guide equipment to provide visitors richer experiences. Dr. Tang will first explore the design of the new multimedia devices with appropriate interfaces and applications for the guided tours.

Dr. Tang will further investigate the design of a mobile application that visitors can use on their smartphone. The goal is to allow visitors to easily access information of exhibits at the gallery and to communicate with others around the exhibits.
Research and Creative Activity Fund Recipients

Dr. Frank (Yu-Cheng) Liu
Assistant Professor of Mechanical Engineering
Research & Creative Activity Grant-$17,282

Investigation of Preferential Vaporization of Multi-Component Fuel Mixtures using Mid-Infrared Absorption Technique

Dr. Liu aims to develop better understanding in light absorption of fuel mixture molecules that can be used as a basis of laser diagnostics for liquid fuel combustion in the near future. A broader future research area includes ignition and combustion of complex liquid fuels, engine exhaust and intake diagnostics. The proposed project is designed to provide evidence that during liquid fuel combustion, the evaporation of multi-component liquid fuels depends greatly on each fuel component’s volatility. This issue has often been ignored in most combustion studies and analyses of practical combustion applications like engines. The importance of this problem stems from the fact that fuels are often injected into a combustion chamber in most transportation systems where fuel ignition occurs in a multi-phase (liquid/gas) situation. Although combustion is mainly a gas phase phenomenon, the fuel vapor concentration could well be controlled by liquid evaporation during liquid combustion. A concentration measurement that is nonintrusive to the combustion system, e.g. light absorption measurement using monochromatic wavelength of light or laser, would be very suitable for this situation.

The short-term objective of this project includes the following three main categories:
1) assessing the viability of nonintrusive concentration measurement for multi-component liquid and vapor fuel mixtures using Fourier transform infrared spectroscopy (FTIR)
2) using the developed concentration detection technique to perform measurements for fuel systems that are more relevant to transportation fuels
3) identifying laser sources and particular wavelength of light from the FTIR spectra that are useful for the concentration detection during real fuel evaporation and combustion.
The fuel mixture of interest is the simple surrogate fuel of gasoline (n-heptane, iso-octane,
Research and Creative Activity Fund Recipients

Dr. Zahid Syed
Assistant Professor of Computer Science
Research & Creative Activity Grant- $17,022

Towards a Robust Touch-Based Authentication System

A Touch-Based Authentication (TBA) system uses the touch gestures executed by a user on a touchscreen device to distinguish between the genuine user and an imposter. Dr. Syed's goal is to determine best practices when designing and implementing a robust TBA system. Using an existing dataset, he will determine what effect the user's growing familiarity with a touchscreen based application has on the TBA system's authentication accuracy. Dr. Syed will then use these experimental results to develop 'best practice' strategies for more robust TBA systems.

Additionally, there are certain data pre-processing techniques that are commonly used in developing TBA systems. Since this field is in its infancy, no empirical evidence exists to suggest which techniques are most helpful and which can be safely discarded. Dr. Syed plans to address this issue through an empirical analysis of the contribution of certain pre-processing techniques.

The project is primarily composed of software development and empirical testing and Dr. Syed will use a dataset that he collected previously. He will lead the management of the empirical test setup, software development and data interpretation. Dr. Syed's student researchers will learn each of these skills and actively participate in formulating the test setup, developing the code and planning the next step after every research question is answered.
Research and Creative Activity Fund Recipients

Dr. Ming Li
Assistant Professor of Mechanical Engineering
Research & Creative Activity Grant-$17,620

On-Line Tool Wear Estimation for Milling Titanium Components Using Unsupervised Neural Network

Titanium and its alloys have been widely utilized for aerospace, automotive and biomedical parts due to their high strength-to-mass ratio, high corrosion resistance, and exceptional resistance to high temperature. However, the machinability of titanium and its alloys is extremely poor, and the high strength of titanium leads to rapid tool wear. Thus, it is necessary to monitor the tool wear conditions while machining titanium.

On line tool wear estimation is critical in the context of automated metal-cutting manufacturing processes. The state of tool conditions is an important factor affecting product quality. Worn tool usage can cause tool breakage and unscheduled downtime. Accurate estimation of tool wear can optimize the replacement of worn tools in order to reduce costs without lowering product quality.

Various methods have been proposed to evaluate the wear levels of tools during the cutting process. The challenge with these methods is the signal-to-noise ratio is extremely low when sensory signals are harnessed while cutting tools are engaged in machining processes. To solve this problem, multiple sensors can be deployed to collect signals from disparate sources that can reflect the tool condition change. Usually, sensory signals of cutting force, spindle torques and acoustic emission are collected and analyzed to estimated tool wear conditions. However, since these signals are indirect representation of tool wear, the estimation based on these sensory data is not accurate.

In this project, Dr. Li proposes a semi-direct method to improve the accuracy of tool wear estimation. In addition to the aforementioned indirect sensory signals, the infrared image of the tool will be integrated to evaluate tool wear conditions. The infrared image can record the temperature of tools during the machining process, while temperature is a key factor indicating the wear rate. Information of tool tip temperature will be a completion of sensory information that represents the tool wear.

The purpose of Dr. Li’s project is to improve the accuracy of tool wear estimation during machining processes. The objective of her project is to develop better understanding of the relationship between tool wear and process parameters, so that they can be used for on line tool wear estimation.
Research and Creative Activity Fund Recipients

Andrew Morton
Lecturer, Theatre and Dance
Research & Creative Activity Grant-$6,833

Theatre for Young Audiences Play Development Project

The Theatre for Young Audiences Play Development Project is an opportunity for Andrew Morton to contribute to the field of Theatre for Young Audiences by researching and developing a new script inspired by the use of Superhero and Comic Book Therapy with young people living in care.

Mr. Morton’s approach to the project is straightforward. With the support of an Undergraduate Research Assistant, he will begin researching the growing trend of using superhero and comic book characters as part of a psychological treatment for young people living in care who have experienced abuse and/or trauma. The preliminary research will include reviewing already existing literature documenting this practice, and conducting interviews with nationally recognized experts in this field, local experts at the Whaley Children’s Center, and colleagues from other departments at UM-Flint (Social Work, Psychology, etc). Once the preliminary research is completed, the material he gathers will help inspire the fictional story of the play.

Andrew will develop an initial draft of the script, and share aspects of the "work in progress" at a national convening for TYA professionals. Once he completes the first draft of the script, the play will then go through a development workshop at Flint Youth Theatre, where Mr. Morton is currently employed as Artist-in-Residence.
Research and Creative Activity Fund Recipients

Dr. Matthew Fhaner
Assistant Professor, Chemistry and Biochemistry
Research & Creative Activity Grant-$18,226

Synthesis and Characterization of Novel Materials for Energy Storage and Conversion

Material synthesis and characterization covers a wide array of fields within many aspects of science. Synthesis of new materials is pivotal in the advancement of modern technology, just as rechargeable batteries have paved the road for our current portable society[6]. Discovering new materials is required in furthering all aspects of science such as energy storage, drug delivery methodology, building materials or just for novel research applications.

Dr. Fhaner’s work centers around two main projects. However, both will involve optimizing currently used rechargeable battery platforms. A rechargeable battery consists of four major parts; the cathode and anode (positive and negative terminal, the electrolyte (allows ions to flow) and the separator (physical barrier to keep positive and negative terminal from interacting and causing a short circuit). Dr. Fhaner will focus on the synthesis of new cathodes and solid electrolytes for lithium and sodium ion batteries. Current cathode materials experience a breakdown in the physical structure with cycling (charging and discharging cycles). In fact, some current lithium batteries only can be cycled at 50% of its theoretical capacity for roughly 300 cycles[6]. The goal of Dr. Fhaner’s work is to create different chemistry structures, also known as lattices, in order to find new cost effective ways to synthesize cathode materials with a 10-fold increase in life time to allow for cycling over 3000 times at 99% of its theoretical capacity. This has been seen in a type of lattice known as a “olivine” structure[7-10].

Dr. Fhaner is also interested in finding new solid electrolyte materials for use in rechargeable batteries. Cathode materials should have high electrical conductivity; which basically means it should allow current to flow freely. This is not the case for solid electrolytes. Solid electrolytes should not let electrons (current) flow, but should allow ions (individual atoms/molecules with a negative or positive charge) to flow across the material. An example of a common material is Li7La3Zr2O12[11]. However, the problem with this material is that the lithium (Li) becomes very mobile and turns to gas at the high temperatures required to synthesize the material which causes the material to have different properties than predicted based on its structure. This part of Dr. Fhaner’s research will the blend well with the cathode project, for optimization of the overall battery.
Research and Creative Activity Fund Recipients

Dr. Jill Slater
Lecturer in Biology
Bryer Research Fund-$10,000

The Role of MicroRNA 187 in Neuroendocrine Tumor Growth and Metastasis

Neuroendocrine tumors of the small intestine (SI-NETs) are a slow-growing, rare malignancy. The slow proliferation rate means that these cells are able to avoid detection by standard chemotherapy and radiation treatments, leaving surgery as the only curative option. However, because the symptoms they generate are very similar to those of other gastrointestinal issues, they are frequently diagnosed well after metastasis, decreasing the likelihood of cure by surgery.

The aim of much research on SI-NETs to this point has been to identify key mutations which cause them. That has proved fruitless, underscoring the need for basic science on these tumor types. Dr. Slater will look at an epigenetic aberration in SI-NETs which has been noted in the literature but not pursued, a decrease in a micro RNA which influences the amount of the protein, Dab2, which exists in the tumor cells. Dab2 has previously been shown to slow cell proliferation, and to be necessary in the initial stages of metastasis. Because these are the two most prevalent characteristics of SI-NETs – slow growth and early metastasis – it is possible that a dysregulated micro RNA/Dab2 axis may play a role in disease progression.
Bryer Research Fund Recipients

Dr. Joe Sucic
Professor of Biology and Program Director
Bryer Research Fund- $8,162

Environmental Stress As A Trigger For Metastasis in Breast Cancer Cells

Cancer is a disease characterized by uncontrolled cell proliferation and the ability of these cells to invade other tissues in the body. The latter characteristic is referred to as metastasis, and is usually the gravest threat to cancer patients. While much has been discovered about the causes of uncontrolled cell proliferation, relatively little is known about the underlying causes of metastasis. Dr. Sucic has proposed the novel hypothesis that metastasis is the result of cells within a tumor trying to escape stressful environmental conditions present in the tumor. These conditions include elevated temperature and low oxygen levels, which result from the high metabolic activity of cells in the tumor. Much of Dr. Sucic’s prior and current research supports this hypothesis. However, these results have primarily been generated with one type of breast cancer cell and are still rather preliminary.

Dr. Sucic is proposing to expand these studies with three specific objectives. First, he and his team plan to expand the experimentation he has done into another type of breast cancer cell. Second, they plan to examine the activity of a key mediator of breast cancer metastasis called MMP9 in cells placed under stress conditions. Third, the team plans to examine the production of important regulatory molecules called micro-RNAs (miRNAs) in cells placed under stress conditions; they will examine 9 different miRNAs that have been implicated in breast cancer metastasis. If the results support their hypothesis about metastasis, Dr. Sucic and his team could provide significant insight into a major biomedical problem and also open up new avenues for cancer diagnosis and treatment.

The Ben F. Bryer Foundation Medical Research Fund was established by the family of Ben F. Bryer to encourage and support the medical research endeavors of University of Michigan-Flint faculty. Special gratitude is extended to Dr. Bryer’s sister and foundation trustee, Bess Hurand, and her husband Arthur for making this fund possible.

Dr. Bryer graduated from Flint Central High in 1930 before receiving a medical degree from the University of Pittsburgh. His post graduate studies were interrupted when Dr. Bryer joined the United States Army as a surgeon during World War II eventually becoming the Lieutenant Colonel M.C. with stations in Texas and China. Upon returning to the United States in 1946, Dr. Bryer continued his study of surgery specializing in abdominal and gastro-intestinal procedures.
Bryer Research Fund Recipients

Dr. Gergana Kodjebacheva
Assistant Professor of Health Administration
Bryer Research Fund-$10,000

Socio-Demographic and Geographic Disparities in Cancer Incidence, Mortality, and Preventive Measures among Children and Adolescents in Michigan

Michigan has one of the highest rates of cancer incidence in the U.S. It has a cancer incidence rate of 481.3/100,000 while the U.S. has an incidence rate of 459.8/100,000. The CDC states that research is needed to assess geographic and ethnic disparities in childhood cancer rates. Dr. Kodjebacheva’s proposal to investigate health disparities in pediatric cancer helps fill several gaps. Her study is the first social epidemiological investigation to comprehensively assess socio-demographic and geographic disparities in pediatric cancer incidence and mortality in Michigan. It is also the first social epidemiological investigation to assess disparities in the receipt of 3 doses of the HPV vaccine among adolescent girls, which is an important cancer prevention measure. In Michigan, only 30% of girls receive the HPV vaccine, which is much lower than the Healthy People 2020 objective of 80%. The study thus has the following objectives:


2. To assess yearly changes/trends in socio-demographic and geographic disparities in cancer incidence and mortality over the years, between 1999-20 II among children and adolescents in Michigan;

3. To assess socio-demographic and geographic disparities in the incidence and mortality rates for 12 types of cancers in children and adolescents in Michigan

4. To access socio-demographic and geographic disparities in the receipt of 3 doses of the HPV vaccine among adolescent girls in Michigan

5. Based on information collected from Objectives 1-4, identify the geographic areas in greatest need for interventions as well as the socio-demographic groups in greatest need for receiving culturally tailored interventions to prevent and manage cancer.
Cancer and its treatment can cause diverse complications affecting body functions leading to long-term disabilities. Cancer has been recognized as a chronic condition of older adults. With the advances in medical care, people are increasingly living longer after the cancer treatments. The number of cancer survivors aged 65 years and over is projected to reach 19 million by 2024. The healthcare need to optimize functional independence and quality of life in older cancer survivors cannot be overlooked.

Dr. Huang and Dr. Blackwood will investigate the burden of cancer on an older person's quality of life, difficulty with daily tasks, problems in balance, walking, and falls. Their objectives are to (1) Examine the impact of a diagnosis of cancer on related quality of life, self-reported functional problems and history of falls in older adults aged 65 years and over enrolled in the Medicare Advantage plan, (2) Examine the relationship between patient- and cancer-specific clinical characteristics, physical and mental health domains of quality of life, functional problems, and falls after a cancer diagnosis, and (3) Develop an evidence-based treatment algorithm to optimize the quality of life and physical functioning in older cancer survivors.

Dr. Huang and Dr. Blackwood will analyze the data relevant to quality of life, activities of daily living, and fall risk management in survivors before and after a cancer diagnosis (cancer group) in comparison with the data in older adults without a cancer diagnosis (control group). The data will be obtained from the Surveillance, Epidemiology and End Results (SEER) and Medicare Health Outcomes Survey (MHOS) linkage database provided by the National Cancer Institute.

Their project will directly contribute to UM-Flint students' learning outcomes through research exploration. It will also inform older cancer survivors and practicing clinicians living in the Flint communities and beyond about the evidence-based strategies to improve quality of life, functional independence, and reduce fall risks after a cancer diagnosis. More specifically, findings from their study will guide clinicians in identifying cancer survivors at risk of declines in quality of life and physical functioning, and initiating early interventions to reduce the cost of care and long-term complications associated with cancer.
University of Michigan-Flint Internationally Sponsored Programs Active and Awarded in Fiscal Year 2015 by Project Director

University of Michigan Flint International Center Proposal FY 2014 - FY 2016
Project Director: Daniel Adams, International Center
Sponsor: Charles Stewart Mott Foundation, $80,559

An Exploration of Inhibitors to Educational Access and Retention within Michigan Underrepresented Groups STEM Higher Education
Project Director: Mark Allison, Computer Science
Sponsor: Michigan Campus Compact/Michigan Nonprofit Association, $5,000

Clinical Simulation Center at the University of Michigan-Flint
Project Director: Margaret Andrews, Nursing
Sponsor: A.G. Bishop Trust, $15,000

University of Michigan-Flint/Hurley Medical Center Operating Agreement
Project Director: Margaret Andrews, Nursing
Sponsor: Hurley Medical Center, $231,094

2015-16 Nursing State of MI Scholarships
Project Director: Margaret Andrews, Nursing
Sponsor: State of Michigan, Department of Licensing and Regulatory Affairs, $6,145

Clinical Simulation Center at the University of Michigan-Flint
Project Director: Margaret Andrews, Nursing
Sponsor: Community Foundation of Greater Flint, $50,000

UMF Nursing State of MI scholarships
Project Director: Margaret Andrews, Nursing
Sponsor: State of Michigan, Department of Licensing and Regulatory Affairs, $5,827

Smart Teachers as Role Models STARS Year 7
Project Director: Robert Barnett, School of Education and Human Services
Sponsor: Mott Community College, $13,955

Christopher Paul Curtis Writing Adventure 2015 CFGF
Project Director: Robert Barnett, School of Education and Human Services
Sponsor: Community Foundation of Greater Flint, $6,000

Loeb Charitable Trust 2015 Christopher Paul Curtis Writing Adventure
Project Director: Robert Barnett, School of Education and Human Services
Sponsor: Frederick and Stella Loeb Charitable Trust, $4,000

Smart Teachers as Role Models STAR Year 8
Project Director: Robert Barnett, School of Education and Human Services
Sponsor: Mott Community College, $17,306

Art-Inspiration and Collaboration
Project Director: Della Becker-Cornell, Early Childhood Development Center
Sponsor: Target Corporation, $143
University of Michigan-Flint Externally Sponsored Programs
Active and Awarded in Fiscal Year 2015 by Project Director

Great Start Readiness UM Flint 13-14
Project Director: Della Becker-Cornell, Early Childhood Development Center
Sponsor: Genesee Intermediate School District, $28,178

The University of Michigan - Flint Expanding Access at the Early Childhood Development Center
Project Director: Della Becker-Cornell, Early Childhood Development Center
Sponsor: Department of Education, $179,508

Great Start Readiness UM Flint 14-15
Project Director: Della Becker-Cornell, Early Childhood Development Center
Sponsor: Genesee Intermediate School District, $313,200

Great Start Readiness UM Flint Summer 14
Project Director: Della Becker-Cornell, Early Childhood Development Center
Sponsor: Genesee Intermediate School District, $38,500

College Entrepreneurship Program Year Six
Project Director: Jacob Blumner, University Outreach
Sponsor: Charles Stewart Mott Foundation, $2,434

Fixed Price: Kawkawlin Education Project
Project Director: Jacob Blumner, University Outreach
Sponsor: Little Forks Conservancy, $33,064

Continuation of a Flint Hub for K-12 Place-Based Education 2013-2015
Project Director: Jacob Blumner, University Outreach
Sponsor: Great Lakes Fishery Trust, $80,774

Service Portfolio Project, Oakland County Parks
Project Director: Jacob Blumner, University Outreach
Sponsor: County of Oakland, $21,763

Alternative Spring Break 2015
Project Director: Jacob Blumner, University Outreach
Sponsor: Community Foundation of Greater Flint, $3,000

CFGF National Service Fund Grant 2014-2015 AmeriCorps Support
Project Director: Jacob Blumner, University Outreach
Sponsor: Community Foundation of Greater Flint, $10,840

College Entrepreneurship Program Year Seven
Project Director: Jacob Blumner, University Outreach
Sponsor: Charles Stewart Mott Foundation, $65,000

Global Youth Service Day; Neff Center/Beecher Middle-High School Project
Project Director: Jacob Blumner, University Outreach
Sponsor: Michigan Campus Compact/Michigan Nonprofit Association, $500
University of Michigan-Flint Externally Sponsored Programs
Active and Awarded in Fiscal Year 2015 by Project Director

GLSI Incentive Grant - Next Generation Strategy 2014
Project Director: Jacob Blumner, University Outreach
Sponsor: Great Lakes Fishery Trust, $15,922

FIRST Robotics Team at Genesee Early College
Project Director: Mihai Burzo, Mechanical Engineering
Sponsor: James A. Welch Foundation, $10,000

III:EAGER: Physio-linguistic Models of Deception Detection
Project Director: Mihai Burzo, Mechanical Engineering
Sponsor: National Science Foundation, $188,864

NCIN 2013 UMFlinn
Project Director: Melva Craft-Blackshear, Nursing
Sponsor: Robert Wood Johnson Foundation, $5,523

UMF Nursing RWJF NCIN PIP 2013
Project Director: Melva Craft-Blackshear, Nursing
Sponsor: American Association of Colleges of Nursing, $4,237

UMF Nursing RWJF NCIN PIP 2014
Project Director: Melva Craft-Blackshear, Nursing
Sponsor: Robert Wood Johnson Foundation, $50,000

NCIN PIP Funds 2014
Project Director: Melva Craft-Blackshear, Nursing
Sponsor: Robert Wood Johnson Foundation, $5,000

Flint Nursing Faculty Loan Program 2014
Project Director: Constance Creech, Nursing
Sponsor: Department of Health and Human Services-Health Resources and Services Administration, $171,720

Graduate Nursing Scholarships for Disadvantaged Students (SDS)
Project Director: Constance Creech, Nursing
Sponsor: Department of Health and Human Services-Health Resources and Services Administration, $220,905

Increasing the Supply of Adult Primary Care Nurse Practitioners: an accelerated two year online Masters of Science in Nursing program at the University of Michigan-Flint
Project Director: Constance Creech, Nursing
Sponsor: Department of Health and Human Services-Health Resources and Services Administration, $288,934

Strengthen Care to Underserved Populations (UM-FISCUP) via Enhancement of Advanced Nursing Education and Practice
Project Director: Constance Creech, Nursing
Sponsor: Department of Health and Human Services-Health Resources and Services Administration, $142,747

Flint Jonas Nursing Scholars
Project Director: Constance Creech, Nursing
Sponsor: Jonas Center for Nursing Excellence, $40,000
University of Michigan-Flint Externally Sponsored Programs
Active and Awarded in Fiscal Year 2015 by Project Director

Flint Nursing Faculty Loan Program 2015
Project Director: Constance Creech, Nursing
Sponsor: Department of Health and Human Services-Health Resources and Services Admin-
istration, $328,020

UM-Flint AENT 2014
Project Director: Constance Creech, Nursing
Sponsor: Department of Health and Human Services-Health Resources and Services Admin-
istration, $333,924

PT Heart 2014
Project Directors: James Creps, Physical Therapy with Shandowny Parker, Public Health and
Health Sciences
Sponsor: Ruth Mott Foundation, $30,710

Opera-tunities! UM-Flint Opera Outreach Program
Project Director: Brian Di Blassio, Music
Sponsor: Greater Flint Arts Council, $2,720

2015 Nurse Anesthetist Traineeship
Project Director: Shawn Fryzel, Public Health and Health Sciences
Sponsor: Department of Health and Human Services-Health Resources and Services Admin-
istration, $17,155

The Geometry of Quasar Outflows
Project Director: Rajib Ganguly, Physics
Sponsor: Space Telescope Science Institute, $5,039

African/African-Diaspora Artist Series 2014
Project Director: Gulumu Gemedu, Africana Studies
Sponsor: Flint Public Library, $7,607

MCOLES-LED Fall 14
Project Director: Raymond Hall, Public Safety
Sponsor: Michigan State Police, $1,679

OHSP Traffic Enforcement-2015
Project Director: Raymond Hall, Public Safety
Sponsor: Flint Township Police, $17,954

Feral Swine Ecology and Control
Project Director: Karmen Hollis-Etter, Biology
Sponsor: Michigan State University, $171,812

The University of Michigan-Flint Accelerated Bachelor of Science in Nursing Program
for Veterans 2014
Project Director: Beverly Jones, Nursing
Sponsor: Department of Health and Human Services-Health Resources and Services Admin-
istration, $1,035,057
University of Michigan-Flint Externally Sponsored Programs
Active and Awarded in Fiscal Year 2015 by Project Director

Urban Alternatives House Consumers' Energy Portion
Project Director: Martin Kaufman, Earth and Resource Science
Sponsor: Consumers Energy Company, $5,092

Building Neighborhood Capacity Program
Project Director: Martin Kaufman, Earth and Resource Science
Sponsor: Metro Community Development, $200

CRIM Fitness Foundation Mapping
Project Director: Martin Kaufman, Earth and Resource Science
Sponsor: Crim Fitness Foundation, $500

Flint’s University Avenue Corridor Coalition (UACC)
Project Directors: Martin Kaufman, Earth and Resource Science, with Suzanne Selig Public Health and Health Sciences
Sponsor: Kettering University, $98,800

GIS Needs Study
Project Director: Martin Kaufman, Earth and Resource Science
Sponsor: Washtenaw County Road Commission, $4,248

Nursing Workforce Diversity UM-FIND
Project Director: Linda Knecht, Nursing
Sponsor: Department of Health and Human Services-Health Resources and Services Administration, $72,808

Sickle Cell Disease Patient Adherence Research Project
Project Director: Gergana Kodjebacheva, Public Health and Health Sciences
Sponsor: Hurley Medical Center, $3,918

Access Program-Year 3
Project Director: Vahid Lotfi, Educational Opportunity Initiative
Sponsor: State of Michigan Strategic Fund, $21,190

Committed to Excellence and Opportunity CEO 2014-2015
Project Director: Vahid Lotfi, Educational Opportunity Initiative
Sponsor: Charles Stewart Mott Foundation, $233,512

Gear Up 13/14
Project Director: Vahid Lotfi, Educational Opportunity Initiative
Sponsor: State of Michigan Strategic Fund, $16,011

Transitions Program-13/14
Project Director: Vahid Lotfi, Educational Opportunity Initiative
Sponsor: State of Michigan Strategic Fund, $44,218

Access Program-Year 4
Project Director: Vahid Lotfi, Educational Opportunity Initiative
Sponsor: State of Michigan Strategic Fund, $44,218

Gear Up Year 4 (14/15)
Project Director: Vahid Lotfi, Education Opportunity Initiative
Sponsor: State of Michigan Strategic Fund, $40,315
Super Science Friday 2015 Loeb
Project Director: Vahid Lotfi, Office of the Associate Provost and Graduate Programs
Sponsor: Frederick and Stella Loeb Charitable Trust, $6,000

Super Science Friday 2015- Nartel
Project Director: Vahid Lotfi, Office of the Associate Provost and Graduate Programs
Sponsor: Werner Nartel Memorial, $10,000

Transition Program-Year 4
Project Director: Vahid Lotfi, Office of the Associate Provost and Graduate Programs
Sponsor: State of Michigan Strategic Fund, $102,700

Point Defect Reduction in Far Infrared Materials
Project Director: Christopher Pearson, Physics
Sponsor: Department of Defense, $28,905

Step Up, Speak Out– Peer Educators
Project Director: Michelle Rosinsky, Office of the Vice Chancellor for Student Affairs
Sponsor: Avon Foundation, $5,000

Examining Disparities in Food Access and Enhancing the Food Security of Underserved Populations in Michigan
Project Director: Greg Rybarczyk, Earth and Resource Science
Sponsor: Department of Agriculture, $30,901

UM-Flint FOSTERing Success
Project Director: Mary Jo Sekelsky, Office of the Vice Chancellor for Student Affairs
Sponsor: State of Michigan, Department of Human Services, $169,613

Flint HCOP
Project Director: Suzanne Selig, Public Health and Health Science
Sponsor: Department of Health and Human Services-Health Resources and Services Administration, $890,417

HCOP Supplemental 2014-15
Project Director: Suzanne Selig, Public Health and Health Science
Sponsor: Department of Health and Human Services-Health Resources and Services Administration, $470,445

Curiosity Academy
Project Director: Jessica Tischler, Chemistry
Sponsor: James A. Welch Foundation, $10,000

Flint Youth Media Blog
Project Director: Donna Ullrich, Communication and Visual Arts
Sponsor: Community Foundation of Greater Flint, $5,000

Scholarships and Initiatives for MA Arts Administration
Project Director: Cristen Velliky, Communication and Visual Arts
Sponsor: Ruth Mott Foundation, $7,635
Office of Research and Sponsored Programs
By the Numbers
FY 2015

Sponsored Grants and Contracts FY 2015
• New and Active External Awards: 73
• Total Awards Portfolio: $6,735,146

Internal Awards for FY 2015
  Faculty: $299,467
  Students: $8,141
  UROP (students): $96,547

Application and Proposal Development
• Funding Opportunity Announcements: 389

Research Regulatory Management
• Human Subjects Research Applications submitted: 172

Statistical Consultations
• Consultations with CSCAR: 30

Student Research Conferences
• SRC number of Student Presenters: 79
  (undergraduate and graduate students)
• Meeting of Minds number of Student Presenters: 24 (representing UM-Flint)

Undergraduate Research Opportunity Program (UROP)
• Number of Student Participants: 154
• Number of Faculty Projects: 61

Research Support
• Posters Printed: 117
• Internal Programs: 41 events and workshops serving 218 individuals