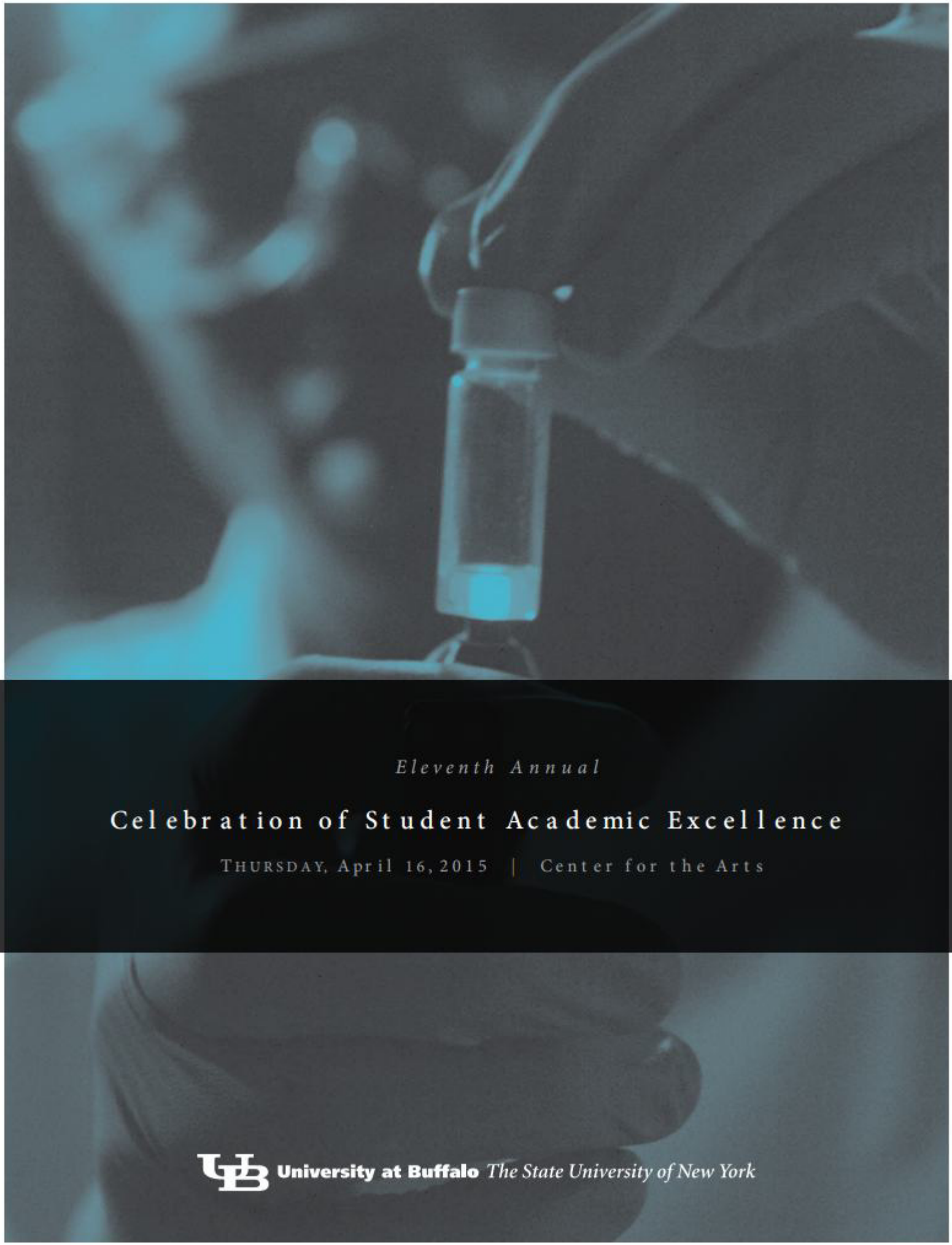

Eleventh Annual

Celebration of Student Academic Excellence

THURSDAY, April 16, 2015 | Center for the Arts

University at Buffalo *The State University of New York*

Eleventh Annual

Celebration of Student Academic Excellence

Thursday, April 16, 2015 | Center for the Arts

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KEY

C = CURCA Funded Project
(Center for Undergraduate Research & Creative Activities)

S = Member of CSTEP
(Collegiate Science & Technology Entry Program)

H = Member of Honors College

L = Member of LSAMP
(Louis Stokes Alliance for Minority Participation)

M = Member of McNair Scholars Program

S = Sustainable Project
(*Description on page 47)

School of Architecture & Planning

Students
Storm Armstrong, Garrett Herbst, Thomas Mason

Major
Architecture

Research Mentor
Sean Burkholder

Title
AYA Monteverde Rope Green Wall

Abstract
The concept of this prototype was a mandatory fixation to a chain-link fence, much like the ones found on AyA tanks around Monteverde. This tactic inspired the use of a light, cheap, and flexible material. Rope was selected for just this purpose. The general thesis for the design is to create a pattern of density with the rope along the front facade of the structure to push the growth back onto and around the chain-link fence. We also expect the rope to absorb water and either provide more vertical growth or collect moss and seeding as the season continues.

Student
Kun Chen

Major
Architecture

Research Mentor
Brian Carter

Title
Slim Fit: mini-house design with shipping container

Abstract
There are approximately 30 million shipping containers in existence and many of them in buffalo are empty and rusting away in their abundance. The concept of this design was using two shipping container to develop an inhabitable mini house. The design sit on a site that is 10'X100' (according to Buffalo district zoning), which ordinary house can's build on it. By reusing this valueless land, the design can save dramatically on land (3K only). Also, using cargo container will save money on construction and material fee.

Eventually, the idea of my design is combining both unvalued properties exist in buffalo to build not only valuable real estate, but also comfortable space for community. This idea is important, especially to myself, as architect to think how to use our intelligence to solve social problem.

Students
Kun Chen, Brandon Small

Major
Architecture

Research Mentor
Annette Lecuyer

Title
Liquid Light

Abstract
Concept: The urban strategy is shaped by natural light at the times of the day when people are most active: leaving home in the morning, lunch-time and returning home in the evening. This light organizes the scheme into into nine 'grounded' towers of dwellings, which range from 1 to 8 stories, and 2 'hanging' towers of gardens, all of which are linked by glazed corridors on three levels only. This allows the natural sunlight to pierce through the site to Allen Street, which is an active pedestrian street. The towers are ambiguous in scale, registering both as large monoliths and as a miniature city.

Program: The cluster of towers - which are situated around the perimeter of the site and occupied by small shops and cafes at ground level - define a public plaza dedicated to play. During the summer, programmable water jets that mark the lines of light penetrating the site, make a splash pad/urban lida. During the winter, the plaza is flooded, freezes and becomes an outdoor ice skating rink that is illuminated by lines of lights strung between the towers.

Students
John Costello, Ryan Hughes

Major
Architecture

Research Mentor
Erkin Özay

Title
house2o

Abstract
Hous2o addresses the particular social, urban and ecological conditions of Buffalo, through the creation of a year round oasis.

.socially. providing varied residencies for the diverse domographic of allentown and the surrounding neighborhoods

.urbanistically. by connecting to and enhancing Buffalo's rich heritage of the Olmstead Park System

.ecologically. facilitating a healthier relationship with the greatlakes
a housing system that aims to react to the both the diverse range of residents in the Allentown area, as well as the pre-existing Olmsted Park System.

This is achieved through the inclusion of a public green space and bath at the ground level, which is paired with a flexible residential system above. Here, the residential form is derived though a series of bands and module sizes to create a range of units both in size, and quality of space. The mixed aggregation of unit types aims to create a socioeconomic mixing of residents within the massing. This mixing becomes a reflection of the social interaction happening at the ground plane below.

Students
Daniel Crowther, Sean Flury

Major
Environmental Design

Research Mentor
Kerry Traynor

Title
Apartment Buildings in Buffalo, NY: A Social and Historical Context

Abstract
Apartment buildings have been an important part of Buffalo's residential scene since the late 1800's. Never were they so important however as between the years 1880-1920, when social and economic forces shaped a unique architectural climate in Buffalo. The 1901 Pan American Exposition was an important influence on the development of this building type at the turn of the twentieth century and contributed to increased popularity and further cultivation of its architectural language. The purpose of this study is to photographically document the existing apartment buildings dating to this time period, map them in context within the city of Buffalo, and provide an analysis of the social and economic forces that shaped the buildings, as well as the architectural typologies that affected their appearance and form.

Student
Matthew Dellehunt

Major
Architecture

Research Mentor
Brian Carter

Title
Compact Living

Abstract
Winning Competition Entry - Buffalo Home Show

BUFFALO CARGOTECTURE IDEAS COMPETITION

At this year's Buffalo Home Show we are following a national trend to provide minimalist, affordable housing, and developing it in a way that would be appropriate to fit on any Buffalo city lot. We have asked our local professional interior designers/Architects to imagine a residential space built from a 8'x40' and a 8'x20' container.

Students
Rahul Ghera, Connor White, Corey Winters, Hoang Vy N Bui, Eric Zeffiro

Research Mentor
Harry L Warren

Title
Fillmore Avenue Urban Design Study

Abstract
This Independent Study focuses on two important community assets on Fillmore Avenue, in Buffalo, NY. Using a team or Planners and Architects, focused Urban Design Studies of the areas surrounding the two structures is undertaken. In Parallel, renovation and expansion studies are conducted of the older existing structures, creating plans for expansion and adaptive reuse, including Urban Design recommendations to improve community access and safety. One structure will become a mixed use facility containing a Community Health Care center and apartments. The other facility is a Employment Training Center for local disadvantaged youth. Our goal is to help improve the urban environment, community access and stability. This project is the first step in a long-term Vision, aimed at revitalizing these historic neighborhoods.

Student
Yibo Jiao

Major
Architecture

Research Mentor
Chris Romano

Title
Rigidized Metals Research

Abstract
This research project will focus on an ongoing collaboration with Rigidized Metals to developing Architectural applications for deep-textured Metals. This includes the design of new products, development of new techniques and optimizing processes through new digital tools.

The research will address the capacity of the Rigidized Metals manufacturing facility for fabricating architectural products, by focusing on self-structuring thin gauge metal surfaces studied with built prototypes, and reflecting sunlight for specular effect studied with parametric modeling.

Student
Ana Misenas

Major
Architecture

Research Mentor
Laura Garofalo

Title
Louvre Cloud Library

Abstract
The Louvre Cloud expresses, not only a final form that the semester procures, but also the in-depth process, research and development that the project undergoes throughout the curriculum. This project has evolved tremendously as more and more research on program requirements, research on classical works, design decisions were made in respect to historical context and much more.

The research center focused on the classical works of Andrea Palladio. It is designed to blur boundaries both visually and experientially between the research facility and Palladio's Villa Foscari. The facilities include living quarters, personal work spaces, a grand library and communal space.

The design of the Louvre Cloud Library continuously refers to the classical design elements of Palladio; site mirroring the original villa, proportions in both plan and section, visually parallel louvres providing a view of the villa from the inside space and more.

More about the project is including in the supporting materials sent to aferger1@gmail.com. And I thank you for your time and consideration.

Students
Caroline Niederpruem, Brandon Stone

Major
Architecture

Research Mentor
Bradley Wales

Title
Equinox Housing

Abstract
In the mid-1800's, Farmer Allen's expanding herd forced him to move his cattle to a larger pasture. The path created was oriented as if it were a sundial, with the herd traveling from east to west. Thus, the street was named Allen Street. This path is bisected by Delaware Avenue of the 1804 Ellicott Radial Plan. At the bisection of these two plans is our site: the corner of Delaware and Allen. It is at the center of convergence between cosmological (Allen) and human-made geometry (Delaware). Placing housing volumes within this grid forms a series of overlaps, and through these overlaps, a matte is generated on the site. The vertical voids created by this matte allows for direct sunlight, and individual terraces for each unit.

Buffalo's neighborhoods primarily consist of single and double family hoses with balcony spaces facing the street that help promote community. Most north-facing balconies provide views toward the corner of Allen and Delaware which is a desirable location for residents that actively engage in annual Buffalo traditions such as the parade on St. Patrick's Day. The south-facing terraces are similar in the sense that some provide views downtown while all of these terraces have the best direct sun access. Additionally, the terraces and the resulting vertical perforations allow for double and triple aspect thru units which eliminates 'sick building syndrome' and makes air conditioning irrelevant.

Student
Alan Vlakancic

Major
Environmental Design

Research Mentor
Sean Burkholder

Title
Miami Street Urban Design & Greenway System

Abstract
Greenway systems represent a symbiosis between the built environment and the local ecology to develop a more livable urban landscape. The potential Greenway system in question will begin at Riverfest Park in Downtown Buffalo, New York, continue through an abandoned raised railway line and terminate in Red Jacket Park on the Buffalo River. The plan will be centered on employing resultant design techniques to work with the ecology of the area rather than against it. This is both to be sensitive to environmental concerns, and maintain the relationship the area has had with the community historically. The Greenway system must be relevant to the area and any pertinent events nearby such as the ongoing revitalization of the South Park neighborhood, and nearby developments such as Silo City, the existent Greenway Program or the Outer Harbor developments.

College of Arts & Sciences

Students
Stephanie Acquario, Jessica Lynn Hall, John Morano, Andrew Rouse, Allison Sansano

Major
Communication

Research Mentor
Lance S. Rintamaki

Title
Gimme Five: The Banners of the UB GRoW Home

Abstract
The GRoW Home is UB's entry for the Department of Energy's 2015 Solar Decathlon. In fact, the GRoW Home was selected by the DOE as one of the top 20 entries from universities across the country and around the world. The Solar Decathlon consists of 10 different competitions, including Communication, part of which involves presenting signage about the GRoW Home to the 300,000 visitors who will tour the home in October. A team of five Communication students has been working diligently to create the signage for this competition, samples of which they will present at the CAE. This presentation will be highly interactive, teaching attendees about the Solar Decathlon and the GRoW Home, as well as fielding questions and gathering feedback on the current signage to discern how best to represent our University at the final judging this fall.

Students
James Adegbite, Paul J. Meyer

Major
Psychology

Research Mentor
Paul J. Meyer

Title
A unique, moveable electrode for recording from multiple sites within the rat brain.

Abstract
Dopamine input into the nucleus accumbens (NAcc) is important for learning about food and drug-related stimuli. In our laboratory, we are developing electrodes to record from multiple sites within the NAcc in awake, behaving rats. We manufacture customized electrodes with two sets of moveable 16-wire assemblies that can record activity from multiple NAcc neurons simultaneously. These electrodes are connected to miniature circuit boards that allow computer controlled recordings from these 32 wires. We typically measure 6-8 neurons per recording session for 4 sessions, giving us recordings from 24 to 32 neurons in a single rat. Our electrodes are also being combined with optogenetic stimulation to determine whether activation of dopamine neurons activates NAcc neurons in specific ways, and whether this activation can lead to behavioral change. Our long-term goal is to understand how this neural circuit is involved in appetitive learning and the development of drug addiction.

Students
Angelina Anzalone, Kristin Beaudoin, Paris Canty-Brown, Christine Chen, Jenna Coppola, Michael Faucher, Natalie Foster, Gregory Franz, Michelle Hand, Melissa Harford, Michael Hasenauer, Wei Qin Koh, Rachel Kramer, Carly Kreitzberg, Tiffany Lande, Nicole Lons, Catherine Masterson, Katherine McCarthy, Samantha Mozo, Sung Ah Park, Daniel Pu, Alexander Pukos, Corey Rosen, Travis Scamurra

Research Mentor
Lance S. Rintamaki, PhD

Title
The Sexual Communication Video Project

Abstract
This project includes interviews with 100 people regarding what shaped their sexual knowledge, attitudes, and behavior. Participants recount fascinating and often uproarious stories about the birds and the bees, the back of the bus, the nefarious side of the internet, and everything in-between! The footage has been edited into short, high-impact films that cover 25 of the project's core sexual communication topics. These films are both fun and informative, and part of a larger campaign that calls into questions how we learn about this important facet of the human experience.

Student
Shontay Barnes

Research Mentor
Leonard J. Simms

Title
Assessing the Self-Other Agreement of the Informant Form of the Personality Inventory for DSM-5

Abstract
In order to improve the quality of information about an individual, psychologists have investigated sources besides the target in question. The current paper evaluates the psychometric properties of the informant-report form of the Personality Inventory for DSM-5 (PID-5-IRF). Proper application of the form would improve research relating to personality pathology. The 220 items on the survey were categorized into personality trait facets, which were then grouped into trait domains. Overall, the present study found similar self-other agreement for the individual items as well the trait facets but significantly weaker correlations for the domains. Further examination must be made to determine what features may contribute to the discrepancies in the self-informant agreement of the trait domains.

Students
Daniel Bartoszek, Cuiting Chen, Alejandro Corona Espinosa, Emily Tevens

Research Mentor
Julie C. Bowker

Title
Examining Which Friendship Qualities Help Shy Young Adolescents

Abstract
It is known that having friends is helpful for shy adolescents. But, it is not known which friendship qualities are most beneficial for shy adolescents, who often victimized and are persistently shy. This study considered, for the first time, several friendship qualities (e.g., companionship, conflict) as moderators of the association between shyness and victimization, and shyness over time (to examine stability). Participants were 273 adolescents (140 boys; Mage = 11.80 years) who completed measures of shyness and victimization (Times 1 and 2), and friendship qualities (at T1). Regression analyses revealed several main and interaction effects. For instance, when predicting T2 shyness, significant interactions involving T1 shyness and companionship ($\beta = 0.63$, $p = .001$), closeness ($\beta = -0.62$, $p = .03$), and conflict ($\beta = -0.48$, $p = .04$) were found. Follow-up simple slope analyses revealed that high levels of closeness and conflict functioned protectively whereas high levels of companionship increased risk.

Student
Sean R. B. Bearden

Major
B.S. Physics and Applied Mathematics

Research Mentor
Dr. Igor Zutic

Title
Putting Spin in Lasers

Abstract
Lasers are ubiquitous devices that are key to a wide range of applications. A key laser characteristic is dependence of the emitted light on carrier pumping or injection. We distinguish spin-lasers from conventional lasers depending on whether pumping/injection introduces spin-polarized or spin-unpolarized carriers, respectively. In lasers, two regimes are distinguished: For low pumping there is no stimulated emission, and emitted photons are incoherent; However, the higher pumping regime is characterized by stimulated emission and coherent light. Lasers in which spin-polarized carriers are injected provide paths

to different practical room temperature spintronic devices, not limited to magnetoresistive effects. Unlike the conventional understanding of spintronic devices, an optimal performance of such spin-lasers can arise for finite, rather than infinite, spin relaxation time. Spin-lasers also show improvements over conventional lasers in transient operation, leading to shorter turn-on delay times, reduced ringing of emitted light, and an enhanced bandwidth.

Student
Michael Benson

Major
Mathematical Physics

Research Mentor
Dr. Surajit Sen

Title
Temperature and Adhesion Force Effects on the Stickiness of Nanoparticles

Abstract
Nanoparticles are extremely tiny – consisting of hundreds to several million atoms. Understanding how they behave individually and as a group is profoundly important. Such knowledge can allow us to make surfaces that are exceedingly strong, data storage devices of unbelievable precision, deliver targeted drugs to various parts of the body and even help understand how stars form.

Studying nanoparticles is not easy in the lab or with a computer. Specialized instrumentation and machines are needed. Here we study the effect of temperature and an interatomic adhesion force on the collisional dynamics of soft and sticky nanoparticles. We ask a simple question – how does the addition of these effects change the dynamics of the resulting collision? We show that the crystal structure plays an important role in the softening of the nanoparticle and that sticky nanoparticles become stickier when either the velocity is too low or too high.

Student
R. Aaron Bola

Major
Biological Sciences

Research Mentor
Denise M. Ferkey, Ph.D.

Title
Sex-based Differences in C. elegans Responsiveness to Aversive Stimuli

Abstract
The nematode Caenorhabditis elegans (C. elegans) is a well-characterized, genetically amenable species with two sexes, hermaphrodites (XX) and males (XO). This makes it an appropriate model system for investigating sex-based behavioral differences.
Chemosensation in C. elegans is mediated by exposed ciliated sensory neurons, one of which is ASH, a polymodal nociceptor that elicits reversal when an animal encounters aversive stimuli. We hypothesized that hermaphrodite and male C. elegans worms respond differently to stimuli detected by ASH such as the bitter tastant quinine, the detergent sodium dodecyl sulfate (SDS), and the heavy metal copper (CuCl2); this hypothesis was tested through drop test assays.

Our results reveal that wild-type C. elegans males are less responsive than hermaphrodites to quinine, SDS, and CuCl2. Further investigations will be conducted through experiments with sex-reversed C. elegans strains to explore potential sites of difference that lead to these observable differences in responsiveness to aversive stimuli.

Students
K Burke, ML Dent, SJ Perrotta, LM Strand

Major
Psychology & Biological Sciences

Research Mentor
Alexis Thompson

Title
The Effect of Neuropeptide Y on Food-Induced Reinstatement and Vocalization in Rats

Abstract
Our laboratory recently found that increasing brain NPY reduces cocaine-induced reinstatement and cocaine-induced 50 KHz ultrasonic vocalizations (USVs) in a rodent self-administration model suggesting it may suppress cocaine-induced relapse. We wondered if the NPY-induced suppression of these cocaine-induced responses could be due to an increase in motivation to seek food and tested that idea by evaluating food-induced reinstatement and food-induced USVs in rats with a history of cocaine self-administration. It was hypothesized that, due to its natural orexigenic effects, administration of NPY would enhance the magnitude of food-induced reinstatement and increase the number 50 KHz USVs made during the reinstatement procedure. The results suggest that food-induced reinstatement is unchanged by administration of NPY and that food-induced reinstatement does not reliably induce 50 kHz USVs. The results suggest that the effect of NPY on cocaine-induced reinstatement and USVs are not due to an increase in food motivation.

Student
Ashley Cercone

Major
Anthropology & Classics

Research Mentor
Peter Biehl

Title
Restoring and Analyzing Ceramics at Seyitömer Höyük

Abstract
This project presents an analysis of the process of restoring and analyzing Bronze Age ceramics which were excavated from the site of Seyitömer Höyük in Kütahya, Turkey, located in western Turkey about 354 kilometers southeast of Istanbul. This site is very important for the history of the area,

since there was and still is today a large pottery trade throughout Turkey. Additionally the mound has some of the largest evidence for pottery production and trade with the Mediterranean and other parts of Anatolia. By restoring ceramics from this site, archaeologists can look at the ceramic as a whole and not just as fragments. Scholars have now been able to find the true uses of each type of vessel and also discover that the inhabitants had very specialized uses for each form. These artifacts are now used to be displayed in museums and reach out to the public to inform them about the past.

Student
Blake Cooper

Major
Spanish, Linguistics

Research Mentor
Dr. Elizabeth Scarlett

Title
Competing Identities in Federico García Lorca's Spain: A Socio-Semiotic Perspective

Abstract
Today the twentieth-century poet and dramatist Federico García Lorca is considered one of the most resonant and emblematic literary voices Spain has ever produced. However, in his time Lorca felt very much alienated from the popular culture: he despised the glorification of war and aggression which he felt was commonplace in his country since the era of the crusades; he identified strongly with his nation's oppressed populations, especially the gypsy culture that underpinned and permeated his native Andalusia; and he struggled to come to terms with his sexuality in a climate that considered homosexuality unspeakable.

How, then, do we reconcile Lorca's identity as a "Spanish" poet with the iconoclasm he was known for in his own country? By examining the author's works using linguistic analyses supported by the socio-semiotic model of M.A.K Halliday and Ruqaiya Hasan, we can better understand how Lorca deconstructed dominant notions of Spanish identity.

Student
Megan Corcoran

Major
Geological Sciences & Chemistry

Research Mentor
Jason Briner

Title
Improving Efficiency of Quartz Isolation for Cosmogenic 10Be Exposure Dating

Abstract
Geologic dating methods are used to place past events in Earth's history into an absolute timescale. One particular dating method is 10Be dating which uses isotopes that accumulate in mineral quartz. The first step in sample processing for this method is a time-consuming process of isolating quartz from rock samples. Isolating quartz from a sample can be difficult because of similar densities between quartz and feldspars. In order to reduce the time and cost of processing 10Be samples four experiments were designed to evaluate multiple aspects of common quartz isolation procedures, each testing different variables. Aluminum content, our main metric for quartz purity, is measured using inductively coupled plasma atomic emission spectroscopy (ICP-AES) at different stages of each experiment. Using aluminum content as a measure of quartz purity, and by comparing quartz yield by weight, we will present our results of the efficiency of the different quartz isolation techniques tested.

Student
Julianna Crumlish

Major
Environmental Geosciences

Research Mentor
Dr. Christopher S. Lowry

Title
Evaluation of Beach Closure Procedures in Western New York Based on Hydrologic Drivers

Abstract
Beach closures due to high bacteria levels are a frequent occurrence in Erie County. The amount of time that it takes to culture E. coli, a common indicator of waterborne pathogens, means that park managers must rely on other methods besides sampling when deciding whether or not beaches should be open for swimming. One tool currently at use at some Erie County beaches is Nowcast, a predictive model created by the U. S. Geological Survey that analyzes precipitation, wave height, and other hydrologic factors in order to create a real-time estimate of water quality. I will evaluate this model for its effectiveness in predicting beach closures at the three area beaches where it is currently used. I will also assess whether adding in new data, such as combined sewer overflow events, increases this model's effectiveness. Lastly, I will look into the feasibility of bringing this model to other area beaches.

Student
Maria Cwiklinski

Major
Dance

Research Mentor
Melanie Aceto

Title
Denude

Abstract
"Denude" began as a solo study in my choreography class. Prior to this study, I researched the history of famous female dancers and their personal perception of their figures. I examined dance icons from the past and the present, noting dramatic changes of society's view of body image. From there, I researched current dancers' thoughts on the matter, relaying their personal struggles of depression, eating disorder, and body-dysmorphia. As a dancer who also battles with the politics

of feminine figures and my personal body image, I felt it was necessary to present an alternative to the idea of a "picture-perfect" body. We as a society must change the way we view women physically. We must accept them for their struggle, their emotion, their talents, their "flaws," and their realness. Most importantly, we must accept them for who they are, disregarding shape and size.

The openness, vulnerability, beauty, and honesty of the dancers in "Denude" depict the personal battle that women face daily and their desire to receive respect from the media and the public who force them to feel flawed. While I hope to raise awareness of female body image, I also hope that my dancers and all women view their body from a new encouraging perspective: "What matters is what you see. Your body is your temple, it's your home, and you must decorate It." – Gabourey Sidibe

Student
Juweria Dahir

Major
Sociology

Title
Gender Differences in the Use and Abuse of Weight-Loss Substances

Abstract
Previous studies on the use and abuse of diet pills and related weight loss substances have frequently noted that such use tends to be more prominent among females. However, the majority of previous studies have focused on the use of diet pills by adolescents. In this study, a nationally representative sample, drawn from the 2012 National Survey on Drug Use and Health, is used to examine the use of diet pills and xanax (a prescription drug often misused for weight loss purposes) among adults. This study also focuses upon the differences in predictors of such substance use among females and males. Using a foundation of self-determination theory (SDT), this study posits that individuals will be more likely to abuse diet pills and xanax when their needs for competence, autonomy, and relatedness are not being met. In the analyses, females are shown to be more likely than males to use diet pills, yet males report a higher rate of consumption of xanax, as compared to females. Among the various measures of well-being, depression appears to be a salient predictor of males' use of both substances, yet not among females. Males also appear to be more likely to use both substances as a function of age, while this association is less influential among females. The meanings and implications of these findings for both researchers and practitioners are discussed.

Student
Audrey Foppes

Major
English

Research Mentor
Barbara Bono

Title
Lafayette High School: A Closer Look

Abstract
Last fall, I completed an internship at Lafayette High School, a school that has recently been making front-line news for its low graduation rates. I was able to witness first-hand the ways in which the school was endeavoring to navigate the daunting challenge of educating over 500 students (70% of their student body) who are immigrants and refugees, coming from countries across the world and speaking over 42 different languages. This study endeavors to dissect negative headlines and plummeting test scores to discover the real situation at the school, highlighting student and teacher perseverance, and finding reasons for hope.

Student
Sara Ann Fox

Major
Biomedical Sciences

Research Mentor
Dr. Omer Gokcumen

Title
The Functional and Biomedical Implications of the Unusual Genetic Variation of the Salivary MUC7 Protein

Abstract
The purpose of my project is to study the evolution and functional impact of genetic variation of salivary human gene, mucin-7 (MUC7), which has been previously associated with susceptibility to asthma. I will present data pertaining my polymerase chain reaction based DNA amplification experiments and visualization of DNA fragment size using agarose gel electrophoresis. My results reveal extraordinary the size variation of MUC7 gene within and among human and nonhuman primate species. Our results also revealed a highly divergent haplotype in humans observed only in African samples. Collectively, our results suggest that MUC7 genetic variation has been evolving under strong and differential adaptive forces and may shed light onto susceptibility to asthma in humans.

Students
Catharine Elisabeth Grainge, Mackenzie A Hafner

Research Mentor
Assoc. Prof.Barbara Wejnert

Title
Road of Tiers, Refugees, Immigrants in Buffalogration

Abstract
The purpose of this project is to reveal the experiences of immigrants and refugees in the United States. The project uses the journals subjects have written to discover any common experience. Only current or former refugee or immigrant can participate in the project.

We ask participants to write a journal of 10-50 pages about their home country and why you came to the U.S. We also ask you questions about how you are treated in the U.S.

Journals are being collected from refugees in Buffalo, NY and Spokane, WA.

Students
Timothy Hansen, Megan Lamb, Claire Thant

Major
Biological Sciences B.S.

Research Mentor
Dr. Shermali Gunawardena

Title
Investigating the Effects of Paraquat Induced Oxidative Stress on Axonal Transport

Abstract
High levels of oxidative stress and axonal transport defects can be detected in neurons affected by neurodegenerative diseases such as Parkinson's, Huntington's, and Alzheimer's diseases. These axonal transport defects are thought to occur early in disease pathogenesis. However, it is unclear whether there is a direct relationship between oxidative stress and the initiation of transport defects. Here we test the hypothesis that oxidative stress within neurons will cause transport defects, utilizing the model system Drosophila melanogaster. Drosophila larvae are raised on Paraquat (a chemical known to induce oxidative stress) laced food, and dissected larvae are analyzed for axonal transport defects. Preliminary results indicate larvae feeding on 10mM concentration of Paraquat contain axonal blockages. We are currently testing the relationship between the concentration of paraquat and the amount of axonal blockages to determine if there is a direct relationship between the level of oxidative stress and axonal transport defects.

Student
Timothy Hansen, Megan Lamb, Claire Thant

Major
Biological Sciences B.S.

Research Mentor
Shermali Gunawardena

Title
The role of the PI3K–AKT pathway in Huntingtin-mediated cell death and axonal transport defects

Abstract
Huntington's Disease is a neurodegenerative disorder caused by a mutation in the huntingtin gene, resulting in the production of mutant huntingtin protein with expanded PolyQ repeat region. Phenotypically, patients with Huntington's disease show aggregations of mutant PolyQ protein, as-well-as defects in axonal transport and neuronal cell death. However, not much is known about the connection between axonal transport defects and neuronal cell death. We hypothesize that axonal transport defects will directly instigate neuronal apoptosis via perturbations to PI3K-Akt signaling, and constitutively activating the PI3K-Akt pathway will rescue both axonal transport defects and neuronal cell death observed in Huntington's disease. Using Drosophila melanogaster as a model system we tested this prediction by crossing flies expressing constitutively active PI3K protein to flies expressing mutant huntingtin. Preliminary results suggest that constitutively activating PI3K protein in mutant Huntington flies is able to rescue cell death, but has no effect on axonal transport defects.

Student
Sarah Hussain

Major
Anthropology & Sociology

Research Mentor
Dr. Debra Street

Title
Assessing Perceptions and Attitudes of the United States Health Care System and Reform

Abstract
This research uses data from an online survey to examine the attitudes andperceptions of U.S. adults toward the health care system, and health care reform. Analysis of 185 participant survey responses provides evidence that current trends may differ from the findings of previous research on these perceptions. Measured were socioeconomic status, political affiliation, and media influence on perspectives and experiences with regard to the U.S. health care system and the Affordable Care Act of 2010. For example, political affiliation may play a stronger role than education or income level when it comes to satisfaction with health care delivery or extending coverage to all legal US residents. This research may provide insight into more effective ways to inform citizens of issues related to health and well-being of the nation.

Student
Karin Hsieh

Major
Biomedical Science and Philosophy

Research Mentor
James Beebe

Title
Investigating the Associations Between Moral Objectivism and Personality Traits

Abstract
Philosophers have often assumed that all people are morally objective. Moral objectivism is characterized by regarding moral claims as objectively true or false and applying to all people, regardless of any other factors. This assumption has not been backed by empirical evidence, so we aim to compare the trait of moral objectivism with other traits to better understand moral objectivism. 92 UB undergraduates were surveyed for this study, filling out questionnaires with scales that measured their moral objectivism, disgust sensitivity, cognitive reflection, and need for cognition. We hypothesized that those with high moral objectivity will be positively correlated with disgust sensitivity, and negatively correlated with cognitive reflection and need for cognition. We found a positive correlation between moral objectivism and disgust sensitivity and an almost significant correlation between moral objectivism and cognitive reflection. Given that at least one trait had correlation with moral objectivism,

there is support that moral objectivism is not in all humans, but can possibly arise from certain world perspectives or tendencies.

Student
Dante A. B. Iozzo

Major
Physics, Mathematics

Research Mentor
Dr. Doreen Wackeroth

Title
Probing Higgs Couplings in Gluon initiated Z-Pair production at the Large Hadron Collider

Abstract
The recent discovery of the Higgs Boson at the CERN Large Hadron Collider has brought the completion of the Standard Model of Elementary Particles, or so it appears. There are various models predicting the behavior of the Higgs Boson and how it interacts with the other particles, and it is currently unclear which model best fits the existing data.

One way to explore the Higgs properties is to analyze the couplings of the Higgs of the gluon initiated production processes, where we assume the Higgs decays into a Z-Boson pair. This event has the largest cross-section at the LHC and therefore provides the ideal testing ground for Higgs' properties.

We are using analytical quantum field theory techniques to calculate the production of a Z-pair from a gluon induced Higgs interaction at the one-loop level. We employ a patron-level Monte Carlo program to make a realistic prediction of this Higgs cross-section. After examining the process under the Standard Model, we will investigate the Higgs production under various coupling adjustments and the possible influence of Supersymmetry.

By studying this coupling, we are able to work within the experimental uncertainty of the measured Higgs cross-section to explore the different possible Higgs behaviors.

Student
Armond M. June

Major
Intended Biomedical Sciences

Research Mentor
Dr. Charlotte Lindqvist

Title
Oceanic Microcosms : The Cetecaen Microbiome

Abstract
All exposed surfaces of the animal body, including humans, are inhabited by a multitude of microbial communities. Comparative studies of mammalian microbiomes are key for understanding the evolution of and effect of bacterial communities in the intestine and other mammalian environments. Unlike methods involving cultivation of cell cultures, which only represent a fraction of the environment, metagenomic techniques can sequence the collective genomes of these communities, or microbiomes, and unearth distinct microbial biota, and their functional potential, within multiple organisms. In this study, shotgun and 16S rRNA amplicon sequencing was performed on samples from the distal guts of two whale species, bowhead and pilot whales. Thus far, amplicon sequencing data from the two whales have been analyzed to yield a taxonomic breakdown, compared with data from 59 terrestrial mammals, and Illumina data have been analyzed to yield the functional potential of the diverse bacterial flora.

Student
Tyler Laurel

Major
Biological Sciences

Research Mentor
Rosemary Dziak

Title
Nano Calcium Sulfate Coating of Implant materials

Abstract
Titanium implants are commonly used in dentistry. Implant surface and biocompatibility are major components in the implant success that is measured by osseointegration, the ability of osteoblastic cells to form bone on the surface. The goal here is to study how coating of titanium implants with a novel strontium-enhanced nano calcium sulfate (nCS) affects osseointegrative properties of the implants. Indices of osseointegration include osteoblastic cell viability as measured by an in vitro test (MTT) and differentiation measured with the marker, alkaline phosphatase. Human osteoblastic cells were obtained using a protocol approved by the University's IRB from alveolar bone specimens of patients after their written consent. Cells were grown on titanium samples with/ without coating with nCS and in the presence of a collagen membrane commonly used in clinical practice along with titanium for enhanced wound healing. Our results suggest that the nCS enhances the osseointegration of the implant materials.

Students
Brooke E. LeBeau, Samantha L. Romand

Research Mentor
Renee Ruffino

Title
The Effects of Graphic Design on Socioeconomic Status

Abstract
After last year's research "The Effects of Package Design on Consumers: How Designers Target Traditional Gender Roles" we chose to further research graphic design's impact on target audiences. Design impacts socioeconomic status in a variety of ways, particularly through package design. This year we have chosen to implement a survey that will reveal how perceived socioeconomic status affects buying trends as well as how design influences purchasing habits within these classes. This survey will give us data on actual versus perceived socioeconomic status and how this influences the habits of particular demographics and individual consumers. In reviewing

this data, based on our knowledge of graphic design, we will have a more in-depth view of how designers target socioeconomic class structures. We hope to expose the tendency on how companies ignore lower class consumers through a lack of design and create an illusion of luxury for higher end products.

Student
Daniel Loebell

Major
Asian Studies

Research Mentor
Kristin Stapleton

Title
Qinghai Province and the Question of Chinese Rural Women's Land Ownership Rights

Abstract
Article 30 of the 2005 People's Republic of China Law on the Protection of Women's Rights stipulates that women enjoy equal rights to property as men. However, issues of marital status, patriarchal social structure, and minority status complicate the legal mediation of women's rural property. Qinghai Province's Hualong Hui Autonomous County (southeast of the provincial capital of Xining) offers one primary example of the difficulty of guaranteeing rural women's land rights, not only because of the above-mentioned problems and the county's autonomous status, but also because of the general lack of awareness of land rights and widespread illiteracy. My thesis answers why the number of property right violations in rural Qinghai Province is increasing.

Student
Antara Majumdar

Major
Biomedical Sciences

Research Mentor
Dr. Richard Salvi

Title
Stress-induced hippocampal damage following noise trauma

Abstract
When a person is exposed to noise trauma on daily basis, they are increasingly prone to neural degeneration. This leaves them incapable of conducting commonplace activities. By identifying the molecular players in the stress axis and how this contributes to reduction in neurogenesis, will allow us to understand better how to treat such conditions. Earlier detection and intervention will give a person a better quality of life. This project involved looking at the different expressions between the GR and MR receptors, both of which are involved in the HPA axis, and the human stress response. The regions of the brain that were analyzed for changes in these receptor expressions included the hippocampus. It can be concluded so far that noise-trauma caused a reduction in neurogenesis in the hippocampus.

Student
Kelly McDonald

Major
BS. Biology

Research Mentor
Dr. MA Coffroth

Title
Development of microsatellite loci for S. psygmophilum (Symbiodinium ITS-type B2)

Abstract
The Mediterranean coral, Oculina patagonica, is an invasive species that has been spreading as rapidly as 22 km per year. O. patagonica harbors the endosymbiotic alga Symbiodinium psygmophilum, a dinoflagellate characteristically found in high-latitude environments. Inter-or intraspecific variation among the symbiont may have facilitated the host's spread. To determine if symbiont variation is correlated with host expansion, it is necessary to examine the population structure of Symbiodinium across the range of O. patagonica and to bring representative symbionts into culture for experimentation. We identified a series of microsatellite loci for S. psygmophilum and screened them for polymorphisms using S. psygmophilum cultures and host tissue samples. These loci were used to test if S. psygmophilum, recently brought into culture, represented their hosts. Future studies will use these loci to examine symbiont diversity and structure in O. patagonica throughout the Mediterranean and to test for amplification of S. psygmophilum in other species.

Student
Shaunna McLeod

Major
Chemistry B.S., Mathematics B.A.

Research Mentor
Janet R. Morrow

Title
Design of Iron(II) Selective Optical Sensors

Abstract
Iron (Fe) is the most abundant transition metal in the body, involved in many cellular functions. Uncertainty surrounds the cellular concentration of Fe(II), the likely oxidation state of free iron, as well as its role in transport, with clarity desired due to iron's role in disease states. Fluorescent sensors are useful to probe these questions, with sensor design focused on selectivity for Fe(II) over other biologically relevant metals such as zinc (Zn(II)) and Fe(III). Using a macrocyclic recognition moiety, methods to tune selectivity were explored by examining the effects of varying donor atoms on the macrocycle as well as different pendant arms, which provide an additional binding site. Binding properties for several ligands were studied through fluorescence titrations as well as paramagnetic 1H-NMR and pH potentiometric studies. Binding constants for Fe(II) with 1,7-diaza-12-crown 4-ether were most promising, with pyridine pendant arms also showing increased selectivity for Fe(II).

Student
Emily Mroz

Major
Psychology/ Heath and Human Services

Research Mentor
Dr. Michael Poulin

Title
Self-Esteem as a Predictor of Caregiving: A Longitudinal Study of Hospice Patients and Informal Caregivers

Abstract
Research on self-esteem and caregiving supports the idea that a caregiver's self-esteem may influence the relationship with a patient. Specifically, higher levels of caregiver self esteem may precede a stronger attachment to a patient as the patient's health declines. Contrarily, lower initial reported self-esteem may precede more detached relationship styles once the patient's health declines. My current research, using a sample of patients and caregivers in the WNY Hospice program, aims to test whether a caregiver's attachment compared with their ill patient's declining health over time may be predicted by the initial reported level of self- esteem of the caregiver.

Student
Sara O'Donnell

Major
Psychology

Research Mentor
Dr. Leonard Epstein

Title
Factors That Influence Inter-Temporal Decision-Making

Abstract
Impulsive decision-making is characteristic of many maladaptive behaviors, such as gambling, substance abuse, and hedonic eating. Impulsive individuals may choose smaller immediate rewards over their larger long-term goals. Notably, there is evidence to suggest episodic future thinking, or prospectively imagining yourself in the future, is able to reduce impulsivity in a delay-discounting paradigm. In a delay-discounting task, subjects choose between larger delayed rewards and smaller immediate rewards. No studies have examined if the rate of delay discounting is influenced by the content of the episodic cues generated during episodic future thinking. The present study compares the effectiveness of episodic future thinking cues specific to future personal finances, general episodic future thinking cues, and episodic recent thinking cues specific to recent personal spending, on reducing impulsivity in a hypothetical monetary delay-discounting task.

Students
Emilie Redwood, Duo Xu

Research Mentor
Omer Gokcumen

Title
Rapid and recurrent evolution of MUC7 repeats within and across primate species

Abstract
MUC7 codes for one of the few intrinsic salivary proteins and the genetic variation affecting this gene has been associated with asthma. The gene is also unusual as it contains exonic repeats, which harbor functionally important O-glycosylation sites. Here, I conducted bioinformatic analysis of human and nonhuman primate genomes, revealing unusually rapid and recurrent nucleotide and copy number evolution of these repeats throughout primate species. In addition, I conducted a phylogenetic analysis of this variation to predict the evolutionary chronology of individual repeats. Collectively, my results are concordant with diversifying selection acting on MUC7, likely as a response to diverse pathogenic pressures.

Student
Amanda Russo

Major
Psychology

Research Mentor
Micheal Dent

Title
Can CBA/CaJ Mice Discriminate Among Renditions of Ultrasonic Vocalizations Within a Defined Category?

Abstract
Little is known about the ability of mice to discriminate among the ultrasonic vocalizations they produce. The ability of six CBA/CaJ mice to discriminate among renditions of ultrasonic vocalizations within a defined category will be determined. A go/no go experimental method will be used to test the ability of these mice to discriminate among four ultrasonic vocalizations in each of four categories. The independent variable will be the combination of a background vocalization and a target vocalization, and the dependent variable will be measured as the percent correct discrimination. I predict that spectrotemporal dissimilarity among vocalizations will lead to better discrimination ability of the mice.

Student
Jenna Tombolesi

Major
Psychology

Research Mentor
Stephanie Godleski Ph.D

Title
How far from the tree does the apple really fall? Investigating hostile attribution biases in parents and their children

Abstract
A hostile attribution bias (HAB) occurs when one perceives a potentially benign action as contentious, which influences the individual's response to it. The goal of this research was to determine if mother's perceiving hostility in peer interactions with her child would be adopted by her children. 105 mother-child dyads, consisting of children between the ages of three and five, were examined through a qualitative self-report measure of reactions to a

set of social situations that were coded for responses that indicated benign or hostile attributions. After partial or missing data was accounted for, data from 38 of those dyads were analyzed. Mothers' perceptions of peer hostility did tend to be associated with children's perceptions of hostility, suggesting that there is potential relationship and that the association may be significant with greater power. Further, within measure parent and child responses were significantly correlated, suggesting the consistency of reported perceptions of hostility.

Student
Athira Unni

Major
English, Sociology

Research Mentor
James Holstun

Title
FUNCTION OF POLYPHONY IN FEMINIST NARRATIVES OF FUAD AL-TAKARLI AND NAWAAL EL-SAADAWI

Abstract
This thesis discusses selected polyphonic and monophonic works of the Iraqi male author Fuad al-Takarli and the Egyptian female author Nawaal el-Saadawi and analyzes how their feminist content suffers due to the shift from polyphonic narrative to monophonic narrative. Political turbulence in Iraq and Egypt at the time had impacted the literary scene, affected polyphonic narratives negatively and incited individualistic novels, such as these authors' monophonic works. The thesis provides a feminist understanding of Al-Takarli's polyphonic The Long Way Back (1980) and monophonic Ring of Sand (1994), Saadawi's polyphonic God Dies by the Nile (1974) and monophonic Woman at Point (1975), and argues that the polyphonic novels are more holistic in portraying patriarchal oppression. God Dies by the Nile is a stellar example of this, accommodating not only the voices of the oppressed, but also giving voice to the oppressive and unsympathetic figures, who simultaneously suffer from and propagate patriarchy.

Student
Shayan Waseh

Major
Biology

Research Mentor
Dr. Michael Garrick

Title
The Effect of Neuroinflammation in Early Alzheimer's on Iron Homeostasis

Abstract
Cellular iron export through ferroportin is inhibited by hepcidin, which is increased by inflammation in the body. This protective mechanism reduces blood iron levels and prevents invading micro-organisms from gaining access to iron. In early Alzheimer's disease, there is inflammation which may activate this mechanism. Therefore, iron levels and other related values might provide an early diagnostic tool in recognizing Alzheimer's disease before there is permanent neurocognitive damage.

Student
Lauren Wehner

Major
History

Research Mentor
Dr. David Herzberg

Title
Cold War Ideology or Corporate Profit?: The Motivation behind Hollywood's Movietime U.S.A. Tours, 1951-1952

Abstract
The 1950s in America was an era of prosperity plagued by the fear of Communist infiltration and the disintegration of morals. Hollywood was a lightning rod for these fears, with accusations of subversive ideas and loose-living stars fueling House of Un-American Activities Committee investigations, congressional hearings, and blacklists. This paper will examine one attempt by Hollywood to clean up its image by bringing the stars of the silver screen to the public, the "Movietime U.S.A." Tours put out by the Council of Motion Pictures Organization (COMPO). In these tours, I argue, movie personalities were sent all over the country for "meet and greets" with civic leaders and the general public with the intention of demystifying and de-villainizing Hollywood. I argue further that while this ideological agenda was significant, there was an additional financial motivation that was less obvious but in fact more important to the industry.

Student
Katherine Zimmerman

Major
Biological Sciences

Research Mentor
Dr. Shermali Gunawardena

Title
Expansion of polyglutamine repeats in Huntingtin perturbs the motility of Rab4 and Rab11 containing vesicles in Drosophila larval axons

Abstract
Huntington's disease (HD) is a neurodegenerative disorder caused by expansion of polyQ repeats in the huntingtin (HTT) gene. Patients with polyQ lengths >35 are at risk of getting the disease. While the cargo that HTT transports is unknown, recent work in our lab has shown that reduction of HTT levels in Drosophilaperturbs the movement of YFP-Rab4 and Rab11-GFP suggesting that HTT is required for normal transport of these proteins. Using in vivo analysis, we characterized how expansion of polyQ repeats in HTT affected the motility of these proteins. We found that while HTT 72Q and HTT 138Q caused large axonal accumulations, HTT 15Q showed robust motility. Further, while both Rab4 and Rab11 motility was perturbed by expansion of polyQ repeats, HTT co-localized with Rab4 and Rab11 containing axonal blocks. Our data suggests that expansion of polyQ repeats in the context of HTT disrupts the normal movement of Rab4 and Rab11.

CSTEP

Student
Warren Barrett

Major
Chemistry

Research Mentor
Dr. Rajendram Rajnarayanan

Title
Interactions of Calbindin with Human Estrogen Receptors

Abstract
Breast cancer is the over proliferation of cells in breast tissue. The transcription activity of estrogen receptors caused by estrogen induces this disease state. EF-Hand proteins that are calcium-binding proteins play a role in estrogen receptor activity. Analyzing how EF-Hand proteins interact with estrogen receptors can lead to a better understanding of breast cancer. These proteins may have agonist or antagonistic effects on estrogen receptors. The interactions of EF hand protein Calbindin with estrogen receptor will be analyzed with the plan to make strides with finding a cure for breast cancer.

Student
David Bratton

Major
Biomedical Sciences

Research Mentor
Dr. Fraser Sim

Title
The Effect of Genes SULF2 & GNB4 on Oligodendrocyte Differentiation

Abstract
Multiple Sclerosis is a neurological disorder resulting from the loss or damage of oligodendrocytes and consequently, myelin. Myelin is a substance that is essential for the proper function of the CNS. Previous studies in this lab have identified 2 genes of interest that regulate the differentiation of oligodendrocyte progenitor cells (OPC's) into immature and then mature oligodendrocytes which produce myelin. These genes, SULF2 and GNB4, have been overexpressed in human OPC's and transplanted into the brains of mice. Here, we will observe the effects of these genes after 8 weeks. In vitro studies of these genes in this lab have shown that SULF2 should inhibit differentiation and GNB4 should promote differentiation of OPC's. The results of this study will increase our understanding of oligodendrocyte development and may present a clinically relevant pathway we can exploit to help treat symptoms of Multiple Sclerosis or other demyelinating diseases.

Student
Kevin Alexis Carpio

Major
Mechanical & Aerospace Engineering

Research Mentor
Dr. Manoranjan Majji

Title
Feature Detector and Tracking System for an Autonomous Drone

Abstract
Autonomous systems such as Unmanned Aerial Vehicles (UAV), commonly known as drones, have proliferated and evolved in the past decade into a new discipline of aerial robotics. Although computer vision is a key element, UAVs cannot independently track and identify targets currently without human intervention. While surveillance is one of the most common UAV applications, operations like location, natural disaster relief, and ground recognition also require a vision based system. Our goal is to create software that will allow UAVs to autonomously track, locate and identify an object of interest (target). This software, novel and specific to this application, is an algorithm developed to carry out the image processing using open source image libraries called OpenCV, and its corresponding language: C++. Due to the UAV specifications, this algorithm needs to be exceptionally robust in order to identify and track targets at a 1000 feet distance.

Students
Sara DiTursi, Hilliard L. Kutscher, Faithful Makita, Jacob Milling, Jessica L. Reynolds

Research Mentor
Gene Morse

Title
Dual Loaded Controlled Release Core-Shell Nanoparticles for Anti-HIV Therapy

Abstract
Human Immunodeficiency Virus (HIV) remains a global epidemic with high morbidity and mortality that suppresses the immune system leading to opportunistic infections and malignancy. Due to length of treatment and adverse effects, patient non-adherence often occurs resulting in viral resistance to current therapeutic regimens. In addition, research emphasis is now on finding a cure for intracellular latent infection. Biodegradable poly(lactic-co-glycolic) acid (PLGA) nanoparticles are able to control the release of lamivudine and nevirapine (two drugs that are components of current therapy in resource-limited countries), and enhance cellular uptake in macrophages, a viral reservoir, using a chitosan shell. These core-shell <200nm nanoparticles were fabricated by nanoprecipitation. Drug release was rapid and occurred over 2 hours. Our goal is that when administered, these nanoparticles will deliver therapeutics to viral reservoirs in a targeted, controlled release fashion. This offers a novel approach that will be a more effective, efficient and affordable treatment.

Students
Kemji Eke, Tyler Mullen

Research Mentor
Gene D. Morse

Title
Building Research Collaborations in the SUNY Global Health Institute

Abstract
The SUNY Global Health Institute (GHI) is a multi-institutional collaboration that

is focused on extending collaboration across SUNY campuses in an effort to expand global health education and research. This research project will assess the current federally supported research projects for each participating SUNY Academic Health Center to identify areas for new collaboration. The project will identify the key SUNY research centers and determine mechanisms for collaboration among SUNY Academic Health Centers, research cores and their international partners to broaden the potential for SUNY to address global health challenges. With the goal of increasing collaboration among the SUNY network, the GHI serves as an outstanding infrastructure for grant applications, academic-corporate partnerships, philanthropic contributions and international economic development programs.

Student
Robert Ferguson

Major
Biological Sciences

Research Mentor
Dr. Michelle Visser

Title
Modulation of Host Cell Lipid Metabolism Activity in Host Cells by Treponema denticola

Abstract
Treponema denticola is a key oral spirochete pathogen in the polymicrobial infection associated with periodontal disease. The major outer sheath protein (Msp) is a major virulence factor of Treponema denticola. Lipid phosphoinositides such as phosphatidylinositol (3,4,5)triphosphate (PIP3) are key regulatory metabolites of many eukaryotic cell functions. Msp modulates cellular lipid phosphoinositide levels through inhibition of PI3-kinase and activation of the phosphatase PTEN. PTEN governs a plethora of cellular processes including survival, proliferation, and energy metabolism. The activation of PTEN causes PIP3 (3,4,5) to become dephosphorylated back into PIP2 (4, 5). PTEN activity can be regulated by multiple mechanisms, yet the mechanism of how PTEN is regulated by Msp is unknown. Learning more about the regulation of PTEN by Msp can give us a better understanding of Treponema denticola and its role in periodontal disease.

Student
Austin M. Price

Major
Biomedical Sciences
Global Gender Studies

Research Mentor
Dr. Moni Kuriakose

Title
Correlation of Microvessel Density and the Degree of Dysplasia in Oropharyngeal Cancer

Abstract
Angiogenesis is a characteristic feature of neoplasia. We intend to investigate a possible correlation between the microvessel density (MVD) with the degree of dysplasia in tumor samples. Tumor samples from 150 patients were assessed for their histological profile by hematoxylin/eosin (H&E) staining. MVD was assessed by IHC using antibodies against CD31, an endothelial marker and statistically analyzed. We expect to see a linear correlation between the degree of dysplasia and MVD count on the samples. If the hypothesis holds true, scanning of MVD can be used to estimate the degree of dysplasia of a tumor sample.

School of Engineering & Applied Sciences

Students
Joshua Abraham, Sardar Elias

Major
Mechanical Engineering

Research Mentor
Dr. Deborah Chung

Title
Three-dimensional Cement Printing Technology Development

Abstract
Three-dimensional (3D) cement printing is attractive for the fast construction of concrete structures, particularly customized structures with complex shapes such as round corners. The technology involves layer-by-layer deposition of a thixotropic cement slurry without a mold, so that the shape of the slurry is maintained afterward, akin to the squeezing out of tooth paste. Cement mix formulation and printer design are essential for this technology. This project is focused on the printer hardware design, which includes the cement slurry vessel, the nozzle, the piston, the motors and the machine mechanisms for providing 3D motion of the vessel assembly as printing occurs. The motion will be enabled by a delta robot, which consists of three arms connected to universal joints, such that the orientation of the vessel is maintained. The motion speed will be coordinated with the slurry deposition rate, so that the thickness of each deposited layer is uniform.

Students
Amadeus Astacio, James Lombardo, Christian Nelson, Nicholas Viola

Research Mentor
Dr. Bay-Cheng

Title
Trailer Top Solar Tracking Sun Panel

Abstract
Energy in the form of electricity has become accessible virtually everywhere in our modern society. You can either tether yourself to a nearby outlet or eliminate the chord and carry the energy with you in a battery. Although this system serves the majority of energy consumers well, it still has its limitations. Electricity is flowing around us almost everywhere but we don't always have access to it, and battery charges have a relatively short shelf life given how much energy is actually demanded. With the advent of renewable energy sources, such as solar panels, a new degree of freedom has been added to the range of energy consumption. In designing a mobile solar tracking sun panel we hope to investigate the integration of the current paradigm of macro-scale energy production with an individualized renewable source so as to bring about new possibilities with respect to energy consumption.

Students
Dale Baran, Andrew Dexheimer, Brian Le Floch, Samuel Pawlyk, Steve Sutton

Research Mentor
Dr. Manoranjan Majji

Title
Quadcopter Platform for Infrastructure Inspection

Abstract
Maintenance of vertical infrastructure, such as buildings, bridges, and telephone poles, requires regular inspection for physical damage, cracks, thermal leaks, and other potential hazards. This is typically accomplished via visual inspection or imaging with devices such as infrared cameras. To do this, people and equipment must be elevated using ladders, bucket trucks, or other machinery. All of these methods put workers at high risk for injury and require time consuming setup. An autonomous aerial vehicle capable of performing this task could save time and money while increasing safety. A remote control quadcopter platform was built to serve this purpose. Sensors were added and control algorithms were developed to allow the quadcopter to hold a fixed distance from a wall autonomously while an unskilled operator controls vertical and horizontal motion across a side of a building. Furthermore, cameras are being integrated to automatically detect thermal leaks, cracks, and other anomalies.

Students
Rebecca Berg, Stephanie Bagatta-Ziel, Leslie McGee

Major
Biomedical Engineering

Research Mentor
Dr. Albert Titus

Title
Non-Contact Piezoelectric Bed Sensor for Asthma Research

Abstract
Approximately 20 million Americans suffer from asthma, a condition that involves inflammation of the airways in the lungs causing constriction or obstruction. Current asthma monitoring relies on daytime measurements and subjective recall of symptoms. There is a particular neglect regarding nocturnal asthma. The quality of respiration of an asthmatic is not monitored at night and is instead noted as restlessness or poor quality sleep. Currently there are no technologies readily available to monitor nocturnal asthma status non-invasively. This project aims to provide a research tool to help identify particular physiologic states which may be present in asthmatics at night. At a minimum, this device aims to capture nighttime respiration and heart rates using a piezoelectric sensor. Piezoelectric sensors have been shown to detect heart and respiration rates in the past and the design of this device will translate that technology to specifically monitor asthmatics.

Students
Ajit Bhat, Daniel M. Hall, Thiru Vikram Suresh

Research Mentor
Bina Ramamurthy

Title
Unmanned Surface Vehicle Control System

Abstract
The project aims to study the technological and commercial feasibility of robotic control systems for freight shipping, and develop a miniature proof of concept based on the findings.

Students
Michael Bill, Daniel Christian, Livio Forte III, Andrew Frauens, Akshay Gupta, Hao Li

Major
Mechanical Engineering

Research Mentor
Jennifer Zirnheld

Title
Robotic Arm Design

Abstract
The University at Buffalo Space Bulls team has designed a prototype planetary rover to compete at the NASA Johnson Space Center as part of the 2015 RASC-AL Exploration Robo-Ops Competition. In order to provide the necessary remote manipulation capabilities, a 2 segment arm with an end effector was used. The arm is driven by linear actuators from Frigelli in order to provide the necessary torque by taking full advantage of lever arms in addition to the power of the actuators, allowing for the appropriate power, precision, and range of motion for 4 degrees of freedom.In addition, 3d printed parts along with laser cut parts allows for rapid prototype of the one of a kind parts required. This combination of precision and build speed allows for rapid testing and integration of the arm onto the University at Buffalo Space Bulls team's prototype Rover.

Students
Mara Boardman, Andrew Harris, Kristina Monakhova

Research Mentor
Dr. John Crassidis

Title
The University at Buffalo Nanosatellite Mission "GLADOS"

Abstract
The purpose of this project is to design, build, test, and fly a small satellite mission—titled the Glint Analyzing Data Observation Satellite (GLADOS)—that will serve as a pathfinder for future small satellite platforms in support of Space Situational Awareness. This mission, which is funded through launch by the Air Force Research Laboratory's UNP-8 program, is currently in an advanced state of prototyping and testing. Our group outlines both the theoretical background for the mission and the current status of the satellite's hardware and software as we prepare for a mid-2017 launch opportunity.

Student
Avery Bodenstein

Major
Aerospace Engineering

Research Mentor
John Crassidis

Title
UB Nanosat EDR

Abstract
The UB Nanosatellite project is a UNP satellite project to design, build, test, and operate a 6U cubesat in low earth orbit. The project at the time of this grant had just entered its Engineering Design Review (EDR) where we traveled to Logan, New Mexico to present at the Small Satellite conference. This is not a fully CURCA funded project, however the CURCA funding allowed additional members of the team to fly to Logan to present.

Students
Avery Bodenstein, Mack Goodstein, Andrew Harris, Kristina Monakhova

Research Mentor
Manoranjan Majji

Title
Synthetic Aperture Radar for UAVs

Abstract
The purpose of this project is to design, build, and test a synthetic aperture radar system for use with UAV platforms. The radar setup, which is based off of a low-cost MIT SAR project, makes use of novel integrated systems to reduce its bulk. At present, analysis and design of the complex radar system is underway and testing plans have been developed.

Students
Daniel Buckmaster, Walker Gosrich, Alberto Padovan, Javier Yu

Research Mentor
Dr. M. Amin Karami

Title
Morphing Wing Aircraft Using Piezoelectric Actuators

Abstract
Using macro-fiber composites as aircraft control surfaces, rather than the hinged flaps of current aircraft, decreases energy and fuel consumption, and can increase wing versatility along with the aircraft's range and endurance. The purpose of this project is to design and fabricate these morphing-wing aircraft control surfaces using piezoelectric actuators. In the first phase of our project, we are fabricating the horizontal stabilizer control surfaces of our aircraft, and testing them under unloaded and loaded conditions. By this process, we will calibrate the control of the actuators, so that the pilot experiences the same reaction from the morphing wing as he would from a normal, hinged-flap wing. This, along with hysteresis analysis of the actuators, will remedy many of the problems experienced by other morphing-wing aircraft, which caused them to be almost impossible to control. By the conclusion of the project, we will have constructed and conducted flight tests with a fully morphing-wing aircraft.

Students
Max Carletta, Nicole Griffin, Richard Izzo, Ryan Shaw

Research Mentor
Ciprian Ionita

Title
Development of an Occlusion-Delaying Cerebral Shunt for the Treatment of Hydrocephalus

Abstract
Hydrocephalus is a disease characterized by increased intracranial pressure due to build-up of cerebrospinal fluid within the brain. The condition is most commonly diagnosed at birth, presenting in ~1/1000 newborns. While no cure exists, the most common treatment is ventriculoperitoneal shunting. While effective in the short term, shunt failure rates are reported (in the pediatric population) at 10% within one year and 50% within two years. A large majority (>70%) of these failures are attributed to ventricular catheter occlusion by brain parenchyma. We used a two pronged approach to understand shunt design factors which contribute to this occlusion process. A computational fluid analysis was conducted via ANSYS CFX to simulate a novel (anatomically accurate) 3D model of ventricle-shunt system. We then applied particle image velocimetry to a 3D printed water-table setup to expand upon these results. Finally, we propose novel shunt designs which our models predict to lower occlusion rates.

Students
Po-Han Chen, Junyi Liu

Major
Chemical Engineering

Research Mentor
Haiqing Lin

Title
Thin Film Composite Membrane with PTMSP Gutter Layer

Abstract
The emission of greenhouse gas CO2 is believed to have impact on global

climate change. One of the approaches to mitigate the CO2 emissions is to capture CO2 from the flue gas at the fossil fuel based power plants. Membrane technology is an attractive way for CO2 capture, which relies on thin film composite membranes with high CO2 flux and high CO2/N2 selectivity. Thin film composite membranes generally contain three parts: a support layer as base, an intermediate gutter layer, and a selective layer on top. The objective of this project is to develop a defective-free intermediate gutter layer for the thin film composite membrane, and a new type of metal organic frameworks (MOFs) as a central component for the selective layer. Composite membranes with the gutter layer of polytrimethylsil ylpropyne (PTMSP) were prepared and characterized. The MOFs were prepared and characterized. The presentation will provide an overview of this work and the future work plan for the membrane development.

Students
Kristian Dalland, Benjamin Kuch, Karthik Yerrapragada, Prince Joseph

Research Mentor
Amin Karami

Title
Wave Energy Harvester

Abstract
The purpose of this project is to investigate and eventually optimize the dynamic system of a wave energy harvester. A model was built in order to further analyse the system. The model was tested in the Jarvis flume with our own wave generator. These tests are ongoing as the project has not yet been completed.The current model incorporates three different generator fixtures each with its own pendulum to absorb wave energy. The first two fixtures are oriented to capture energy from the roll and pitch movements of the model while the third is a vertical axis pendulum which generates better the closer the model is to a pitch, roll ratio of two.

Student
Robert DeBortoli

Major
Computer Engineering

Research Mentor
Dr. Karthik Dantu

Title
Indoor Feature Detection For Micro-Aerial Vehicle Swarms

Abstract
This project focuses on micro-aerial vehicle control and perception. Specifically, we have programmed the Bitcraze Crazyflie to control its flight using onboard inertial sensors. Given that aerial vehicle control is very hard using just inertial sensors, we will explore the use of light-weight, low-power vision sensors, perform on-board image processing, and use vision perception for better MAV control. We hope to extend this work to perform topological mapping of an indoor scenario using the same vision sensors. This work has many potential applications including disaster search-and-rescue, item delivery, as well as building surveillance.

Prior work: https://www.youtube.com/watch?v=i2Repl2cA5c

Students
Nicholas Delgobbo, Xiao Li, Kwangil Suh, Jingyan Yang

Research Mentor
Jee Eun Kang

Title
Constructing Activity-Mobility Patterns of Students Based on UB Card Transactions

Abstract
The primary goal of this research is to construct activity-mobility patterns of students based on their UB card transaction.

The research project has two different stages. The first stage consists of the development of algorithms that construct students' continuous paths in space-time dimension using a set of UB card transaction data points as our input. The base algorithm will construct of activity-mobility patterns with no prior knowledge. The modified algorithm will construct activity-mobility patterns with prior knowledge of students' prior pattern as they have similar patterns for certain days of the week.

With our second stage, a survey will be conducted to provide detailed information of the students' daily routine from home to school and back. When comparing the survey data with the algorithm results, we will be able to analyze the performance of our algorithms. Our anticipated results will be that our algorithms created can find a more efficient critical path movement throughout the campus than the real life collected data.

Student
Christopher Diaz

Major
Industrial Engineering

Research Mentor
Jun Zhuang

Title
TSA PreCheck Parallel Screening Model in the Face of Strategic Applicants

Abstract
In security check systems, tighter screening processes increase the security level, but also cause more congestion for normal applicants. Having to deal with more congestion in lines also could cause issues for the screeners, making the job a lot harder. The TSA Precheck program was introduced to create a lane in airports with the goal of expediting passengers that the TSA deems to not be a threat. In this lane the TSA allows passengers to enjoy less restrictions in order to speed up the time spent screening the applicants. Motivated by the TSA Precheck program, we study parallel queueing imperfect screening systems, where potential normal and adversary applicants decide whether to apply to the Precheck program or not.

This research integrates game theory and queueing theory to study the optimal screening policy and provides sensitivity analyses in two parallel queueing imperfect screening systems.

Students
Gaurang Dimri, Nazia Hasan, Stephen Schneider

Research Mentor
Robert Baier

Title
Nitrous Oxide Detection in Dental Operatories

Abstract
Nitrous oxide exposure levels in dental operation rooms were shown to be as high as 1000 ppm instead of the recommended 50 ppm. Overexposure can result in adverse health effects such as neurological, renal, and liver disease. Current N2O detection methods are not used in dental offices because they are very costly. Our proposed solution is a cheaper alternative using a contact potential device, which uses alpha particle emission to measure the work (delta V) required to remove an electron from the interior lattice of two solids to an external point at zero potential. It has been hypothesized that a specific concentration of N2O will correspond to a specific delta V reading on the contact potential, which can be used to detect overexposure.

Students
Nick DiRienzo, Brijesh Rakholia

Major
Computer Science

Research Mentor
Geoffrey Challen

Title
Progresso: Quantifying Mobile App QoE by Measuring User-Facing Events

Abstract
Mobile applications (apps) are used daily by billions of people worldwide. Mobile app developers aim to produce the best user experience possible. Unfortunately, Android's fragmented smartphone ecosystem makes it difficult to build apps that meet every user's expected Quality of Experience (QoE). To provide developers with feedback on their app's QoE, we use indicators from the smartphone screen to provide a quantitative measure of QoE. Through events such as progress bars, screen redraws, and other user-facing low-level platform events, we quantitatively measure user-perceived latency between users' physical actions (e.g. typing or clicking) and the corresponding digital responses (e.g. updated content or new screens). We provide these measurements to developers through Progresso, a modified version of the Android platform, which allows them to improve their apps' QoE and reduce overall user frustration and time wasted in apps.

Students
Lei Fang, Max Simon

Research Mentor
Dr. Blaine Pfeifer

Title
Novel Variable Modifications to Polyketide Synthase Pathway and Screen Process for Complex New Natural Products

Abstract
Polyketide synthesis (PKS) pathway modifications offer a limitless diversity of products. Soil microbes, such as the Acidobacteria phylum, are physiologically diverse, however their unique composition does not allow them to be easily cultured in vitro. These bacteria have been found to be rich in polyketide production and are a desired focus for polyketide discovery, specifically antibiotics compounds. Environmental DNA (eDNA) offers a new route to examine these PKS pathways and assay their antibacterial activity, as well as potential for their antitumor and antiviral properties. eDNA transformed into Escherichia coli contain a sequence of genes to be tested for antibiotic activity. These samples plated against another bacteria, Bacillus subtilis in both liquid and solid agar, to determine their antibiotic activity. Even when these compounds are discovered, their efficacy decreases with bacteria becoming resistant to their effects. Chimera compounds, utilizing the deoxysugars, loading domains, and PKS pathways of different, known PKS pathways, offer an untapped source of novel antibiotics, for which no bacterial resistance has yet to be seen. Erythromycin, a common antibiotic, has faced resistance from a multitude of prevalent bacteria today. Its synthesis consists of iterative addition of carbons to form the erythromycin precursor, 6-deoxyerythronolide B (6-dEB). This then undergoes post-translational modification with the addition of two-deoxysugar groups and methyl-hydroxylation. Through the genomic modification of the loading domain and diversifying which molecule the synthesis begins with, as well as the sugar groups that are added onto the molecule, novel compounds can be formed that exhibit greater antibiotic activity than erythromycin.

Students
Steven Fatscher, Michael Herr, Kyle Mentkowski

Research Mentor
Ferdinand Schweser, PhD

Title
Magnetic Resonance Compatible Four Dimensional Vascular Brain Model

Abstract
The four dimensional brain vasculature flow phantom will be used in medical research to visualize and quantify blood flow through and around different vascular pathologies. Our model will allow events such as aneurysm and stenosis to be studied without the need for an actual patient.

Students
Daniel Filipski, Piyush Kathuria, KeyOnna Miller, Zack Salim, Alina Swierski, Megan Yoerg

Research Mentor
Dr. Kris Schindler

Title
The UB Talker

Abstract
The UB Talker is an augmentative and alternative communications device for the speech impaired. Additions and modifications were made to the UB Talker in order to accommodate ALS patients. Those suffering from ALS lose the ability to speak and the mobility of their extremities. As a result, conventional means of using a computer or tablet device are no longer effective. The challenge is in implementing hardware and software in a way that would be easiest for people at this disadvantage to use. Hardware, such as a brain-computer interface, increases the ease of accessibility for the UB Talker, whereas efficient word prediction and auto-scanning techniques allow the UB Talker software to facilitate communication as effectively as possible.

Students
Nalini Gadkary, Erin Giangreco, Nikita Kumar, Asmah Shafie

Research Mentor
Ciprian Ionita

Title
Determination of Hydraulic Resistance of Endovascular Stents

Abstract
Stents are medical tools used to aid in the treatment of aneurysms and a variety of other medical conditions, such as clogged arteries. However, insertion of stents into blood vessels can disrupt the normal blood flow, causing blockages in the vessels and unsuccessful treatment of the disease. Such complications are due to unaccounted resistances which are related to hemodynamic factors such as differences in pressure and blood velocity. Therefore it is necessary to design a testing device that measures the resistance of stents under such biologic conditions. In this project we intend to design a system with pressure control. The testing device will contain two pressure chambers, one of which will be set at a constant value and a second which will have variable pressure values. It will also simulate an endovascular environment with a stent in place in a vascular phantom to provide reliable data. A sensor will be used to send signals to a valve in order to control the flow at a secondary pressure chamber which will allow us to adjust the pressure variations according to a set value. The sensors will also provide digital feedback to a computer of the pressure and flow rate readings. This measurement device will be used to calculate the vascular resistance caused by a stent and improve the efficiency of stent designs for successful medical treatments.

Students
Eric Ghiandoni, Alexander Podgorsak

Research Mentor
Matthew Podgorsak, PhD

Title
Development of a Multi-Modality Imaging QA Phantom for Gamma Knife Radiosurgery

Abstract
Currently, there does not exist a single unified phantom that can be used in the evaluation of the spatial accuracy of CT, DSA, and MR images used in planning stereotactic radiosurgery treatments. Our project aims to design a phantom that can be used to evaluate the spatial accuracy of all three modalities sequentially. The benefit of using a phantom such as this will be an increase in the confidence of the spatial information obtained using the three modalities. CT, DSA, and MRI units could be calibrated to a single standard, which means increased accuracy of the information that the imaging modalities provide.

Students
Jessica Glauber, Erica Marron, Kayleigh Miller, Diana Rudz

Research Mentor
Ciprian Ionita

Title
Study of Mechanical Forces During Nitinol Stent Catheter Loading

Abstract
Carotid Artery Disease affects up to three percent of the general population and can result in ischemic stroke due to hardening or blockage of the artery. Neuro-angioplasty is a technique used to reopen blocked vessels and is performed using nitinol stents that are crimped and placed into catheters for delivery. This project examines the method Toshiba Stroke and Vascular Institute researchers use to load stents into catheters as well as the force that the stent sustains during this process with the aim to increase efficiency of stent loading and decrease damage to stents. This is done through creation of a motorized stent pusher that can also sense the amount of force being placed on the stent. The maximum force is determined through a variety of force tests. The motorized stent pusher and study of force allow for more time and money to be spent on important aspects of neuro-angioplasty research.

Students
Gabrielle Gosset, Alex Horn, Tomasz Pietruszka, Kyle Zalud

Research Mentor
Jennifer Zirnheld

Title
Closed Loop Control System for Planetary Rover

Abstract
The University at Buffalo Space Bulls team has designed a prototype planetary rover to compete at the NASA Johnson Space Center as part of the 2015 RASC-AL Exploration Robo-Ops Competition. To achieve the system response in real time and optimize control capabilities of the rover the NI myRIO hardware embedded device has been implemented. The NI myRIO is a portable reconfigurable I/O (RIO) device that combines ARM® Cortex™-A9 real-time processing with a Xilinx FPGA. Programming of the myRIO is done in LabVIEW, a graphical programming language. Using the myRIO and external circuits, real time measurements of temperature, acceleration, axis tilt, direction, voltage, and current of the system is displayed to the user. To control the arm rock aquisition system

on the rover with more precision and speed, the myRIO receives an input from the user that drives the servo motors and linear actuators accordingly.

Students
Johannes Hachmann, Bryan Moore, Ching Yen Shih

Research Mentor
Johannes Hachmann

Title
Discovering and Analyzing Trends in Data from Different Quantum Chemical Models

Abstract
This research project was designed to examine and compare various Density Functional Theory data that has been compiled for over 11 Million Geoms. We focused our efforts on recognizing certain correlations between data by mapping two different DFT flavors against each other and setting a linear regression line to test it's correlation.

We have found that most of the DFT flavors have an overall linear relationship, which was a tremendously important breakthrough in our research and made the continuing of our analysis very relevant.

Finding trends in the DFT data and realizing which flavors can appropriately model certain chemical compounds will have long reaching implications for the use of different approximations.

Students
Spencer Heyden, Nicholas Lanzano, George Melero, Zachery Willis

Research Mentor
Edward M Kasprzak

Title
Research On Tubular Space Frames For Off-road Vehicle Applications

Abstract
Research, design, optimize, build and validate a tubular space frame for offroad vehicle applications. The frame design process should balance the effects of frame geometry on suspension design, weight minimization and stiffness-to-weight ratio optimization. Once constructed, the completed frame should undergo physical testing to determine how closely design predictions were met.

Students
Kaipin Huang, Haiqing Lin, Shawreen Manish Shah, Shizhong Zhao

Research Mentor
Haiqing Lin

Title
Understanding Zwitterionic Membrane

Abstract
The ability of recovering and reusing the wastewater is an effective way in reducing the manufacturing cost in a green manner. Polymeric membranes have become an important separation technology for wastewater treatment due to its low cost, and high energy efficiency. These membranes allow pure water to permeate and reject the contaminants in the water, thus achieving the separation. However, many foulants may attach to the membrane surface, leading to fouling and lower water flux through the membranes. We propose to mitigate the fouling by coating a thin hydrophilic layer on top of the membrane, reducing the fouling. More specifically, the goal of this project is to evaluate a series of copolymers of zwitterionic polymers and poly(ethylene glycol) as the coating layer for membrane surface modification. This presentation will discuss the synthesis and characterization of these polymers, including the water sorption, flux and contact angle.

Student
Weiguang Jia

Major
Chemical Engineering

Research Mentor
Haiqing Lin

Title
Characterization of Porous Membranes using Dusty-Gas Model

Abstract
In this work, first the supported membrane were prepared with three different structure of membranes. Then the permeance of He, N2, CO2 and CH4 gases in different pressure gradient was investigated in a self-designed membrane module. According to dusty-gas model, using the relationship between permeance and pressure to determine pore size and porosity of support later in the membrane. The experimental results were compared with data provided by the manufacturer, through comparing the data, which can be judged whether dusty-gas model was applied to structural characterization of practical support membranes.

Student
Stephanie Kong

Major
B.S. Chemical Engineering
B.A. Spanish

Research Mentor
Professor Paschalis Alexandridis

Title
Micellization Studies of Branched Alkyl Ethoxylate and Branched Alkyl Alkoxylate Surfactants

Abstract
Non-ionic surfactants are important for a wide range of industrial applications including detergency, stabilization, and emulsification. These macromolecules play a critical role in oil-spill cleanup by stabilizing oil-in-water emulsions produced in the presence of nanoparticles, cosolvents, and other ionic or nonionic surfactants. This study investigates the effect of molecular architecture on micellization thermodynamics in aqueous solutions for a homologous series of Lutensol® nonionic surfactants. The two surfactant families studied are branched alkyl ethoxylate and branched alkyl alkoxylate surfactants. To our best knowledge, this is the first study that attempts to

analyze single-branched surfactants. To conclude this study on molecular architecture, we additionally analyze the thermodynamic effects of 1) the ethylene oxide-based (EO) head group and 2) the propylene oxide (PO) segment which exists within the (EO) head group of the alkyl alkoxylate family. Conclusions from this study are useful in predicting interactions between oil and water in complex aqueous environments.

Student
Henry Kwan

Major
Mechanical Engineering

Research Mentor
Jihyung Yoo

Title
OFDR-Based Measurements of Transient Temperature Distributions

Abstract
It's very difficult to measure temperature distributions at discrete locations and time with current devices used today. But, it's also very important to be able to have data on temperature distributions in engines, train tracks, airplanes, and many other places for safety and efficiency. This Optical Frequency Domain Reflectometry (OFDR) Temperature Sensor allows us to not only measure temperature at discrete locations and time, but also with high spatial resolution. By using widely available optical telecommunication equipment, this OFDR setup can be replicated on an affordable budget.

Students
Debrup Laha, Ansh Pandey

Research Mentor
Dr. Deborah D.L. Chung

Title
Toward Practical 3D Metal Printing

Abstract
Due to the high strength of metals compared to polymers, it is important to extend the three-dimensional (3D) printing technology from polymers to metals. However, due to the high temperatures associated with metal processing, this extension is not simple. This project is developing a novel 3D metal printing technology that is cost-effective and applicable to the printing of large metal objects such as cars. Current technologies of 3D metal printing are not applicable to the printing of large objects, due to their low deposition rate, high electric power requirement, low precision and/or high cost. The principle behind the novel printing technology has been developed by Professor Chung (SUNY faculty mentor) and an invention disclosure has been filed with the university (UB STOR Docket R-6934). It is estimated that the novel printing technology will allow the printing of a car in as little as 7 hours.

Student
Margaret Lawn

Major
Aerospace Engineering and Mechanical Engineering

Research Mentor
Dr. Ehsan Esfahani

Title
Using Shape Memory Alloys in Lightweight Origami Springs

Abstract
Origami-inspired engineering is the design of two-dimensional systems which can be induced to fold into complex three-dimensional structures. Shape Memory Alloys (SMAs) are materials that have the ability to memorize shapes through a thermally induced solid state phase transition; that is, they can change shape with the application of heat. These alloys represent an effective alternative to traditional actuation systems because they are lightweight, silent, mechanically simple, and can tolerate high strain. Complex structures, when used in conjunction with SMA actuators, can be remote-controlled, adaptable, or self-assembling. The use of SMA actuators with origami design produces constructions that are lightweight, compact, and transportable for deployment at some final location. This project investigates the use of SMA wires and sheets in the actuation of an origami spring assembly, aiming to achieve ultra-lightweight one-dimensional actuation with a high strength-to-weight ratio.

Student
Tho Duc Le

Major
Chemical Engineering

Research Mentor
Dr. Haiqing Lin

Title
Hyflon AD 80 Composite membrane for Gas Separation Process

Abstract
Membrane is an important separation technology over the past decennia due to its simplicity in operation, compactness and high energy-efficiency. The membrane process does not need an addition of chemicals and is a green technology for separation. Glassy polymers, due to their rigid polymer chains and strong size sieving ability are promising materials for gas separation. The glassy perfluoropolymers have attracted significant interests for gas separation due to their high permeability and selectivity, as well as good mechanical properties, chemical resistance, and excellent film forming properties. The goal of this project is to investigate the gas separation properties in a commercial perfluoropolymer, Hyflon AD 80. We have made thin film composite membranes. The effect of film thickness on the gas separation properties is studied. This presentation will also discuss the time dependence behavior of gas permeance and selectivity.

Student
Yi Jui Lee

Major
Mechanical Engineering

Research Mentor
Venkat Krovi

Title
Bluetooth Interfaces with Robotic Systems

Abstract
The purpose of this project is to leverage Bluetooth with MATLAB to communicate and manipulate robotic systems wirelessly. A working example for the tele-operated robot using a gesture based mechatronic controller would also be demonstrated.

Student
Sharon Lin

Major
Chemical Engineering

Research Mentor
Dr. Blaine Pfeifer

Title
A Study on Gene Therapy: Using Poly (β-aminoesters)

Abstract
Gene delivery is the process of administering therapeutic genes to a patient's cells, where upon uptake, their modulation of the protein expression patterns in the host can result in a desired phenotype. This is especially beneficial for the treatment of a large number of diseases at the genetic level, including cancer. Cationic polymers, which are known for their ease of synthesis that can allow for a large library of polymers to be created for studies, have garnered much attention as potential gene delivery vectors. One type of cationic polymer, poly (β-aminoesters) (PBAEs), is being utilized as a potential type of vector for gene delivery. Unlike other vectors that have been observed in the past, which include viral vectors, poly-L-lysine [PLL], and poly(ethylene imine) [PEI], PBAEs are structurally diverse and non-cytotoxic. In addition, PBAEs are easily synthesized (via Michael addition), biodegradable, and capable of controlled DNA release into the cell.

Student
Michael Morse

Major
Chemical Engineering

Research Mentor
David Kofke

Title
Analysis of Multistate Bennett's Acceptance Ratio

Abstract
In 1976, Bennett introduced a technique to optimize Monte Carlo estimation of free energy differences. Although this "Bennett's Acceptance Ratio" (BAR) method improved previous one-sided exponential averaging methods, it had the limitation of only pertaining to two systems. Subsequently, methods to handle multiple states were introduced, such as the Weighted Histogram Analysis Method (WHAM). These methods however have some drawbacks, such potential to yield biased results, and difficulty of evaluation their statistical uncertainty. In a 2008, Shirts generalized BAR into a multistate method (MBAR) claiming to be the "statistically optimal way of analyzing same form multiple equilibrium states" that avoided shortcomings of the WHAM. In this project, we examine BAR and MBAR through the simple problem of evaluation of the area of overlap of different shapes. This problem has much in common with the general free-energy calculation problem, but provides a way to understand the methods more intuitively, possibly leading to routes for their improvement.

Students
Ryan O'Hara, Megan Russ, Swetadri Vasan Setlur Nagesh, Maxim Mokin, Carlos Jimenez, Adnan Siddiqui, Daniel Bednarek, Stephen Rudin, Ciprian Ionita

Research Mentor
Dr. Ciprian Ionita

Title
3D Printing Phantoms for Image-Guided Neuro-Vascular Intervention Treatment Planning

Abstract
The purpose of this study is to evaluate the feasibility of using 3D printed phantoms of patient vasculatures in order to increase the benefits of endovascular therapies through treatment planning and reduce the high costs of device research. We used de-identified Computed Tomographic Angiography (CTA) data from real patients and segmented vessel geometries as stereolithographic (STL) files using a Toshiba Vitrea 3D station. Mesh-editing software and a 3D printer were used to generate the individual structures. A full vascular model of the endovascular treatment process was manufactured using CTA image data from the Circle of Willis, coronary arteries, aorta, and femoral arteries. Endovascular interventionists reported positive results about the full model's similarity to patients after performing mock procedures. Full vascular replicas of patient vascular anatomy allow interventionists the ability to efficiently train and determine treatment solutions, such as stents or coiling, before operating on patients with complex vascular anatomies.

Students
Kaitlynn Olczak, Joshua Reich, Gregory Salamone

Research Mentor
Dr. Andrew Ray

Title
Weight Reducing Treadmill System

Abstract
Patients with COPD can have their condition treated by exercise. In order to make exercising easier for them, a system that removes some of their weight and lightens the load on their respiratory system will enable the patients to work out longer and therefore receive more treatment.

Student
Kyoung Eun (April) Park

Major
BS in Computer Science

Research Mentor
Jun Zhuang

Title
Modeling Attacks and Defenses of Operating Systems in Driverless Cars using Game Theory

Abstract
Automobile companies have competed fiercely to create the best autonomous car technology. Autonomous cars utilize operating systems, which creates some cyber-security concerns for the safety of the passengers. Unfortunately, such concerns have not been thoroughly studied in the literature. We develop a game-theoretical model to demonstrate strategic interactions between an autonomous car's operating system and a hacker. Then we analyze their trade-offs by using Nash equilibrium. The framework provides some robust attack and defense strategies against the worst-case scenario in cyber-security. We provide an initial approach for the effective decision-making development of operating systems in autonomous cars for real-life.

Students ♀ ♂
Lauren Roberts, Nicolette Scerra

Major
Biomedical Engineering

Research Mentor
Richard Ohrbach

Title
Optimizing Effects of Brain Stimulation

Abstract
Transcranial Direct Current Stimulation (tDCS) is a form of non-invasive electrical neurostimulation that uses sponge electrodes on the scalp to deliver constant current to an area of the brain. This stimulation facilitates synaptic activation, enhancing neuroplasticity and learning. We previously demonstrated that variation in how tDCS is applied can affect outcomes. Consequently, this open-label study aims to determine the effects of tDCS on learning as measured by responses to a new reaction time task. Laboratory personnel will serve as subjects. Anodal stimulation is applied over the motor cortex, and a decrease in reaction time is anticipated. During a tDCS session, subjects respond to a 4-choice reaction time task where visual stimuli are presented in different positions on the computer screen and each keyboard choice corresponds to the location of the stimuli. The data will be analyzed to determine within-subjects differences between normal vs tDCS-stimulated reaction time.

Student ♂
Robert Swick

Major
Environmental Engineering

Research Mentor
Dr. James N. Jensen

Title
Effectiveness of Muslin Fabric Filtration for Drinking Water Treatment in Developing Countries

Abstract
Little work has been done to apply the scientific method to optimize fabric filtration. In this work, laboratory experiments were conducted to quantify the extent to which different types of fabric removed turbidity from different water sources. These experiments involved testing several types of muslin fabric and measuring the influent turbidity, effluent turbidity, water flow rate, and hydraulic conductivity of the fabric. Independent variables included the numbers of layers (1 to 8), fabric type (bleached and non-bleached), initial water turbidity, and fabric thread count. As expected, the most effective filtration was achieved with the highest number of layers of high-thread-count fabric. Unbleached fabrics typically showed better performance than bleached fabrics. The percent turbidity remaining after filtration decreased exponentially with the number of fabric layers, in accordance to filtration theory through granular media. The data obtained can be used to empower people in developing countries in providing safe drinking water for themselves.

Students ♀ ♂
Kyle Thompson, Mack Ward, Scott Will

Research Mentor
Jennifer Zirnheld

Title
Micromouse: An Autonomous Maze-Solving Robot

Abstract
Micromouse is an event in which teams of participants construct robots that attempt to autonomously traverse and solve planar mazes in as little time as possible. A common strategy adopted by competitors is a two-stage process. First, a mouse explores the maze and incrementally generates a virtual representation of the maze layout. Then, it computes the optimal path and returns to the starting position to move along the optimal path towards the goal. To reduce the amount of time our robot spends exploring the maze, we propose a different strategy: using a camera mounted on the mouse at sufficient height and techniques from computer vision and image processing, generate an image of the maze from the perspective of a viewer looking down from above, extract the locations of the maze walls programmatically, and proceed to solve the maze by directly moving to its center.

Student ♀
Min Wei

Major
Chemical Engineering

Research Mentor
Haiqing Lin

Title
Determining the Effect of Plasticizers on Cellulose Triacetate for CO2/ CH4 Separation

Abstract
The removal of CO2 from natural gas is an important step in the natural gas processing, which is estimated to have $1 billion market. Currently, there are two methods which be mainly used in gas separation, amine absorption

technology and polymeric membranes. Amine absorption is cumbersome and energy intensive. In contrast, polymeric membranes are economical and reliable. Cellulose triacetate (CTA) is a common material for polymeric membranes in the industry. However, due to the high crystallinity of CTA, the permeability for CO2 is very low. The approach for this project is to dope small molecular size of plasticizers, triethyl citrate (TEC), triethyl 2-acetylcitrate (TEAC), or glycerin triacetate (GTA) into CTA, developing amorphous CTA. Doping with plasticizers can reduce the crystal formation in CTA, and increase CO2/CH4 selectivity. This paper would provide an insight of the findings for new membranes through FTIR, TGA and XRD studies.

Honors College

Student
R. Jamie Asbach, Brian Kiel

Major
Mechanical Engineering

Research Mentor
Dr. Tarunruj Singh

Title
Development of a Low-Cost Sky Imager

Abstract
Sky imaging is a very useful practice for predicting cloud cover and thus solar energy availability. With this technology, it is possible to decipher when conditions are optimal for harnessing the sun's energy at solar power plants. A sky imager is a relatively small, weatherproof device equipped with a camera used outdoors to view the sky. In the most basic sense, a sky imager generally consists of three elements: a camera used to record a direct or reflected image of the sky, an arm or device used to block direct sunlight, and a digital video transmitter coupled with image processing software. This project is specifically being conducted to see if an inexpensive sky imager can be constructed and used to collect data necessary for forecasting the motion of clouds, and available sunlight.

Student
Yun Beom Lee

Major
Biochemistry and intended Neuroscience

Research Mentor
Caroline E. Bass

Title
Knockdown of presynaptic D2 receptors from mesolimbic and nigrostriatal terminals: and mRNA analysis

Abstract
Recent studies in our laboratory show that the D2 dopamine receptors(D2R) modulate the expression of the receptors in the striatum. However, D2R is also found on presynaptic terminals, and it is unknown now their expression modulates other relevant presynaptic receptors. Striatal D2R effects are difficult to study since it is very hard to distinguish between activities at pre and postsynaptic sites. To overcome this we infused recombinant adeno-associated virus (AAV) that produces short hairpin RNA (shRNA) targeted to D2R into the Ventral Tegmental Area (VTA) and Substantia Nigra (SN). The resulting D2R knockdown in the striatum will be restricted to dopaminergic terminals and therefore only the presynaptic receptor will be affected. We then collect tissue punches for mRNA analysis to determine how presynaptic D2R knockdown will impact the expression of other neurotransmitter systems.

Student
Kristen Brooks

Major
Biochemistry and Geological Sciences

Research Mentor
Dr. Gail Willsky

Title
Comparison of the Toxicity of Individual Plants and Plant Mixtures Used by the Curanderos of Northern Peru to Treat Infectious Disease

Abstract
Northern Peruvian curanderos have traditionally used mixtures of local plants to treat infectious diseases. We hypothesized that 2-plant mixtures would exhibit lower toxicity than the individual plants, and tested this using brine shrimp toxicity assays in three 2-plant mixtures (Pimpinella anisum/Mentha spicata, Tagetes filifolia/ Mentha spicata, and Apium graveiolen/ Petroseliumum crispum. Serial dilutions of plant extracts were added to brine shrimp, and the dead shrimp were counted one day later. The LC50, the concentration necessary to kill 50% of the shrimp, was calculated from percent survival curves. LC50 values ranged from 0.49 to 1.35 mg/mL in the tested plant extracts. The extract of one 2-plant mixture (T.filifolia/M.spicata) exhibited lower toxicity than the extracts of either component plant (higher LC50). The 2-plant mixture that exhibited lower toxicity when compared to its individual components merits further study and demonstrates the use of this toxicity assay in the search for new antibiotics.

Student
Dylan Burns

Major
Architecture

Research Mentor
Erika Abbondanzieri

Title
"Building Wellness: Revitalizing a Community and its Verdure through Architectural Design"

Abstract
Architecture impacts everyone for every minute of every life. Architectural design, or lack thereof, is completely tied, both directly and indirectly, to the wellness of individuals, ranging from social, to physical, to intellectual, to environmental. Accommodating this and conceiving of innovative solutions are inherent roles of the architect. Often though, they are relegated to generic solutions while other elements of design comprise the soul of a project.

This project focuses on wellness as a driving force of design. By approaching the project with a logic that the wellness of the city begets the wellness of the individual, design choices were geared towards creating a system that would be most beneficial to the neighborhood in which the project resides.

Located nearby the burgeoning medical campus, the project seeks to create a neighborhood asset by accommodating the needs of its residents and workers through accessible programming and the implementation of strong urban environmental design principles.

Student
Lauren Carnevale

Major
Biochemistry

Research Mentor
Dr. Gail R. Willsky

Title
Antibacterial Activity of Medicinal Plants Used to Treat Infectious Disease in Northern Peru

Abstract
OBJECTIVE: In order to compare the treatment used by the curanderos (native healers) with Western medicine practice, the antibacterial activity of plant extracts (Acanthoxanthium spinosum, Borago officinalis, Desmodium mollicum, Phyllantus niruri, Picrosia longifolia, Uncaria tomentosa, and Mentha spicata) was measured.

HYPOTHESIS: The plant extracts will have antibacterial activity.

METHODS: Plants were purchased, dried, and ground. Alcohol extracts were prepared, concentrated, dried, re-suspended in boiling water, and sterilized. Bacterial growth inhibition against S.aureus and E.coli was measured spectrophotometrically at various extract concentrations.

RESULTS: Data was normalized to percent growth and IC50 values were calculated. Plant extracts were more efficacious against S. aureus than E.coli. The IC50 of plants used for infections against S.aureus was 0.15-6.5 mg/mL. Two of these had IC50 values against S. aureus <1 mg/mL.

CONCLUSION: Antibacterial activity was observed in all plants. Further study of plants with high anti-bacterial activity could identify new antibiotic compounds.

Student
Sampurna Chakrabarti

Major
Biological Science B.S., Psychology B.A.

Research Mentor
Malcolm M. Slaughter

Title
Comparing Antagonistic Effects of Ginkgolide B and Picrotoxin on alpha 3 Glycine Receptors

Abstract
Ginkgolide B (GB) and Picrotoxin (PTX) are antagonists to the major inhibitory receptors of the Central Nervous System: the GABA and Glycine Receptors (GlyRs). There are four known alpha subunits isoforms of GlyRs; amongst which alpha3 and alpha4 are poorly understood. This study seeks to compare how GB and PTX block homomeric alpha3 GlyRs expressed in HEK 293 cells by whole-cell patch clamping. The recovery from liganded block by 100μM GB was significantly slower than unliganded block but no such distinction was found between liganded and unliganded block of 1mM PTX. This property is unique to alpha3 subunits since alpha1 and alpha2 subunits are unblocked in unliganded state. Interactive effects of GB and PTX on homomeric and heteromeric alpha3 will be studied in future.

Student
Steven James Coffed, Corey Needle

Major
Mechanical and Aerospace Engineering

Research Mentor
Dr. Paul E. DesJardin

Title
Experiments in Upward Flame Spread

Abstract
Running small scale experiments in upward flame spread allows for the determination of both material and thermochemical properties. Data can then be compared with accepted models that predict how materials behave when they combust. The theory being used for validation in this project is upward flame spread theory. Data points are extracted using DSLR cameras, mass balances, and temperature measurement tools. In our experiment, we observe and record the combustion of Polymethyl Methacrylate (PMMA), also known as Plexiglas. This project seeks to build upon experiments previously performed, by incorporating several high precision methods of data collection for parameters such as mass loss rate, flame height, and thermal gradient. These experiments will be used to create a database of combustion properties for various materials, which can then be used in CFD combustion models.

Student
Thomas Effland

Major
Applied Mathematics

Research Mentor
Dr. Bina Ramamurthy

Title
Focused Retrieval of University Course Descriptions from Highly Variable Sources

Abstract
Finding topically relevant content from disparate sources on the Web requires robust techniques due to the variability of sites. A focused web crawler is a type of crawler that attempts to make predictions about page relevance and traverse the web efficiently. In this work, we design a novel system of focused crawling tailored to identifying and extracting semantically similar topical

information from disparate but known seed domains with highly variable structure that do not reference each other. We first extract rich predictive features from web pages. We then utilize Weakly-Supervised Machine Learning techniques to predict the link distance of current pages to target pages by employing two separate Random Forest classifiers that rank the current page and potential relevance gain of hyper-links. We use these page representations and rankings to efficiently tunnel through irrelevant pages and reach target pages efficiently.

Student
Emma Janicki

Major
English

Research Mentor
Dr. Jean-Jacques Thomas and Dr. Steven Miller

Title
Marguerite Duras: Alcoholism, Desire and Woman's Writing

Abstract
This Honors College and English Honors Thesis explores the function and importance of female alcoholism and desire in the works of French author Marguerite Duras. By focusing on works including "The Malady of Death," "Man Sitting in the Corridor," ""The Ravishing of Lol V. Stein" and "10:30 on a Summer Night," the thesis addresses some of the most prominent themes in the complete works of Duras. The thesis also uncovers the connections between Duras's novels and her biography.

Student
William Kellogg

Major
Chemical Engineering

Research Mentor
Gang Wu

Title
Nanostructured Oxide Anode Materials for Energy Applications

Abstract
Escalating global fuel demands coupled with diminishing petroleum reserves and increasing atmospheric carbon levels necessitates advancement in renewable energy technology. The shift from petroleum energy to electrochemical technologies is currently hindered by the high costs resulting from the use of expensive precious metal catalysts. We aim to develop non-precious metal catalysts that can match the activity, selectivity and durability of precious metals. Perovskite oxide catalysts have demonstrated great promise as bifunctional oxygen reduction reaction (ORR) and oxygen evolution reaction (OER) electrocatalysts for reversible electrochemical energy technologies. In this work, we synthesized and characterized BaTiO3−x perovskite catalysts. My research task is to optimize catalyst performance by analyzing the impact of: ball milling time, binder type, dispersant, sample age, and mass transfer on the activity and selectivity of perovskite oxide catalysts by using rotating disk electrode techniques. These results establish which conditions will generate peak performance for future tests.

Students
Brian Le Floc'h, Chams Eddine Mballo

Major
Mechanical and Aerospace

Research Mentor
Dr. Ehsan T Esfahan

Title
Design and Control of a Modular Snake Robot

Abstract
Robotic ""snakes"" consist of many slender links connected by motorized revolute joints. Their unique geometry allows them to climb over rough terrain and enter narrow crevices that are inaccessible to traditional wheeled vehicles. This could be useful for search and rescue or environmental monitoring applications. A prototype of a snake robot was created to demonstrate this capability.

To create the prototype, the kinematics of the motion of real snakes was analyzed. This information was used to create a dynamic model of the robot's motion using MATLAB SimMechanics. The requirements from the dynamic model were used to design a modular robot consisting of many identical, interchangeable links. The robot is currently controlled manually through a MATLAB graphical user interface and has been proven to navigate flat terrain successfully. Advanced control algorithms are in development to allow for autonomous control over varied terrain.

Student
Graham Pierce Lyon

Major
Physics, Chemistry, Mathematics

Research Mentor
Dr. Serdar Gozpinar

Title
High-Temperature Superconductivity Experiment Development

Abstract
High temperature superconductors are very interesting metamaterials currently being researched around the world. Giving students easy access to an education-rich superconductivity experiment is the goal of the project. After years of hard work, the experiment will be available by the end of the spring 2015 semester.

Students
Farhana Mohamad Shafi, Dawn Rowland, Sailee Rasam, Brian Macqueen

Major
B.S. Biotechnology and B.A. Communication

Research Mentor
Dr. Patricia Masso-Welch

Title
Time Lapse Video of Cell Cultures for Enhanced STEM Education

Abstract
From the Department of Biotechnical and Clinical Laboratory Sciences, we present this time-lapse cell video project that is dedicated to enhance the field of science, technology, engineering and mathematics (STEM) by exposing middle school through college students and teachers to videos of cell cultures. The cells used in this videos were originated from mouse breast cancer cells of two types, mesenchymal-like and non-mesenchymal-like, cultured in various conditions. Video recording was done using Zeiss Axio Imager Z1 microscope courtesy of UB Confocal Microscopy and 3D Imaging Facility, from summer 2014 to fall 2014. Videos were edited using FIJI, OMERO and Corel VideoStudio Pro X7 software programs, and edited in such ways that they can be uploaded and played through a dedicated YouTube channel. This project is a part of the Honors College's Advanced Honors Program requirement.

Student
Meg Phillips

Major
Nursing

Research Mentor
Yu Ping Chang

Title
Brief Intervention on Patients with Substance Abuse in an Outpatient Setting

Abstract
Purpose This purpose of this paper was to systematically research and review the literature that exists on the effectiveness of brief intervention administered to patients with a positive screening for substance abuse in an outpatient setting.

Background The NIAAA states that 17 million people over the age of eighteen suffer from alcohol abuse or dependency. In the United States, 9.2 percent of the population reported using an illegal drug during the three months prior to their survey. Brief intervention and motivational interviewing are techniques suggested by healthcare professionals to treat chemical dependence.

Methods I searched the databases PubMed, MEDline, CHINAL, and PSYCHinfo using the key words "brief intervention AND outpatient setting AND drug OR alcohol" to develop a matrix of fourteen articles that matched our inclusion criteria.

Results Of the fourteen articles, five indicated that brief intervention was an effective method of treating patients with substance dependency, while five articles indicated that brief intervention was not an effective way to treat these patients. The remaining four had inconclusive results that neither supported nor refuted the hypothesis that brief intervention is an effective way to treat patients with substance dependency. This research has indicated to us that there is still a lot to be learned about brief intervention before we can implement it in a clinical setting.

Student
Megan Pszonak

Major
Nursing

Research Mentor
Davina Porock Ph.D, R.N.

Title
Impact of Music Therapy on Agitation and Cognitive Impairment in People with Dementia

Abstract
Purpose: to determine the evidence for music therapy as a method to improve the quality of life in people with dementia.

Methods: A systematic search of the electronic databases was conducted. After removing duplicates, 206 results were retrieved and reviewed for relevance, resulting in a final sample of 20 primary research articles.
Results: 17 studies included reduction in aggression and difficult behaviors as a primary or secondary outcome of the music therapy. Music had no significant impact on agitation in one study, and in another agitation increased. In the majority of studies, music improved behavior. Three studies focused exclusively on cognitive improvement and had mixed results.

Limitations: Measurement issues, inconsistent definitions of music and music therapy, a lack of standardization in music used, and intervention fidelity limited all studies.
Conclusion: Anecdotally, people have found music therapy very useful, but the research lacks the rigor to support or refute these claims.

Student
Brenna Riordan

Major
Nursing

Research Mentor
Dr. Yu-Ping Chang

Title
Intervention Strategies for Substance Abuse Among Older Adults

Abstract
Substance abuse in older adults is a growing public health concern. Yet effective interventions designed for this population have been neglected. Approximately 88.4% of adults over 60 use at least one prescription drug. The concurrent use of substances and prescription drugs is concerning due to possible drug-substance interactions leading to adverse events. This study aimed to systematically review research evidence regarding substance abuse intervention in the older adult population. The database CINAHL, MEDLINE and PubMed were used to identify relevant articles using different keywords, limited to the years between 1994 and 2014. Forty-six articles were reviewed and 26 included relevant intervention strategies. The strategies shown to have positive results included educational programs, group intervention and education for family and clinicians. Many of these interventions were in the preliminary

phases of testing so further research is needed before coming to a conclusion on the optimal treatment program for older adults.

Student
Victoria M. Riso

Major
Engineering Physics Major

Research Mentor
Dr. Simon Labov

Title
Hybrid and Distributed Spectral Gamma Ray Detector Systems

Abstract
The ability to detect and identify hazardous radioactive sources is a crucial aspect of our nation's security. We are working to create a model to predict how various types of detectors react to sources under different conditions. With this model, we hope to combine the strongest elements of each detector to provide the best possible picture of a given situation. In addition, we are looking at the potential of combining information from distributed, highly portable, small detectors to create a clear view of specific circumstances.

Student
T.J. Robak

Major
Biomedical Sciences

Research Mentor
Dr. Peter Horvath

Title
The Acute Effects of Shiitake and White Button Mushroom Intake on Postprandial Lipemia and Lipid Oxidation Following a High-Fat Meal

Abstract
This project aims to determine the effects of mushrooms taken with a high fat meal on the body's cholesterol and fat management. Blood samples will be taken from each study participant before and after the high fat meal and will measure for the body's handling of the meal both with and without the mushroom supplement. The data collected from this project has the potential to help better understand how mushroom supplementation may lower the risk of obesity and the chronic diseases associated with it.

Student
Matthew Rosen

Major
Architecture

Research Mentor
Laura Garofalo

Title
Architectural Assay: An Experimental Studio

Abstract
This architectural design exercise was a culmination of a semester's work in the School of Architecture and Planning. The goal of the project was to create an architectural studio on the corner of Delaware and Chippewa Streets in downtown Buffalo.

In considering office for architects, it was apparent that in order to design a space, it was first necessary to define an architectural viewpoint. Like a musician's taste in music, or a chef's favorite food, an architectural office is inherently a reflection of an approach towards architecture. This subjective approach became the impetus behind the design.

Ultimately, people not building materials, are the greatest medium of architecture. The experience of a place and its capacity to facilitate interaction is one of architecture's greatest strengths. The office became the physical manifestation of this idea, utilizing carefully articulated geometries to simultaneously create an office and a sociological instrument, together, enhancing the experience of space.

Student
Megan Schmit

Major
Biotechnology B.S.
Chemistry B.A.

Research Mentor
Dr. Jennifer Surtees

Title
Effect of Rtt109 on Mismatch Repair Efficiency

Abstract
Mismatch repair (MMR) is critical for correcting errors in DNA replication. However the efficiency of MMR is dependent on location of the errors within the genome. We propose that these differences in efficiency are due to differences in accessibility of the DNA and type of histone modifications present. In Saccharomyces cerevisiae the sup6 region, a tyrosine t-RNA gene, has high rates of mutation regardless of the activity of mismatch repair. This suggests that this region is not accessible to mismatch repair proteins. Histone modifications in this region include acetylation of lysine 9 of histone 3 (H3K9Ac) by Rtt109. This is notable because a balance of acetylation and deacetylation during replication has previously been shown to be critical for genomic stability. We hypothesize that deletion of Rtt109 will decrease mutation rate in strains with functional mismatch repair in the sup6 region by providing a more accessible environment for mismatch repair.

Student
Jasdeep Virk

Major
Biology

Research Mentor
Carla Jungquist

Title
Effect of Sleep Deprivation on Pain Perception

Abstract
This project involves studying the effects that sleep deprivation have on pain perception. A participant group of 40 individuals (22 male, 18 female). Subjects are administered a cold-pressor test (CPT) in which the individual's foot is submerged in an ice water bath. The control group will receive the recommended eight hours of sleep a night while the experimental group will stay up the entire night. The following morning, the groups underwent a CPT while an fMRI was taken to study regions of the brain that respond to pain. This information will impact future research studies involving sleep deprived individuals.

Student
Scott Will

Major
Electrical Engineering

Research Mentor
Natalia Litchinitser

Title
Free-Space Components for Wireless Transmission

Abstract
The ability to guide, manipulate, and process radio- and microwave-frequency radiation is limited by two major factors. First, the intensity and width of a beam propagating in a free space, as well as the angular and range resolution of radar systems, are limited fundamentally by diffraction. Second, from a more practical viewpoint, free-space beam processing is hindered by a lack of available free-space instrumentation for beam focusing, steering, and (de)-multiplexing. As a result, modern radar systems often employ advanced signal processing and detection techniques aimed at enhancing target and feature estimation. Here, we propose several new plasma-based metamaterial structures aimed at addressing such problems and providing tools for greater capability in microwave transmission than has been possible in the past. Such structures are formed from arrays of plasma filaments in air, and their anisotropic behavior is leveraged to demonstrate resolution enhancement in radar as well as rudimentary beam multiplexing.

LSAMP (Louis Stokes Allianace for Minority Participation)

Student
Craig Ashcroft, Saniya Attar, Laketta Jackson

Research Mentor
Paul Meyer

Title
Can the Propensity to Attribute Incentive Salience to Food Stimuli Predict Cocaine-induced Vocalizations in the Rat?

Abstract
Some individuals have a greater propensity to attribute incentive salience to conditioned stimuli, especially when such a stimulus has acquired strong motivational properties. We wanted to determine whether this trait predicts the motivational effects of cocaine in rats, as measured by emission of 50-kHz ultrasonic vocalizations.

First, we used a Pavlovian conditioned approach procedure to measure rats' propensity to attribute incentive salience to food cues. In this procedure, an eight second lever presentation predicts the delivery of a food pellet. We then recorded ultrasonic vocalizations of cocaine-injected rats for 30 minutes while in an open field locomotion chamber.

Experiments are ongoing; we hypothesize that rats more likely to approach the food-associated stimulus will also emit more 50-kHz ultrasonic vocalizations. If this hypothesis is confirmed, it will suggest that cocaine induced vocalization and the attribution of incentive salience to food cues are subserved by common psychological and neurobiological systems.

Student
Daniel Calzadilla

Major
Chemical & Biological Engineering

Research Mentor
Marina Tsianou

Title
Emulsion Stabilization by Particles and Amphiphilic Polymers for Oil Spill Remediation

Abstract
Marine oil spills cause detrimental effects on ecosystems due to the spreading of oil on the ocean surface. One way to combat oil spills is by utilizing dispersants, which reduce the oil-water interfacial tension, allowing for oil droplet formation and dilution through the water column, thus accelerating the degradation process by bacteria. Even though current dispersants are relatively non-toxic, they still add solvents and contaminants to the environment due to the large amounts used. In this work, we explore the use of mineral particles in dispersants in order to reduce the amounts of surfactants utilized and to develop formulations that have low impact on the environment. We investigate the effects of solid or mesoporous silica particles or clay particles and/or amphiphilic polymers on the stability of oil-in-water emulsions. Hexadecane and toluene have been selected as the oil phase to model the aliphatic and aromatic components of crude oil, respectively. The aqueous phase used is deionized water where particles and/or polymers have been added. The emulsification behavior of these systems and the stability of the resulting emulsions to creaming and/or coalescence were assessed by turbidity measurements and oil droplet size distributions. The nature of both the surfactants and the particles and their concentrations affect the droplet size and polydispersity as well as the stability of the emulsions. Under certain conditions the particles have exhibited synergistic behavior with surfactants, resulting in stable emulsions. Our data provide a better understanding of the mechanisms and interactions between surfactants and particles at the oil-water interface,

critical for the design of more effective dispersant systems and for determining oil spill remediation methods close to shorelines.

Student
Ifechukwu Ononye

Major
Aerospace Engineering

Research Mentor
Richard Gonsalves

Title
GPS and the effects of Relativity

Abstract
The Global Positioning System (GPS) provides people around the world with very accurate position and time. The GPS uses many satellites with atomic clocks to keep time measurements. Using an earth centered reference frame a preliminary model of the GPS can be created. However, in reality there are relativistic effects. The GPS operations depend on a very accurate time reference, which is provided by the clocks aboard satellites. Without taking relativistic effects into consideration, small errors accumulate and quickly the GPS measurements become inaccurate. In this project, a conceptual base is discussed, a model is created. Then, time and position measured are taken, and these are compared to the model.

School of Management

Students
Jose Castillo

Major
Accounting

Research Mentor
Alex Ampadu

Title
First Touch of Business

Abstract
The objective of this project is to showcase my experience working in my Family Business to illustrate how theory and practice of accounting look like in real life, in a small operational business.

Student
Evan Chen, Rony St Simon

Major
Accounting, Business Administration

Research Mentor
Natalie Simpson

Title
Behind the Scenes of the Student Association

Abstract
As Vice President of the Student Association, and Assistant Treasure, we have had an exceptional experiences from working in SA. We would like to present how our experience and roles has had played a role with helping the student association achieve its goals. Being how SA's goal is to provide a better university experience of all undergraduate students by representing students to university administrators and advocate for their needs while providing an enjoyable and rewarding experience through limitless services, opportunities, events and club organizations, we believe that our impact a wide range of student and others living in the buffalo community. Therefore, we think that showing the inner works of SA based on our experience would be something valuable to present. This would ultimately show the panel and guest a glimpse of behind the scenes of the largest SUNY Student Association.

Student
Lili Chen

Major
Business Administration

Research Mentor
Carrie Gardner

Title
Strategic Planning at Food Bank of WNY

Abstract
The time I spent at Food Bank of WNY as a strategic planning intern was memorable for me as it was rich in experience sharing and helped me discover my potential. I have so many rich experiences and opportunities, which shaped and influenced my professional life while fostering personal growth and development. My primary responsibilities are coordinating the Board of Director Retreat and participate distribution of SWOT survey and subsequent data collection to help Food Bank develop goals for next few years. Starting from the first day of my internship, I already have a lots of engagements to work with and I am able to meet and contact with staff from different levels and committee members especially past chair, chair, strategic planning facilitator, president and CEO. Food bank has very clear mission, and it is incredible to work with others who truly care deeply about their work and community.

Student
Sabina Evangelisa, Jacob Shupbach

Major
Business Administration

Research Mentor
Laura Amo

Title
HBO Campus Agents: North of the Wall

Abstract
As HBO Campus Agents, we generate buzz and excitement about HBO Go on campus as well as promote the HBO brand to all students. Each Campus Agent assumed a role, either the event chair or the digital chair. The event chair focused on creating events centered on the programming of HBO while the digital chair diligently marketed though social media outlets. We attend weekly status calls and complete weekly trackers to inform our team leads from GMR Marketing of our progress. Our main focus this semester is bringing a pre- screening of the new season of the hit HBO show, Game of Thrones to the University at Buffalo. We have partnered with many influential on campus organizations and have learned the importance of making and maintaining connections. As we excitedly approach our main event, we would love the opportunity to share our experiences with the greater community.

Student
Aaron Fiebelkorn

Major
Business Administration

Research Mentor
David Murray

Title
Hacking a Scheme to UB NetDef's Cyber Security Competition

Abstract
I received the opportunity to learn and gain experience in the information security domain. This includes networking, cyber security, system administration, risk management, information assurance, social engineering, and more. Usually, it involves technical skills to secure a network infrastructure from professional penetration testers (ethical hackers). The scenarios give the penetration testers an unfair advantage but we get to experience a great time learning our strengths and weaknesses for next time. To better prepare ourselves, we decided to create a smaller but similar competition. After successfully hosting three competitions within our independent study, I wanted to dramatically increase the complexity and scope. Over winter break, I developed a syllabus and designed a project competition design to help me lead my peers to success. My vision is to have UB host a semesterly competition for various colleges' student teams to participate, learn, and enjoy the various elements of information security.

Students
Kelsey Flanagan, Kathleen Anne Gaul, Mahwish Khan, Dominique Poslinski

Research Mentor
Dorothy Siaw-Asamoah

Title
Leaderless Revolution: The Global Diffusion of a Participatory Culture

Abstract
The theory of Diffusion of Innovations, strives to explain how to promote the adoption of beliefs through the various communication channels. By implementing this theory on social media, our objective is to explore how social media provides a platform for the public to exhibit and engage in citizen journalism. By comparing and contrasting the Egyptian Revolution and Occupy Wall Street, we discuss how leaderless revolutions effectively utilized platforms like Facebook, Twitter and YouTube to organize, coordinate and showcase demonstrations. We believe that the homogeneity of the demographics, attitudes and status of the protestors/visionaries involved in these two revolutions, has encouraged them to exhibit resonant leadership. We have gathered information and identified patterns from published journal articles, newspapers articles, blogs, tweets and Facebook posts. We question the long-term sustainability of such a neo-anarchist spirit, by gauging its long-term fight for social justice.

Student
Juan Jimenez

Major
Business Administration

Research Mentor
Mara Huber

Title
Center for Development and Strategy

Abstract
In May 2014, a group of students came together to form the first nonpartisan, student-run think tank, the Center for Development and Strategy. Since last year, CDS has grown to encompass 15 student staff members, 6 chapters across 3 countries, and two core services; Incubation and Publication. CDS strives to create change through spreading awareness of key issues in development, encouraging student collaboration, and publishing new research. CDS is also hosting its first conference in University of Toronto this coming fall, and has received funding from UT for this endeavor. Additionally, CDS has a new initiative, called Think Incubation. This innovative project seeks to help new non-profit organizations with the development and execution of their ideas in the real world.

Student
Hardeep Kaur

Major
Business Administration

Research Mentor
Veljko Fotak

Title
Beautifying Buffalo

Abstract
This project was done through an internship in the Division of Citizen Services in the Mayor's office of Buffalo, NY. The objective of this experience was to draft and submit a $10,000 grant proposal in an effort to receive funds for the betterment of Buffalo. There were many ideas and extensive conversation

about the most needed and convincing argument to receive these funds. The proposal was then to be presented to Mayor Byron Brown and DCS staff for questions and approval. After approval, the application was submitted into the process which was taken over by the DCS staff to carry out and implement if accepted by the grant committee.

Students
Seung Bom Kim, Naiem Khanjani

Research Mentor
Natalie Simpson

Title
Bitcoin; The New Way of Transactions in the Future

Abstract
Bitcoin is the future of online transactions. We have done extensive research on how bitcoins work, and would like to share our findings.

Student
Bryan Krajewski

Major
Business Administration

Research Mentor
Debbie Grossman

Title
Syllabus Rate

Abstract
I was a student who never knew what class to take. I would register, go to the first class and review the syllabus, and add and drop courses accordingly during the first week of the semester. This was very inconvenient. I thought it would be great if I could see a course syllabus ahead of time as well as feedback from students who had taken the course. So I came up with SyllabusRate.com. It allows students and university professors, etc. to upload/view/rate course syllabi, so prospective students know what class will be a best fit for them and they will be prepared for the course. Students also use it as a quick source to reference the course syllabus.

Ronald E. McNair Scholars Program

Student
Barinaepkee Banuna

Major
Biological Sciences and Psychology

Research Mentor
Jeffrey Lombardo, PharmD

Title
Utilizing Document Digitization and Recognition Technology for Genetic Testing Results in an Oncology Practice – a pilot study

Abstract
The Medication Management Research Network (MMRN) conducts innovative research using health information technology. MMRN's focus is to integrate pharmacogenomics reports with clinical data and medications from electronic health records (EHR) systems into Patient Safety Organization work products for an oncology practice. The purpose of this study is to establish an algorithm for the digitization of genetic testing results using genetic testing companies that provide results in varying formats so that they can be incorporated into an EHR system with a larger database. Genetic testing results stored in PDF formats from different EHRs are de-identified and converted into a standardized template. A digitization test is conducted for 100% accuracy then the results are integrated into the EHR. Once a health record is established it will be used to optimize medication management and patient safety.

Student
Tatiana Jimenez-Knight

Major
Psychology

Research Mentor
Dr. Stephanie Godleski

Title
Maternal Prenatal Cigarette Smoking: Effects on Maternal Characteristics and Child Factors

Abstract
Past research has shown that maternal cigarette smoking during pregnancy is associated with child externalizing behavior (e.g., hyperactivity and inattentiveness; Cornelius, Goldschmidt, DeGenna & Day, 2007; Ellis, Berg-Nielsen, Lydersen & Wichstrøm, 2012). Cigarette smoking is associated with maternal characteristics that can have a negative impact on parenting, such as maternal hostility (McCabe, 2014; Schuetze, Eiden, & Dombkowski, 2006). In examining the associations between maternal hostility, child gender, and smoking during pregnancy, we found an association between maternal hostility and three child factors: externalizing, internalizing, and dysregulation. Through further examination, differences were found on maternal hostility and these child factors at 24 months. At 24 months, maternal hostility was associated for all three factors for girls, but only dysregulation for boys. This implies that at 24 months there may be a developmental difference that begins to emerge due to gender difference. Future research should investigate whether these effects continue across development.

Student
Theresa Yera

Major
Anthropology

Research Mentor
Dr. Emily Greenfield and Dr. Jane Miller

Title
Does Experience with Caregiving, Informal Helping, and Family Health History Predict Who Volunteers in Healthcare?

Abstract
With the rise of healthcare costs and the aging US population, recruitment of healthcare volunteers is of vital importance to administrators. Utilizing

linked lives dimension of life course theory, this study examines whether recent experiences with caregiving, informal helping, and family health problems predict who volunteers generally and, among volunteers, who volunteers in healthcare. Data come from 1,588 respondents from the 2005 National Survey of Midlife in the United States. We found positive associations between both volunteering variables for informal helping and family health problems. We also found that providing unpaid assistance increased odds of general volunteering and healthcare volunteering. Furthermore, having a parent with health problems, and older age were positively associated with volunteering in healthcare among individuals who volunteer. Recent caregiving was not a predictor of either outcome. Overall, results suggest that some life experiences and relationships may be elements of what inclines individuals to volunteer in healthcare.

Student
Alex Dragon Wong

Major
English Literature

Research Mentor
James Holstun

Title
What is Paternalism?

Abstract
The nostalgia for paternalism in the American South is a real and present danger to the racial relations within the United States that has been heavily discussed in Fox Genovese's Roll Jordan, Roll and Ulrich Phillips' American Negro Slavery; however, "What is paternalism?" is a simple question with varying complicated answers. A literary and historical study of the relationships and arguments of paternalism shows a lack of consensus among popular pro-slavery writers and historians. Close readings of pro-slavery literature explains how paternalism is described, both as a way of life and contemporary business ethics. Analyzing paternalism as a metaphor and ideology, through literature of the history of American Civil War, allows a proper understanding of this threat.

School of Medicine & Biomedical Sciences

Student
Summar Amin

Major
Biomedical Sciences

Research Mentor
Dr. Frank Scannapieco

Title
Associations between oral and systemic health in long-term care residents

Abstract
Objectives: The aim of this study was to test the association between oral and systemic diseases among residents at a long-term care facility in WNY.

Methods: Dental and medical records of all residents discharged between January 1, 2009 and December 30, 2012 who utilized dental services were reviewed. Information on demographic and socioeconomic variables was extracted, and medical diagnoses at admission were defined using (ICD-9).

Results: Diabetes mellitus was associated with poor OH (OR=4.67, 95% CI: 1.09-19.95) and PD (OR=6.34, 95% CI: 1.51-26.57); Respiratory diseases were associated with full denture (OR=2.89, 95% CI: 1.02-8.18); Genitourinary diseases were associated with full denture (OR=8.28, 95% CI: 1.18-58.21) and oral lesions (OR=33.53, 95% CI: Dementia was associated with poor OH (OR=4.74, 95% CI: 1.44-15.65) and PD (OR=3.69, 95% CI: 1.25-10.90).

Conclusions: This study suggests that inflammatory oral conditions are associated with dementia, diabetes mellitus, and respiratory and genitourinary diseases in long-term care residents.

Students
Erika Barrientos de Moraes, Yoochan Hong, Andrew Ng, Lindsay Ponto, Shuying Yang

Research Mentor
Shuying Yang

Title
Understanding Osteoporosis: Identifying and Characterizing the Binding Partners of RGS12 in Osteoclasts

Abstract
Osteoporosis is a pathological condition characterized by reduced bone integrity that predisposes to increased risk of fractures. This progressive bone loss worsens with age, and while modern medicine has served well to prolong lifespan, quality of life is severely hampered by aging-related diseases like osteoporosis. The cause of osteoporosis, however, is poorly understood. Regulator of G-protein Signaling 12 (RGS12) is a protein previously shown to be important for the differentiation of osteoclasts, the cells responsible for bone degradation. RGS12 is an unusually large protein that contains multiple protein-binding domains. Therefore, our goal is to identify and characterize the RGS12 protein-protein interactions that are important for osteoclast differentiation. In this study, we successfully generated a system to study these interactions. We caused osteoclast precursor cells to express a recombinant RGS12 protein fused to a FLAG-tag, which will allow us to purify the protein, along with any interacting proteins, from the cells.

Student
Sushobhna Batra

Major
Biochemistry, Biomedical Sciences

Research Mentor
Richard A. Rabin

Title
Effects of Ethanol on Brain Injury: Role of Microglial Migration

Abstract
Traumatic Brain Injury (TBI) involves damage to the brain due to a hard blow or jolt. Alcohol consumption increases the risk of accidents and trauma, and data reveal that a significant percentage of TBI patients were intoxicated prior to the injury. The effects of ethanol on TBI's outcome, however, are unknown. A critical component of the brain's response to TBIs is the activation and migration of microglia cells, which are the primary innate immune cells of the brain. The objective of the present study was to determine the effects of ethanol on microglial migration. To this end, confluent mouse BV2 microglial cell layers were scratched with a pipette tip and then incubated in media in the absence and presence of ethanol for 6 hours. Reduction in the area of the scratch after 6 hours was less in the presence of ethanol. Our results indicate that ethanol inhibits microglial migration.

Student
David A. Bratton, Aberlee J. Milliron, Melanie A. O'Bara, Suyog U. Pol, Hani J. Shayya, Fraser J. Sim

Research Mentor
Fraser J. Sim

Title
The Role of GNB4 and SULF2 in Human Oligodendrocyte Differentiation

Abstract
Demyelinating diseases are characterized by a loss of oligodendrocytes and myelin. Remyelination restores myelin but is limited due to impaired human oligodendrocyte progenitor cell (hOPC) differentiation. Using Weighted Gene Co-expression Network Analysis (WGCNA) we identified SULF2 and GNB4 as potential key regulators of hOPC differentiation. Over-expression of GNB4 and SULF2 in vitro promoted and inhibited hOPC differentiation respectively. To validate this in vivo we transplanted hOPCs over-expressing SULF2, GNB4, or mCherry (control¬) into the corpus callosum of neonatal shiverer/rag2 hypomyelinating mice. At 8 and 12 weeks post-implantation we perfused, sectioned, and stained their brains via immunohistochemistry using markers for proliferation (Ki67), and differentiation as astrocyte (GFAP) and oligodendrocyte lineages (CC1 and MBP). GNB4-infected hOPC transplanted mice exhibited a significant increase in MBP within the corpus callosum and SULF2 over-expression greatly reduced the percentage of hOPCs undergoing CC1+ oligodendrocyte differentiation. As such, GNB4 and SULF2 represent potential pharmacological targets for remyelinating therapies.

Students
Amandip Cheema, David Lee

Major
Biological Sciences

Research Mentor
Rajendram Rajnarayanan

Title
Attenuation of muscular dystrophy phenotype in drosophila by estrogen-mimics

Abstract
Muscular dystrophy is a disease characterized by progressive muscle wasting, respiratory and cardiac complications, and ultimately death. The disease is caused by a mutation in the protein dystrophin, which normally plays a role in the protection of muscle. Recent studies have suggested that the use of tamoxifen, an anti-cancer drug, may have therapeutic effects on the muscular dystrophy phenotype in mice. Based on our preliminary computational analyses we hypothesize that compounds targeting nuclear transcription factors estrogen receptor and\or estrogen receptor related receptor may have some beneficial effect on the muscular dystrophy phenotype in drosophila by increasing dystrophin expression. Our project aims to further investigate the role of estrogenic compounds, as a therapeutic, to the muscular dystrophy phenotype in drosophila. The compounds were administered to the flies orally by mixing them with the normal fly feed. After ingestion, we used a cluster of locomotion markers to assess the compounds' activity. Tamoxifen appears to ameliorate locomotion deficit in dystrophic flies. We believe, non-steroidal estrogenic compounds hold the key to the development of next generation therapeutics for the treatment of muscular dystrophy.

Students
Nicole Coloney, Bruce Davidson, Tracey A. Ignatowski, Barbara Mullan, Ashley Re

Major
Biomedical Sciences

Research Mentor
Tracey A. Ignatowski

Title
Pro-inflammatory TNF and HMGB-1 Increase During Diabetic Neuropathy: The Effect of Decreasing Levels of TNF in the Brain on HMGB-1 Production

Abstract
Neuropathic pain (NP) is a form of chronic pain that results in damage to the nervous system. Diabetic neuropathy is a debilitating complication of diabetes mellitus and is the most frequent form of neuropathic pain encountered in the developed world. Damaged neurons release an inflammatory protein termed high-mobility group box chromosomal protein 1 (HMGB-1). HMGB-1 is a nuclear protein; however, when released from cells it has pro-inflammatory cytokine-like activity. An increase in the pro-inflammatory cytokine tumor necrosis factor-α (TNF) underlies nerve dysfunction and death, and development of NP. HMGB-1 released from damaged neurons stimulates production of TNF. While diabetes is associated with elevated HMGB-1 levels, whether this contributes to diabetic neuropathy is unknown. TNF-silencing nanoplexes are effective for relieving diabetic NP. These nanoplexes knocked-down TNF levels in the brain and decreased pain. We hypothesize that the TNF nanoplexes will also indirectly reduce HMGB-1 levels, contributing to the reduction in diabetic NP.

Student
Benjamin I. George, Gary J. Iacobucci, Aparna Z. Nigam

Research Mentor
Gabriela K. Popescu

Title
Regulation of NMDA receptor unitary properties by intracellular residues on the GluN1 subunits

Abstract
The NMDA receptor is a glutamate-gated ion channel that mediates excitatory neurotransmission in mammalian central nervous system. They are heterotetramers of two GluN1 and two GluN2 subunits. They produce large Ca2+ currents that mediate critical physiologic functions. The present work seeks to delineate mechanisms of channel regulation by the receptor's intracellular domains. We substituted 9 serine residues on the cytoplasmic domain (CTD) of the GluN1 with alanine residues (9S/9A) to prevent their phosphorylation by endogenous kinases. Relative to wild type (WT) receptors, phosphodeficient receptors had larger unitary conductance: γWT = 59 ± 4 vs. γ9S/9A = 72 ± 3, $p < 0.05$, which suggests that phosphorylation of GluN1 residues reduces channel currents. Physiologically occurring splice variants of GluN1 that include or that lack the C1 cassette within the CTD, also had distinct unitary conductances: γGluN1-1a = 75 ± 1 vs. γGluN1-2a = 79 ± 2, $p<0.05$; and γGluN1-3a = 75 ± 1 vs. γGluN1-4a = 84 ±3 $p<0.05$. Taken together, these results suggest that phosphorylation sites within the C1 cassette may control the channel's unitary conductance and differential splicing may control the channel's sensitivity to regulation by phosphorylation.

Student
James Hawkins, Abdel Rahman Alnaji

Major
Biomedical Sciences

Research Mentor
Tracey A. Ignatowski

Title
Assessment of TNF production by peritoneal macrophage from C57BL/6-RAGE-KO mice: The effect of streptozotocin (STZ)-induced diabetic neuropathic pain and stimulation of adrenergic receptors.

Abstract
Increased production of pro-inflammatory tumor necrosis factor-alpha (TNF) mediates development of neuropathic pain (NP). The contribution of TNF to diabetic NP is being studied by assessing TNF production in mice lacking 'receptor for advanced glycation end products', or RAGE. Activation of RAGE on macrophages induces TNF production. The hypothesis is that macrophages from RAGE-KO mice produce less TNF, protecting from NP development. Following streptozotocin (STZ) or saline injection, wild-type and RAGE-KO mice were grouped as STZ-diabetic neuropathy (STZ-DN), STZ-non-responders (STZ-NR), and saline-injected controls by gender. Harvested macrophages were stimulated with lipopolysaccharide (LPS) and exposed to α2- and β2-AR agonists, to assess regulation of TNF production. LPS-stimulated STZ-DN macrophages show increased TNF production, while STZ-NR macrophages produced less. Both female wild-type and RAGE-KO are resistant to STZ-induced diabetes, with their macrophages producing less TNF than their male counterparts. These results support that diabetic neuropathy is associated with increased macrophage TNF production.

Student
Muhammad Jaffari

Major
Biology, History

Research Mentor
Tracey Ignatowski

Title
Assessment of TNF in the brain and Neurogenesis

Abstract
Chronic pain is an abnormal, persistent condition of sufficient duration and intensity to negatively affect a person's level of functioning and quality of life. Neuropathic pain, a type of chronic pain due to nerve injury, is very difficult to treat. Pain relievers (analgesics) are generally effective for nociceptive pain, but are not very effective for neuropathic pain. Tricyclic antidepressant drugs that are normally prescribed for treatment of depression are often prescribed to manage neuropathic pain disorders such as diabetic pain. The question I intend to answer is whether there is an association between increased hippocampal TNF levels and a neuronal process in this brain region, neurogenesis (growth and development of neurons). The hypothesis is that during diabetic pain, increased TNF in the brain leads to decreased neurogenesis. This will be tested by staining hippocampal sections, prepared from rodents experiencing neuropathic pain, for TNF and for markers identifying newly developed neurons.

Student
Shangru Lyu, Jing Wang, Nicole Wawrzyniak

Research Mentor
Fraser J. Sim

Title
Transcription factor PRRX1 regulates human OPC differentiation, proliferation and migration

Abstract
Multiple Sclerosis results in damage of the myelin sheath, oligodendrocytes and nerve cells. Consequently, proper conduction of electrical signals in the nervous system is hindered. Implantation of human oligodendrocyte precursor cells (hOPCs) can help to reverse the process and restore normal function. Our previous research identified specific expression of transcription factor PRRX1 mRNA by hOPCs in the developing human brain (Wang et al., 2014). In order to understand the role of PRRX1, we infected CD140a+ hOPCs in vitro with lentiviruses expressing PRRX1a, PRRX1b or mCherry as a control. We assessed the effects on differentiation by immunocytochemistry for

oligodendrocyte (O4) and astrocyte (GFAP) markers. We discovered that both PRRX1a and PRRX1b promoted differentiation into oligodendrocytes, and PRRX1a decreased migration of hOPCs in a transwell assay. We also observed that PRRX1a reduced proliferation of hOPCs. Therefore, PRRX1 is involved with hOPC function and needs to be considered in OPC remyelination therapies.

Student
Kristen Milleville

Major
Biomedical Sciences

Research Mentor
Dr. Ralph Benedict

Title
Predicting Changes in Employment Status using the Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS)

Abstract
Multiple Sclerosis (MS) is a chronic, progressive neurological disorder. Cognitive impairment affects 40-65% of patients and has been shown to significantly impact employment status. Previous findings suggest that the Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS) is a valid measure of commonly affected cognitive domains: processing speed, verbal memory, and visuospatial memory. Utilizing the BICAMS, we assessed cognition in MS patients at two time points (a mean of 6.45 ± 2.32 years apart). Longitudinal analysis revealed significant differences between subjects whose employment status remained stable versus those who transitioned from gainfully employed to reduced capacity or unemployed. These findings suggest that poor performance and decline on BICAMS measures identify patients at risk for changes in employment status. While further studies are warranted, these data indicate that the BICAMS can be used to identify those employed persons with MS who are at risk for job loss in the future.

Student
Aberlee J. Milliron

Major
Biomedical Sciences

Research Mentor
Dr. Fraser Sim

Title
Determining the role of SULF2 on human OPC Differentiation

Abstract
Restoration of myelin in multiple sclerosis occurs when human oligodendrocyte progenitor cells (hOPCs) replace lost oligodendrocytes through a regenerative process known as remyelination. In this study, we explored the role of the endosulfatase SULF2 in vivo by transplanting hOPCs overexpressing the SULF2-encoding gene into hypomyelinating shiverer/rag2 mice and compared their ability to myelinate host axons to mCherry-infected hOPC controls. Through immunohistochemistry at 8 weeks post-implantation, we found that SULF2 notably suppressed the percentage of hOPCs undergoing CC1+ oligodendrocyte differentiation, while increasing the proportion of human cells undergoing astrocytic differentiation compared to the control. Interestingly, SULF2 over-expression did not significantly reduce overall myelin basic protein (MBP) and myelin synthesis. These data suggest that SULF2 over-expression delays oligodendrocyte differentiation possibly by redirecting transplanted hOPCs to astrocytic fate. As such, SULF2 plays an important role in hOPC development and may represent a future target for induced oligodendrocyte differentiation in myelin disease.

Students
Sahar Naseer, Priya Sasankan, Kristina Seiffert-Sinha, Animesh A. Sinha

Research Mentor
Animesh A. Sinha

Title
Comparative genomic analysis in Pemphigus autoimmune clusters

Abstract
It is well established that individuals affected by one autoimmune disease are more susceptible to developing another. Our group has identified a distinct disease cluster with thyroid disease (AITD), rheumatoid arthritis (RA), and type 1 diabetes (T1D), as well as another cluster with systemic lupus erythematous (SLE), RA, and AITD linked to Pemphigus Vulgaris (PV), a life threatening autoimmune blistering disorder. These data suggest that common genetic components may underlie autoimmune development in these conditions. To identify shared genes and pathways among the disease clusters we compared publicly available GWAS and DNA microarray data, including data from our own lab. Pathway analysis of common genes derived from GWAS studies reveals involvement of basic immunologic canonical pathways. Pathway analysis of differentially expressed genes (DEGs) derived from microarray studies reveals an effect of RhoA signaling's involvement and oxidative stress. These data provide support for the common gene hypothesis of autoimmunity.

Students
Dhara Parikh, Gregory Roloff, Kathleen Rusnak

Research Mentor
Satpal Singh

Title
A Biostatistical Analysis of Cardiac Dysfunction with Celebrex

Abstract
Abstract: Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) inhibit cyclooxygenase (COX) enzymes, and are widely used for treating pain and inflammation. Celecoxib (Celebrex), a selective COX-2 inhibitor, is prescribed as an anti-analgesic and anti-inflammatory agent for treating rheumatoid arthritis and other musculoskeletal conditions because of its reduced gastrointestinal side effects compared to non-selective COX inhibitors. Our previous studies have shown that celecoxib inhibits the voltage-gated delayed rectifier potassium

channels (Kv2) independently from COX-2 inhibition. Our recent data show that celecoxib inhibits human potassium channel, hERG, expressed in a human cell line. This channel is critically involved in human cardiac rhythm. To examine the clinical relevance of this finding, we have analyzed 35 quarters of the FDA (Food and Drug Administration) data on adverse effects (encompassing over 3.5 million case reports). The results showed that the percent of individuals taking celecoxib and experiencing cardiac dysfunction is significantly higher than those not taking the drug.

Student
Chien Poon

Major
Biomedical Engineering, Biochemistry

Research Mentor
Michael Garrick

Title
Does hepcidin inhibit iron uptake by binding to divalent metal transporter (DMT1)?

Abstract
"Iron is an essential nutrient for many critical functions in the human body and the deficiency or overload of iron in the cells contributes to the cause of many disorders. This is why it is carefully regulated in order to maintain iron homeostasis. DMT1 is the major iron importer across the enterocytes, while Ferroportin is the only known iron exporter. DMT1 has 4 major isoforms which differ in where transcription starts and whether it has an Iron Responsive Element. Research has shown that Ferroportin degrades thus losing its function when hepcidin is bound to it. Recent reports have shown that hepcidin reduces the activity of DMT1 in enterocytes before Ferroportin degrades. We are interested in finding out if hepcidin binds DMT1 as observed for Ferroportin. Our results have shown that hepcidin does not directly bind to DMT1, which lead us to query how hepcidin signals to DMT1."

Student
Breandan Quinn, William Richardson

Research Mentor
Laura Rusche

Title
Telomere binding protein Rif2 as a product of subfunctionalization or neofunctionalization following the whole genome duplication in yeast species

Abstract
In the yeast species Saccharomyces cerevisiae, the Rif2 protein serves to protect telomere ends. Rif2 associates with Rap1, which binds directly to telomeres, to inhibit telomere lengthening by telomerase. Sequence studies have shown that Rif2 proteins descended from replication protein Orc4 as a result of a gene duplication. This raises the question as to how a telomere protein evolved from a replication protein. Our hypothesis is that Rif2 is a product of subfunctionalization, meaning that the duplicated Orc4 resulted in two genes, each retaining a different portion of the original function. To test this hypothesis, Orc4 telomeric association was assessed through chromatin immunoprecipitation (ChIP) in the pre-duplicated species Kluyveromyces lactis. Our results shows that Orc4 does not associate with telomeres, and thus does not share the Rif2-like function. This observation suggests that the function of Rif2 evolved after the duplication event, making it a product of neofunctionalization.

Student
Marc Salme

Major
Biological Sciences B.A.

Research Mentor
Frank Scannapieco

Title
Utilization of Dental Services at a Long-Term Care Facility

Abstract
Objectives: The New York State Department of Health requires that all residents at a long-term care facility (LCF) be offered dental services annually. Residents have the right to refuse such services. They sign a consent form to accept or refuse dental services. The aim of this study was to assess differences of residents who utilize dental services compared to those who refuse it.

Methods: Medical records of all residents of a LCF in Western New York, discharged between January 1, 2009 and December 30, 2012 were reviewed. Information on demographic and socioeconomic variables was extracted from electronic health records, and information on oral health variables was extracted from patient charts. Differences between two groups were tested by t-test for continuous, and chi-square test for categorical variables.

Results: Medical records of 2,002 residents were available. Of those, 221 (11%) received dental services. The mean age at admission (83.34 vs. 79.04 years, $p \leq 0.001$), length of stay (4.79 vs. 1.77 years, $p<0.001$), and the prevalence of females (75.6% vs. 63.6%, $p<0.001$) and widowed (71.5% vs. 48.4%, $p<0.001$) were significantly higher among residents who utilized dental services compared to those who didn't. Discharge status for two groups also differed significantly: The prevalence of deceased was significantly higher (64.4% vs. 12.8%, $p<0.001$), while the prevalence of those who were discharged home was significantly lower (18.6% vs. 66.3%, $p<0.001$) among those who utilized dental services compared to those who did not. There were no significant differences by race and body mass index between the two groups.

Conclusions: This study suggests that only a small percentage of LCF residents utilize dental services, and there are significant disparities between users and nonusers. These results may help develop new approaches to increase the utilization of dental services, and reduce disparities.

Student
Hani J. Shayya

Major
Medicinal Chemistry

Research Mentor
Dr. Fraser Sim

Title
Evaluating a potential mechanism for Sulf2 and PI-88 modulation of OPC differentiation

Abstract
Endogenous or engrafted oligodendrocyte progenitor cells (OPCs) can differentiate into oligodendrocytes and remyelinate regions of demyelination in the central nervous system. However, remyelination may be inadequate in diseases such as multiple sclerosis (MS) if OPCs fail to differentiate in a complete and timely manner. In previous work, we identified the gene SULF2 as inhibitory to OPC differentiation. SULF2 encodes an extracellular endosulfatase that is inhibited by the pharmacological compound PI-88. Here, we have examined the ability of SULF2 and PI-88 to modulate WNT and BMP signaling, both of which inhibit OPC differentiation. In the CG-4 rat OPC cell line, we used western blotting to determine that PI-88 inhibits WNT and BMP activity in a statistically significant, dose-dependent manner. We confirmed these findings at the transcriptional level using two lentiviral luciferase reporter constructs, pBARLHyg and L-BRE-Luc. We are currently using these constructs for further mechanistic studies of Sulf2 and PI-88 in primary mouse and human OPCs.

Student
Jessica Smith

Major
Biochemistry

Research Mentor
Dr. Jennifer Surtees

Title
The Effect of dNTP Alterations on Genome Stability

Abstract
Deoxyribonucleoside triphosphates (dNTPs) are the building blocks of DNA. Previous studies showed that unbalanced dNTP levels reduce the fidelity of DNA synthesis, increasing mutation rates. However, DNA mismatch repair (MMR), which targets replication errors for repair, was present in these studies, potentially masking the full effect of the altered dNTP pools. Therefore, using Saccharomyces cerevisiae, or budding yeast as a model system, we have combined mutations in RNR1, encoding a subunit of ribonucleotide reductase (RNR), that skew the dNTP pools in vivo with a deletion of MSH2, eliminating MMR. Mutation rates will be determined using the canavanine resistance assay; the can1 locus of canavanine resistant colonies will be sequenced to determine whether altered dNTP pools change the spectrum and/or location of mutations. Tumor cells often have altered dNTP pools. Therefore knowing their effect on replication fidelity in different genetic backgrounds is critical in understanding processes that contribute to carcinogenesis.

Student
Alexandra Van Hall

Major
Chemistry

Research Mentor
Margarita Dubocovich, Raj Rajnarayanan

Title
Molecular Modeling Predicts Affinity of Environmental Toxins for Human and Mouse MT1 and MT2 Melatonin Receptors

Abstract
Melatonin regulates circadian rhythm through activation of two G-protein coupled receptors, MT1 and MT2. Circadian disruption has been linked to an increased risk in type 2 diabetes and other metabolic disorders. Molecular modeling and in silico screening were used to identify circadian disruptors from databases of environment chemicals. The effect of two classes of insecticides, carbamates & pyrethroids, identified by our screening protocols, were determined on 2-[125I]-iodomelatonin binding affinity to human (h) and mouse (m) MT1 and MT2 melatonin receptors. Carbaryl and carbofuran competed for 2-[125I]-iodomelatonin binding to the mMT1 and mMT2 melatonin receptors expressed in CHO cells, with lower affinity than for the human receptors, however both insecticides showed higher affinity for MT2 receptors. Pyrethroid insecticides (bifenthrin, cypermethrin, deltamethrin, prallethrin, resmethrin) competed for 2-[125I]-iodomelatonin binding to hMT1 and hMT2 receptors, with similar affinities at both receptors. We suggest that both carbamate and pyrethroid insecticides could potentially bind to melatonin receptors and disrupt circadian rhythms. Furthermore, differences in affinities between the human and mouse receptors should be taken into account when extrapolating data from mice to humans.

School of Nursing

Student
Marisa Castelli

Major
Nursing

Research Mentor
Dr. Carla Jungquist

Title
The Relationship of Pain, Sleep, Mood and Function in a Community Sample

Abstract
Introduction: In studying the affects of the high prevalence of sleep disorders and the high incidence of pain disorders, we can begin to understand the suffering of people in a community as well as tailor interventions to individualize treatment. In this study, we assessed the relationships of sleep, pain, mood, and function.

Methods: The design for this study was cross-sectional and included a sample (n = 299) of participants recruited from the community at large using posters, research match, and the university recruiting website. Data was collected for a larger study; this is a secondary analysis of study variables. Variables included demographics, the PROMIS-57 profile component standard scores, Insomnia Severity Index (ISI) total score and Epworth Sleepiness Scale (ESS) total score, actigraphy measures of total sleep time in hours, and the AHI as measured by the Apnealink device. Analysis procedures were descriptive and correlational.

Results: Two hundred ninety-nine subjects completed all study procedures. Age M(sd) 40(17), BMI M(sd) 27(6), Physical Functioning M(sd) 55(6.5), Anxiety M(sd) 50(8.9), Depression M(sd) 46(7.9), Social Role M(sd) 52(8.3), Fatigue M(sd) 49(8.6), Pain Interference M(sd) 47(7.7), ISI Total M(sd) 8.1(5.6), AHI M(sd) 4.32(8.04), Total Sleep Time M(sd) 6.93(0.8). Significant correlations with Pain Interference were Sleep (r = -.219, p = .000), Fatigue (r = .381, p = .000), Physical Function (r = -.618, p = .000), Depression (r = 316, p = .000), and Anxiety (r = .221, p = .000).

Conclusion: Patients with pain are likely to also suffer from poor sleep, increased fatigue, decreased physical functioning, depression, and anxiety. Caring for patients with pain should also assess for and address associated symptoms.

Acknowledgment: This abstract is a product of the Rochester Prevention Research Center: National Center for Deaf Health Research and was supported by Cooperative Agreement Number U48DP001910 from the CDC. The findings and conclusions in this abstract are those of the author(s) and do not necessarily represent the official position of the CDC.

Student
Laura Clark, Kimberly Lam

Major
Nursing

Research Mentor
Jessica Castner

Title
Affordability and Accessibility of Asthma Self-Care Equipment

Abstract
The purpose of our community-based needs assessment project was to evaluate the affordability and accessibility of asthma self-care equipment in 5 target zip codes with the highest pediatric emergency department visit rates. In collaboration with the Asthma Coalition of Erie County, we investigated items' availability and prices at 13 pharmacies. Using publicly available information, the following percent of pharmacies carried: spacers (85%, price disparities from $10-48.99), peak flow meters (45%), and nebulizer kits (15%). Medicaid recipients had a unique requirement for handwritten prescriptions on tamper resistant paper. There are several barriers to obtaining the ideal equipment for asthma self-care and medication administration for low income families. Price disparities, a different type of prescription (paper), the need to return to the pharmacy for pre-ordered equipment or need to visit an additional durable medical equipment company besides the pharmacy create barriers to the affordability and accessibility of asthma self-care equipment.

Student
Sana F. Raheem

Major
Biology

Research Mentor
Carla Jungquist

Title
The Association of Depression, Smoking and Use Of Opioid Medications For Pain

Abstract
The Association of Depression, Smoking and Use Of Opioid Medications For Pain
Introduction: The objective of this study was to assess the relationships between pain intensity, opioid use, depression and the number of cigarettes smoked.

Methods: A descriptive cross sectional study was conducted. The subjects (n=419) were adults with and without chronic pain who had been referred to a sleep disorders center for evaluation of their sleep. All subjects filled out questionnaires and underwent an in-lab sleep study.

Results: Age M(sd) 49(12), 49% female, Cigarettes per day M(sd) 3(6), BMI M(sd) 33(7) Morphine equivalent dose 152 mg (195), Depression 21%, pain intensity M(sd)2(2). Significant positive correlations were found between opiate prescription use and cigarette use (r = .195 p. = 0.003), smoking and pain intensity (r = .511, p. = .000), pain intensity and depression (r = .147, p. = .003).

Conclusion: Patients who are taking opiate medications are more likely to smoke cigarettes, and patient in pain are more likely to smoke and experience depression.

School of Pharmacy & Pharmaceutical Sciences

Student
Ann Chi Sam

Major
Pharmaceutical Sciences

Research Mentor
Marilyn E. Morris

Title
Validation of qPCR Assays for Mouse Megalin, Cubilin and FcRN

Abstract
Neonatal Fc Receptors, megalin and cubilin are endogenous protein receptors that play a major role in renal function in the kidney. It is proposed that FcRN, megalin and cubilin expression is altered in the blood brain barrier of a transgenic mouse model of Alzheimer's disease, which might affect the brain penetration of drugs. RNA was isolated from brains of mice and synthesized into cDNA. A PCR was performed to amplify three different protein receptor expressions: FcRN, megalin, and cubilin. A gel analysis was performed to determine if the PCR was successful. The PCR products were cloned with an Invitrogen TOPO TA Cloning kit. This mixture was cultured onto Luria Broth ampicillin agar plates and a separate culture was performed for one colony. The plasmid DNA was isolated from the culture with a Omega EZNA Plasmid DNA Mini Kit. Restriction Enzyme Digestion was performed with ECOR1 and the products were placed onto a gel to determine if the plasmid DNA was present. Real Time PCR was performed to validate the products. Plasmid assays were developed and a standard curve was produced.

Student
Samuel Kim

Major
Pharmaceutical Sciences

Research Mentor
Dhavalkumar Shah

Title
Determining the Pharmacodynamic Properties of Oxidative Phosphorylation Uncouplers in Fat Cells

Abstract
Obesity is a disorder that plagues more than a third of the American population. The current treatment options either act on the central nervous system or inhibit the absorption of fat from the gastrointenstinal tract. Both treatment options are associated with undesirable side effects. The objective of this project is to target fat cells directly using antibody-drug conjugates (ADCs) to transport uncouplers of oxidative phosphorylation into fat cells. This portion of the project will evaluate the in vitro efficacy of this novel form of treatment using Tyrphostin A9, a potent uncoupler. Analyses were performed to measure fat content, membrane potential and viability of Tyrphostin at varying doses. Preliminary results showed that doses of 500nM of Tyrphostin were toxic to the cells while 10nM doses produced 20% reductions in fat content. Based on the data acquired, further studies of Tyrphostin in vivo can be insightful for achieving this targeted approach for the treatment of obesity.

Student
Michael Payne

Major
Pharmaceutical Sciences

Research Mentor
Javier Blanco

Title
Profiling Genetic Variation of Variable Number Tandem Repeats in Promoter Region of FcRn Receptor

Abstract
Neonatal Fc receptor,(FcRn), is an integral component for the transport of immunoglobulin G (IgG) across placental cells. Additionally, FcRn plays a key role in recycling IgG and many therapeutic antibodies. To date few studies have profiled the pharmacogenetic determinants of FcRn expression. The gene promoter region for FcRn in FCGRN gene contains a variable number tandem repeats, VNTR, which was previously shown to have potential effects on gene expression. Genetic variation resulting in VNTR polymorphisms may alter the methylation pattern of FcRn gene promoter region. DNA was isolated from lymphoblastoid cell lines, and VNTR genotype was determined by polymerase chain reaction on ethidium bromide stained 2.5% agrose gels. The allelic frequency of rare VNTR alleles was higher than previously reported. In addition, a novel VNTR allele (VNTR6) was detected. Differences in allelic frequencies warrant functional studies in lymphoblastoid cell lines and mRNA expression-genotype correlations studies in relevant human tissues.

Student
Negin Salehi

Major
Pharmaceutical Sciences

Research Mentor
Sihem Bihorel

Title
Optimizing Combination Chemotherapy of Trastuzumab with Paclitaxel in HER2-positive Breast Cancer

Abstract
Background: HER2-positive breast cancer (HER2+ BC) usually occurs in younger women and is more quickly-growing and aggressive than other types of BC.. Trastuzumab (TmAb) is a recombinant DNA-derived humanized monoclonal antibody that is used in combination with chemotherapy in patients with HER2+ BC. Our objective was to investigate the in vitro drug-drug interaction and the cell viability response for the association TmAb with paclitaxel (PAC) in BT474, a HER2+ BC cell line.

Methods: BT474 cells were cultured in DMEM medium supplemented with 10% FBS.
Cell viability response was assessed using the cell counter by measuring

the percentage of cells alive after drug treatment. TmAb and PAC were each tested separately in a range of concentrations of (0.1-100) μM and in combination at 100 nM. Model-based approach was used to assess the pharmacodynamic interaction of both agents.

Results: Trastuzumab and paclitaxel caused partial inhibition of BT474 cells when administered alone to BT474 cells. The mean concentrations inhibiting 50% of the cell viability response (IC50) were 20.9 nM for TmAb and 42.2 nM for PAC. The estimate for the interaction term between both drugs was 1.03.

Conclusion: The drug-drug interaction of TmAb with PAC shows that the two drugs exert a very slight antagonism (or additivity) in terms of inhibition of BT474 cells proliferation. Further dosing regimen are under investigation.

School of Public Health & Health Professions

Student
Ilona Belous

Major
Exercise Science

Research Mentor
Jennifer L. Temple, PhD

Title
Timing of Water Intake on Perceived Hunger

Abstract
Several studies have noted that water intake increases weight loss during diets. Because of the close relationship between water and food intake, this study examines the effects of the timing of drinking water on perceived hunger. Subjects drank several different amounts of water throughout the morning and completed a hunger rating at three time points: immediately, 30 min, and 2 h later. There was no influence of water intake on perceived hunger in males. Females, however, showed a significant influence of water condition and timing on perceived hunger ($F_{4, 56}=2.97$, $p=.0269$). Post-hoc analyses revealed that when females consumed water, feelings of hunger decreased immediately, and stayed suppressed for at least 30 min. This study will help to determine the prime time of drinking water and its effects on hunger in order to serve as a significant dietary tool.

Student
Tan Yi Ching

Major
BS in Exercise Science
BA in Psychology

Research Mentor
Dr. Scott White

Title
Effects on postural control during quiet standing under perturbed conditions.

Abstract
The study of Center of Pressure (COP) measures during quiet standing have often been used to help us increase our understanding of the control of balance. While there have been convincing evidence that postural control strategies are distinct for both anterior-posterior (A-P) and medial-lateral (M-L) postural displacement, the time-dependent characteristics of the separate control strategies have not been explored. Data analysis suggests that these time-dependent differences may provide further insight to helping us understand the body's systematic approach to postural control. Our results suggest that there is a preferred dominant approach that the body reverts to under different perturbations and the predictive measure of this support system may be used towards future studies in dynamic gait stability.

Students
Harminder Chonk, Erin O'Brien, Leah Panek-Shirley, Faryal Sahibzada, Edison Wei Soon

Research Mentor
Jennifer L. Temple

Title
Dose Response Effect of Caffeine on Appetite Sensations and Mood

Abstract
It is hypothesized appetite sensations and mood, will be affected by caffeine; however, these effects will be mediated by gender, BMI and/or withdrawal reversal. To test our hypothesis, we had 18-50 y old adults abstain from all forms of caffeine 24-h prior to each laboratory session. At that time, they were given a relative (0, 1, or 3 mg/kg) dose of caffeine in a 350-mL beverage. Appetite sensations and mood were assessed prior to beverage administration and again 30-min later. Low dose caffeine significantly decreased Nervousness ($p=0.023$) and increased Strong ($p=0.021$) compared to placebo and moderate dose. Males only significantly decreased Sadness at the low caffeine dose compared to placebo or moderate dose ($p=0.0110$). Findings suggest the amount of caffeine ingested significantly affects mood and emotions at a low caffeine dose, but this effect may be mediated by gender.

Students
Samantha R Considine, Jennifer L Cook, Avonlea S. Frye, Brian T Williams

Research Mentor
Andrew Ray

Title
The Effects of Respiratory Muscle Training On Performance In Hockey Players

Abstract
Purpose: Our goal is to determine if respiratory muscle training can improve Wingate performance in male collegiate hockey players.

Method: Seven collegiate hockey players have completed baseline testing. They are currently completing a 4-week progressive resistance respiratory muscle training (RMT) protocol set at 50, 60, 70 and 80% of their baseline maximal pressures. Pre and post pulmonary function tests, a peak exercise test, and five Wingate tests will be performed.

Results: Baseline expiratory and inspiratory pressures averaged 46.57% and 87.86%, respectively. Peak power of the first Wingate averaged 1011±127Watts (W). Ratings of perceived breathing effort (6-20) averaged 15±2.69for the first and increased to 19±1.54 by the fifth Wingate test.

Conclusion: Preliminary results indicate that breathing effort is maximized by the 5th Wingate test. However, it remains to be determined whether the work of breathing will impact repeated Wingate test performance. The study is currently in progress.

Students
Samantha R Considine, Jennifer L Cook, Zachary Dziadaszek, Avonlea S Frye, Martin C Mahoney, Brian T Williams

Research Mentor
Dr. Andrew D Ray

Title
A Pilot Exercise Intervention to Enhance Fitness and Quality of Life among African American and White Colorectal Cancer Survivors

Abstract
Purpose: To determine the feasibility of recruiting African Americans (AA) and Caucasian (C) subjects into a training intervention study to improve physiologic and quality of life measures.

Methods: Former CRC patients were contacted and if available, were consented and screened for eligibility. Eligible patients completed exercise and spirometry tests prior to 12 weeks of progressive exercise training.

Results: After fifteen months of recruitment, 126 AA, 126 C patients have been contacted. Of those contacted, 10 AA (8%), 5 C (4%) patients were available and consented to begin the study. 2 AA (1.6%) and 2 C (1.6%) have completed the entire study with 2 C in progress of completion.

Conclusion: Subject recruitment for a twelve week intervention study of colorectal cancer survivors has not been very successful with race not being an issue of consent or study completion.

Students
T.J. Furst, H. Marsales, B.T. Williams

Research Mentor
Peter Horvath

Title
The Effects of Beta-alanine Supplementation on the Aging Population

Abstract
Beta-alanine supplementation has shown promise in improving cognitive function and submaximal exercise duration. Supplementation increases carnosine concentrations found within the brain and skeletal muscles containing antioxidant, neuro-protective, and buffering capabilities.

PURPOSE: To improve systemic carnosine levels resulting in improved cognitive function and extended exercise duration.

METHODS: 16 healthy adults over the age of 50 years will be randomized to two groups for supplementation using a double blinded parallel arm experimental design. They will ingest either beta-alanine or a Placebo supplied daily for 28 days. Cognitive and physical assessments will be performed prior to and after supplementation which include the Stroop test and physical work capacity (PWC) by cycle ergometer.

RESULTS: We expect improved Stroop test performance and PWC performance which will correlate to increased serum carnosine levels within the beta-alanine group.

CONCLUSION: Beta-alanine supplementation may lead to improved cognitive function and enhanced fatigue resistance during exercise.

Student
Zach LaMacchia

Major
Biomedical Sciences

Research Mentor
Peter Horvath

Title
Effect of Aspartate Supplementation on Athletic Performance in Young Men

Abstract
D-aspartic acid has been suggested to enhance athletic performance by regulating the hypothalamus-pituitary-gonadal axis by increasing plasma testosterone. Aspartate supplementation may be useful to increase testosterone for individuals with low plasma testosterone due to aging and other conditions.

PURPOSE: To determine the effect of D-aspartic acid supplementation on athletic performance in young male athletes.

METHODS: After screening for ACSM low risk, 9 healthy male athletes (average age = 22y, body weight = 82.7 kg and body fat = 10.4%) were randomized to two groups for supplementation using a double blinded parallel arm experimental design. They ingested either 3 grams of d-aspartic acid (Aspartate, n=5) or a Placebo (n=4) for 14 days supplied in capsule form. Subjects recorded and replicated previous 3 day diets prior to testing. Physical assessments were performed prior to and after supplementation included a peak VO2 test by cycle ergometer, 1 maximal repetition bench press and 1 maximal repetition squat (average values ±SD before supplementation were 41.7 ±6.4 ml/kg/min, 117.9 ±11.1 kg and 151.7 ±19.0 kg, respectively).

RESULTS: The Aspartate group improved performance in 1 maximal repetition bench press by 4.5 ±1.6kg (average ±SEM, p=0.03) and 1 maximal repetition squat by 8.2 ±3.8kg (average ±SEM, p=0.04). No change in performance measures were observed in the Placebo group. Body composition did not change for either group. CONCLUSION: D-aspartic acid supplementation may lead to improved acute skeletal muscle synthesis improving upper and lower body muscle performance.

Student
Chaman K Sharma

Major
Biomedical Sciences

Research Mentor
Heather Orom, PhD

Title
Racial discrimination and stigma consciousness and their associations with chronic disease risk factors in minority men

Abstract
Background: Evidence relating racial discrimination and health outcomes is mixed. Studies with large sample sizes that examine multiple components of the experience of racial discrimination are needed to clarify this relationship.

Methods: Participants were 1331 men recently diagnosed with localized prostate cancer. Using generalized linear models, we examined the relationship between frequency of racial discrimination and stigma consciousness and systolic and diastolic blood pressure, diagnosis of hypertension, and body mass index (BMI).

Results: Minorities reported more racial discrimination and stigma consciousness than whites (ps<.001). For minorities, greater stigma consciousness was associated with greater risk of having hypertension (RR=0.10, p=.04) and greater racial discrimination was associated with higher diastolic blood pressure (RR=0.002, p=.03). Among minorities, greater stigma consciousness (RR=0.001, p=.03) and racial discrimination (RR=0.0008, p=.03) were associated with higher BMI.

Discussion: For racial/ethnic minorities, discrimination and stigma consciousness are associated with common risk factors for chronic disease and premature death.

Student
Irianna M. Torres

Major
Biomedical Sciences

Research Mentor
Dr. Dominic J. Smiraglia

Title
Targeting the methionine salvage pathway as a metabolic point of leverage in novel therapeutic approaches for prostate cancer.

Abstract
Polyamines are metabolites required for cellular proliferation. The prostate is unique in that high levels of polyamine secretion into the lumen causes increased biosynthetic flux to replenish intracellular polyamine pools. This strains nucleotide and s-adenosylmethionine pools. This stress is increased in prostate cancer (PCa). We hypothesized that the methionine salvage pathway is critical to PCa due to high metabolic flux through polyamine biosynthesis, and that this dependence can be enhanced by increasing secretion of polyamines. In cell line studies, we pharmacologically increased polyamine flux in PCa cells and found that this synergized with an inhibitor of the methionine salvage pathway.

The Academies

The Undergraduate Academies are a Living Learning Community that introduce students to links between classroom and practical learning through five interdisciplinary lenses: Civic Engagement, Entrepreneurship, Global Perspectives, Research Exploration and Sustainability. Each Academy uses its themes as a means of focusing discussion, organizing experiential learning opportunities, and offering enriched programming to students.

Civic Engagement

Students
Madelaine Britt, Colleen Carew, Elizabeth Mercer

Research Mentors
Dr. Barbara J. Bono; TA Dylan Steed

Title
Co-Lab[oration] in the University Heights

Abstract
The University Heights (UH) Co-Lab is a volunteer-operated space that offers low-cost classes and workshops to the University Heights community and its surrounding neighborhoods. Located adjacent to the UH Tool Library, the Co-Lab opens its doors for an affordable price to anyone interested in learning a new skill, renting out a space, or displaying their art. Emphasizing the importance of community development through education, interaction, and collective culture-building, the Co-Lab serves the UH neighborhood as a learning resource and interactive brainstorming space. When it's not being used to teach Intro to Sign Language, woodworking, or to present an artist's portfolio, the Co-Lab is a free and open space for group work and collaboration, operating during the hours of the University Heights Tool Library. As project managers for the Co-Lab, at the Celebration of Academic Excellence we will be discussing our funding, outreach efforts, programming, and the importance of community learning spaces.

Students
Madelaine Britt, Colleen Carew, Alejandra Cisneros, Will Coates, Brian Lau, Beth Mercer, Jan Orate

Research Mentors
Dr. Barbara J. Bono; TA Dylan Steed

Title
ReTree the District

Abstract
"ReTree the District" is a two-year project to plant 1,000 new trees in the University District, contributing to energy conservation, air quality, crime control, beautification and increased prosperity, neighborliness and community pride. Building on the efforts of "ReTree Western New York" to replace 30,000 trees damaged in the disastrous October 2006 ice storm, the project has the support of the current University District Councilman, the City of Buffalo Forester, and numerous other co-sponsors. In its fall 2014 phase it involved 20 Team Leaders from the UB Academies leading over 300 volunteers on Saturday, November 1st in planting 185 trees at an expense of $13,806.70 worth $39,462.50 volunteer person hours. Planning for the spring 2015 April 18th planting is well advanced, and will involve 20 additional new Acadenies Team Leaders as well as many project veterans. The project will continue at the same pace throughout the fall 2015-spring 2016 academic year.

Students
Iris Lopez, Jaime Polito

Research Mentors
Dr. Barbara Bono; TA Dylan Steed

Title
Paws for Love: Stress Relief Animals at UB

Abstract
We should care for animals, for animals have cared for us. Since the mid- 19th century, organizations like the ASPCA have been dedicated to the prevention of cruelty to animals; today the fields of animal studies and animal rights extend the understanding of our beneficial relationships with them. One example of the good that animals do for us is the success of stress-relief animals in settings such as health-care institutions, schools, airports, and elder homes. Here at UB, librarian Pam Rose, in collaboration with Therapy Animals of Western New York (TAWNY), "Paws for Love" program of Erie County SPCA, and UB Wellness Center, has, since 2011, brought therapy dogs to campus during exam week. Our project will solidify this service through a student survey and publicity effort which already reveals that students approve of but typically have not used it, and through building a volunteer corps to help sustain it.

Global Perspectives

Students
Thomas Ancillotti, Carly Gottorff, Jillian Kelly

Research Mentor
Colleen Culleton

Title
Slavery in the Contemporary World

Abstract
The omnipresence of contemporary slavery in the United States has been largely ignored since the abolition of the transatlantic slave trade in the nineteenth century. The multiple facets of contemporary slavery include sex trafficking and labor trafficking which constitute an estimated population of 25-35 million slaves worldwide. The United States policy focuses on human trafficking abroad even though the issue is so prevalent within the country's own borders. This research seeks to better understand contemporary slavery in the United States by placing it in a global context. By virtue of contrast, a more accurate sense of contemporary slavery may lead to a potential for change.

Students
Jocelyne Bello, Angela Hyeji Kim, Angie Quilla

Research Mentor
Colleen Culleton

Title
Women's Rights Organizations in France and Saudi Arabia

Abstract
Woman activists in Saudi Arabia and France are working to gain more rights for women. In France, the country with the highest percentage of women in government, women's equality means having more women appear in higher positions of leadership in business and government. When, on the other hand, in Saudi Arabia laws for women are more restricting. Women's role in the public sphere is very limited. Our group is researching different organizations in these two countries working for women's rights in their respective contexts. We ask the question "What is each activist group from each country fighting for and what methods are they using?" This project demonstrates how women activists' approaches differ from each other between these two countries.

Research Exploration

Students
Ali Alqaraghuli, Matthew Bosque, Tanahiry Escamilla, Natram Lackraj, Moises Martins, Raphael Perci, Angie Quilla, Kherolayne Ribeiro,

Research Mentor
Dr. Peter Horvath

Title
Applications of Particle Accelerators

Abstract
Over the last 100 years, science and technology have experienced a huge progress. Engineering has a major role in that progress, as it turns the theoretical knowledge into real-life discoveries. An example of such discoveries is particle accelerators, built and designed by modern-day engineers. A particle accelerator is a device for accelerating subatomic particles in high velocities, such that those particles collide to produce high energy. This device has been essential in significant scientific innovations such as vibration isolation systems, cryogenic preservation, and cancer therapy. This project studies those innovations, and focuses on analyzing how particle accelerators significantly impact branches of engineering such as electrical, mechanical, civil, chemical, and biomedical.

Students
Nisha Chowdhury, Linda Huynh, Tara McHugh, Stephanie Wolcott, Leah Novo

Research Mentors
Dr. Peter Horvath

Title
Alternative Medicine

Abstract
Traditional western allopathic medicine isn't the only way to treat pain. While modern medicine has greatly enhanced the quality of life for many people, the practices of traditional medicine can still offer benefits. The purpose of this study is to research alternative medicine, specifically acupuncture. Acupuncture is an ancient Chinese medicine in which thin needles are put into the skin at strategic points in the body, in order to balance out chemicals and energy flow. Today people use this form on holistic medicine to heal not only physical pain but mental pain as well. We will discuss the use of acupuncture as treatment for headaches, arthritis, chronic pain, menstrual cramps, and anxiety. This form of treatment isn't a permanent solution but, could act synergistically with western medicine.

•There are multiple ways to treat mental and physical pain.

•Acupuncture is an effective method of treatment, however there is a lack of knowledge in its use and it is costly.

•We will be evaluating acupuncture's effectiveness of treatment versus other western methods that could help close the education gap.

•Using evidence based research on acupuncture techniques, could show how it provides comparable or greater relief to those suffering from pain compared to western medicine. This work will increase awareness and usage of acupuncture methods.

Students
Zoey Davis, Leah Pilcher, Pedro Sierra, Maria Tsororos

Research Mentor
Dr. Peter Horvath

Title
Recidivism

Abstract
Reason: America has the highest rate of crime and incarceration when compared to other countries. Problem: The high incarceration rates are large in part due to the high recidivism rates leading to a heavy economic burden on its citizens. Methods: Factors will be evaluated such as family structure, education programs in prison and prison conditions that could have an effect recidivism. Hypothesis: Socioeconomic factors as well as prison conditions will positively correlate to recidivism. Implications: Determining important factors that cause recidivism could educate policy makers to reduce the factors which will ultimately reduce recidivism.

Students
Stephanie Gavin, Alexandra Kocaj, Julia Morales, Maisa Santos, Mahfuj Uddin, Zoe Vaughn

Research Mentor
Dr. Peter Horvath

Title
AIDS and Cultural Variation

Abstract
Introduction: AIDS, a chronic immune system disease caused by HIV(human immunodeficiency virus), has been affecting thousands of people for over thirty years.

Hypothesis: We hypothesize that underdeveloped countries will have higher rates of AIDS patients due to the less accessibility to information and

treatment than those that are developed. Methods: We will investigate the epidemiology of HIV/AIDS and compare the prevention strategies used in different regions of the world, specifically East Africa, West Africa, East Asia, South Asia, Europe and the United States.

Discussion: We will analyze how the economic conditions, cultural stigma, and social barriers in poverty stricken countries impact the spread and prevention of the disease, and how they differ from some of the more developed countries of the world. Implication: Understanding the reasons for higher rates of AIDS in different regions of the world will help researchers implement new ways to approach the problem.

Students ♂
Aayushi Mehrotra, Victoria Rance, Tomas Segura

Research Mentor
Dr. Peter Horvath

Title
Oil and the Economy

Abstract
Natural gas and crude oil are critical issues in the areas of energy in the economy and the environment. One major source of natural gas production is hydraulic fracturing, however recently this method of production has caused varied crude oil prices and an increase of environmental contamination risks. This process, over the years, has led to a drop in the price of oil by a dollar or two per gallon. The reason this has happened is because of the method of shipping the natural gas across the nation is cheaper price wise, thus making the price of oil cheaper as well. We found out that other forms of energy, such as solar, wind, and water are alternative fuel sources may lead to less dependency on crude oil and natural gas. In turn, these alternative fuel sources may balance out economic factors all the while improving environmental factors.

Sustainability

Students ♂
Stephanie Acquario, Zach Eaton, Tim Huang, Minkue Kim, Raphael Perci Santiago, Jennifer Watson

Research Mentor
Kenneth Shockley

Title
Solar Usage Effectiveness in Different Environments (SUEDE)

Abstract
A vital part of a sustainable future is renewable energy, and one such renewable energy is solar power. We want to examine how and if solar power can be implemented successfully in three different urban environments: Buffalo, Shanghai, and Belo Horizonte. We chose instructively different cities from around the world: Buffalo, our local city and reference standard, Shanghai, a modern and heavily populated city in China, and Belo Horizonte, a smaller city in Brazil. We will investigate the degree to which private and government programs have guided the transition to solar power. We suspect that this investigation will demonstrate difficulties in that transition, primarily taking the form of resident opposition and technological issues with the panels. For each city we will research economic, geographic, demographic, and social impact data for each city. We would like to gain a greater understanding of what conditions affect successful implementation of solar in different areas.

Students ♀ ♂
Philip Chan, Amanda Low, Kelley Mosher, Rebecca Oaks

Research Mentor
Jessica Russell

Title
Sustainable Approaches to Food Production

Abstract
Permaculture is a system of ecological design that aims to create more sustainable communities: its principles reinforce to participants understanding patterns of nature, learning food production, managing water catchment and storage, utilizing renewable energy, and building communities. A permaculture system is the exemplary sustainable approach to food production systems that the Campus Garden aims to bring to the University at Buffalo. Using the framework "Grow better, not bigger," the ultimate goal of this research is to double the amount of food production to forty-pounds, in the same 20'x20' plot of the UB Campus Garden. To advance the Garden's vision and further emphasize the importance of sustainability, it is our goal to explore different gardening techniques for implementation during the growing season. We aim to educate individuals on gardening techniques, prove that implementation of these techniques is plausible at various sites, and expand the understanding of the importance of food production.

Students ♂
Hillary Chiarella, Monica Lippens

Research Mentor
Kenneth Shockley

Title
Exploring the Benefits of Western New York Environmental Alliance Membership

Abstract
The Western New York Environmental Alliance (WNYEA) is a unique coalition of nonprofit environmental organizations. In this project we will investigate the different ways in which its diverse member organizations benefit from participation in WNYEA. Through our analysis, we will determine whether the network created through WNYEA increases the influence of both the collective, as well as each individual member organization. Our hypothesis is that the primary benefit of WNYEA is the ability to form interpersonal connections with professionals in other member groups, and that these connections allow member organizations to advance their individual agendas and long-term goals. In order to evaluate these hypothesized benefits, we will examine four member organizations

that represent the diversity of WNYEA. We will conduct interviews with these groups focusing on the different ways in which each organization benefits from WNYEA membership.

Students
Vanessa Dwyer, Olivia Frank, Moises Soares Martins, Vitor Jose Jeronimo De Moraes, Bryce Potter, Brian Stuhlmiller

Research Mentor
Kenneth Shockley

Title
Is Organic Worth It?

Abstract
There is a general presumption that buying organic food is impractical because of the high cost and difficulties accessing organic foods. For most it is a challenge to incorporate eating organically into ones' lifestyle, as they believe they lack the money and time required. We propose to explore this presumption by finding measurable differences between buying organic and buying non organic in the city of Buffalo, by comparing costs and accessibility. We expect the results of our research to show that buying organic food does not have to be extremely costly, time consuming, or difficult to achieve. To measure these differences, we will create two grocery lists for a week's worth of groceries: one for a single individual and one for a family of four. Our research will clarify clear the differences in costs and availability of organic food, and the extent to which buying organically imposes a financial burden.

Academic Displays

GRoW Home
Led by the School of Architecture and Planning in partnership with the School of Engineering and Applied Sciences and the School of Management, UB students and professors will build a 1,400-square-foot solar-powered home as finalists in the U.S. Department of Energy's elite Solar Decathlon competition.

Playfully called the GRoW House, the UB project is designed to appeal to Buffalo's urban gardening contingent. The dwelling will have space where residents can Garden, Relax or Work (GRoW). Features include a generous greenhouse and kitchen for growing, processing, cooking and storing food.

The Solar Decathlon is a national, two-year contest that challenges collegiate teams to design, construct and operate cost-effective solar dwellings.

Students
Ryan Dussault, Ian Farneth, Vageesh Govindhen, Pranav Hardas, Nate Heckman, Praveen Iyer, Matt Kreidler, Amanda Mumford, Alanna Olear, Chris Osterhoudt, Louis Rosario, Joe Tuberdyck, Comato "Ronnie" Vella, Duane Warren, Nicole Wawrzyniak

Research Mentor
Martha Bohm

Title
GRoW Home

Abstract
The GRoW Home is the University at Buffalo's entry into the US DoE's 2015 Solar Decathlon. GRoW Buffalo is one of 17 teams from around the world to compete in this prestigious competition that challenges students to design, construct, and operate an ultra-efficient solar powered home. The competition provides students with a platform to present models for sustainable and efficient home design to the public. GRoW Home was conceptualized as a home that promotes a low impact lifestyle, while also producing more energy than it consumes. Inspired by Buffalo's urban gardening movement, the house allows for a lifestyle that reduces the need for energy intensive agricultural practices by allowing for year round indoor farming. The GRoW Home meets its energy needs with an array of PV panels that power the home's energy star rated appliances and efficient lighting design. A comfortable temperature is maintained by the dynamic interaction between the passively designed ventilation system and a water source heat sink HVAC system. The innovations in the house combine passive design strategies with active, energy producing technologies to redefine the meaning of low footprint urban housing.

Sustainable Projects
As you walk through the exhibition today you may notice that some research has been denoted with a green Sustainability Badge. These research projects have been identified as contributing to the University's collective mission to address global challenges through sustainability research. It is a testament to the dynamic and forward-thinking students and faculty to see such a broad representation of research focused on preserving and advancing the healthy function of ecological, economic, and social systems now and in the future.

Sigma Xi

Sigma Xi is an international science and engineering honor society with nearly 60,000 members in over 100 countries. Our members engage in original research across the vast spectrum of science and technology, and promote an appreciation of research within society at large. More than 200 Nobel prize-winners have been members of Sigma Xi.

The University at Buffalo chapter of Sigma Xi has sponsored the Sigma Xi Graduate Student Research Competition annually for over 20 years.

Student
Carol Adornetto

Title
The Effects of Anti-Emetic Prophylaxis on Postoperative Nausea and Vomiting

Student
Rana Alameri

Title
Procedural Pain: A Concept Analysis

Student
Rana Ali S Alameri

Title
Changing Behavior in Lung Cancer Survivors: Patients Can Sleep

Student
Anusha Balasubramoniam

Title
Stability investigation of a Gamma fitting algorithm for angiographic parametric imaging at low x-ray exposures using a patient specific neurovascular phantom

Student
Caitlin Biddle

Title
Not so straightforward: The complex relationship between knowledge and prostate cancer treatment decision-making

Student
Emily Brooks

Title
Corrosion and Mechanical Performance of AZ91 Exposed to Simulated Inflammatory Conditions

Student
Krystal Burns

Title
Needs Assessment: Infection Control in Anesthesia

Student
Sarah Cercone

Title
Past Year Non-Medical Opioid Use and PTSD Diagnosis: Interactions with Gender and Associations with Symptom Clusters

Student
Jenna Covelli

Title
A Novel Validated LC-MS/MS Assay for Polymyxin B (PB)

Student
Alireza Farasat

Title
Social Structure Optimization in Team Formation

Student
Gabriela Jude Fernandes

Title
Prevention of Alveolar Osteitis using Doxycycline/Local Anaesthetic in a Gelfoam Scaffold

Student
Scott Ferguson

Title
Kinetics of Self-Replicating mRNA: Impact of Dose Selection and Cellular Defense Mechanisms

Student
Alexander Foss

Title
A Semiparametric Method for Clustering Large Mixed Data Sets

Student
Prerna Gera

Title
Hydrodynamics of Multicomponent Lipid Vesicles in Three-Dimensional Space

Student
Jingyang Guo

Title
A new non-polynomial interpolation for the (weighted) essentially non-oscillatory methods

Student
Guanchen He

Title
Chemical Vapor Deposited Single Layer MoS2 Field Effect Transistors

Student
Aaron Huber

Title
Influence of Hyaluranon (HA) Preparations on Ionizing-Radiation-Treated Collagen-based Tissues

Student
Sameer Jain

Title
Effects of Surface-Active Dehydration of Etched Dentin on Bonding to Restorative Resin Material

Student
Anthony Jones

Title
Environmental Circadian Modulators Target Melatonin Receptors in Pancreatic β-Cells

Student
Zainab M Khaku

Title
Effects of Pharmacological M3R Inhibition on Myelination

Student
Antari Khot

Title
Development of a Physiologically Based Pharmacokinetic Model for Antibody Drug Conjugates.

Student
Victoria Kisekka

Title
Investigating the Antecedents of Organizational Resilience in Hospitals after an Extreme Event

Student
Devi Kolluru

Title
Cross-sectional Study to Determine Factors associated with Elevated Blood Lead Levels in Children Residing in Erie County

Student
Sumukh Bysani Krishnakumar

Title
Investigation of an Electron Multiplying Charge Coupled Device (EMCCD) based Micro-CT system at low x-ray exposures.

Student
Jessica Kulak

Title
Hooked on Hookah: Nicotine and pH Levels in Shisha

Student
Susan LaValley

Title
Patient-centered vs. caregiver-centered communication: negotiating information needs in end-of-life care

Student
Malvika

Title
Potential osseointegration of ceramic implants

Student
Eric McDermott

Title
Live Cell Imaging of Pre-Osteoblasts on Commercially Pure Titanium Under Electrochemical Conditions

Student
Jacqueline Meaney

Title
Efficacy of L-Methylfolate for the Treatment of Psychiatric Disorders in Patients with Mutations in the MTHFR Gene: A Retrospective Review

Student
Charvi Nanavati

Title
Systems Pharmacology Based Analysis of Vorinostat and Bortezomib Interactions in Multiple Myeloma

Student
Jin Niu

Title
Synergistic Interaction between Birinapant and Paclitaxel on Pancreatic Cancer Cell Line

Student
Srikanth Parameswaran

Title
Job Performance Effects of Enterprise Social Software Design Features: Interplay of Push-Pull richness and online centrality

Student
Saloni Patel

Title
In Vitro Pharmacodynamics (PD) of Polymyxin B (PB) in Combination with Meropenem (MER) against Carbapenemase Producing Klebsiella pneumoniae (KP)

Student
Kari Puma

Title
A Biomechanical Characterization of Intramedullary Reaming in the Human Tibia

Student
Krista Pundt

Title
Translational pharmacology approaches to explore the novel mechanism of a pan-PIM kinase inhibitor, JP-11646, in acute myeloid leukemia

Student
Vidya Ramakrishnan

Title
Minimal Physiologically-based Pharmacokinetic Model of 1α, 25-dihydroxyvitamin D3 in Mice

Student
Eric Read

Title
Creating Tailored Messages for Future BOCA Patients in the Dominican Republic

Student
Xing Ren

Title
Estimating the Empirical Null Distribution of Maxmean Statistics in Gene Set Analysis

Student
Angela Ruscitto

Title
Functional characterization of a MurQ etherase homolog from Tannerella forsythia

Student
Megan Saddleson

Title
Which College Students are Likelier to be Susceptible to using E-cigarettes?

Student
Mohammadreza Samadi

Title
Finding Influential Nodes for Initiating Successful Campaigns in Social Networks

Student
Mahboobeh Ghesmaty Sangachin

Title
Does Work Perception Matter? A Study of the Relationship between Work Psychosocial Factors and Worksite Wellness Program Participation

Student
Joseph Santini

Title
The Function of Cholinergic Input to the Ventral Tegmental Area

Student
Xiaomeng Shen

Title
Identification of specific virus control mechanisms by Comparing Long-term-non-progressors vs. Normal-progressors among HIV-infected patients using comprehensive proteomics profiling

Student
Georgios Sklivanitis

Title
All-spectrum Cognitive Channelization around Narrowband and Wideband Primary Stations

Student
Sheryl Trueman-Fathallah

Title
Optimization of pancreatic tumor priming by dovitinib to enhance gemcitabine uptake and efficacy.

Student
Hongying Wan

Title
Octupling the Imaging Speed of Multi-focal Photoacoustic Computed Microscopy through Compressed Sensing and Curvelet Inpainting

Student
Jing Wang

Title
Induction of human oligodendrocyte progenitor by a single transcription factor

Student
Qixin Wang

Title
MicroRNAs as Biomarkers for Pulmonary Toxicity Induced by Multiwall Carbon Nanotubes

Student
Rachel Pranitha Wood

Title
Quantitative analysis of a 3D printed perfusion phantom using Digital Angiography

Student
Santosh Rohit Yerrabolu

Title
Safer Reaming Tools for Hard Biological Tissues

Student
Aradhana Yoganand

Title
Angiographic analysis for phantom simulations of endovascular aneurysm treatments with a new fully retrievable asymmetric flow diverter

Student
Yang Zhao

Title
TSC: An R Package for Exact Parametric and Nonparametric Likelihood-ratio Tests for Two-Sample Comparisons

Student
Xu Zhu

Title
Network analysis of proteomics of gemcitabine and birinapant combinations in apoptosis signaling of pancreatic cancer cells


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