Tenth Annual

Celebration of Student Academic Excellence

Wednesday, April 23, 2014 | Center for the Arts

University at Buffalo The State University of New York


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**KEY**

- **H** = Member of Honors College
- **C** = CURCA Funded Project (Center for Undergraduate Research & Creative Activities)
- **§** = Member of CSTEP (Collegiate Science & Technology Entry Program)
**School of Architecture & Planning**

**Student**
Gary Chung

**Major**
Architecture

**Research Mentor**
Ludovico Centis

**Title**
The Eternal Blast | What is a Monument?

**Abstract**
My role within the research directed by the Ludovico Centis, Banham Fellow 2013 - 2014 consists of many. In the beginning, we've started looking into how the Manhattan Project had specifically affected Buffalo and the rest of the Western New York region, which soon escalated to the rest of the country. My focus is more directed towards the Buffalo and Niagara County region, where I record, map out wastes and more within industrial sites that were involved within the Manhattan Project and the Age of Industrial rising within this city. We've collaborated and participated in interviews with people around the country from artists, sociologists to researchers and more. Recently, I've been transcribing the interviews that were recorded with some of the many people that were involved as well as compiling a scrapbook of images that emphasizes the rising of the Industrial Revolution within Buffalo, while still mapping out the waste and industrial locations. All of my work will soon be compiled into separate book with the works of my colleagues and those outside of the Department of School of Architecture and Planning that choose to help get involved with this research yearlong research.

**Students**
John N. Costello and James T. Rice

**Research Mentor**
Kerry Traynor

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**Student**
Yibo Jiao

**Major**
Architecture

**Research Mentor**
Nerea Feliz

**Title**
House Renovation

**Abstract**
This is a project to study the refurbishment of an existing house in the North of Spain. A single family house to be transformed to accommodate two housing units. Renovation always means establishing a relationship with the past, what already exists in place, and with the imagined future. But above all, it means working in the present, to eliminate, repair, reconstruct, replace and add on to the existing structure. This research evaluates the superimposition of time, materials, structures, strategies and individuals. The methodology includes case study analysis, material research and design development via drawings, 3d models and physical models.

**Students**
Rebecca Johnstone and Kelley Mosher

**Major**
Environmental Design

**Research Mentor**
Harry Warren

**Title**
The Future of the Seneca One Tower

**Abstract**
The Seneca One tower is a beautiful piece of the history of Buffalo. The building stands as the tallest structure of downtown and is considered an icon for the area. It previously was the headquarters for HSBC bank for decades before the company's recent decision to leave. The absence of this anchor tenant has left this 38 story building vacant for the first time since its construction. The period in the life of the tower should be seen as a transition into its next use. We plan to research current issues with the site as well as possible uses for the Seneca One Tower. We also plan on analyzing how these new uses will impact the buildings sense of place. This will be done by analyzing the solutions and proposed uses in terms of urban design, financial feasibility, and architectural design.

**Student**
Ian Liu

**Major**
Architecture

**Research Mentor**
Jin Young Song

**Title**
Urban Experiment

**Abstract**
We seek to explore new urban design ideas with a non-motorized based system along with a new transit system to include within the city. The projects
in this independent study will include recreation parks, investigating the economic aspect of planning a non-motorized leisure city. We will also investigate the urban forms of a compact city to find solutions of uprising urban sprawl and means of creating space and dealing with density. By conducting research on the topics listed above we will enter the “Shenzen Bay Super City International Competition” working through digital media and interdisciplinary research based design to complete the competition.

**Student**  
Trenton Van Epps

**Major**  
Architecture

**Research Mentor**  
Dennis Maher

**Title**  
Reconstructing an Urban Fabric: A Buffalo Legacy

**Abstract**  
This project analyzes the abstract and tangible flow of materials throughout the city of Buffalo. Various scales are measured and compared to one another in an attempt to document one craftsman’s method. The work of a carpenter, Sean Wrafter, has been documented and analyzed through series and strings of drawings that try to explain how he is reconstituting the urban fabric of Buffalo through his unique practice of wood reuse from buildings that are being torn down. The project documents his woodworking process and his method of salvage from buildings through hand drawing, collaging and other drawing methods.

**College of Arts & Sciences**

**Student** 🌲  
Mark Asirwatham

**Major**  
Business Administration

**Research Mentor**  
Dr. Mary Bisson

**Title**  
Cadmium toxicity in the macrophytic alga Chara: role of reactive oxygen species and effect of zinc

**Abstract**  
Cadmium (Cd) is a toxic heavy metal that contaminates many environments worldwide. We are developing the large, freshwater alga Chara australis as a possible biological agent for removing Cd from aqueous environments. Earlier work in our lab showed that Chara survives in sediment and waters containing cadmium and translocates to the harvestable shoot. We also showed that Zinc (Zn) protects against Cd toxicity. In the work reported here, we explore the nature of Cd toxicity and how Zn protects against it. We hypothesized that reactive oxygen species, ROS, which can cause oxidation damage to cellular components, were produced as a response to heavy metal stress. We developed a technique using a compound (DCHF-DA) that becomes fluorescent when oxidized to measure ROS levels. We confirmed that this technique was valid by exposing the algae to high light or wounding, known to generate ROS in other species, and showing increases in fluorescence. However, after 2 weeks incubation in Cd, fluorescence decreased. We hypothesize that the initial production of ROS in response to Cd stress is counteracted by the synthesis of anti-oxidant compounds, and that Zn protects against toxicity by enhancing the production of the compounds.

**Student** 🌱  
Courtney Ball

**Major**  
Anthropology

**Research Mentor**  
Dr. Rebecca Cuddahee

**Title**  
Hemochromatosis and its Connection to the Bubonic Plague Through Darwinian Medicine

**Abstract**  
This research is regarding the genetic disorder hemochromatosis and its survival into today’s genetic pool. By understanding the effects of hemochromatosis on the body and how the bubonic plague also effects the body, one can draw the conclusion that through the Darwinian medicine, there is a connection between these ailments. Furthermore, this research explains that there is a benefit to having a disorder such as this one to enable survival past the approximate age of reproduction.

**Student** 🌳  
Michael Benson

**Major**  
Mathematical Physics

**Research Mentor**  
Dr. Surajit Sen

**Title**  
Are Nanoparticles Sticky or Bouncy?

**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 a
seemingly simple problem using high accuracy computer simulations – the collision of two nanoparticles. We ask a simple question – how do they interact in a collision and we, by solving lots and lots of Newton’s equations that slow moving nanoparticles can be firm and bouncy whereas fast moving nanoparticles can be pliable and sticky. This is in stark contrast to how simple balls behave when they collide. Thus the behavior we observe is counterintuitive. The poster will focus on the physics supporting the stickiness and bounciness of nanoparticles.

**Student**  Luke Bodmer

**Major**  Physics and Math

**Research Mentor**  Dr. Wackeroth

**Title**  Using Effective Field Theories to Search For New Physics Beyond The Standard Model

**Abstract**  After the discovery of the Higgs Boson at the Large Hadron Collider (LHC) at CERN, Switzerland, there remains the task of ensuring that the properties of the Higgs are those predicted in the Standard Model of particle physics. There are two sources of possible physics beyond the Standard Model. One being new particles and the other is new interactions between known particles. The effective field theory approach allows us to search for these sources of new physics while still respecting the gauge symmetries of the theory. We apply the effective field theory approach to search for physics beyond the Standard Model in the Higgs Sector at the LHC. This method can provide guidance towards the most likely place to see the effects of new physics.

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**Student**  Ian Bick

**Major**  Environmental Engineering

**Research Mentor**  Dr. Mary Bisson

**Title**  Heavy Metal Phytoremediation Potential of Macroalgae, Chara australis

**Abstract**  This project investigates the potential of the macroalgae, Chara australis, for cost-effective phytoremediation of heavy metals in mixed-contaminant soils. Sediments contaminated with a variety of chemicals are common at post-industrial superfund and brownfield sites in the United States. Previous research has suggested Chara’s utility in remediation of cadmium in laboratory conditions, with algae achieving bioconcentration factors above 1.0 in soils. We seek to evaluate Chara in conditions simulating a superfund remediation project to determine its viability as a soil remediation option. Sediment collected from the Buffalo River serves as a model growth medium, containing multitudes of chemicals of concern (COCs) such as benzo(a)anthracene, benzo(a)pyrene, and arsenic as revealed by laboratory testing. Preliminary experiments demonstrate the ability of Chara to grow in this medium. Ten experimental tanks are now operational. These are currently testing the effects of a harvesting regime on Chara’s cadmium adsorption in soil doped to 10 ppm Cd. Typically, U.S. soils contain up to 1.0 ppm. A comparison in growth rates between clean soil and collected soil from the Buffalo River will also take place. We expect that Chara will prosper in all tanks, with harvesting regimes showing increasing Cd adsorption rates.

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**Student**  Mark Alexis D. Burgos

**Major**  Communication and Psychology

**Research Mentor**  Debra Kolodczak

**Title**  Phylogenetic Analyses of New World Mints Using Nuclear and Chloroplast DNA Datasets

**Abstract**  The mint family Lamiaceae is one of the...
largest flowering plant families and it has major economic and ecological importance. While recent molecular phylogenetic work has addressed relationships in its second-largest subfamily, Lamioideae, several important questions remain unanswered, including the origin and evolution of major morphological and biogeographical radiations. My research focuses on elucidating phylogenetic relationships within Synandreae, a lamioid group of five North American endemic genera that are found primarily in the South Eastern US, although some species are vastly distributed throughout North America. The only other New World members of Lamioideae are found within the globally distributed tribe Stachydeae. Based on DNA sequence data from five nuclear-encoded low copy genes and various bioinformatic techniques, I am analyzing the phylogenetic relationships and biogeography of Synandreae members into the New World, as well as comparing their diversifications into the New World with that of Stachydeae. I am also compiling a supermatrix of Lamioideae chloroplast sequence data to make new comparisons between both nuclear and chloroplast datasets and to elucidate the phylogenetic placement of Synandreae within the subfamily Lamioideae. Preliminary nuclear data corroborate a single origin of the Synandreae and an independent colonization of Stachydeae into the Americas.

Student  
Jiechen Chen

Major  
Mathematics

Research Mentor  
Gino Biondini

Title  
Realistic modeling and simulation of influenza transmission over an urban community

Abstract  
Infectious diseases that are spread through human contact can progress very rapidly in a population. One of the key factors in the spreading of contagion, and a main concern in attempting to stop the spread of illness, is the particular configuration of links among individuals in local communities within the larger population. This study uses a detailed individual-based, three-partite model comprising about 245,000 individuals located in an urban area in the Northeastern United States. Interactions among individuals are divided into family, workplace and pastime (service places, shopping, etc), each occurring during a separate time period (daytime, pastime, and nighttime). Thus, the network allows one to model the spatial and temporal heterogeneity in the transmission of communicable diseases and to capture the differences between various individuals’ vulnerability to infection. We performed Monte-Carlo simulations of the spreading of influenza through this network. Simulation results correspond well to the reported epidemic information. We expect that the findings will offer a valuable platform to devise spatially and temporally oriented control and intervention strategies for communicable diseases.

Student  
Sylvia Choi

Major  
Geology and Geography

Research Mentor  
Dr. Jason Briner

Title  
The Climate and Environmental Record of Dragonfly Kettle Pond

Abstract  
Analyses were conducted on the post-glacial sediment record of a kettle pond at the Beaver Meadow Audubon Society site in North Java, New York. The goal was to determine climate and environmental fluctuations of the past 16,000 years in western New York. The Dragonfly Kettle bog site (DFK) has an area of 0.0037 km2 with up to 8 m of post-glacial sediment fill. Sediments were probed with a Russian peat corer and subsequent cores were obtained with a Livingstone coring system in multiple one-meter-long drives. The composite core from the kettle (13DFK-A) contains 5.96 m of sediment.

Basic sediment analyses include moisture content, organic content, carbonate content and magnetic susceptibility at a minimum of 5 cm resolution on the composite core. The DFK core stratigraphy includes 0.21 m of basal glacial fine sand overlain by 2.13 m of gyttja overlain by 3.63 m of peat. Radiocarbon dating six macrofossils throughout the 13DFK-A core enabled the construction of an age-depth model, which revealed transitions from glacial sediments to lacustrine sediments to bog sediments at ~15.5 ka and ~10.8 ka, respectively. DFK’s basal age of 15.5 ka provides a new constraint on deglaciation of this part of New York.

Student  
Katherine Coffin

Major  
Environmental Geoscience and Geology

Research Mentor  
Dr. Jason Briner

Title  
Lake sediment records from isolation basins constrain relative sea level changes during the Holocene near Nordskioeld Gletscher, Western Greenland

Abstract  
Lake sediments were analyzed from three isolation basins in western Greenland to create a record of relative sea level (RSL) during the Holocene. The record assesses the glacial isostatic adjustment and associated RSL change from retreat of the Greenland Ice Sheet (GrIS) during the Holocene. The main objective of this study is to inform current RSL models for western Greenland to further constrain Holocene GrIS behavior by analyzing RSL within an inland uplift setting that is not well addressed by the current literature. Sediment cores were obtained from four lakes located near the margin of Nordskioeld Gletscher and analyzed to determine organic-rich vs. minerogenic-rich material. A chronology was created
expressions have a somewhat restricted...
**ABSTRACT**

Numerous barriers impede open and honest dialogue between physicians and patients when it comes to sexual health, with scant research available on how best to overcome these obstacles and facilitate this important form of physician–patient communication. As such, the current study examines patient preferences for how physicians might initiate and manage these delicate discussions. Survey responses from over 1,800 participants across the United States and Southeast Asia regarding their experiences with and preferences for physicians conducting discussions about sexual health were coded using both latent and manifest content analytic techniques. This process produced an inventory with three super-categories of patient preferences regarding (a) initiation, (b) content, and (c) physician demeanor during these discussions, which included four, six, and twelve sub-categories, respectively. Logistic regression models revealed how only five of the 22 subcategories were related to participant demographics, with relationships small in effect size. Communication constructs, such as Facework and Communication Accommodation Theory, help frame and interpret these findings, which provide insight on how physicians can integrate strategies into their routine interaction style to better address patient sexual health.

**Student**

Ethan M. Guthman

**Major**

Psychology

**Research Mentor**

Larry W. Hawk, Jr., Ph.D.

**Title**

Functional Effects of Reinforcement on Human Error Detection

**ABSTRACT**

Error detection is an important part of learning and can be measured via the error-related negativity (ERN), an event-related brain potential that occurs within 100 milliseconds (ms) after an individual makes an error during a forced-choice task. The study examined how reinforcement affects ERN amplitude and behavioral responses during a forced choice task. The study used a within-subjects design with approximately 32 undergraduates from the University at Buffalo. I used two independent variables to examine the effect of reinforcement: Reinforcer Type (points, money) and Reinforcer Magnitude (0, 10, 50, 100 points or $0.00, $0.01, $0.05, $0.10). I used electroencephalography (EEG) to measure ERN amplitude during all conditions. Behavioral measures also were recorded.

**Student**

Timothy Hansen

**Major**

Biological Sciences

**Research Mentor**

Dr. Shermali Gunawardena

**Title**

Investigating the Role of Molecular Motors in Retrograde Bone Morphogenetic Protein (BMP) Signaling

**ABSTRACT**

Formation of new synapses as well as the maintenance of existing synapses is essential for proper neuronal function. One pathway that is of particular importance in synapse formation, and maintenance is the bone morphogenetic protein (BMP) signaling pathway. Here, we test the hypothesis that components of the BMP signaling pathway are transported via axonal transport, and that BMP signaling is dependent on the use of the molecular motors kinesin and dynein. In order to test this proposal, we looked to see if perturbations in axonal transport disrupted BMP signaling, as measured by its downstream signal phospho Mad. We also analyzed the in vivo transport dynamics of the Thickvein (TKV) receptor. We found that mutations in both kinesin and dynein cause a reduction of pMad signal intensity within the brain. Additionally, we observed bidirectional transport of TKV-GFP protein within larval segmental neurons. When the amount of functional kinesin or dynein motors is genetically reduced, TKV motility is hindered. Taken together our results suggest that the transport of BMP signaling proteins is largely dependent on axonal transport. Furthermore, these results suggest the possible existence of a BMP signaling endosome that directly interacts with molecular motors, similar to that found in NGF-TrkA signaling.

**Student**

Farhana Hasan

**Major**

Biological Sciences

**Research Mentor**

Dr. Shermali Gunawardena

**Title**

The Story of the Food Chain and Nepali L2 Learners

**ABSTRACT**

Recently, Buffalo has become the number one recipient for international refugees in New York State. In addition to overcoming traumatic experiences, refugee adolescents are often students with interrupted formal education (SIFE); frequently functioning at least (if not more than) two years below expected grade level, especially in science. This is supported by Cummin’s (1981) proposal of Cognitive Academic Language Proficiency (CALP), where L2 learners are linguistically several years behind in comprehending and expressing content based materials. ESL instruction is an immediate problem in Buffalo, and often times, specifically in content areas; there isn't much in the way of supplemental materials for the ELL student.

My research demonstrates audio-visual language sample narratives of Nepali ESL students discussing one of key topic in the New York State's biology curriculum for eighth grade: the food chain. The audio-visual language sample narratives that have been collected can be considered a “story” about the food chain, since all the elements of a story can be found within it. By analyzing the linguistic performance of the L2 Learners, I hope to observe the exact parameters of discrepancy that occurs due to a lack of expression of scientific terminology.
Abstract
The aim of this project is to examine the effects of complex auditory stimuli, such as music, on neural oscillations. Evidence suggests that it is possible to alter the frequency of brain waves via exposure to a rhythmic stimulus. Previous studies have shown statistically significant synchronization in response to exposing participants to simple, periodic drumming sounds. (Will and Berg, 2007) Additionally, a large body of literature explains that different wave frequencies are correlated with different cognitive functions, suggesting that the ability to manipulate them could have behavioral implications (Klimesch, 1999) Specifically testing with music, a commonly encountered stimulus, could shed light on the kind of mental alteration people expose themselves to regularly. This study will use EEG to measure the effects of music on neural activity, incorporating a memory task to determine whether successful neural entrainment or induced peaks can alter cognitive performance. This research would help to better define the capabilities and limitations of sound on entrainment and potentially lead to further projects investigating the use of entrainment to influence cognitive performance.

Student  Ⓓ  Amanda Haskell

Major  Psychology and Philosophy

Research Mentor  Dr. Eduardo Mercado III

Title  Can Stimulus Induced Neural Oscillations Improve Memory Performance?

Abstract
The effects of complex auditory stimuli, such as music, on neural oscillations. Evidence suggests that it is possible to alter the frequency of brain waves via exposure to a rhythmic stimulus. Previous studies have shown statistically significant synchronization in response to exposing participants to simple, periodic drumming sounds. (Will and Berg, 2007) Additionally, a large body of literature explains that different wave frequencies are correlated with different cognitive functions, suggesting that the ability to manipulate them could have behavioral implications (Klimesch, 1999) Specifically testing with music, a commonly encountered stimulus, could shed light on the kind of mental alteration people expose themselves to regularly. This study will use EEG to measure the effects of music on neural activity, incorporating a memory task to determine whether successful neural entrainment or induced peaks can alter cognitive performance. This research would help to better define the capabilities and limitations of sound on entrainment and potentially lead to further projects investigating the use of entrainment to influence cognitive performance.

Student  Ⓓ  Rudolph Johnson

Major  Communications

Research Mentor  Hua Wang, Ph.D.

Field of Study  Student Performance.

Title  Oscillations Improve Memory

Abstract
The effects of complex auditory stimuli, such as music, on neural oscillations. Evidence suggests that it is possible to alter the frequency of brain waves via exposure to a rhythmic stimulus. Previous studies have shown statistically significant synchronization in response to exposing participants to simple, periodic drumming sounds. (Will and Berg, 2007) Additionally, a large body of literature explains that different wave frequencies are correlated with different cognitive functions, suggesting that the ability to manipulate them could have behavioral implications (Klimesch, 1999) Specifically testing with music, a commonly encountered stimulus, could shed light on the kind of mental alteration people expose themselves to regularly. This study will use EEG to measure the effects of music on neural activity, incorporating a memory task to determine whether successful neural entrainment or induced peaks can alter cognitive performance. This research would help to better define the capabilities and limitations of sound on entrainment and potentially lead to further projects investigating the use of entrainment to influence cognitive performance.

Student  Ⓓ  Lindsay C. Krygier

Major  Geological Sciences

Research Mentor  Christopher S. Lowry

Title  Identifying zones of groundwater discharge in an urban bedrock stream

Abstract
Identifying zones of groundwater discharge in an urban bedrock stream.

Student  Ⓓ  Brooke Lebeau and Samantha L. Romand

Major  Visual Studies

Research Mentor  Renee Ruffino

Title  The Effects of Package Design on Consumers: How Designers Target Traditional Gender Roles

Abstract
The effects of complex auditory stimuli, such as music, on neural oscillations. Evidence suggests that it is possible to alter the frequency of brain waves via exposure to a rhythmic stimulus. Previous studies have shown statistically significant synchronization in response to exposing participants to simple, periodic drumming sounds. (Will and Berg, 2007) Additionally, a large body of literature explains that different wave frequencies are correlated with different cognitive functions, suggesting that the ability to manipulate them could have behavioral implications (Klimesch, 1999) Specifically testing with music, a commonly encountered stimulus, could shed light on the kind of mental alteration people expose themselves to regularly. This study will use EEG to measure the effects of music on neural activity, incorporating a memory task to determine whether successful neural entrainment or induced peaks can alter cognitive performance. This research would help to better define the capabilities and limitations of sound on entrainment and potentially lead to further projects investigating the use of entrainment to influence cognitive performance.

Student  Ⓓ  Christopher S. Lowry

Major  Communications

Research Mentor  Hua Wang, Ph.D.

Title  Identifying zones of groundwater discharge in an urban bedrock stream

Abstract
Identifying zones of groundwater discharge in streams flowing over bedrock or in confined channels in urban settings can be difficult. These settings prevent the use of traditional methods such as seepage meters and mini-piezometers. In order to overcome these difficulties we propose the use of ground based thermal imaging and stream gauging to identify zones of groundwater discharge. Thermal imaging has been used successfully to identify annual temperature gradients between groundwater and surface water in various settings. Based on previous work, we apply these thermal imaging techniques to the highly urbanized Scajaquada Creek in Buffalo, NY to identify zones of groundwater discharge through fractured bedrock. These results are expected to help support future restoration work within the Creek by identifying zones of potential mixing between groundwater and surface water.

Student  Ⓓ  Renee Ruffino

Major  Visual Studies

Research Mentor  Brooke Lebeau and Samantha L. Romand

Title  The Effects of Package Design on Consumers: How Designers Target Traditional Gender Roles

Abstract
The effects of complex auditory stimuli, such as music, on neural oscillations. Evidence suggests that it is possible to alter the frequency of brain waves via exposure to a rhythmic stimulus. Previous studies have shown statistically significant synchronization in response to exposing participants to simple, periodic drumming sounds. (Will and Berg, 2007) Additionally, a large body of literature explains that different wave frequencies are correlated with different cognitive functions, suggesting that the ability to manipulate them could have behavioral implications (Klimesch, 1999) Specifically testing with music, a commonly encountered stimulus, could shed light on the kind of mental alteration people expose themselves to regularly. This study will use EEG to measure the effects of music on neural activity, incorporating a memory task to determine whether successful neural entrainment or induced peaks can alter cognitive performance. This research would help to better define the capabilities and limitations of sound on entrainment and potentially lead to further projects investigating the use of entrainment to influence cognitive performance.

Student  Ⓓ  Amanda Haskell

Major  Psychology and Philosophy

Research Mentor  Dr. Eduardo Mercado III

Title  Can Stimulus Induced Neural Oscillations Improve Memory Performance?

Abstract
The effects of complex auditory stimuli, such as music, on neural oscillations. Evidence suggests that it is possible to alter the frequency of brain waves via exposure to a rhythmic stimulus. Previous studies have shown statistically significant synchronization in response to exposing participants to simple, periodic drumming sounds. (Will and Berg, 2007) Additionally, a large body of literature explains that different wave frequencies are correlated with different cognitive functions, suggesting that the ability to manipulate them could have behavioral implications (Klimesch, 1999) Specifically testing with music, a commonly encountered stimulus, could shed light on the kind of mental alteration people expose themselves to regularly. This study will use EEG to measure the effects of music on neural activity, incorporating a memory task to determine whether successful neural entrainment or induced peaks can alter cognitive performance. This research would help to better define the capabilities and limitations of sound on entrainment and potentially lead to further projects investigating the use of entrainment to influence cognitive performance.

Student  Ⓓ  Rudolph Johnson

Major  Communications

Research Mentor  Hua Wang, Ph.D.

Field of Study  Student Performance.

Title  Oscillations Improve Memory

Abstract
The effects of complex auditory stimuli, such as music, on neural oscillations. Evidence suggests that it is possible to alter the frequency of brain waves via exposure to a rhythmic stimulus. Previous studies have shown statistically significant synchronization in response to exposing participants to simple, periodic drumming sounds. (Will and Berg, 2007) Additionally, a large body of literature explains that different wave frequencies are correlated with different cognitive functions, suggesting that the ability to manipulate them could have behavioral implications (Klimesch, 1999) Specifically testing with music, a commonly encountered stimulus, could shed light on the kind of mental alteration people expose themselves to regularly. This study will use EEG to measure the effects of music on neural activity, incorporating a memory task to determine whether successful neural entrainment or induced peaks can alter cognitive performance. This research would help to better define the capabilities and limitations of sound on entrainment and potentially lead to further projects investigating the use of entrainment to influence cognitive performance.
to be more attentive to underlying objectives of package designs so they can become better-informed shoppers.

**Student**  
Na Lin

**Major**  
Communication

**Research Mentor**  
Debra Kolodczak

**Title**  
Imagining China's Yandang Mountain

**Abstract**  
In China, you will find impressive examples of ancient architectural achievement proving that, over centuries, human culture can exist in harmony with nature. "This vision is highly relevant today as we seek sustainable models of development in the face of unprecedented ecological and social change," according to Dr. Beverly Foit-Albert, author of the award-winning book, China's Sacred Sites. One of the sites featured in her book is Yandang Mountain. Located in Zhejiang province, millions of people visit the site. Their annual pilgrimage was a source of pride for me while growing up in <NAME the city> near the Mountain. Unknown to the visitors, we school children were memorizing the ancient poetry associated with Yandang Mountain.

**Student**  
Katrina K. Lindsay

**Major**  
Environmental Studies

**Research Mentor**  
Chris S. Lowry

**Title**  
Using social media and citizen science for hydrologic data collection

**Abstract**  
There is an increased demand in the hydrologic sciences to collect finer spatial and temporal resolution measurements. However, these measurements come at a significant cost and as a result new and innovative techniques are needed to meet these increased demands. In an attempt to address these demands we have developed a new method to collect hydrologic data by asking citizens to send in text messages of water levels in various parts of the United States. This method has been successful thus far both in responses received and accuracy. Citizen science is becoming a more popular way to conduct research in the environmental field. Since social media is a part of everyday life for many individuals, combining the various networking platforms is the next step in the future of citizen science. Although texting is an effective way of conducting research, it is believed that using texting in conjunction with social media such as Twitter, could increase the amount of responses. Combining social media and citizen science is expected to produce a clearer picture of distributed hydrologic measurements.

**Student**  
Susan F. B. Little

**Major**  
Environmental Geosciences

**Research Mentor**  
Dr. Chris S. Lowry

**Title**  
Combined Sewer System Impact on the Integrity of an Urban Waterway

**Abstract**  
Urban waterways are particularly susceptible to human intervention and alteration, and Scajaquada Creek as it passes through the City of Buffalo, is no exception. Beginning in the 1920’s Scajaquada Creek has been partially channelized and connected to Buffalo's Combined Sewer System. At Forest Lawn Cemetery, where this study takes place, Scajaquada Creek emerges from the 3.5-mile Scajaquada Drain, and meets with Combined Sewer Overflow #56. It is at this point that runoff and sanitary sewage discharge regularly during rain events. The research presented here observes the Creek, beginning at the mouth of this tunnel, to the Delaware Avenue Overpass. Water quality samples were collected at twenty-three sites for nine months, testing parameters including conductivity, dissolved oxygen, pH, temperature, and turbidity, as well as Escherichia coli. It is the objective of this research to create a temporal picture of water quality in order to better advise management decisions and mediate health risks in the future.

**Student**  
Nikeia McMillon

**Major**  
Communication

**Research Mentor**  
Debra Kolodczak

**Title**  
Beyoncé, celebrity worship, and the interplay of illusion and reality.

**Abstract**  
Beyoncé is, arguably, the brightest star in the musical celebrity universe. Her star power radiates integrity in the way she lives, loves, and epitomizes the ultimate luxury of female sensuality. As one of the best-selling musical artists of all time, her lyrics are etched deep in the heart and soul of millions of fans. If money equates to success, then consider this: Beyoncé's current net worth, when combined with that of her husband, Jay-Z, is over $850 million (Forbes, 2014). What happens when millions of ordinary women worship the extraordinary Beyoncé? Does such celebrity worship build confidence or does it reinforce inferiority? Is her career capitalizing on fantasy, or is it rooted in authenticity? Answers appear in the slogans of devoted fans: "B is for Bow Down." This project gathers facts, photographs, media reports, and fan reaction to develop visual case study of celebrity worship, leading to a better understanding of the media's role in fabricating fan worship. The goal of my work is to understand the dichotomy between illusion and reality in order to discover deeper meanings beneath the surface of Beyoncé's expertly crafted celebrity status. I investigate the question: Is she, or she not, de-stigmatizing the role of women?
Student
Ariel Namoca

Major
Communication

Research Mentor
Debra Kolodczak

Title
The Subtle Delights of Solitude

Abstract
Loneliness is a familiar feeling. Even when the causes, effects, typology, frequency and treatments of loneliness are well researched, the paradox is that many people feel more alone than ever, while far too few, such as myself, actually enjoy solitude. We understand that being alone does not equate to loneliness. For me, growing up in a supportive family, enjoying friends, team sports, and leading a youth group, all has helped me to value time shared with others, yet somehow not feeling directly connected. I feel alone. I enjoy it. However, the dominant voice of popular culture dictates that if you are alone, you are lonely. Western civilization is awash with artistic expressions that portray isolation as a sort of “aesthetic of loneliness.” You can easily find such artworks in world-class art galleries. You cannot easily find artworks that show an opposing view, namely, the natural comfort of solitude. This project addresses that apparent imbalance. By capturing a series of original photographs that celebrate solitude, then, juxtaposing the new images with key examples of classic artwork depicting isolation, my work challenges the assumption that being alone equates to loneliness. The resulting poster aims to illustrate the subtle delights of solitude.

Student
Anokhi Patel

Major
Biological Sciences and Psychology

Research Mentor
Dr. Ashu Sharma

Title
Commensal oral streptococci based designer vaccine against tooth and gum diseases: a proof of principle study

Abstract
We attempt to genetically modify oral non-pathogenic streptococci (Streptococcus gordonii) to express a virulence factor of the periodontal pathogen Tannerella forsythia. We will test in a mouse model to see if streptococci expressing surface antigen BspA provides protection against T. forsythia infection. My objectives during the past research period were to generate the recombinant DNA constructs for BspA-expressing S. gordonii. The bspA gene was amplified by PCR from the T. forsythia genomic DNA and cloned into a plasmid vector for chromosomal integration into S. gordonii by genetic transformation. Our preliminary data showed that immunization with the recombinant BspA protein in mice elicits BspA-specific serum IgG response, and protects mice against T. forsythia infection. As a proof of principle concept of recombinant vaccine for periodontitis and other infections, genetically modified S. gordonii expressing BspA (Sg-BspA) will be tested against T. forsythia infection in a mouse model of periodontitis. We predict that oral immunization with Sg-BspA vaccine would reduce T. forsythia infection and the associated alveolar (jaw) bone loss in mice.

Student
Nur Syahirah Abdul Rahman

Major
Communication

Research Mentor
Debra Kolodczak, PhD

Title
Understanding what workers want

Abstract
What do workers want? Quite simply, they want their work appreciated. Appreciation cultivates acceptance, which leads to awareness and action, which generates innovation, creativity, and productivity. These are the fundamental requirements for a productive workplace. This project compiles a photographic study of a process that aims to boost employee productivity by fostering a workplace of appreciation through ‘Five-Steps’: Acknowledge; Award; Accredit; Applaud; Aware. As a student of SIM-UB Singapore, in Fall 2013 I enrolled in Stephanie Pollack’s course, ‘Advanced Organizational Communication’. For this course, we explored the theory that employers can actually boost employee productivity by simply expressing gratitude and offering encouragement. ‘Team Connect’ was formed by the class “to encourage organizations to adopt and integrate appreciation” in the workplace. We identified, studied, and ultimately honored organizations in Singapore which demonstrate how...
the act of appreciating workers actually improves the bottom line. We also produced an electronic guide that features fifty-six activities intended to inspire corporate managers to adopt a culture of appreciation. By creating a photo-montage of how to implement the Five-Steps, I intend to illustrate the theory in actual practice: productivity improves when workers feel appreciated. The poster will feature approximately ten photographs that show what workers want.

**STUDENT**
Christopher Reinhardt

**MAJOR**
Chemistry

**RESEARCH MENTOR**
Dr. John P. Richard

**TITLE**
Understanding the Role of Loop-Loop Interactions Through Mutagenesis Studies in Triosephosphate Isomerase

**ABSTRACT**
Triosephosphate isomerase (TIM) utilizes desolvation of the active site and electrostatic interactions to efficiently catalyze the isomerization reactions between D-glyceraldehyde-3-phosphate (D-GAP) and dihydroxyacetone phosphate (DHAP). Upon substrate binding, TIM’s loop 6 closes and situates the catalytic base towards the substrate for proton abstraction. Loop 6 is stabilized in the closed conformation through interactions with loop 7. Inhibition studies with 3-phosphoglycolic acid (PGA), a transition state analog, were conducted on Y208 mutants to elucidate its role in stabilizing the close, active conformation. The results suggest that the tyrosine residue is involved in the facilitation of loop-6/7 hydrogen bonding. The Y208T mutation had little effect on the pKa of the active catalytic base, E165. Y208A and Y208F mutants perturbed the pKa of E165, resulting in values of 9.0 and 7.5 respectively. This variation indicates that more than one hydrogen bond is involved.

**STUDENT**
Sarah Reynolds

**MAJOR**
Psychology and Health and Human Services

**RESEARCH MENTOR**
Jamie Ostrow, Ph.D.

**TITLE**
Bullying in Early Childhood: The Bully Role and its Associated Adjustment Outcomes

**ABSTRACT**
Bullying is a problem that has been widely studied in middle childhood and adolescence, but has received little empirical attention in early childhood. The current study examined the existence of the bully role in early childhood, and unique associations with specific outcome measures. Ninety-one preschool children participated in the current study, as a secondary analysis of an existing dataset. The average age is around 45 months, and approximately 50% of the sample are girls. Children were recruited in two different cohorts from the same schools within a larger short-term longitudinal study. Teacher and observer reports were used to assess bullying, and outcome variables: peer acceptance, depression, and anxiety. These measures demonstrated appropriate reliability and validity. Based on preliminary findings, the bully role exists in early childhood, and is relatively stable over time.

**STUDENT**
Erin Richley

**MAJOR**
Geological Sciences

**RESEARCH MENTOR**
Dr. Charles Mitchell

**TITLE**
Biostratigraphic Analysis of Core 75NY-11 in the Mohawk Valley, NY, USA

**ABSTRACT**
During the Ordovician Period, the Mohawk Valley of New York State contained a large basin that deposited black shales such as the Utica. These black shales contain graptolite fossils that can be used to constrain ages of the Taconic thrusting taking place. I have analyzed the biostratigraphy of core 75NY-11 located near Ballston Spa, NY for its graptolite biozones. These results have also been compared to other cores in the region in order to better understand the ecology of graptolites in the Mohawk Valley. Core 75NY-11 exhibits lower diversity within the Orthograptus ruedemanni zone of the Utica shale than another core further east. This may be due to differences in environmental factors within the basin.

**STUDENT**
Roza Rouhani

**MAJOR**
Biomedical Sciences

**RESEARCH MENTOR**
Dr. Shermali Gunawardena

**TITLE**
Characterizing the Role of Huntingtin in Rab4 movement in Drosophila larval axons

**ABSTRACT**
Huntingtin (Htt), the protein that causes Huntington’s disease (HD), has been suggested to have a function in axonal transport. Previous work in the Gunawardena lab has implicated Htt in the transport of a small GTPases called Rab11. Rabs are involved in many vesicular functions including vesicle formation, movement, and membrane fusion. Interestingly, Rabs consist of a large family of proteins, some of which have unknown functions, but are present in many compartments including endosomal and synaptic compartments. One of these, Rab4 is a vesicular protein, but its function and the compartment it is associated with are still unidentified. Here, we evaluated the role huntingtin plays in Rab4 transport within axons. While Rab4 showed bi-directional motility, reduction of huntingtin via RNA interference (RNAi) dramatically perturbed movement and reduced both anterograde and retrograde velocities.
These data suggest that huntingtin influences Rab4 transport in vivo. Currently, we are evaluation whether Rab4 and huntingtin move together as part of a potential rab/htt complex using dual imaging.

Student  Christine Schaefer

Major  History and German

Research Mentor  Patrick McDevitt

Title  Not Just a Game?: How and Why Sport Becomes Legend

Abstract  This research focuses on questions regarding the legitimation of large-scale sporting victories. It undertakes two case studies: the victory of the Federal Republic of Germany over Hungary in the 1954 Football World Cup and that of South Africa’s Springboks over the New Zealand All Blacks in the 1995 Rugby World Cup. By examining what some Germans and some South Africans in the media have said about these victories over time, I hope to reveal the evolution of the memory of these events. Hypothetically, the addition of legendary aspects to these two stories of victory should be traceable. I also seek to understand why the importance of each of these games to their respective victorious country’s well-being is often stressed over the importance of each country’s economic or political stability (at least in the popular media). Why do people tend to view large-scale sport victories as a point of salvation for a nation?

Student  Alveera Tabbasum

Major  Biological Sciences

Research Mentor  Dr. Mary A. Bisson

Title  Cadmium Toxicity in the Macrophytic Alga Chara: Role of Reactive Oxygen Species and Effect of Zinc

Abstract  Cadmium (Cd) is a toxic heavy metal that contaminates many environments worldwide. We are developing the large, freshwater alga Chara australis as a possible biological agent for removing Cd from aqueous environments. Earlier work in our lab showed that Chara survives in sediment and waters containing cadmium and translocates to the harvestable shoot. We also showed that Zinc (Zn) protects against Cd toxicity. In the work reported here, we explore the nature of Cd toxicity and how Zn protects against it. We hypothesized that reactive oxygen species, ROS, which can cause oxidation damage to cellular components, were produced as a response to heavy metal stress. We developed a technique using a compound (DCHF-DA) that becomes fluorescent when oxidized to measure ROS levels. We confirmed that this technique was valid by exposing the algae to high light or wounding, known to generate ROS in other species, and showing increases in fluorescence. However, after 2 weeks incubation in Cd, fluorescence decreased. We hypothesize that the initial production of ROS in response to Cd stress is counteracted by the synthesis of anti-oxidant compounds, and that Zn protects against toxicity by enhancing the production of the compounds.

Student  Zi Yi Alina Tan

Major  Psychology

Research Mentor  Dr. Julie Bowker

Title  Displaying prosocial behaviors: Implications for the associations between anxious-withdrawal and psychological adjustment

Abstract  Anxious-withdrawal is a strong risk factor for psychological maladjustment during early adolescence (10-14 years), and yet little is known about possible protective factors. Drawing from research with adults, the goal
of this study was to investigate whether engaging in prosocial behavior diminishes the psychological maladjustment associated with anxious-withdrawal during early adolescence; gender was considered as another moderator. Two hundred and seventy-one students (139 boys; Mage = 11.54 years) completed peer nominations of anxious-withdrawal and prosocial behavior (Time 1; T1), and self-report measures of loneliness and depression (Times 1 and 2; T2). Hierarchical linear analyses revealed several main and interaction effects. For instance, anxious-withdrawal emerged as a concurrent and longitudinal positive predictor of loneliness. When predicting T1 depression, the interaction between anxious-withdrawal, prosocial behavior, and gender was significant. Simple slope analyses revealed that anxious-withdrawal was a positive predictor of depression for girls with high levels of prosocial behavior ($\beta = 0.12, p < 0.05$), but not for girls with low levels of prosocial behavior, or boys with high and low levels of prosocial behavior ($ps > .05$). Findings were unexpected and suggest that being prosocial during early adolescence may enhance the psychological risk associated with anxious-withdrawal, but only for girls.

**CSTEP**

**Student**  
John Brito

**Major**  
Biological Sciences

**Research Mentor**  
Dr. Jessica Reynolds

**Title**  
Administration of Nanoparticles to HIV-Infected Monocyte-Derived Macrophages

**Abstract**  
According to Lansky et al. (2010), there are more than 1.1 million people living with HIV in the United States, and approximately 56,000 new HIV infections annually. Macrophages derived from monocytes are one of the first lines of defense against HIV and are a reservoir for HIV-1. 1,3-β-Glucans stimulate the innate immune system by binding to and activating Dectin-1, a pathogen-recognition receptor, on the surface of monocytes and macrophages. Nanoparticle drug delivery systems are versatile because they target antiretroviral drugs to specific cells. They can be synthesized to target macrophages and monocytes using the surface ligand, 1,3-β-Glucan.
Our research examines the expression of Dectin-1 on monocytes and macrophages to determine nanoparticle uptake capabilities of each cell type. We hypothesize that an increase in Dectin-1 expression on macrophages compared to monocytes will lead to a greater uptake of nanoparticles in macrophage than in monocytes. We speculate that an increase in nanoparticle uptake will occur in macrophages compared to monocytes due to the increased expression of Dectin-1 thereby increasing antiretroviral(s) cell concentrations. The enhanced immune response elicited through Dectin-1 on macrophages can potentially act in synergism with the effects of antiretroviral(s) encapsulated in nanoparticles thereby, decreasing viral load in macrophage.

**Student**  §  Ayo McKenzie

**Major**  Chemistry

**Research Mentor**  Dr. Alice Ceacareanu

**Title**  Effects of Estrogen on the Development of the Fatty Liver in a High Fat Fed SCID Mice Model

**Abstract**
Our research investigates the role of estrogen in the development of the fatty liver in hopes of proving that a sufficient amount of estrogen may be a key source in preventing weight gain and the development of glucose intolerance in cancer patients. We use Severe Combined Immunodeficient (SCID) mice which models cancer patients, due to traditionally high rates of diabetes. Estrogen insufficiency combined with a high fat diet has been associated with insulin resistance and development of diabetes. We expect 17β-estradiol to decrease lipid accumulation in SCID male mice on a high fat diet due to an increase in bile acid synthesis and expression of lipid receptors. Similarly, female SCID mice on a high fat diet should exhibit low levels of lipid hepatosteatosis after receiving 17β-estradiol for 18 weeks. Male SCID mice on a high fat diet with low estrogen levels are expected to display inflamed adipose tissue due to lack of β- and T-cells and diabetic structural changes in the liver. Based on the results of the project, we may be able to suggest the role that estrogen plays in the development of diabetes in immune compromised people such as cancer or HIV patients.

**Student**  §  Julia Newman

**Major**  Biological Sciences

**Research Mentor**  Dr. Michael C. Yu

**Title**  The Role of Post-Translational Modifications on Protein-Protein Interactions

**Abstract**
A number of human genetic disorders and neurodegenerative diseases are associated with dysregulation in the formation of RNA. DNA, via transcription, is converted into RNA and is necessary for regular cellular function. One way of ensuring this formation is through the protein complex TRAMP which polyadenylates RNAs designated for degradation by the nuclear exosome. TRAMP destroys erroneous RNAs before they leave the nucleus to prevent faulty proteins from being made, potentially causing harmful effects on particular phenotypes. This research aims to determine whether an enzyme in the budding yeast, Hmt1, has an effect on protein-protein interactions within the TRAMP complex. Protein function can be regulated by post-transcriptional modifications (PTM). One example of a PTM is protein arginine methylation, which is the enzymatic addition of a methyl group onto the amino acid arginine within a protein context. Arginine methylation influences proper making of RNAs. Arginine methylation is catalyzed by a family of enzymes known as Protein Arginine Methyltransferases (PRMTs). In the budding yeast Saccharomyces cerevisiae, the major type I PRMT is Hmt1. Due to the fact that defects during protein synthesis may ultimately lead to detrimental effects on an organism’s health, it is important to examine these interactions.

**Student**  §  Asmah Shafie

**Major**  Biomedical Engineering

**Research Mentor**  Dr. Jonathan Lovell

**Title**  Nanoparticle-Protein Association for Cancer Theranostics

**Abstract**
Interactions protein synthesis may ultimately lead to detrimental effects on an organism's health, it is important to examine these interactions.

§ = Honors  C = CURCA  $ = CSTEP
**Abstract**

My research project focuses specifically on nanoparticle-protein association. Nanoparticles advance therapeutic applications because of their biocompatibility and high loading capacity for drug delivery. A recent discovery of porphysomes, nanoparticles with unique nanoscale optical properties that are self-assembled from phospholipid-porphyrin conjugates, is central in nanotechnology. The porphyrin plays an important role in the development of therapeutic and diagnostic tools by absorbing light near infrared regions, release heat, and generate photoacoustic signals upon detecting diseased tissues. Since nanoparticles are smaller than the average human cell, it can be absorbed into the cell easily. An important therapeutic advantage of the porphysome is its use in PET (Positron Emission Tomography) and optical imaging. PET is a noninvasive imaging technique that allows doctors to locate the cancer from outside of the body without initiating surgical procedures. Optical imaging would further detect the edges and surgical margins of the cancer in order to ensure all cancer is removed. However, in order to prevent unwanted side effects, it is important to analyze the porphysome-protein interaction. In this research, we show that cobalt-porphysome can bind with modified histidine proteins, as a result of cobalt chelation. This phenomenon may lead to optically active theranostics agents in cancer therapy.

**School of Engineering & Applied Sciences**

**Students**

Mary Canty, Courtney Kodweis, Jason Ross

**Research Mentor**

Dr. Leslie Ying

**Title**

MRI Phantom for Cardiac Perfusion Imaging

**Abstract**

Approximately 16.3 million Americans, twenty years or older, have been diagnosed with coronary heart disease, a direct result of coronary artery disease (CAD). CAD results from damage to or disease within coronary blood vessels, key for supplying oxygen and nutrients to the heart muscle. Current methods of evaluation CAD, such as single-photon emission computed tomography (SPECT), positron emission tomography (PET), and first-pass perfusion with magnetic resonance imaging (MRI), are insufficient due to associated radiation exposure, poor resolution and the use of potentially toxic contrast agents. Current research is focused on improving the capacity of MRI to analyze myocardial perfusion utilizing imaging phantoms. In the biomedical research field, there are currently no phantoms available for MRI specific myocardial perfusion analysis. Our team will develop MRI-compatible, dynamic cardiac perfusion phantom with the capability to model coronary artery stenosis. The design will involve a 3D printed product, associated pressure-based pump system, and a removable stenosis insert. T1/T2 values appropriate to the MRI phantom will approximate that of intravenous fluid (blood). From the final product, biomedical researchers will be able to develop new MRI calibration algorithms for the diagnosis and evaluation of coronary artery stenosis.

**Students**

William Dell’Anno, Peter Casey, Livio Forte, Mitchell Rathbun

**Research Mentor**

Dr. Jennifer Zirnheld

**Title**

Planetary Rover Power and Communications System

**Abstract**

The UB Space Bulls team has designed a prototype planetary rover to compete at NASA’s Johnson Space Center as part of the RASC-AL Exploration Robo-Ops Planetary Rover Competition. Our research has centered on developing the control and monitoring systems for the rover. These systems include: four wheels driven utilizing a pair of two-channel motor controllers with four high torque DC motors; an Arduino-controlled arm and manipulator assembly to retrieve objective rocks; a mast-mounted camera assembly with a high resolution PTZ camera and a high resolution webcam; a mini-ITX form-factor AMD computer; a Verizon 4G LTE to
The computer vision tracking system installed in the UAV streams a video feed to the ground station in real time where a dedicated computer is used to select the region of interest in the video frame. This project is realized through the integration of many subsystems: airframe and structural components, camera and camera joint, camera and camera focus, and aerodynamic components, autopilot system, engine and propulsion system, and the computer vision tracking system. The computer vision tracking system has been implemented, and tested using video taken from a stationary camera. Future testing will involve camera footage from the flying UAV.

### Abstract

The purpose of our research is to test the output of our reaction wheels. This is an important part of the satellites stability and tracking. Our satellite will become unstable when we first get released into space, due to the velocity and angle that we are being released from the space shuttle. Other factors that will make the satellite unstable will be the solar radiation from the environment, drag, and the other moving parts that are contained in the satellite. The output must be accurate to allow us to know what direction the satellite is facing. We have already done several rough tests, using spin tables to give us estimates of the torque output. When we receive our torque sensor we will be able to accurately determine the torque output from the reaction wheels.


**Student** Ryan O’Hara

**Major** Biomedical Engineering

**Research Mentor** Ciprian Ionita

**Title** Manufacturing Patient Specific Phantoms to Treat Aneurysms Using Rotational Angiography and 3D Modeling

**Abstract**

The vascular structure of a human body varies from patient to patient. Every aneurysm that is diagnosed is different in size, shape, severity, location and risk. The purpose of this project is to manufacture a patient specific phantom of an aneurysm that can be observed and tested to determine the need for interventional treatment. The volumes of the phantoms are taken from unhealthy patients using rotational angiography as a part of a larger stroke research study. By combining aneurysms of different shapes, sizes, and locations into one central vascular model, physicians and other researchers can test treatment options and determine if these options are needed.

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**Student** Ryan Zeiger

**Major** Chemical Engineering

**Research Mentor** Dr. Sriram Neelamegham

**Title** Engineering sialic acid derivatized glycans using CMP-Neu5Ac synthetase

**Abstract**

N-acetylleucaminic acid (Neu5Ac) is a member of the sialic acid family whose structure is commonly found at the terminal position of oligosaccharide chains found on the cell surface. The location of this molecule allows it to be involved in cell recognition and intercellular interactions. The biochemical addition of sialic acid requires metabolic synthesis of the activated sugar-nucleotide complex CMP-Neu5Ac. This synthesis is catalyzed by the enzyme CMP-Neu5Ac synthetase (CSAS) which facilitates reaction between Neu5Ac and the energy molecule CTP to form CMP-Neu5Ac. The goals of this study were to determine kinetic rate constants for the enzyme with respect to its human substrate Neu5Ac, and to also determine the degree to which CSAS will activate non-human Neu5Ac analogs. Activation of these similar molecules and their integration into the oligosaccharide chains could interfere with native recognition function by preventing ligand-receptor interactions or eliciting immune response. Isolation and purification of active enzyme produced in E. coli allowed for the kinetics experiments to be conducted. Michaelis-Menten constants have been calculated for both Neu5Ac and CTP based on absorbance readings obtained through High Performance Liquid Chromatography (HPLC). Further research will elucidate more information pertaining to the interactions between CSAS and Neu5Ac analogs.

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**Student and Honors College**

**Student** Nabiha Ahsan

**Major** Biomedical Sciences

**Research Mentor** Joan Linder

**Title** Illustrating Anatomy

**Abstract**

This project represents an exploration of the field of medical illustration and anatomical drawing. With the hand as a starting focal point, different modes of visual representation will be surveyed ranging from photorealistic drawing to line art. References will include cadavers at the Gross Anatomy Laboratory, both in person and from photographs, and atlases of the human body. Comparative
anatomy of primates may also be briefly
explored. The complexity of the hand
allows it the potential to be the main
focus of the drawings, but other areas of
the body may be included as well. The
overall purpose is to understand the field
of medical illustration better, practice
representational skills using different
media, observe the differences between a
cadaver and a medical illustration,
and learn the anatomy of the areas in
question.

**Student**
Vivaswath Ayyar

**Major**
Biological Sciences and Psychology

**Research Mentor**
Dr. Debra DuBois and Dr. Richard
Almon

**Title**
Time-course and magnitude of
GILZ mRNA expression in healthy,
glucocorticoid-treated and LPS-induced
inflammatory model rats

**Abstract**
Glucocorticoids (GCs) are pleiotropic
steroid hormones extensively involved
in the regulation of development,
metabolism and immune function. They
produce a myriad of changes in gene
expression across a wide array of
tissues, primarily via “transactivation”
and “transrepression” mechanisms. The
glucocorticoid-induced leucine zipper
(GILZ) gene is strongly transactivated
by GCs, and is an important component
of GC-mediated anti-inflammatory
response. In this study, we quantified
GILZ mRNA expression across different
Wistar rat tissues, established the
circadian rhythm of endogenous GILZ
expression in lung, and studied the time
frame and magnitude of GILZ mRNA
expression in corticosteroid-treated
rats, as well as in a rat-model of acute
inflammation using highly quantitative
qPCR assays. Results indicate that GILZ
was expressed in all tissues measured,
with high-level expression in lung.
Further, we found that GILZ mRNA
expression in vivo is entrained to that of
endogenous corticosterone production.
Last, GILZ mRNA expression profiles
were similar in both methylprednisolone
(MPL) treated-rats as well as in the MPL
plus lipopolysaccharide (LPS) treated
model, suggesting that LPS-induced pro-
inflammatory cytokines such as TNF-α
did not suppress GILZ expression. These
results indicate that novel “dissociated”
GR agonists which fail to transactivate
genes with anti-inflammatory potential
may lack important therapeutic
properties.
Title
The Application of Digital Media to Architectural Design

Abstract
Throughout the semester, my studio coursework was focused on the integration of prominent modern digital media technologies with the architectural design process. While working with a precedent, Lost Manantiales Restaurant, which is an example of a doubly-curved thin-shell structure designed by Felix Candela, I worked to establish an understanding of and reasoning for the generation of form. Successful thin shell structures are often reduced to the simplest element of a ruled line. Structures that are generated from a ruled line are created by the sweeping of a straight line along a curved path. This formal type is what dictated the design process, which worked with three key types of digital media. The first type, a foam cutter which worked with a heated, rotating wire, melted a designed path through foam and was used to create massing models that represent different types of ruled line surfaces. The second type, a 3D printer that uses a rendered computer model and thin plastic wire to create accurate and quick models, was used to explore physical outcomes of ideas in relation to the design program and requirements. Although initially strictly formal, the 3D printed models evolved into a scaled representation of the final designed structure, which took on the program of an art museum. The third medium, a CNC mill, which removed material from a block to create a sculpted mass, was used to create an accurate site representation into which the 3D print was placed. All three media were used to strengthen the design process and create accurate representations of the final designed form.

Student
Steven Coffed, Corey Needle

Major
Mechanical and Aerospace Engineering

Research Mentor
Dr. Paul DesJardin

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Title
Experiments in Biomass Combustion

Abstract
The focus of this research is on the understanding and predictions of flame spread over and ignition of biomass materials. Two experimental configurations will be used. The first is on the ignition of small pellet sized materials using a radiant heater. The second is an apparatus to explore upward flame spread. The goal of these activities is to compare experimental measurements of temperature and flame structure to predictions using numerical modeling and simulation.

Student
Nicholas V. DiRienzo

Major
Computer Science

Research Mentor
Geoffrey Challen

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Title
Smartphone Users Want to Be Mocked

Abstract
Smartphones have the opportunity to know a lot about their owner through the multitude of sensors and helpful interactive apps. In this position, today’s smartphone apps can learn much about their users: where they are, who they talk to, and more. Tomorrow, apps may be able to assess much more about their users, such as socioeconomic status or overall health. Unfortunately, users are giving up their private data without a say; to install an app on Android smartphones, users have to accept all requested permissions for sensitive data or reject the request and not install the app at all. This is flawed, so we are providing the user to better control their data — such as location data, sensor data, and network data. PocketMocker is an app and suite of Android framework modifications to allow users to alter — or mock — their behavior by feeding fake data to unknowing apps. Our goal is to provide more protection to the user's private data, and in turn, making their true data far more valuable.

Student
Justin M. Imiola

Major
Economics and Environmental Geosciences

Research Mentor
Dr. Himanshu Grover

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Title
Risk|Stress|Capacity: Explaining Quality of Transportation Emissions Reduction Policies in Local Climate Action Plans

Abstract
Climate change is a problem that impacts all ecosystems, nations, and individuals making it an issue of 'global commons.' In the past few decades, there have been increasing number of efforts both globally and locally to limit greenhouse gas emissions, the primary cause of climate change especially in the transportation sector. In the United States, Climate Action Plans have been adopted as the primary vehicle for
implementation of such policies. This research study examines a sample of 32 jurisdictions across the country with respect to the content and quality of transportation policies contained in their climate action plan. We use regression analysis to analyze the influence of risk, stress, and capacity indicators on the content and quality of transportation related emissions reduction policies. Our analysis reveals that communities at high risk, and with higher capacity have the best policies, whereas communities that contribute more to the problem through carbon emission (stress) are least likely to have good quality of transportation emission reduction policies.

Students Dante Iozzo, Alyssa Yaeger

Research Mentor Dr. Bernard Weinstein, Nelson Gross, and George Lindberg

Title A Quantitative Analysis of Raman Selection Rules in a Zincblende Crystal System

Abstract Raman spectroscopy is used to confirm the scattering geometry selection rules for a sample of Gallium Phosphide to determine the direction of cleavage in the material. Both backscattering and right-angle scattering were employed to view both the transverse and longitudinal optical phonon from a (1,0,0) crystal face. We used both a Krypton and an Argon Ion laser at various frequencies, along with a pair of polarizers and a calibrated rotation mount to orient the the sample relative to the incoming and outgoing polarization vectors. Longitudinal optical (LO) phonons were observed for all backscattering and right-angle orientations. The transverse optical (TO) phonons were forbidden as predicted for backscattering, but contrary to the selection rules, did not appear for the right-angle scattering. Thus, the backscattering results were in agreement with the literature, but the right-angle scattering results were divergent from that expected based on standard literature sources. Possible reasons for this are discussed.

Student Patricia Johnson

Major Medicinal Chemistry

Research Mentor Jeunghoon Lee, Ph. D.

Abstract Beta-sodium ytterbium tetrafluoride upconversion nanoparticles doped with yttrium, erbium, and gadolinium are useful due to their two-photon absorption of 980nm near-infrared light and consequent emission of one photon in the visible range of the electromagnetic spectrum. The particles were first encapsulated with poly-acrylic acid modified with differing percentages of carboxylic acid groups. It was found that the particles were most water-soluble when 15% of the PAA amino substituents were modified as compared to 0% and 40%. The encapsulation process decreased the emission intensity from the particles. After encapsulation, single stranded DNA (ssDNA) modified with an amino group was attached to the carboxylic groups on the capsule. This process was successful as demonstrated by Forster Resonance Energy Transfer between the particle and a rhodamine dye on a strand of complementary ssDNA that was later annealed to the particle DNA. While this data provides proof of concept, the emission intensity dropped significantly between each stage of the process.

Student Stephanie Kong

Major Chemical Engineering

Research Mentor Professor Paschalis Alexandridis

Abstract The noise blast, due to high intense pressure waves, not only damage the peripheral sensory organs like ears and eye, also induce dramatic central brain damage. Battlefield, sports and road accident are major places where subject can be exposed to blast wave. Central brain injury caused by peripheral damage due to blood vessels and axonal damage & shearing are causal source for many neurodegenerative diseases. Activated microglia, the resident immune cells in the brain is commonly linked with the pathology of neurodegenerative diseases. Therefore we examined CD68 protein expression, a marker for activated microglia, using

Student Antara Majumdar

Major Biomedical Sciences

Research Mentor Dr. Richard Salvi Ph.D.

Abstract Blast wave activates brain immune cells

Title Blast wave activates brain immune cells

Abstract The noise blast, due to high intense pressure waves, not only damage the peripheral sensory organs like ears and eye, also induce dramatic central brain damage. Battlefield, sports and road accident are major places where subject can be exposed to blast wave. Central brain injury caused by peripheral damage due to blood vessels and axonal damage & shearing are causal source for many neurodegenerative diseases. Activated microglia, the resident immune cells in the brain is commonly linked with the pathology of neurodegenerative diseases. Therefore we examined CD68 protein expression, a marker for activated microglia, using
imunohistochemistry method in 6 months post blast waves rat brain. Brain regions involved in hearing (cochlear nucleus), Memory (hippocampus) showed significant increase in expression of CD68 protein. This result suggested that blast wave may induce server neurodegenerative diseases.

**Student**: Tatiana Matlasz  
**Major**: Psychology  
**Research Mentor**: Dr. Julie Bowker  
**Title**: The Associations Between Having a Popular Friend and Psychological Adjustment in Early Adolescence

**Abstract**

It is known that young adolescents benefit socially when they affiliate with popular peers (“basking in reflected glory” effect). However, it is not clear whether young adolescents also benefit psychologically when their friends are popular. This study examines, for the first time, the associations between having a popular friend and psychological adjustment during early adolescence. Friendship mutuality, adolescents’ own levels of popularity, and gender were tested as moderators. Two hundred and seventy-one adolescents (Mage = 11.54 years) reported on loneliness, depression, and friends, and completed peer nominations of popularity at two time points (T1, T2). Hierarchical linear regression analyses revealed several significant main and interaction effects. For instance, friend popularity predicted loneliness at T1 (β = -0.17, p = .03) and T2 (β = -0.13, p = .001). There was also a significant interaction involving adolescent popularity, friend popularity, and gender when predicting T2 loneliness, such that, friend popularity was associated significantly with T2 loneliness only for girls low in popularity (β = -0.46, p = .006). Findings suggest that many young adolescents may benefit uniquely and psychologically from having a popular friend, but that the strongest benefits may be garnered by unpopular young adolescent girls.

**Student**: Nigel S. Michki  
**Major**: Computational Physics  
**Research Mentor**: Dr. Andrea Markelz  
**Title**: Method for Electrostatically Aligning Proteins in Solution

**Abstract**

The vibrational modes of proteins are thought to be related to their functions in biological systems. Many of these modes have energies lying in the terahertz (THz) frequency range and can thus be probed using terahertz time-domain spectroscopy (THz-TDS). However, water molecules have a high absorption in this frequency range, effectively masking the motion of proteins when in solution. Even so, if the proteins were aligned along one axis their signal could be isolated and analyzed.

Building on the designs of Dr. Deepu George, I fabricate an electrostatic alignment cell to align proteins (with a large dipole moment) along one axis while in solution. I then test the effectiveness of this cell by taking two measurements with THz-TDS: one with the THz beam polarized along the electrostatic alignment axis, and one with the THz polarized perpendicular to it. After subtracting these two measurements, the contribution from the randomly oriented water molecules is drastically reduced, and the resultant signal can be attributed solely to the motions of the proteins.

**Student**: Mahisha L. Naidu  
**Major**: Psychology  
**Research Mentor**: Micheal L. Dent  
**Title**: Spatial Unmasking in CBA/CaJ Mice

**Abstract**

The experiment, using operant conditioning techniques is designed to study the ability of mice to identify
tones played at various frequencies, in the presence of a background masker, which is emitted from either the same location that the tones are playing from or 90 degrees to the right of it. Six mice, 3 male and 3 female, were assigned randomly to eight different conditions: 8kHz Front mask, 8 kHz Side mask, 12kHz Front mask, 12kHz Side mask, 16kHz Front mask, 16kHz Side mask and 24 kHz Front mask, 24kHz Side mask. Each mouse will run on all conditions in a random manner. The mice will be tested on their ability to respond to the various tone frequencies. Owing to the fact that mice communicate in the ultrasonic range, it is hypothesized that mice will show spatial unmasking which would be greater for higher frequencies than lower frequencies. Also, we expect that the thresholds for tones embedded in maskers where the noise is coming from the same location as the tone signals will be higher than thresholds for the maskers at a 90 degree separation from the signals.

**Student** 
Abhiram Rao

**Major**
Mechanical Engineering/Biomedical Engineering

**Research Mentor**
Dr. Prahlad Menon

**Title**
Patient-Specific Hemodynamic Evaluation and in-silico Planning for Optimal Interventions in Tetralogy of Fallot

**Abstract**
Tetralogy of Fallot (ToF) is one of many congenital cardiac defects that require complex reconstructive surgery. Associated anomalies further complicate surgical decisions, which often have to be made at the operating table. The presented novel surgical planning strategy involves in-silico reconstruction of patient-specific vascular models, and functional studies to analyze outcomes based on pre-surgical anatomy. Patient specific in-silico anatomical surface models were reconstructed from three-dimensional (3D) computed tomography (CT) diagnostic image volumes of two patients with ToF associated with left pulmonary artery stenosis and a patent ductus arteriosus. The pre-surgical models were characterized for similarity after registration using diameters of inlets and outlets, following which computational fluid dynamics (CFD) simulation was employed to establish baseline pre-operative hemodynamic characteristics. In-silico reconstruction to correct anomalous anatomy was performed using the advice of surgeons, and CFD simulations were performed in post-surgical anatomy. Improvements in pressure gradients and pulmonary flow distributions were then evaluated. Our approach is presented as a paradigm shifting concept to evaluate patient-specific anomalies in a manner more objective than mere visual inspection of radiology images. Present studies are focused on analysis with a larger patient cohort to establish repeatability as well as extending the proposed method to other vascular procedures.

**Student**
Brandon Wyman

**Major**
Biomedical Sciences

**Research Mentor**
Vivian Cody

**Title**
Structure of Lamprey TTR as a Model for the Evolution of Thyroid Hormone Binding Protein Function

**Abstract**
Transthyretin (TTR) is a carrier protein that binds to and transports thyroid hormones (TH) and retinol binding protein (RBP), and is responsible for the diseases in humans: senile systemic amyloidosis, familial amyloid polyneuropathy, and familial amyloid cardiomyopathy. TTR is only found in vertebrates, while transthyretin-like protein (TLP), which shares a 60% DNA sequence similarity with TTR, has been observed in all kingdoms. This suggests that the TTR gene may have evolved from the duplication of the TLP in early vertebrate evolution. Lampreys, considered the most basal group of the vertebrates, have been identified to have TTR with characteristics of both TLP and TTR. Structural studies of lamprey TTR, using x-ray crystallography, can validate the hypothesis that it is the closest TTR to diverge from TLP, and can provide data for the role that DNA sequence changes in TTR play in the formation of amyloid fibrils in humans.
Matthew Zaslansky

Research Mentor
EunHee Lee

Title
A Look at the Production of Korean Referring Expressions by English-Dominant Speakers

Abstract
In my research I look at how successfully Korean heritage speakers and advanced second language learners (L2s) produce referential expressions in Korean narrative discourse. Entities in discourse can be encoded by different referential expressions, such as proper names (John), definite descriptions (the man), and pronouns (he), depending on their discourse status. Korean exhibits certain characteristics that are very different from Indo-European languages, such as frequent omission of arguments retrievable from context (zero anaphora), and prevalent use of bare (i.e., articleless) NPs. Heritage and L2 speakers of null argument languages, like Korean, have been observed to consistently replace null arguments with overt nominal expressions in discourse pragmatically inappropriate contexts.

Preliminary results showed that for both heritage language learners and L2 learners, production of most types of referring expressions was significantly different from native Korean speaker data. Moreover, heritage learners showed non-native-like features such as more frequent topic/subject shift across sentences, and the use of zero anaphora for such a shift. This research has practical implications for Korean language pedagogy, and theoretical implications for ‘Interface Hypothesis,’ which proposes that interface structures between cognitive domains such as syntax and pragmatics are more difficult to acquire for non-natives than structures without this interface.

Student
Jose Barajas

Major
Chemical Engineering

Research Mentor
Dr. Jason Benedict

Title
Synthesis and characterizations of metal organic frameworks utilizing a bifunctional acetylacetonate organic linker

Abstract
Metal-organic frameworks (MOFs), crystalline materials constructed from organic linkers bridging metal centers, remain an active research area due to the enormous design flexibility associated with the innumerable combinations of the constituent building blocks. The key property of these solids, their permanent porosity, makes them excellent materials for a diverse range of applications including CO2 sequestration, chemical separations, fuel storage and drug delivery. Carboxylates, one of the most popular functional groups for binding linkers to the metal centers, are often readily hydrolyzed which in turn leads to decomposition of the MOF lattice. Groups working on dye-sensitized solar cells (DSSCs) have recently overcome a similar hydrolytic stability issues by exchanging the carboxylate binding group for acetylacetonate (acac). Given the impressive chemical stability of the acac-based dye sensitizers in DSSC applications, we posited that similar chemical stability might be achieved through acac-based MOFs. We’ve recently completed the synthesis of the ditopic organic linker bis(1,4-diacetylacetonate) benzene. Work is currently underway to characterize the crystalline materials generated by the reaction of a wide variety of metal centers and the bifunctional acac linker. Details of the synthesis, structural analysis via X-ray diffraction, and the optical properties of the crystalline materials will be presented.

Student
Maliek F. Likely

Major
Chemical Engineering

Research Mentor
Dr. Sarbjit Banerjee

Title
Chemical Lithiation of V205 Nanowire Arrays Grown via Chemical Vapor Deposition

Abstract
Vanadium (V) oxide has been the subject of much investigation due to its attractiveness for use as a cathode material in lithium-ion batteries. The layered structure of V205 allows for the insertion of lithium ions into interstitial

Student
Lauren Coviello

Major
Industrial Engineering

Research Mentor
Dr. Jun Zhuang

Title
Terrorist Attacks in Relation to the Top 10 Tourist Countries

Abstract
Through previous research, terrorism and tourism have been studied extensively, but in literature, gaps exist in researching the historical terror data using time series models for forecasting. Based on the data from the GTD (Global Terrorism Database) and UNWTO (United Nations World Tourism Organization), this study concentrates on the top 10 tourist countries listed in 2012. First explored are relationships between incidents, fatalities, wounds, target types, group types and motivations using statistical analysis methods. These results will be shown in statistical and network graphs in different aspects, followed by developing different mathematical time series models to predict the potential future of terrorist events.

Student
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Major
Industrial Engineering

Research Mentor
Dr. Jun Zhuang

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within the crystal. Due to the large available space for the intercalation of lithium ions, V205 has a high energy density. However, Li-ion batteries have long been limited in lifetime energy density, and cyclability due to gradual degradation of electrodes due to the stresses generated from volume expansions and contractions with lithium insertion/removal. This is a problem that can be sloved by scaling materials to nanoscale dimensions. Arrays of oriented quasi-1D nanostructures are an attractive improvement upon traditional bulk materials, and continuous films due to several reasons. Chemical vapor deposition allows for the synthesis of oriented arrays of nanostructures that are densely packed and anchored to a conducting substrate. The nanoscale size of these arrays shortens the average path length for Li insertion allowing for faster cycling; whereas, the increased freedom to accommodate strain prevents degrading upon cycling. This study shows the synthesis of such arrays, and their ability to reversibly accommodate the insertion and removal of lithium ions.

**Student**  
Ifechukwu Ononye

**Major**  
Aerospace Engineering

**Research Mentor**  
Dr. John L. Crassidis

**Title**  
Characterizing the Response of a CCD Camera

**Abstract**  
Two Smartek GC1392 Cameras will be used in the University at Buffalo’s Nanosat team mission. They will be responsible for acting as a guide, and for collecting data during the mission. The effectiveness of the camera will be evaluated through a series of tests that look at the noise changes with respect to integration time, as well as how the noise levels change with the temperature. These results will give an idea of the noise levels to expect during the mission.

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**School of Management**

**Student**  
Scott Anderson

**Major**  
Business Administration

**Research Mentor**  
Derek Mohr

**Title**  
Shorting Gamestop

**Abstract**  
TKIG is a student run investment group that invests with real money. The group had only taken long positions on equities. I decided to go a new route by pitching that we take our 1st ever short position. The difference between a short position and long position is that in a long position you want the stock price to increase, but in a short position you want the stock price to decrease. The company that was chosen was GameStop Corp (GME). There were unique challenges with this choice because there had previously been investors taking short positions on GME, but they got “squeezed” out of their position. The holiday season was approaching and new gaming consoles were going to be released which was expected to help GME sales. Although these factors seemed favorable to GME, I believed that these factors were already priced into the stock. In addition their business model wasn’t suited for long-term growth in the industry. I performed detailed research on the gaming industry, examined GME’s financials, and analyzed the different type of consumers. I then pitched the stock to our group with the recommendation to short 100 shares at $52.62. Currently GME is trading at $37.33.

**Students**  
Jacob Bluestein, Safia Dandia, Peter Preziosoa, Daniel Maitles

**Research Mentor**  
Mark Adler

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**Culture is the Key to its Future Success**

**Student**  
Aaron Fiebelkorn

**Major**  
Business Administration

**Research Mentor**  
Mark Sauberan

**Title**  
Becoming a Business Analyst and Programmer as a Student and Student Assistant

**Abstract**  
The purpose of my project will be the history and development of my skills from no business intelligence to developing information systems for the School of Pharmacy. I am currently a student assistant at the School of Pharmacy for the Lead Programmer/Analyst. Even though I am a student assistant, my supervisor (Mark Sauberan) has me do tasks and projects that an intern or entry level programmer would do. I started with no programming and now know several. The project will show the steps I took
to get where I am today which includes being the Second Runner-Up of Student Employee of the Year (first time being nominated). The project will show how I am able to take business rules and create an information system either through a web interface or MS Access and save other employees times in other departments. (One of my systems saved one person 6 days of manually inputting information in.) Some things on the poster will include things that I learned in my classes, which I was able to apply to my job.

**Students**

Louis Galarza, Andrew Leung, Robert Gray

**Research Mentor**

Kathleen Nesper

**Title**

Vitalizing the Community with VITA

**Abstract**

The Volunteer Income Tax Assistance Program is a community service program designed to relieve the financial burden associated with tax season for low-income families. Our IRS certified volunteers file over 800 returns a year completely free of charge for individuals with income below $51,000. The program is run by the Zeta Theta of Beta Alpha Psi, which is an international honorary organization for Accounting, Finance, and MIS majors. Our VITA program was featured on both NBC and Time Warner News last month, and the program was featured on both NBC and Time Warner News last month, and the service is currently available on South Campus, but will be hosted on North Campus during the end of March and early April. The four VITA chairs and myself, all members of Beta Alpha Psi, delivered the training sessions to over 150 School of Management students this semester.

**Student**

Ryan Hauser

**Major**

Business Administration

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**Research Mentor**

Natalie Simpson

**Title**

Agent-Based Modeling of Railroad Classification Yards

**Abstract**

The objective of this study was to develop inbound and outbound decision rules that would minimize total railcar delay in a simulated railroad classification yard. In a given classification yard, two engines select railcars for assembly into departing trains: the hump engine (located at yard entrance), and the pullback engine (located at yard exit). We construct a simulation model of railcar selection in which each of these engines operate as independent agents, to assess which selection rules minimize railcar delay throughout the system. By using a framework in which the outcome of interest (railcar delay) is dependent on the interaction of autonomous agents, we develop a system-wide plan that does not require advance information or intensive computational resources. Thus, our model can stand on its own as classification yard policy, or serve as a contingency plan, allowing a yard to operate as effectively as possible during periods in which other planning capacities are not available. We also show that the penalty incurred by using the agent-based model is relatively small in comparison to employing significantly more burdensome optimization techniques, as demonstrated with benchmark data provided by the INFORMS Railroad Application Society.

**Students**

Jesse Koester, Nguyen Nguyen, Nick Horvath, Evan Marazek

**Research Mentor**

Joana Monteiro

**Title**

Optimized Routing: The Future of Logistics

**Abstract**

Jesse is currently an intern at Will Foods, a meat distributor in Buffalo, NY. One of the projects he is working on consists of incorporating an application which will enable us to put smartphones into each truck with specially designed routing software. This application will enable us to input all of the product information including weight, dimensions, and where it has to be delivered to. Once this information has been inputted, the software will run its process and create a specially designed optimized route which will enable the dispatcher to automatically create a more organized, efficient, and cost saving plan to deliver all of the product on time. Another feature of this system will give us the ability to send the optimized route directly to the smartphones in each truck. This will show each truck exactly where to go using GPS and google maps as well as give management the ability to track the location of each truck so that they know where they are at all times.

**Student**

Wen K. Luo

**Major**

Business Administration

**Research Mentor**

H. Raghav Rao

**Title**

Gambling on the Sun: Forecast Daily Solar with an Ensemble of Weather Models

**Abstract**

The project was a Machine Learning-based algorithm that I created for the American Meteorological Society 2013-2014 Solar Energy Prediction Contest. The contest was an academic competition consisting mostly of professional data scientists and professors and researchers from academic institutions. The purpose of said contest was to predict solar energy production at 98 stations over the course of the years 2008-2009. Solar energy is known to fluctuate due to weather patterns and electric companies need accurate forecasts of energy production to know how much non-renewable energy should be produced to compensate for the energy not covered. Errors in forecasting solar energy lead to

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**Student**

H. Raghav Rao

**Major**

Business Administration

**Research Mentor**

Wen K. Luo

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losses in either using too much energy or requiring emergency purchases of energy to compensate. The goal of this contest is to discover which statistical and machine learning techniques provide the best predictions of solar energy production.

**Students**
Brittany Popovski, Dominic Eusanio

**Research Mentor**
Kathleen Nesper

**Title**
Sophomore Standout – Accepting the Challenge as a Sophomore

**Abstract**
The Sophomore Standout poster describes Brittany Popovski and Dominic Eusanio’s experiences during the PricewaterhouseCoopers Challenge Case Competition. The objective of the case was to present to a panel of employees from PricewaterhouseCoopers with a solution to whether or not their client should start a biodiesel company. We were to provide them with the social, environmental, and financial implications of starting the company, West Texas Biodiesel Facility. Our team of 5 was given 12 minutes to present our findings. As sophomores, this was our first time exposed to this competition and we were able to learn and grow from this new experience in many different ways. Newly acquired skills from the competition will help us stand out among other students our age since we decided to get involved early.

**Student**
Brandon Sackler

**Major**
Business Administration

**Research Mentor**
David Murray

**Title**
Machine Learning in the P2P Lending Space for Fun and (Excess) Profit.

**Abstract**
Peer to peer lending is a new form of “banking” in which instead of one’s loan being funded by a bank or similar institution, it’s funded by the contributions of one or (typically) more investors, in increments as small as $25 per investor. Cutting out the banks in this way results in lower costs for borrowers and higher, more stable yields for investors. When investing in one of these loans there are many parameters to consider, this makes it difficult to analyze using traditional methods. Inspired by previous work experience at a hedge fund dealing in distressed consumer debt I sought to find a method to optimize a portfolio of such loans in a way which would exceed the average return. This led me to machine learning, an approach that leverages computers to optimize a solution via a variety of methods.

**Student**
Rohan Kapoor

**Major**
Business Administration

**Research Mentor**
Veljko Fotak

**Title**
Let’s Talk About It – Rebranding Staples

**Abstract**
Prior to attending UB, I worked as a Mobile Consultant for Staples. In charge of the Mobile Technology Department, I became responsible the sale of cell phones and other related tech products. At the time I was hired, the department was going through a rough patch, with extremely poor sales. My poster explains how I assessed this problem, and through the marketing and promotion of my department, increased sales by over 200% in just one month. Due to my success, I also had the opportunity to implement my sales tactics in other stores by training their Mobile Consultants. My presentation will feature some of the material I created, explain the sales tactics I used, and reflect on my experiences as a Mobile Consultant at Staples.

**Student**
Stanley Diih

**Major**
Health and Human Services, Early Childhood Studies

**Research Mentor**
Dr. Nathan J Daun-Barnett

**Title**
FAFSA Completion Project

**Abstract**
Research has shown that many low-income students who are eligible to receive financial aid, do not because they fail to fill out the Free Application for Federal Student Aid (FAFSA). This past spring, the researchers and volunteers for the FAFSA Completion Project worked in the district of Buffalo public schools to increase application submissions before the April 1st deadline—the deadline for the April 1st tuition guarantee. Initial findings suggest a 60% increase in submissions as well as a 5% increase in the accuracy of submissions. This research demonstrates an effective approach to increasing college access for low-income students.

**Student**
Paul Glenn

**Major**
Mathematical Physics

**Research Mentor**
Dr. William W. Menasco

**Title**
MICC: A tool for computing short distances in the curve complex

**Abstract**
The curve complex C(Sg) of a closed orientable surface of genus g is the simplicial complex having a vertex for each isotopy class of essential simple closed curves in Sg. Two vertices share an edge if they have...
disjoint representatives in $S_g$. A metric is obtained on $C(S_g)$ by assigning unit length to each edge. Thus, the distance between two vertices, $d(v, w)$, corresponds to the length of a shortest edge-path between $v$ & $w$. Although there are finite time algorithms for computing distance, the fact that the generic situation has infinitely many geodesic paths makes the implementation of these algorithms impractical. However, John Hempel has a practical algorithm to determine whether $v$ & $w$ are distance 4 or greater. In this note we introduce the software package MICC (Metric in the Curve Complex), an implementation of the Hempel algorithm. We will discuss the mathematics underlining MICC and give applications. In particular, we give examples of distance 4 vertex pairs in genus 2 and 3. Previously, there was only one known pair due to Hempel.

**Student**
Christine Tjahjadi-Lopez

**Major**
Geography

**Research Mentor**
Dr. Henry L. Taylor, Jr.

**Title**
The Social Impact of Business Investments on Black, Latino & Minority Populations: Are Supplier Diversity Programs Fulfilling Their Purposes?

**Abstract**
This study evaluates the effectiveness of supplier diversity programs. Supplier diversity programs originated from President Nixon’s proposal of Black Capitalism and the neoliberal idea of corporate social responsibility. This study sought to determine whether supplier diversity programs are creating their assumed positive impact on the Black, Latino, and minority communities. A literature review of 54 academic definitions of corporate social responsibility and an examination of how 115 companies evaluate the impact of their supplier diversity programs was conducted. An evaluation system to ensure an impact of supplier diversity programs on Black, Latino, and minority populations is proposed.

**School of Medicine & Biomedical Sciences**

**Student**
Kanisho Abiko

**Major**
Biochemistry

**Research Mentor**
Laura Feltiri, MD

**Title**
P38 MAPK, A Potential Therapeutic Target for Multiple Sclerosis Treatment

**Abstract**
Multiple Sclerosis (MS), a common neurological disorder in the central nervous system, is caused by an abnormal autoimmune attack against myelin, which is the sheath structure around nerves and enables normal nervous function. The disease usually starts with relapsing-remitting phase where myelin is destroyed and regenerated by myelin-making-cell, oligodendrocytes. Gradually the disease shifts to a progressive stage where oligodendrocytes lose its ability to re-myelinate and die. Many treatments have been developed to suppress and modulate autoimmune response at the onset of the disease, but few for progressive MS and none which restore the ability of oligodendrocytes to myelinate. We discovered that a protein kinase, p38γ, can inhibit myelin formation. P38 mitogen activated protein kinase (MAPK) is a major player in controlling cell proliferation, differentiation, and stress response. Mice lacking p38γ showed early myelin formation. This indicates that p38γ might inhibit oligodendrocytes differentiation and/or maturation. This project aims to show which step of oligodendroglia development p38γ is affected the most. By understanding the mechanism of p38γ myelin formation inhibition and if p38γ also inhibits remyelination in MS, we can explore it as a novel therapeutic target for stimulating remyelination in MS.

**Student**
Abdel Rahman Alnaji

**Major**
Pharmacology and Toxicology

**Research Mentor**
Tracey A. Ignatowski, Ph.D.

**Title**
β2- and α2-Adrenergic receptor regulation of TNF production by peritoneal macrophages during diabetic neuropathy

**Abstract**
The pro-inflammatory cytokine tumor necrosis factor-α (TNF) is a key mediator in development of neuropathic pain. A major source of TNF is macrophages, innate immune cells that express receptors responsive to neurotransmitters. The present work assessed TNF production from macrophages harvested from rats with diabetic neuropathy. Sprague-Dawley rats received intra-peritoneal injection to induce diabetes and were grouped as STZ-induced neuropathy (STZ-DN), STZ-non-responders (STD-NR) and saline-injected (CONTROL). Subsequently rats received bilateral hippocampal injection of either control or small inhibitory TNF (siTNF)-nanoplexes. Peritoneal macrophages were exposed to β2- or α2-adrenergic receptor (AR) agents with lipopolysaccharide (LPS); TNF levels were determined by WEHI bioassay. Our results show for the first time that STZ-DN macrophage with or without LPS stimulation produced greater amounts of TNF, and STZ-NR macrophage produced less. Activation of AR on LPS-stimulated macrophage from controls showed opposite responses: α2-ARs increased TNF production, and β2-ARs decreased production. α2-AR enhancement of TNF production was not evident in STZ-DN macrophages, and β2-AR inhibition of TNF production was reduced. Decreasing TNF solely in the brain by siTNF-nanoplex injection reversed the enhanced TNF production by STZ-DN macrophages. Thus, during diabetic neuropathy, there is enhanced macrophage TNF production that may be explained by the altered AR profile.
The Effects of Lidocaine on NMDA Receptors

ABSTRACT

N-methyl-D-aspartate (NMDA) receptors are critical for proper function of the central nervous system. Under normal conditions the neurotransmitter, glutamate, will be released in response to a stimulus and bind to this receptor, which causes its channel to open and have ions, especially calcium, flow into the cell and activate downstream signaling events within the cell. However, when antagonists, or any ligand or drug that binds to the receptor to inhibit the channel's activity, are present, some properties of the receptor's channel will be altered. This may include a change in the mean open time or frequency of the channel. Recently, it has been shown that the local anesthetic, lidocaine, acts as an inhibitor of NMDA receptors. Single channel recordings of 0.15 mM and 1.5 mM lidocaine have different effects on the NMDA receptor channels, but show an overall decrease in the channel's open time while whole cell recordings reveal that lidocaine binding is voltage-dependent, showing a stronger affinity to binding to NMDA receptors at highly negative voltages. These results reveal that lidocaine acts as a channel blocker to prevent ion influx through the NMDA receptor, which sheds light on this anesthetic's physiological effects on an individual.

ABSTRACT

BACKGROUND. Multiple sclerosis (MS) and systemic lupus erythematosus (SLE) are central nervous system (CNS) diseases of autoimmune origin. Patients of both diseases present with neuropsychological impairment and formation of lesions and development of brain atrophy. The inherent differences in white matter (WM) integrity of patients with these diseases compared to healthy controls (HC) are not understood.

OBJECTIVE. To investigate the normal-appearing WM structure of patients with MS and SLE and HC by using diffusion-tensor imaging (DTI) with tract-based spatial statistics (TBSS).

METHODS. The studied groups consisted of 30 relapsing-remitting MS patients (mean age 43.8 ±8.4, mean disease duration 12.1 ±7.9), 32 patients with CNS SLE (mean age 48.1 ±12.4, mean disease duration 14.38 ±8.6) and 43 HC (mean age 44.7 ±9.8). DTI was performed on 3T scanner in all patients and HC. The DTI images were post-processed using the FSL Software Package (Oxford, UK) and also corrected for lesions. The images were then analyzed using a TBSS analysis. FSL's randomise tool was used to perform permutation-based statistical inference. WM tract integrity was determined between the groups by comparing mean fractional anisotropy (FA).

RESULTS. Significantly decreased FA was found in subcortical areas comparing SLE patients vs. HC (p<.001) and also MS patients vs. HC (p<.001). Significantly decreased FA was detected in MS patients in subcortical areas including the corpus callosum and central WM pathways compared to SLE (p<.001).

CONCLUSIONS. This study shows that compared to SLE patients and HC, MS patients experience greater WM impairment, especially in areas of high axonal traffic such as the corpus callosum.

Use of Artemia franciscana in Evaluating the Toxicity of Plants Used to Treat Infectious Disease in Northern Peru

ABSTRACT

Background: The curanderos of Northern Peru have a long history of treating diseases with plants. This study focuses on plants and plant mixtures used to treat conditions believed to be caused by bacterial infection.

Hypothesis: Combined with bacterial inhibition data, toxicology data can be used to help select plants for further study.

Methods: Ethanol extracts made from dried, ground plants obtained in local markets were dried by rotary evaporation. This method was resuspended in boiling water and filtered. A. franciscana were incubated in serial dilutions for 24 hours. Surviving brine shrimp were counted. Counts were converted to percent survival. LC50 values, the concentration of extract lethal to 50% of shrimp, were calculated from dose-response curves (overall range from 0.81 to 5.67 mg/ml).

Results: Examination of data collected from various extracts demonstrated reproducibility. The effect of expanding the assay's scale around the area with the greatest change in percent survival was tested. Relative activity indices (RAIs), the ratio of LC50 for brine shrimp to IC50 for Staphylococcus aureus, were determined.

Conclusions: LC50 values for extracts of plant mixtures were significantly different from LC50 values of corresponding single plant extracts.
Mitochondrial dysfunction is the primary cause of many neurodegenerative diseases. Previously, researchers at the University at Buffalo discovered Ievy, a temperature-sensitive mutation in the nuclear DNA of Drosophila. Ievy encodes a dysfunctional subunit of the protein complex Cytochrome c Oxidase (COX) that under normal conditions acts as the rate-limiting step of the electron transport chain (ETC). In Ievy mutants, this process is disrupted which leads to a whole host of symptoms collectively known as Leigh Syndrome. Recently, a modifier mutation known as Suppressor of Ievy [Su(Ievey)] was identified and shown to partially rescue the effects of Ievy mutation however, the precise location of the mutation is still unknown. The primary objective of this study is to sequence the Su(Ievy) and find out which gene it resides in. Additionally, this study aims to determine whether the Su(Ievy) acts as a specific or non-specific suppressor in the Ievy pathway. Using the UAS-GAL4 system in Drosophila, we are able to cross a fly containing the Su(Ievy) to another fly containing one of the seven alternative mutant neurodegenerative genes. This research opens the door for future researchers to explore potential therapeutic treatments regarding the pathways involved in various neurodegenerative diseases.

**Student**  
Mark Goodman

**Major**  
Biochemistry

**Research Mentor**  
Dr. Ji Li

**Title**  
The Drug Salicylate as an Activator of AMP-Activated Protein Kinase (AMPK)

**Abstract**  
AMP-Activated Protein Kinase (AMPK) is an enzyme that modulates and senses cellular energy status. Activation of AMPK in the heart has been shown to protect against myocardial infarction, and therefore interest as grown about pharmacological activators of AMPK as possible treatments for ischemic heart disease. Recent research has demonstrated the drug salicylate activates AMPK in liver and colorectal cancer cells. The goal of our study is to determine if salicylate activates AMPK in the heart, and to determine if salicylate is cardioprotective against ischemia/reperfusion injury by augmenting AMPK signaling. Tail vein injections of salicylate were given to wild-type mice in basal conditions. The dose- and time- dependence of AMPK activation by salicylate in the heart was determined by Western blot. The cardioprotective effects of salicylate were measured in an acute ischemia/reperfusion model in which the left anterior descending coronary artery was occluded.

**Student**  
Zach LaMacchia

**Major**  
Biomedical Sciences

**Research Mentor**  
Peter Horvath PhD

**Title**  
Effect of Aspartate Supplementation on Hormone Levels in Athletes

**Abstract**  
Dietary supplements are currently used to increase athletic performance for many types of athletes. Many new supplements come to the market every year with little research done on their efficacy in improving athletic performance. Dietary protein supplements have become a large portion of the type of supplements used

**Student**  
Christ Ange G. Katche

**Major**  
Pharmaceutical Sciences

**Research Mentor**  
Rajendra Rajnarayan

**Title**  
New Sites for Old Suspects: Endocrine disrupting chemicals targeting human estrogen receptor non-ligand binding sites

**Abstract**  
Estrogen receptors (ER) play a critical role in the development of breast carcinoma. Estrogen Activates ER by directly binding to its ligand binding domain (LBD) and mediates a cascade of cellular signaling events that promote growth and proliferation. Upon activation, ER recruits co-activators which enable the transcriptional activity of ER at the target genes. Endocrine disrupting chemicals (EDC) including alkylphenols, bisphenols, diethylstibesterol binds directly to ER LBD and enable ER dimerization and estrogen response elements (ERE) mediated transcript of target genes. While these EDC’s have the required pharmacophore to induce agonist conformation of ER, many EDC’s are classified as weak estrogen like elements. Yet, considerable damage derived from the exposure to EDC. We intend to elucidate the physical interaction between these compounds and ER. We hypothesized the phthalate ester bind near if not all the co-activator moiety of ER and enhance Estrogen affinity at the LBD. Here we report our intergrated in silico and in vitro structure activity analyses of phthalate esters and their ability to modulate ER-ERE based trans-activation by acting on a non-ligand binding site.

**Student**  
Rajendram Rajnarayanan

**Major**  
Biomedical Sciences

**Research Mentor**  
Dr. Ji Li

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**Student**  
Andrew Cotronea

**Major**  
Biomedical Sciences

**Research Mentor**  
Satpal Singh

**Title**  
Evaluating the Effects of Suppressor of Ievy in Drosophila Models of Neurodegenerative Diseases

**Abstract**  
Mitochondrial dysfunction is the primary cause of many neurodegenerative diseases. Previously, researchers at the University at Buffalo discovered Ievy, a temperature-sensitive mutation in the nuclear DNA of Drosophila. Ievy encodes a dysfunctional subunit of the protein complex Cytochrome c Oxidase (COX) that under normal conditions acts as the rate-limiting step of the electron transport chain (ETC). In Ievy mutants, this process is disrupted which leads to a whole host of symptoms collectively known as Leigh Syndrome. Recently, a modifier mutation known as Suppressor of Ievy [Su(Ievey)] was identified and shown to partially rescue the effects of Ievy mutation however, the precise location of the mutation is still unknown. The primary objective of this study is to sequence the Su(Ievy) and find out which gene it resides in. Additionally, this study aims to determine whether the Su(Ievy) acts as a specific or non-specific suppressor in the Ievy pathway. Using the UAS-GAL4 system in Drosophila, we are able to cross a fly containing the Su(Ievy) to another fly containing one of the seven alternative mutant neurodegenerative genes. This research opens the door for future researchers to explore potential therapeutic treatments regarding the pathways involved in various neurodegenerative diseases.

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Mark Goodman

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Biochemistry

**Research Mentor**  
Dr. Ji Li

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**Student**  
Zach LaMacchia

**Major**  
Biomedical Sciences

**Research Mentor**  
Peter Horvath PhD

**Title**  
Effect of Aspartate Supplementation on Hormone Levels in Athletes

**Abstract**  
Dietary supplements are currently used to increase athletic performance for many types of athletes. Many new supplements come to the market every year with little research done on their efficacy in improving athletic performance. Dietary protein supplements have become a large portion of the type of supplements used
and even singling out specific types of amino acids alone for improvement of athletic performance. D-aspartic acid (Aspartate) is one such amino acid that is being sold as a supplement used to improve muscle function in athletes.

Aspartate is a non-essential amino acid which is acquired through different aspects of the diet. The amino acid can be found in various foods but it is primarily found in soy products. Aspartate is found in the "L" form shortly after consumption, and is stored in the brain. In the brain, it is racemized, transforming it into the "D" form. In the "D" form, it acts as an endogenous neurotransmitter on NMDA and AMPA receptors. Aspartate is localized in the pituitary, which is the gland that secretes hormones such as Luteinizning Hormone which controls testosterone production in gonads. D-Aspartic acid also accumulates in leydig cells which are located in the testies where they have a catalyzing role in the synthesis of testosterone.

The primary aim of the study will be to observe the effect of supplementing 3 grams of aspartate, over a 14 day period, on Luteinizning hormone and testosterone. Researchers will also study the effect of aspartate supplementation on athletic performance. Twenty participants will run through a parallel arm, randomized study to look at the effects of aspartate. The study will take approximately 4 months to complete.

**Student**
Joseph Noble

**Major**
Biology

**Research Mentor**
Fraser Sim

**Title**
Transcription Factor SOX10 is Sufficient to induce Human Oligodendrocytes in-vivo

**Abstract**
Multiple Sclerosis is a neurological disorder that occurs when oligodendrocytes—the cells responsible for myelin production in the brain—are injured. Myelin is critical for brain function as it allows neuronal signals to propagate along axons quickly. Research has been done to determine the critical transcription factors controlling oligodendrocyte progenitor cell fate for inducing functional oligodendrocytes. Based on our previous study in the lab, transcription factor SOX10 could induce mature oligodendrocytes from human neural stem/progenitor cells (NPCs) in-vitro. We expanded on this knowledge by transplanting human neural precursor cells overexpressed with SOX10 into rodent brains and observing the effects at the 12 week time point, which were shown to have increased oligodendrocytes as compared to mCherry control animals. However, we were unsure when these effects took place during the development of the brain. For this project, we transplanted SOX10 overexpressed NPCs into the rodent brain to observe the effects at 8 weeks. We found that even in younger mice, oligodendrocytes were developed in a higher proportion than control animals. In all, SOX10 seems to be a very important regulator of oligodendrocyte biology, permitting myelination in the brain.

**Student**
Diane Oramus

**Major**
Biochemistry

**Research Mentor**
Jennifer A. Surtees, Ph.D

**Title**
In vivo characterization of rad1 alleles in DNA repair pathways.

**Abstract**
Saccharomyces cerevisiae Rad1-Rad10 is involved in a variety of DNA repair pathways essential for maintaining genome stability; including nucleotide excision repair (NER), interstrand cross-link repair (ICLR) and double strand break repair (DSBR) by homologous recombination. Rad1-Rad10 is a structure specific endonuclease, with specificity for double-strand/single-strand junctions with 3' single-strand DNA. In some DSBR pathways, such as single strand annealing, 3’ non-homologous single-stranded DNA is present, and must be removed in order to prime DNA synthesis. Rad1-Rad10 is critical for processing these 3’ non-homologous tails. Other proteins, Msh2-Msh3, Saw1 and Sls4, are also involved in this process. Similarly, Rad1-Rad10 requires different protein co-factors for its activity in NER and possibly ICLR.

To understand how Rad1-Rad10 coordinates with different partner proteins in these distinct DNA repair pathways, we generated two rad1 alleles with mutations in a previously uncharacterized region of Rad1. We performed an in vivo characterization of these rad1 alleles in all three repair pathways (NER, ICLR and DSBR). Both alleles exhibited a separation-of-function phenotype, with the most pronounced defects occurring in DSBR. Neither allele was dominant in the presence of the wild-type RAD1 allele. Further characterization of these mutations will provide important insight into these Rad1-Rad10-dependent DNA repair pathways.

**Student**
Padraic Philbin

**Major**
Biotechnology

**Research Mentor**
Dr. Kate Rittenhouse-Olsen

**Title**
A Method for High-Throughput Screening of Antibody Variants for Optimization of Binding Kinetics

**Abstract**
Optimization for desired binding properties of therapeutic antibody candidates is a critical step in the development of antibody therapeutics. Optimization is the process of synthesizing many antibody variants via mutagenesis, and screening them to identify mutants with desirable binding properties. Optimization is usually performed by bacterial phage display to produce non-native antibody forms (Fab, ScFv). Non-native antibodies
require humanization to achieve any clinical therapeutic relevance; a difficult process which may alter the antibody’s binding properties. Mammalian cell display is preferable because it utilizes the native IgG form. Optimization through mammalian cell transfections is typically a time-consuming limitation in the development of therapeutic antibodies. We hypothesized that it is possible to expedite this process by developing a high-throughput method for expression of antibody variants, and for screening of their kinetic binding properties via Octet kinetic assays. The Octet platform allows efficient screening of variants directly from small volumes of conditioned medium, eliminating the need for IgG purification or large-scale transfections. With this method, we synthesized 1075 combinatorial mutants of native-form “Antibody X” and screened their kinetic binding properties in under 60 days. This method of optimization could dramatically shorten the timeline for development of an ideal therapeutic antibody.

Note: This project was performed while interning for Pfizer, Inc.; due to confidentiality agreements it was necessary to censor certain parts of my abstract and poster. “Antibody X” is a therapeutic antibody which is currently used for treatment of a disease.

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**Student**

Megan Schmit

**Major**

Biotechnology

**Research Mentor**

Dr. Jennifer Surtees

**Title**

The Role of Rad1-Rad10 and Saw1 in Interstrand Crosslink Repair

**Abstract**

Genomic stability is critical in all organisms and multiple pathways are required to prevent increased mutation rates and chromosomal rearrangements. Saccharomyces cerevisiae Rad1-Rad10 is a structure-specific endonuclease that plays a role in three distinct DNA repair pathways: nucleotide excision repair, interstrand crosslink repair (ICLR) and a specialized form of DNA double-strand break repair (DSBR) that involves the removal of 3’ non-homologous tails. In each of these pathways, Rad1-Rad10 forms a stable complex with Saw1, which is essential for its activity in DSBR; Saw1 recruits Rad1-Rad10 to the DNA and stimulates its endonuclease activity. In vivo, the Rad1-Rad10/Saw1 complex has been implicated in ICLR, a pathway that removes covalent bonds formed across the DNA helix. In the absence of ICLR, DNA replication is blocked. Our goal is to determine the step at which Rad1-Rad10/Saw1 functions in ICLR in vitro. We have purified the wild-type and mutant forms of the complex. WE are performing endonuclease assays with these complexes, using synthetic substrates that mimic distinct steps in ICLR. A mechanistic understanding of ICLR would allow new drug target discovery to prevent resistance to interstrand to crosslinking agents.
Dr. Rajendram Rajnarayanan  
Research Mentor  
Biomedical Sciences  
Major  
Kenny Wu  
Student  

The objective of this project is to characterize the direct effects of ethanol exposure on purinergic (i.e. ATP) modulation of microglia phagocytosis. For these studies, the acute and chronic effects of ethanol will be tested, and phagocytosis will be measured with drugs that are specific for the different purinergic receptor subtypes.

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Dr. Richard Rabin  
Research Mentor  
Biomedical Sciences  
Major  
Jordan Valley  
Student  

The next step is to hopefully prevent the formation of MN induced by clastogenic and its MN-inducing substances can reflect the sensitivity in MN formation. The next step is to hopefully prevent the formation of MN induced by clastogenic or aneugenic material by anti-cancer agents such as Tamoxifen and other agents.

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Dr. Laura Anderson  
Research Mentor  
Interdisciplinary Nursing and Social Science  
Major  
Samantha L. Kulu  
Student  

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Interdisciplinary  
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concerning the PFI symptom cluster in patients with solid tumors (breast, colorectal, lung, and prostate) and identify research gaps.

Methods: PubMed, CINAHL, PsycINFO were reviewed using key words: pain, fatigue, insomnia, and breast cancer, colorectal cancer, lung cancer, and prostate cancer. Search results were limited to English language, adults, and human studies through June 2013.

Results: 21 studies included 13 descriptive, cross-sectional, 5 longitudinal, and 3 intervention studies. Sample of 3395 included a grand mean age of 61 years, 77% female, 75% Caucasian, 62% breast cancer, and 66% early stage disease. Results indicated that patients with solid tumors reported moderate to severe PFI symptom scores which negatively impact quality of life. Intervention studies to manage the PFI symptom cluster were effective in the short term after intervention administration, but not in the long term.

Research Implications: The PFI symptom cluster is considered a priority cluster for intervention development, given that these three symptoms are known to frequently co-occur and that this particular cluster of symptoms affects a large number of cancer patients.

**Student**

John Pender

**Major**

Psychology and Nursing

**Research Mentor**

Dr. Carla Jungquist

**Title**

Reliability Of Capturing Sleep Diary Data Via Wrist Worn Electronic Device

**Abstract**

Introduction

Paper sleep diaries are the gold standard for assessment of sleep continuity variables in clinical practice as well as research. In recent years web based programs via computer or hand held devices have shown promise in improving timeliness and accuracy of data collection. Actigraphy has also become a popular avenue of collecting objective measures of sleep. In this study, we proposed to assess the reliability of using a wrist worn electronic sleep diary that also includes actigraphy in comparison to collecting sleep diary data via paper diary.

Methods

The nested, prospective design included capturing two weeks of paper sleep diary, wrist worn electronic sleep diary, and actigraphy. Baseline covariate data included sex, age, race, ethnicity, years of education, Insomnia Severity Index (ISI) total score, PROMIS-57 profile, Epworth Sleepiness Scale (ESS), and the Sleep Disorders Screening Questionnaire. Analysis strategies were descriptive as well as Pearson r correlations between calculated scores on sleep latency (SL), wake after sleep onset (WASO), number of awakenings (NWAK), and sleep efficiency (SE) via the paper diary, electronic diary, and actigraphic data.

Results

Thirty-four participants were recruited from the community at large. 76% females, 79% white, mean age 37 (14), mean education was 2 years college, and household income 32% less than 30K/yr and 47% between 50–100K/yr. All subjects completed all study procedures. Significant correlations were found between actigraphy and electronic diary [SL: r = .479, p = .007], [WASO: r = .424, p = .019], [TST: r = .721, p = .000]. No significant correlations were found between actigraphy and paper diaries on SL, WASO, NWAK, or TST.

Conclusions

Wrist worn electronic capture of sleep diary variables appears to be higher correlated with actigraphy data than does data collection via paper diaries.

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**SCHOOL OF PHARMACY & PHARMACEUTICAL SCIENCES**

**Student**

Robert Dingman

**Major**

Pharmaceutical Sciences

**Research Mentor**

Dr. Richard Salvi

**Title**

Microglia Activation Following Exposure to High Intensity Noise

**Abstract**

Employees in certain professions are routinely exposed to loud noises, and exposure to high intensity noise has long been known to cause sensory cell loss in the inner ear. However, the neuronal mechanism of this pathology is poorly understood. Neuronal damage leads to release of damage associated proteins, triggering microglial activation. Activated microglia up-regulate Major Histocompatibility Class II molecules, priming microglia for phagocytic functions. In some cases, over-activation of microglia may become harmful, as suggested in many neurodegenerative diseases such as Alzheimer’s disease. We propose over-activation of microglia may lead to neurodegeneration, causing irreparable damage to the auditory pathway.

Rats were unilateraly exposed to a narrow band noise at 12 kHz and 126 dB for 2 hours. Rats were sacrificed at various time points after the procedure. Using the Glucose Oxidase/DAB method of immunohistochemistry, brain tissue from noise exposed rats was stained to detect the presence of immunoreactive microglia using OX-6 and CD68 antibodies. These antibodies are expected to selectively stain activated microglia in the brain.

Preliminary results have shown increases in microglia activation 14 days after noise exposure using both CD68 and OX-6 antibodies. This up-regulation may be indicative of chronic microglia...
activation negatively impacting the auditory pathway.

**Student**
Ankit Senjalia

**Major**
Pharmaceutical Sciences

**Research Mentor**
Dr. Sathy Balu-Iyer

**Title**
Apoptotic bodies loading efficiency with the monoclonal antibody Adalimumab

**Abstract**
Immunogenicity is one of the major problems associated with protein therapeutics. Most of the drug fail in clinical trials due to the unwanted immunogenicity. Immunogenic responses could result due to multitude factors such as aggregation or because of the drug itself. This pose a problem with protein therapeutics since increase in immunogenicity could in turn decrease efficacy of the drug. It has been shown previously that pre-exposure of a protein therapeutic in presence of phosphatidylserine induces hypo-responsiveness towards the further exposure of the protein by itself hence, leading to tolerance. Phosphatidylserine plays an important role because of it Immunomodulatory properties and is found on the external membrane of apoptotic bodies. Using these apoptotic bodies to introduce potential therapeutic agents such as monoclonal antibodies to immune system should develop immunological tolerance to that agent. The loading efficiency of apoptotic bodies is crucial in determining effective drug concentration to achieve immunological memory. With this idea in mind, we investigated the apoptotic bodies loading efficiency with a monoclonal antibody Adalimumab, also known as Humira®. We isolated apoptotic bodies by culturing murine dendritic cells and inducing apoptosis. We quantified the presence of Adalimumab in apoptotic bodies using sandwich ELISA.

**Student**
Genevieve Stever

**Major**
Pharmaceutical Sciences

**Research Mentor**
Dr. Melanie Felmlee & Dr. Marilyn Morris

**Title**
mRNA Expression of OAT1 and OAT3 in Human Renal Tissue

**Abstract**
Drug transporters that are involved in active tubular secretion are located in proximal tubule cells within the kidney. Two of these transporters move molecules, including drugs, from renal blood into the tubular fluid. The transporters: Organic Anion Transporter 1 (OAT1) and Organic Anion Transporter 3 (OAT3), belonging to the solute carrier family, are important in the transport and uptake of small hydrophilic organic anions to be excreted into the urine. Determining absolute transporter expression and its variability amongst humans is important while predicting renal clearance. It is believed that some of the organic anion and cation transporters are controlled by sex hormones. The objective of this study is to examine other variables such as age and ethnicity. The current study utilizes quantitative polymerase chain reaction (q-PCR) with a gene specific standard curve. The goal is to assess the total sum of mRNA expressed in human renal samples based on the following transporters: OAT1 and OAT3. We also have an interest in examining other transporters such as Organic Cation Transporter 2 (OCT2), Multidrug And Toxin Extrusion protein 1 (MATE1), and Sodium-Glucose Transport proteins (SGLT2).

**Student**
Abigail Romano

**Major**
Biochemistry

**Research Mentor**
Dr. Nadine Fisher

**Title**
Effects of Resistive Respiratory Muscle Training on Respiratory Function, Exercise Duration and Fatigue in Individuals with Multiple Sclerosis

**Abstract**
The goal of the study is to determine the effects of a 6-week resistive respiratory muscle training (RRMT) program on respiratory muscle strength, exercise duration and fatigue on Multiple Sclerosis (MS) patients. Seventeen individuals with mild-to-severe MS were randomly assigned to RRMT (n=9) or placebo control (n=8) groups. Exclusion criteria were a relapse within past 6 weeks, smoker, wheelchair-bound, breathing/respiratory illness within past 6 weeks or contraindications for exercise. Both groups participated in breathing exercises for 6 weeks, 3x/wk, 30 min./session: RRMT with resistance breathing; control with no-load breathing. All participants were tested at baseline and after 6 weeks. The variables measured were maximal inspiratory and expiratory pressures, exercise duration during a submaximal endurance (60% of max) test, and perceived fatigue (Modified Fatigue Impact Scale). Results were analyzed using paired t-tests. The RRMT group significantly improved exercise duration (p=.032), maximal expiratory (p=.013) and inspiratory (p=.007) pressures, and fatigue levels (p=.009) after the short-term RRMT program, while the placebo control group had significant change in maximal inspiratory pressure (p=.034) only. This study will lead to a better understanding of MS fatigue and the potential for improving respiratory muscle strength and exercise endurance with a short-term respiratory rehabilitation program.

Honors = CURCA

School of Public Health & Health Professions

**Student**
Abigail Romano

**Major**
Biochemistry

**Research Mentor**
Dr. Nadine Fisher
Title
Effect of Chronic Mushroom D Enriched Portabella Mushroom Intake on Functional Fitness in Older Men and Women

Abstract
Vitamin D intake has been shown to be beneficial in weight management and quality of life. To determine the effect of chronic vitamin D enriched Portabella mushroom intake on anthropometric measures and quality of life in older men and women, seventeen subjects, six men and eleven women between 36 and 66, were screened for vitamin D levels and general health. They were randomized to take either 2 large vitamin D enriched portabella mushroom caps with approximately 14,000 IU D2 (Vit D) or 2 unenriched portabella mushroom caps (control) a week for twelve weeks. Anthropometric measures (weight, BF%, BMI, LBM) and quality of life surveys (Yale Physical Activity survey, SF36v2-general health survey, CES depression survey, and a 3 day diet record) were taken at baseline and again after 12 weeks. The group taking enriched mushrooms lost an average of 1.7 kg in body weight (P=0.02) primarily due to a 1.5 kg body fat loss with no change in lean muscle mass. Quality of life measurements did not change throughout the duration of the study. We conclude chronic mushroom intake may lead to reduced body weight and body fat.

Title
Analysis and Modeling of Patient Flow Through Emergency Departments

Abstract
As health systems become more complex and demand for healthcare services increases, healthcare providers such as hospitals are increasingly looking for ways to optimize their processes, especially in the emergency department. Increasing patient loads and overcrowding conditions in emergency departments have caused hospitals to increase their focus in managing patient flow through the department in order to increase safety and responsiveness (Saghafian, Hopp, Van Oyen, Desmond and Kronick). While hospitals previously had excess capacity in their emergency rooms, many hospitals now feel strained in their attempts to manage patient flow (Bazzoli, Brewster, May and Kuo). Healthcare systems have also been setting higher standards for responsiveness and in trying to reduce the amount of time a patient needs to spend in the hospital or emergency room system, again highlighting the focus on process improvement (Fletcher, Halsall, Huxham and Worthington). I focus on analyzing and modeling ways in which hospitals can improve patient flow.

Title
The Search for a New Waffle House Principle: A Case Study in Business Operation After Hurricane Sandy

Abstract
FEMA currently makes use of Waffle House statuses in the southeastern United States to gauge the condition of a region in order to efficiently administer disaster relief. However, the “Waffle House Principle” cannot be applied everywhere due to the scarcity of Waffle House location outside the southeast. In this research we explore whether data from Hurricane Sandy’s response about other business’ status could be used to develop an alternative measure for assessment.

Title
Molecular Genetic Analysis of Schizophrenia

Abstract
Schizophrenia is a long term mental disorder, characterized by delusions, hallucinations, disorganized thinking and a lack of emotion. The present study proposes to examine the hypothesis that Schizophrenia is associated with low penetrance but common, functional variations in a number of susceptibility genes. Candidate genes have been selected on the basis of previous research that points to specific receptors that might be involved in the development of Schizophrenia. From a methodological perspective, the initial goal of this study was to conduct DNA assays and structured interviews with 100 schizophrenic patients from the VA Healthcare System and 100 matched controls. Many of the specific candidate genes were examined with this sample size; however other candidate genes, particularly those related to different aspects of...
the disease, will require a much larger sample size of schizophrenics. Hence, we plan to continue to collect patients on an ongoing basis and to eventually recruit patients from other hospitals. We will investigate the variants of susceptibility genes for schizophrenia, to analyze their role in the liability to develop neuropsychiatric disorders and to determine their role in response to medication.

Student: Oscar Lee  
Major: Biology and Chemistry  
Research Mentor: Mary Bisson  
Title: Cadmium Toxicity in the Macrophytic Alga Chara: Role of Reactive Oxygen Species and Effect of Zinc

Abstract  
Cadmium (Cd) is a toxic heavy metal that contaminates many environments worldwide. We are developing the large, freshwater alga Chara australis as a possible biological agent for removing Cd from aqueous environments. Earlier work in our lab showed that Chara survives in sediment and waters containing cadmium and translocates to the harvestable shoot. We also showed that Zinc (Zn) protects against Cd toxicity. In the work reported here, we explore the nature of Cd toxicity and how Zn protects against it. We hypothesized that reactive oxygen species, ROS, which can cause oxidation damage to cellular components, were produced as a response to heavy metal stress. We developed a technique using a compound (DCHF-DA) that becomes fluorescent when oxidized to measure ROS levels. We confirmed that this technique was valid by exposing the algae to high light or wounding, known to generate ROS in other species, and showing increases in fluorescence. However, after 2 weeks incubation in Cd, fluorescence decreased. We hypothesize that the initial production of ROS in response to Cd stress is counteracted by the synthesis of anti-oxidant compounds, and that Zn protects against toxicity by enhancing the production of the compounds.

Student: Frank Repetti  
Major: Mechanical and Aerospace Engineering  
Research Mentor: Dr. Esfahani  
Title: BCI Systems

Abstract  
The goal is to design a mechanical system that could be manipulated by the brain. Using various stimuli we were able to isolate specific signals to then react in a desired form. For our particular design the end goal is to have the user move a robotic arm with their brain. Many filters were used in this project to remove noise and isolate the desired output. Overall, this was no easy task and we will continue to improve the system.

Student: Matt Wheeler  
Major: Mechanical Engineering  
Research Mentor: Dr. Jason Armstrong  
Abstract  
The ability to quickly gain entry to a structure is a skill paramount to effective emergency service work. This CURCA funded proof of concept study sought to examine a scaled model of a forcible entry simulator designed in MAE 377/498 to determine if the design was feasible, as well as make clear areas of potential design improvements. Under the guidance of Dr. Jason Armstrong the full scale design was modified down to a testable size that involved studying the spring locking mechanism – the main difference between current forcible entry designs and the design being studied. Utilizing PTC Creo for 3D modeling and detail drawing generation, as well as the Engineering Machine Shop in Jarvis Hall for manufacturing, a prototype model of the locking mechanism was modeled, manufactured and tested.

After testing the design a few major concerns were noted and would need to be addressed prior to constructing a full scale model. These findings are outlined in more detail in the attached report and are pertinent as they serve to exemplify the sole reason for the proof of concept study.
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
Lynette Acheampong, Won Woong (Tyler) Choi, Mebrehat Haile

Research Mentors
Dr. Barbara Bono, Dr. Nathan Daun-Barnett, TA Victoria Robbins

Title
The FAFSA Completion Project, Year Two: A Tale of Two High Schools

Abstract
In the first year of its operation “Say ‘Yes’ to Education”—which offers full tuition post-secondary scholarships to qualified students—led to an astonishing 9% increase in college enrollment for students from Buffalo public high schools. The Buffalo News, in a front-page March 5, 2014 story, called it one “ray of sunshine” in an otherwise still-gloomy public school scene.

However, “Say ‘Yes’” is a last-dollar program: to claim the award students must submit their Free Application for Federal Student Aid (FAFSA) form for all other available grants, often a daunting prospect to these students and their families. Critical to that effort is the FAFSA completion project, a combined effort of college financial aid advisors, accountants from H&R Block, and a squadron of dedicated UB students who go into the schools to aid in filling out the forms.

Last year the UB Undergraduate Academy for Civic Engagement sent ten undergraduate volunteers to high schools throughout the city. This year a new group continues their effort strategically in two key high schools, International Prep at the former Grover Cleveland High School on Buffalo’s west side, and Bennett High School in UB’s own University Heights neighborhood. Besides helping students with their paperwork they are learning about the different cultures of these two schools and serving as college ambassadors. Senior Lynette Acheampong is herself a UB South Campus resident; freshman Tyler Choi and sophomore Mebrehat Haile are themselves recent immigrants from Korea and Eritrea/Ethiopia respectively. Tyler and Mebrehat are particularly welcome at International Prep where over 40 different languages are spoken, since it is one of two Buffalo public high schools most impacted by our recent waves of immigrant-refugees.

For Civic Engagement has previously partnered, has planted some 26,358 new trees of its original 30,000 tree goal. The time is right for strategic neighborhood efforts to further enhance its efforts.

The University Heights/UB South Campus neighborhood has suffered extensive tree loss without replacement. The University Heights Collaborative, organizing various University Heights block clubs and enabled by the University Heights Tool Library, has already planted over 100 trees in the Heights since 2012. Now they are recruiting partners for a district-wide “ReTree the District” project which aims, in its first phase, to plant 250 additional new trees in November, 2014. Academies students and Heights residents freshmen Nicholas Czekaj and Mahathi Gottumukka, and senior Hilary Swartwood are attending organizing meetings and participating in survey and fund-raising efforts throughout the spring semester and hope to serve as team leaders and volunteer coordinators in the fall.

A mature tree canopy contributes major benefits to a neighborhood such as noise abatement, improved air quality, storm-water runoff mitigation, reductions in crime, increased property values, and sheer beauty. In these ways Buffalo’s renewed reputation as a “City of Trees” will enhance its reputation as the “City of Good Neighbors.”

Global Perspectives

Students
Gabrielle Cilento

Research Mentor
Dr. Patrick McDevitt

Title
What’s your dress size? The Devolution of Standardized Sizing

Abstract
America lacks a standardized system of clothing sizes, most are based on arbitrary numbers, and it is specifically the sizing of dresses that can be erratic. We will focus our research on the varying sizing systems found...
Throughout the world and throughout time. For example, we will look at the sizing systems in America, Europe, and Asia. In our analysis of sizing systems found in the past, we will look at the effects of war, revolution, politics, social change, and economic rises and falls. For our examination of the present, we will focus on the effects of culture and biology on sizing—a USA size small is almost equivalent to an Asian size large. We will also investigate the effects of standardization on the consumer, the manufacturer, the industry, and the economy. We will then try to determine the effects of a completely standardized system, and whether or not it is even possible to standardize.

**Students**
Jaspreet Kaur, Christine Tjahjadi-Lopez

**Research Mentors**
Dr. Patrick McDevitt

**Title**
Fashion As a Solution to Help Alleviate Sex Trafficking

**Abstract**
Globalization has created a new global market for the fashion industry. This same globalization is a contributing factor to the increase in international sex trafficking. Providing steady income for survivors following their rescue and restoration process is crucial for reintegration into society. Businesses such as the International Princess Project, Elegantees, and Made By Survivors employ sex trafficking survivors while empowering and teaching them a new trade. These “made by survivor” products are then sold internationally. This study examines the success of fashion businesses whose primary purpose is to acquire profits which fund human trafficking restoration programs. We propose that business models such as these should be implemented in the rescue-restoration process to help increase the success of sex trafficking survivor reintegration programs.

**Students**
Rahinatu Razaku, Mavis Gyamfi, Beatrice Aidoo

**Research Mentors**
Dr. Kenneth Shockley

**Title**
African Textiles Back in Fashion

**Abstract**
Like many different fashions, African design motifs go in and out of style. However, while many people in the world today embrace the African textile prints, these are not simply patterns like plaids or polka-dots, but rather are freighted with historical and symbolic meanings connected to race, imperialism, and notions of authenticity and inauthenticity. Through oral interviews and historical research, our project will examine the inspirations and meanings attached both historically and contemporaneously to African textiles among Africans and non-Africans, and consumers and designers.

**Students**
Derek Stein, Yao Xiao

**Research Mentors**
Dr. Kenneth Shockley

**Title**
Fashions of the Cold War: The Soviet Union vs. the United States

**Abstract**
The purpose of this presentation is to showcase and examine the differences in fashion and clothing in the Soviet Union and in the United States during the cold war, as well as other aspects of clothing in the two nations. Including the differences that emerged in fashion over the course of the cold war, from the post-second world war, to the end of the cold war and dissolution of the Soviet Union. The culture and politics behind these developments will also be examined. Examples of the fashions and clothing that would have been worn by the average citizen of both nations will also be presented, through the poster itself. The insight of the presentation and its purpose, will be to show how different the two superpowers were in general by focusing on the differences present in their fashions, as a result of developing differently through years of different politics and culture and how it came that these differences would impact clothing and fashion through the cold war.

**Research Exploration**

**Students**
Gabriel E. Berrios, Allicia N. Gurpersaud, Hayley G. Hofmar-Glennon, Alvin B. Samuel

**Research Mentor**
Dr. James N. Jensen

**Title**
Effects of ADHD Medications on the Performance of College Students

**Abstract**
The use of ADHD medications by college students has increased significantly in the past years. The purpose of this research is to understand the consequences and the effects of intentional usage of ADHD drugs to enhance academic performance. By utilizing published works of credible sources, the goal of this research is to discover the results of ADHD medications and their effect on academic stability and development. Data sources include national surveys on college campuses and published data on the cognitive and academic performances of students using ADHD drugs.

**Students**
Nolan Hale, Yoochan Hong, Vijyendra Ramesh, Jessie Schreiber, Ashish Tyagi

**Research Mentors**
Dr. James Jensen

**Title**
Gender Differences in Learning

**Abstract**
One system for categorizing learning styles is the VARK system, with Visual, Auditory, Read-write, and Kinesthetic
elements. We conducted a survey based on VARK and studied the peer-reviewed research. Most male students preferred multimodal instruction (all four modes, VARK). Most female students preferred single mode instruction (in particular, the K mode). We will extend these results to gender preferences in professions. Kinesthetic mode professions include physicians, nurses, and occupational therapists.

**Students**
James Devany, Kaitlin Halligan, Thiru Vikram Suresh, Megan Syrell, Sungsoon Yim

**Research Mentor**
Dr. James N. Jensen

**Title**
Impact of Calorie Restriction on Human Lifespan

**Abstract**
The impact of calorie restriction (a dietary regimen that limits calorie intake significantly) on human longevity has been the subject of a number of studies. The results have been mixed, possibly because other factors affect the lifespan of subjects, including the availability of medical aid, hygiene, cultural eating and exercise habits, free radical effects, and the environment. We used statistical analysis to determine correlations between the calorie intake and life expectancy of humans.

**Students**
Alexander Ding, Namrata Madoor, Merin Panthapattu, Matt Stroud, Antoni Szeglowski, Esteven Tino Mateo

**Research Mentor**
Dr. James N. Jensen

**Title**
Brain Connectivity: Nature or Nurture?

**Abstract**
The debate on whether brain connectivity develops by nature or nurture is highly significant to children development. Identifying the intersection between nature and nurture will lead to innovative education, parenting, and societal approach that will not constrain on gender differences. Brain connectivity network is defined by a collection of nodes and links between pairs of nodes, composed of neural populations of synapses and individual brain cells that send and receive messages across the body. The major modes of brain connectivity are structural connectivity, functional connectivity, and effective connectivity, illustrated among four brain regions in macaque cortex. Current theories on development by nature shows correlation with cerebral cortical folding patterns. Recent studies have revealed minimal cognitive disparity in children which may suggest a development pattern by nurture. This poster explores different claims and experiments performed by other researchers on brain connectivity and discusses a feasible explanation by combining current theories on brain development. It appears that there is a higher chance cognitive disparity is caused by nurture factors rather than biological factors by nature.

**Students**
Jonathan Lau, Lai Yu Tsang, Luona Yang, Jing Yu

**Research Mentors**
Dr. James Jensen

**Title**
Western New York Sits Down for Change

**Abstract**
A central concern of sustainability is our rate of consumption. In this project we examine the effect of sharing on consumption and suggest how we might better utilize sharing as a means of increasing sustainability. We live in a time where consumers are being consumed by the amount of products they amass and it seems the novelty of product- and service-sharing will offer some relief. This is becoming an increasingly prevalent practice by businesses and community members. Examples of product and service sharing include Buffalo CarShare, Buffalo Bikeshare, the Massachusetts Avenue Project, and the University Heights Tool Library. Sharing is a sustainable practice because it promotes the minimization of products being purchased individually, reduces the production of waste, and cuts down on transportation emissions. Product and service sharing could be improved upon by making it more of a widespread standard; doing so would boost local economies by retaining profits and encourage a shift from a consumption-based economy to one focused on sharing. Evidence of the benefits of product and service sharing can be seen in community data regarding obesity rates, car ownership, and average income.

**Students**
Shivani Kamodia, Olivia Gambocarto, Kelsey Schaffstall

**Research Mentors**
Dr. Kenneth Shockley

**Title**
Sharing Products, Sharing Futures

**Abstract**
A central concern of sustainability is our rate of consumption. In this project we examine the effect of sharing on consumption and suggest how we might better utilize sharing as a means of increasing sustainability. We live in a time where consumers are being consumed by the amount of products they amass and it seems the novelty of product- and service-sharing will offer some relief. This is becoming an increasingly prevalent practice by businesses and community members. Examples of product and service sharing include Buffalo CarShare, Buffalo Bikeshare, the Massachusetts Avenue Project, and the University Heights Tool Library. Sharing is a sustainable practice because it promotes the minimization of products being purchased individually, reduces the production of waste, and cuts down on transportation emissions. Product and service sharing could be improved upon by making it more of a widespread standard; doing so would boost local economies by retaining profits and encourage a shift from a consumption-based economy to one focused on sharing. Evidence of the benefits of product and service sharing can be seen in community data regarding obesity rates, car ownership, and average income.

**Students**
Jayralin Herrera, Kristen Janson

**Research Mentor**
Dr. Kenneth Shockley

**Title**
Sharing Products, Sharing Futures

**Abstract**
A central concern of sustainability is our rate of consumption. In this project we examine the effect of sharing on consumption and suggest how we might better utilize sharing as a means of increasing sustainability. We live in a time where consumers are being consumed by the amount of products they amass and it seems the novelty of product- and service-sharing will offer some relief. This is becoming an increasingly prevalent practice by businesses and community members. Examples of product and service sharing include Buffalo CarShare, Buffalo Bikeshare, the Massachusetts Avenue Project, and the University Heights Tool Library. Sharing is a sustainable practice because it promotes the minimization of products being purchased individually, reduces the production of waste, and cuts down on transportation emissions. Product and service sharing could be improved upon by making it more of a widespread standard; doing so would boost local economies by retaining profits and encourage a shift from a consumption-based economy to one focused on sharing. Evidence of the benefits of product and service sharing can be seen in community data regarding obesity rates, car ownership, and average income.

**Students**
Jayralin Herrera, Kristen Janson
Abstract

Have you ever wondered how you could make real systemic change to make your world more sustainable? This project will examine one organization that enables the citizens of western New York to make those changes. The Western New York Environmental Alliance (WNYEA) brings together many diverse organizations to tackle the issues faced by our region, with the goal of providing sustainable solutions. These issues include the need for efficient public transportation, social equity, urban regeneration, safe waste management, alternative energy use, as well as the responsible use and conservation of natural resources. Integrating these issues into our community’s personal and political decision-making presents a further problem. WNYEA brings together citizens, organizations, and policy makers, and facilitates action driven by the needs and desires of the people in Western New York (WNY). Through GrowWNY, the communications portal for the WNYEA, involvement is made easier and opportunities for that involvement are opened to everyone. Each citizen in WNY is a potential change-maker; and to answer these pressing questions of sustainability we need everyone at the table.

The Alliance is Western New York’s table.

Students
Benjamin Wagner, Hanqi Yin

Research Mentors
Dr. Kenneth Shockley

Title
Computer Use and Wasted Energy: a study of unproductivity

Abstract

Few of us pay attention to the amount of energy required for our incessant computer use. Without some means of drawing attention to that energy use, there is no reason to think that we will see computer use as a matter of sustainability. In this project we will explore the prospects of a visual campaign to provide computer users with the information necessary to make sustainable decisions about their computer use. We will consider how other energy efficiency programs have used visual clues (e.g., signs) and other avenues of information dissemination (e.g., online social networks) to bring about behavioral change.

Students
Bryanna Young, Frank Pichardo, Hilary Swartwood

Research Mentors
Dr. Kenneth Shockley

Title
Buffalo Public Transportation: Move to Improve

Abstract

Transportation is an essential part of everyday life. However the sustainability of transportation has been challenging, particularly in cities. The city of Buffalo has a functioning and productive metro and bike system. Nonetheless the number of people who drive automobiles is still greater than the number of people who utilize these alternative public transportation systems. We could do better. We suggest solutions, alternatives, and improvements by exploring the Buffalo area and by observing successful transportation in other cities. We believe that by increasing the efficiency and accessibility of the metro and bike systems, more people would take advantage of them. Specifically, we think that by developing a more expansive and community based bike share program, supplemented with additional bike lanes, we would help create a more enjoyable environment for bikers. Additionally, we believe constructing more metro routes and stops would not only help decrease urban sprawl, but improve public transportation. Through these alternative public transportation systems, Buffalo has the potential to become a more sustainable and aesthetically pleasing city.

Students
Connor Brown, Connor Devine

Title
Pedal Power Project

Abstract

Description: Pedal power is the transfer of energy from a human source through the use of a foot pedal and crank system. ESW-UB has created a system that drives a belt to turn a motor and generate electricity to a set of light bulbs. We use the bike at outreach events to show people how much energy electronics require.

H = Honors
C = CURCA
$ = CSTEP

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