BRADLEY University

The 2017 Student Scholarship Expo

Abstracts and Award Winners

April 2017

STUDENT SCHOLARSHIP EXPO

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A Letter from the Event Organizers

April 2017

Dear Colleagues:

On April 11-13, 2017, the Bradley University Office of Sponsored Programs (OSP) and the Center for Teaching Excellence and Learning (CTEL) hosted Bradley's 24th annual Student Scholarship Expo. Over 180 projects representing the broad disciplinary spectrum of Bradley's five colleges were presented by 349 student presenters under the mentorship of 109 faculty mentors. We are particularly grateful for the 129 volunteers from the Greater Peoria Area and Bradley University who served as our EXPO judges and evaluated the student presentations, determining who won the prestigious EXPO awards for the best presentations made at the event.

Some highlights that made this year's EXPO particularly memorable: our undergraduate President's Award winner, Katie Eckhoff, achieved an EXPO first as she tied with herself for the award, receiving perfect scores for two separate projects under two different faculty mentors. Even more remarkable, the two projects draw upon very different disciplinary references and methodologies. Katie drew upon her degree in Ethics to conduct her project titled *Bradley Student Opinion on the Ethics of Genome Editing,* and upon her Biology degree to work on her project titled *Nitrogen Runoff in a Restored Wetland at Wightman Lake.* Katie will graduate this spring, and plans to pursue a Ph.D. in Biology.

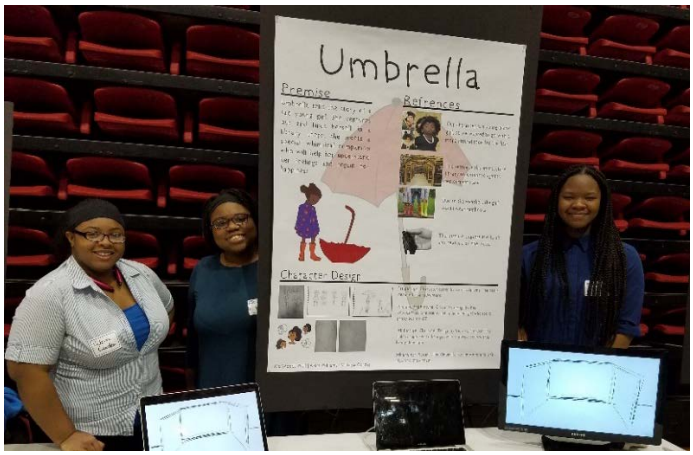
We also wanted to make special mention of Victoria Corder, Akira Williams, and Kia Woods-Wall – three students just completing their first year pursuing degrees in Animation in the Slane College of Communications and Fine Arts. Their beautiful animation titled *Umbrella,* which they created in recognition of the lack African-American and minority female character representation in animations. As stated in their abstract, through their animations, they seek to "uplift and inspire girls and women to be strong, to seek out higher education, to learn how to deal with complex emotions, and to let their voices be heard." From our records, this is the first time a team comprised exclusively of first-year students has presented at EXPO, and we are greatly looking forward to seeing what these artists accomplish in future years at Bradley!

These are just a few of the wonderful stories that made the 2017 Student Scholarship Expo a memorable and remarkable event. We hope you enjoy reading out our award winners, and perusing the abstracts of all the projects presented this year. We invite you to join us in future years on campus as an EXPO judge or by visiting us in our public viewing period, always held immediately prior to the awards ceremony. More information about the annual Student Scholarship Expo can be found on the Bradley University website.

Sincerely,

Sandra Shumaker
Executive Director
Office of Sponsored Programs (OSP)

Sara Glover
Interim Director
Center for Teaching Excellence and Learning (CTEL)



From Left to Right: Victoria Corder, Akira Williams, and Kia Woods-Wall Pause for a photo next to their poster about their animation titled Umbrella

The 2017 Student Scholarship Expo Award Winners:

The Dean's Awards

The Dean's Awards recognize the undergraduate and graduate students whose EXPO presentations best exemplify the excellence of the disciplinary areas represented by each of the five colleges at Bradley University. Each team or individual award recipient of the Dean's Awards receives a monetary prize of $500.

The College of Liberal Arts and Sciences

The College of Liberal Arts and Sciences Award in the Humanities

The Essential Diversification of Media
Sierra Doss '19, Television Arts, Spanish and Creative Writing
Faculty Mentor: Dr. Devin Murphy, Department of English

The College of Liberal Arts and Sciences Award in the Social Sciences

The Evolution of the National Identity of the Islamic State
Andrea Winn '17, International Studies and Political Science
Faculty Mentor: Dr. Charles Bukowski, Department of International Studies

The College of Liberal Arts and Sciences Award in the Natural Sciences

Undergraduate Recipients:

The effects of commercial and native arbuscular mycorrhizal fungi on growth and production of Echinacea purpurea (Purple Cone Flower)
Andie Miller '17, Environmental Science and Religious Studies
Mentor: Dr. Sherri Morris, Department of Biology

Graduate Recipients:

The Synthesis and Analysis of 3-Oxo-Delta Lactone Derivatives
Danielle Wentzel '17, Chemistry
John Kuhns '18, Chemistry (Undergraduate Student)
Mentor: Dr. Brad Andersh, Mund-Lagowski Department of Chemistry and Biochemistry

The College of Liberal Arts and Sciences Award in Computation and Mathematical Sciences

Undergraduate Recipients:

A Curve Interpretation and Rule Based Program for CAT Loaders and Haulers
Matthew Weiss '17, Computer Science and Management & Leadership
Jeremy Carter '17, Computer Science and Mathematics
Wittaker Gramly '17, Computer Science
Aidan Kennel '17, Computer Science
Mentors: Dr. Steven Dolins, Department of Computer Science and Information Systems; Sanat Talmaki, Caterpillar, Inc.

Graduate Recipients:

Innovative Software Systems for Smart Classrooms
Rama Rachakonda '17, Computer Science
Colleen Heinemann '17, Computer Science
Annie Benitha Thomas '18, Computer Science
Poojtha Durga '18, Computer Science
Karri Srinivas '17, Computer Science
Mentor: Dr. Vladimer Uskov, Department of Computer Science and Information Systems

AWARD RECIPIENTS FROM THE COLLEGE OF LIBERAL ARTS AND SCIENCES

Pictured from left to right: Front Row: Andie Miller, John Kuhns, Dannielle Wentzel, Andrea Winn, Colleen Heinemann, Rama Rachakonda
Top Row: Dr. Chris Jones, Dean of the College of Liberal Arts and Sciences; Dr. Sherri Morris, Biology, Dr. Brad Andersh, Chemistry and Biochemistry; Jeremy Carter, Matthew Weiss, Sierra Doss, and Dr. Uskov Vladimir, Computer Science and Information Systems

The Caterpillar College of Engineering and Technology

The Caterpillar College of Engineering and Technology Award in Mechanical Engineering

Undergraduate Recipients:

Optimization of Polycaprolactone-Collagen Nanofiber Scaffolds for Tissue Regeneration Utilizing Autologous Adult Stem Cells
Jack Blank '19, Mechanical Engineering and Biology
Jonathan Tiessen '18, Biology and Chemistry
Jaclyn Conway '19, Biology
Faculty Mentors: Dr. Craig Cady, Department of Biology
Dr. Kalyani Nair, Department of Mechanical Engineering

Graduate Recipients:

The effects of roughness on the principal components of friction at the micro- to nanoscales
Omer Ahmed '17, Mechanical Engineering and Design
Faculty Mentors: Dr. Shannon Timpe, Department of Mechanical Engineering

The Caterpillar College of Engineering and Technology Award in Electrical and Computer Engineering

Undergraduate Recipients:

Experimental Validation of Distributed Algorithms Using Kilobots
Anthony Birge '18, Electrical Engineering
Faculty Mentor: Dr. Jing Wang, Department of Electrical and Computer Engineering

Graduate Recipients:

A Multiagent Reinforcement Learning Control Approach to Environment Exploration
Mohammad Imtiaz '17, Electrical Engineering
Faculty Mentor: Dr. Jing Wang, Department of Electrical and Computer Engineering

The Caterpillar College of Engineering and Technology Award in Civil Engineering and Construction

Undergraduate Recipients:

Assessment of Landslide Susceptibility using a Catastrophic Failure Model
Brian Fiedler '17, Construction Management
Mentor: Dr. Sihyun Kim, Department of Civil Engineering and Construction

Graduate Recipients:

Analysis of contaminant transport in the low electric flux intensity medium
Chandra mouli Tummala '17, Environmental Engineering
Mentor: Dr. Krishnanand Maillacheruvu, Department of Civil Engineering and Construction

The Caterpillar College of Engineering and Technology Awards in Industrial and Manufacturing Engineering and Technology

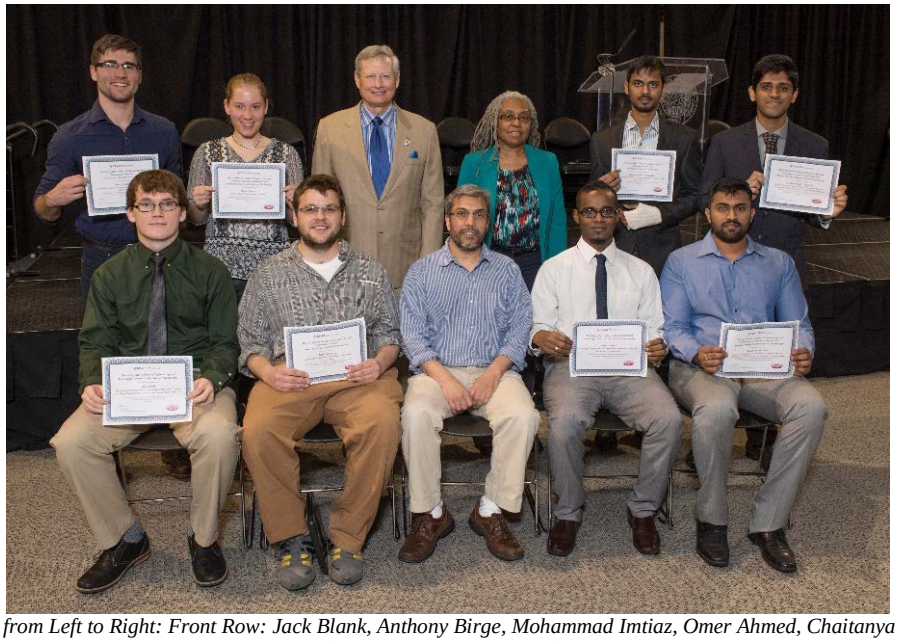
Undergraduate Recipients:

Bacteriophage Viruses used as Antibiotics
Tyler Kauffman '19, Manufacturing Engineering and Business Leadership & Management
Anna Hanson '18, Nursing
Mentor: Dr. Kalyani Nair, Department of Mechanical Engineering

Graduate Recipients:

Design of Workplace and Workspace to Meet the Physical Characteristics of the Workers at a Local Printing Company
Chaitanya Tatineni '17, Industrial Engineering
Sri Jagannadh Dwaram '17, Industrial Engineering
Mentor: Dr. Regina Pope-Ford, Department of Industrial and Manufacturing Engineering and Technology

AWARD RECIPIENTS FROM THE CATERPILLAR COLLEGE OF ENGINEERING AND TECHNOLOGY



Pictured from Left to Right: Front Row: Jack Blank, Anthony Birge, Mohammad Imtiaz, Omer Ahmed, Chaitanya Tatineni
Top Row: Brian Fiedler, Anna Hanson, Dr. Lex Akers, Dean of the Caterpillar College of Engineering and Technology, Dr. Regina Pope-Ford, Industrial and Manufacturing Engineering and Technology; Chandra mouli Tummal; and Sri Jagannadh Dwaram

The Foster College of Business

The Foster College of Business Award in Quantitative Areas:

Alternative Forms of Shareholder Compensation
Rachel Teague '17, Finance, Spanish and Management & Leadership
Mentor: Dr. Amit Sinha, Department of Finance and Quantitative Methods

The Foster College of Business Award in Behavioral Areas:

Undergraduate Recipients:

The Development of an Applied Ethical Hacking and Security Assessment Course
Samantha Johnson '17, Management Information Systems
Kerstyn Campbell '17, Management Information Systems, Social Media Marketing and Management & Leadership
Angelica Fanti '17, Management Information Systems and Social Media Marketing
Zach Sells '17, Management Information Systems and Management & Leadership
Alex Sutter' 17, Computer Information Systems and Management & Leadership
Mentor: Dr. Jacob Young, Department of Entrepreneurship, Technology and Law
Graduate Recipients:

Help! I Need Somebody: Managing Others' Cognitive Dissonance
Jan Kotik '18, Business Administration
Mentors: Dr. Jennifer Robin, Center for Professional Excellence
Dr. Heidi Baumann, Department of Management and Leadership

FOSTER COLLEGE OF BUSINESS AWARD RECIPIENTS

Pictured from Left to Right: Front Row: Alex Sutter, Kerstyn Campbell, Angelica Fanti
Back Row: Jan Kotic, Dr. Jennifer Robin, Center for Professional Excellence, Dr. Darrell Radson, Dean of the Foster College of Business, and Dr. Jacob Young, Entrepreneurship, Technology and Law

The College of Education and Health Sciences

The College of Education and Health Sciences Award in Education

Collaborative Strategies Enhancing Social-Emotional Growth in the Classroom
Katherine Hart '17, Special Education
Roxanne Parks '17, Elementary Education
Mentors: Dr. Heljä Antola Crowe, Department of Teacher Education
Dr. Patricia Nugent, Department of Teacher Education

The College of Education and Health Sciences Award in Health Sciences

Effects of an Individualized Exercise Program on Physical and Psychosocial Factors in an Individual with Multiple Sclerosis: A Case Study
Hanna Booker '18, Physical Therapy
Patrick Finn '18, Physical Therapy
Lauren Galick '18, Physical Therapy
Mentor: Dr. Melissa Peterson, Department of Physical Therapy and Health Sciences

The College of Education and Health Sciences Award in Family and Consumer Sciences

Undergraduate Recipients:

Analysis and Improvement of a Hospitality House Meal Program through Service Learning and Internship
Sarah Wagner '18, Dietetics
Mentor: Dr. Magdalena Sas, Department of Family and Consumer Sciences

Graduate Recipients:

The Relationship between Breakfast Consumption and Mood among Undergraduate College Students
Kari Sunnarborg '17, Dietetics
Mentor: Dr. Amanda Newell, Department of Family and Consumer Sciences

Where Do People Get Their Diet/Nutrition Information?
Jessica Dolan '17, Dietetics
Mentor: Dr. Amanda Newell, Department of Family and Consumer Sciences

AWARD RECIPIENTS FROM THE COLLEGE OF EDUCATION AND HEALTH SCIENCES

Pictured from Left to Right: Front Row: Sarah Wagner, Katherine Hart, Roxanne Parkes, Jessica Dolan, and Hannah Booker
Back Row: Dr. Melissa Peterson, Physical Therapy and Health Sciences; Patrick Finn; Kari Sunnarborg, Dr. Amanda Newell, Family and Consumer Sciences; Lauren Galick; and Dr. Magdalena Sas, Family and Consumer Sciences

The Slane College of Communications and Fine Arts

The Slane College of Communications and Fine Arts Award in Communications

Urban Artifacts Advertising Campaign Plan
Katie Sainz '17, Advertising, Spanish and Creative Writing
Brandon Seyller '17, Advertising, English and Creative Writing
Madison King '17, Advertising and Graphic Design
Mentor: Dr. Stephen Banning, Department of Communications

The Slane College of Communications and Fine Arts Award in the Fine Arts

Parallel Lines – An Art Documentary
Allison Walsh '17, Studio Art, Spanish and Philosophy
Mentor: Dr. Margaret LeJeune, Department of Art

The Slane College of Communications and Fine Arts Award in the Digital Arts

Bradley University Hollywood Semester Fall of 2016: Music Video Project, "The Day" (Gesaffelstein Remix) by Moby
Madison King '17, Advertising and Graphic Design
Katie Sainz '17, Advertising, Spanish and Creative Writing
Jonathan Perera '17, Television Arts
Matt Slifka '17, Music Business
Pablo Iglesias '17, Sports Communication
Erin Bendle '18, Interactive Media Animation and Visual Effects
Bryce Schwerbrock '19, Creative Writing
Ellie Rhodes '17, Television Arts
Mentors: Jacob Huberman, Doug Frank, Bryan Yokomi, and B.J. Lawrence, Hollywood Semester

The Slane College of Communications and Fine Arts Award in Interactive Medias

Rewards
Pooja Arhsanapally '18, Interactive Media and Entrepreneurship & Innovation
Mentor: Dr. Ethan Ham, Department of Interactive Media

AWARD RECIPIENTS FROM THE SLANE COLLEGE OF COMMUNICATIONS AND HEALTH SCIENCES

Pictured from Left to Right: Front Row: Pooja Arhsanapally, Allison Walsh, Madison King
Back Row: Erin Bendle, Dr. BJ Lawrence, Associate Dean of the Slane College of Communications and Fine Arts; Brandon Seyller, and Katie Sainz

The Distinguished Graduate Scholarship Award

The Distinguished Graduate Scholarship Award is presented to the graduate student who has demonstrated during the year the highest level of scholarship in a thesis, research project, creative production, capstone project, or other scholarly pursuit. The award recipient receives a financial prize of $500.

The Recipient of the 2017 Distinguished Graduate Scholarship Award

Guan Gong '17, Manufacturing Engineering
Mentor: Dr. Joseph Chen, Department of Industrial and Manufacturing Engineering & Technology

Pictured from left to right: Dr. Jeff Bakken, Associate Provost for Research and Dean of the Graduate School; Guan Gong, Recipient; and Dr. Lex Akers, Dean of the Caterpillar College of Engineering and Technology

The Office of Sponsored Programs Award for Multidisciplinary Integration

The Office of Sponsored Programs (OSP) Award for Multidisciplinary Integration recognizes the undergraduate and graduate students whose EXPO presentation best demonstrates the integration of ideas, methods, or processes from multiple disciplines. Recipients receive a monetary prize of $500.

Undergraduate Recipients:
Students Engaging Students to Improve Learning: Using Student-Led Focus Groups to Gather and Make Sense of Assessment Evidence
Kevin Mikolajczak '18, Interactive Media and Theater
Kelsey Vogt '18, Finance
Mentors: Gregory Haines, Director of the Academic Exploration Program
Jon Neidy, Assistant Vice President for Student Affairs

Graduate Recipients:

Cost Benefit Analysis: A Comparison Analysis of Two Companies
Aaqib Ashraf Mohammed '17, Mechanical Engineering
Mentor: Dr. Regina Pope-Ford, Industrial and Manufacturing Engineering and Technology

OSP AWARD FOR MULTIDISCIPLINARY INTEGRATION RECIPIENTS

Pictured from Left to Right: Dr. Jeff Bakken, Associate Provost for Research and Dean of the Graduate School; Dr. Regina Pope-Ford, Industrial and Manufacturing Engineering and Technology, Aaqib Ashraf Mohammed, Graduate Recipient, Kevin Mikolajczak, Undergraduate Recipient, Kelsey Vogt, Undergraduate Recipient, Jon Neidy, Assistant Vice President for Student Affairs

The Provost's Awards

The Provost's Awards recognize the most exemplary undergraduate and graduate presentations, after the President's Award Recipients, made at the Student Scholarship Expo. The award recipients receive a monetary prize of $500.

Undergraduate Recipients:

Introducing DonorClimate by TrinixCreative – Payment Processing, Integrated Custom Donation Forms, and Donor Management
Kevin Mikolajczak '18, Interactive Media and Theater
Mentor: Tanya Melendez, Department of Interactive Media
Devin Monnens, Department of Interactive Media

Graduate Recipients:

Deconstructing the Boundaries of Material Reality: The Significance of Touchstone Characters in Theoretical Approaches to Magical Realism
Sarah Kerrn '17, English
Mentor: Dr. Danielle Glassmeyer, Department of English

THE PROVOST'S AWARD RECIPIENTS

Pictured from Left to Right: Dr. Chris Jones, Dean of the College of Liberal Arts and Sciences; Dr. Danielle Glassmeyer, English; Sarah Kerrn, Graduate Recipient, Kevin Mikolajczak Undergraduate Recipient, Dr. BJ Lawrence, Associate Dean of the Slane College for Communications and Fine Arts, and Dr. Walter Zakahi, Provost and Senior Vice President for Academic Affairs

The President's Awards

The President's Awards recognize the most exemplary undergraduate and graduate projects presented at the Student Scholarship Expo. Recipients receive a monetary prize of $1000. A unique circumstance this year, there was a tie for the undergraduate President's Award, but the two projects that tied were presented by the same student.

Undergraduate Recipients:

Bradley Student Opinion on the Ethics of Genome Editing
Katie Eckhoff '17, Biology, Chemistry and Ethics
Mentor: Dr. Keith Johnson, Department of Biology

Nitrogen Runoff in a Restored Wetland at Wightman Lake
Katie Eckhoff '17, Biology, Chemistry and Ethics
Mentor: Dr. Sherri Morris, Department of Biology

Graduate Recipient:

Pavement Roughness Prediction using Neural Network Modeling
Leela Sai Praveen Gopisetti
Mentor: Dr. Mohammad Hossain, Department of Civil Engineering and Construction

THE PRESIDENT'S AWARD RECIPIENTS

Pictured from Left to Right: Dr. Chris Jones, Dean of the College of Liberal Arts and Sciences; Dr. Lex Akers, Dean of the Caterpillar College of Engineering and Technology; Leela Sai Praveen Gopisetti, Katie Eckhoff, Dr. Imran Hossain, and Dr. Walter Zakahi, Provost and Senior Vice President for Academic Affairs

2017 Student Scholarship Expo Projects and Abstracts

The College of Liberal Arts and Sciences

Listed in order by Lead Author Last Name

The Short-Term Effects of Multiple Environmental Stressors on Zebra Mussel Performance
Undergraduate Presenters: Madison Baer '17, Biology and Chemistry; Katie Eckhoff '17, Biology, Chemistry and Ethics
Mentors: Dr. Jennifer Jost, Biology

Sessile aquatic invertebrates are particularly vulnerable to physiological changes caused by fluctuations in their environment. Zebra mussels are invasive, and little is known about their cellular physiology. Increased water temperatures and aquatic hypoxia are the most common environmental changes, and often happen simultaneously. However, few studies have investigated the effects of these multiple co-stressors on organisms, and even fewer have investigated these effects on zebra mussels. This short-term study aims to look at the variables, heat and hypoxia, under realistic biological conditions both separately and as co-stressors over the course of 24 hours. Mussels were collected from Banner Marsh in central Illinois and slowly acclimated from river water temperature to one of four experimental treatments: control (20°C/normoixia), heat (30°C, normoxia), hypoxic conditions (20°C, DO=5mg/L) and heat/hypoxia (30°C/DO=5mg/L). AMPK activity and HSP70 levels were used to identify the cellular response to these stressors. This study was then repeated using winter mussels and cellular lactate levels were observed in addition to AMPK and HSP70 levels. It is predicted that cellular markers will corroborate these physiological stressors and indicate decreased organismal performance. This study found there to be a synergistic response when zebra mussels were exposed to a combination of those stressors in AMPK levels as well as HSP70 levels.

Person Perception: Effects of Gender, Sexual Orientation, and Marital Status
Undergraduate Presenters: Ilirianna Ballazhi '16, Psychology; Brian Cheline '19, Psychology and Literature; Alexandra Kraus '17, Psychology and Sociology; Brooke Rudolph '17, Psychology and Women & Gender Studies; Hanna Snidman '19, Psychology and Sociology; Jacob Thompson '16 Psychology; Rachel Weaver '17, Health Science and Family & Consumer Science
Mentors: Dr. Claire Etaugh, Psychology

An investigation of whether gender, marital status, and sexual orientation affected college-aged participants' perception of a stimulus individual used surveys rating various stimulus individuals to evaluate differences in conceptions of these three facets of the stimulus individuals' lives, and provided information about how those facets compared to one another.

Characterization of Macromolecular Interactions that Influence *Pichia pastoris* Vac8p Function in Microautophagy
Undergraduate Presenters: Jason Bellmore '17, Biochemistry; Elijah Potokar '17, Chemistry
Mentors: Dr. Michelle Fry, Chemistry and Biochemistry

We have previously demonstrated that Vac8p, an armadillo repeat protein that contains putative fatty acylation sites at the amino terminus, is required for microautophagy. Furthermore, we have demonstrated that Vac8p armadillo repeat domains were essential for protein function in the vacuolar sequestration steps of microautophagy. In this study, we have employed immunoblot analysis and fluorescence microscopy to investigate a putative interaction between Vac8-GFP and actin, a cytoskeletal protein. The results of these studies will help elucidate protein-protein and protein-membrane interactions that influence the behavior and function of Vac8p. Vac8p is resistant to extraction from the membranes with NaCl, Na2CO3, and urea, while partial extraction was observed using detergents such as SDS and TRITON X-100. Preliminary results suggest that Vac8p interactions with actin compromises Vac8p solubility.

This project was made possible in part through support from the Sherry Endowment for Collaborative Student/Faculty Projects in the Liberal Arts and Sciences.

“Hidden in the Landscape": Architectural Landscape and Spiritual Mystery in Romantic England and Ireland
Presenters: Anna Berlinger '17, English and History with a Concentration in Creative Writing
Mentors: Dr. Bradford Brown, History; and Dr. Kevin Swafford, English

From the first appearance of stone circles and passage tombs in ancient Neolithic times to the towering cathedrals of the post-Romantic Gothic Revival, architecture in England and Ireland played a significant role in the way the Romantics viewed spirituality. Historians have addressed the question of architectural landscape (old pieces of architecture which have become scenic markers) and its importance to English and Irish Romantic interest in the Middle Ages by focusing on various aspects. The medievalism of the British Romantics appears repeatedly in the architecture, literature, and art of the period. In areas of Britain where there was more cultural tension such as Ireland, the Romantics’ work took on more nationalistic qualities. While some historians ask what varying perspectives – medievalism and nationalism – Romantics had when approaching this architecture, I want to analyze the overarching theme of spiritual mystery, specifically in connection with Tintern Abbey. People are often familiar with William Wordsworth’s poem about Tintern Abbey; however, the repeated interest of numerous other British Romantic writers, poets, and artists is rarely ever discussed. This project will analyze the repeated theme of spiritual mystery in British Romantic poems and art about Tintern Abbey and what that testifies about British Romanticism as a whole.

Re-Engineering a Proof of Concept Codebase
Undergraduate Presenters: Ryan Billingsly '17, Computer Science and Professional Writing; Nicholas Celiberti '17, Computer Science; Jacob Nash '17, Computer Science; Tom Nielsen '17, Computer Science and Mathematics; Drew Whitmire '17, Computer Science
Mentors: Dr. Chris Alvin, Computer Science and Information Systems

This project involves taking a proof of concept codebase in C# and re-engineering that code base into Java in order to support a more robust, open-source user interface. The goal was two-fold: translation of the original code and establishing a robust test framework. Throughout translation, certain aspects of the previous code were re-engineered in order to improve clarity, robustness, and performance. In order to facilitate an automated testing framework, entirely new packages were conceived and implemented. We report on the progress of this project.

NewSnoop
Undergraduate Presenters: Jack Bridge '18, Computer Science; Anousack Martheppharack '17, Computer Science; David Wadi, Computer Science '17; Charles Cohen '17, Political Science and Public Relations
Mentors: Dr. Young Park, Computer Science and Information Systems

In these tumultuous political times, our media has been marked by many as the central adversary of the people. Our journalists are consistently criticized and openly ridiculed for reporting the truth and attempting to hold our government accountable. We now live in a reality of "fake news" and "alternative facts". With a growing number of people receiving their news via social media, determining what news and news sources are reliable has never been more difficult. Our mobile application, NewSnoop, will deliver to users the ability to quickly determine just how reliable any given news source is. With its simplistic search bar and accessible database design, NewSnoop is the best of both worlds: easy and efficient. The app produces a reliability percentage, calculated using advanced metrics to help guide the user in making a decision as to the accuracy and trustworthiness of each individual news source. A free and reliable press is a core aspect of any successful Democracy. It's about time we start acting like it. Here we report on our progress, which includes the design and construction of the mobile application.

Perceiving Sexual Minorities and Heterosexuals: Does Gender and Gender-typed Job Matter?
Undergraduate Presenters: Max Brown '17, Psychology and Studio Art; Alexis Dockman, '18, Pyshcology, Women & Gender Studies, Spanish and Sociology; Alexandra Kraus '17, Psychology and Sociology; Hannah Long, '17, Psychology, Biology and Neuroscience; Kerri Predovich, '19, Psychology and Management & Leadership; Brooke Rudolph '17, Psychology and Women & Gender Studies; Hannah Snidman, '19, Psychology and Sociology; Jake Snowman '17, Psychology
Mentors: Dr. Claire Etaugh, Psychology

Several studies have examined how gender and gender-typed occupations affect observer ratings of heterosexual individuals. Little is known, however, about how sexual orientation interacts with these variables. The current study examined how college students perceived stimulus persons based on their gender, sexual orientation, and the gender-typing of their occupation. 210 undergraduate students were given a brief vignette describing a male (Christopher Johnson) or female (Elizabeth Johnson) stimulus person. The description varied based on sexual orientation and occupation. Participants rated stimulus persons on a 31-item questionnaire measuring professional competence, nurturance, adjustment, and stress. Sexual minorities were rated as more stressed overall and less competent when they belonged to corresponding gender-typed occupations (i.e., women judging nurses; men judging police officers). Nurses were rated as more nurturing, while police officers were rated as more poorly adjusted. A significant interaction between gender and occupation emerged, with female police officers being rated as the least nurturing and most stressed of all possible variations. Findings appear to support existing stereotypes surrounding gender and sexual orientation.

Supply Chain Middleware
Undergraduate Presenters: Alexander Castor '17, Computer Science and Management & Leadership; Jacob Peters '17, Computer Science; Michael Matteri '17, Computer Science; Mitchell Siver '17, Computer Science and International Studies; Ryan Vance '17, Computer Science; Jacob Wilson '17, Computer Science
Mentors: Dr. Steven Dolins, Computer Science and Information Systems; Brian Anderson

In supply chains today, data associated with products is not visible throughout the entire supply chain. Often, the data associated with previous or future supply chain steps is not available. This creates issues when optimizing supply chains and improving production and distribution. Further, when there is an issue with a product, data needed to diagnose root causes and prevent additional occurrences of this issue is unavailable. We worked with two domain experts in the food industry; a chicken farmer and a local entrepreneur. Their problem was presenting data from the “farm to table” so data is accessible from any step of the chain. The team began their research by investigating off-the-shelf middleware solutions. These tools were designed to transfer data effectively, but none of them were designed to integrate data from numerous steps in the supply chain. We built a prototype of a food supply chain, and tracked individual animals, e.g., chickens, as they moved from the genetics phase at a lab to the grower phase at a farm to consumption at a restaurant. We fabricated data for the various supply chain steps; we created data by utilizing various USDA and food industry-related websites. This prototype included a transparent supply chain database that contained data for all phases in the chain. An application program interface (API) was implemented to allow a simple frontend to access this database. We designed a mobile application prototype for consumers. This mobile app would utilize data from the database and successfully demonstrate an end-consumer use case.

The Vedic Roots of Colorism in Indian Society
Undergraduate Presenters: Everley Davis '18, Spanish, Sociology and Religious Studies
Mentors: Dr. Daniel Getz, Religious Studies

India does not openly admit to discriminating based upon skin tone although the popular use of light or white actors in Indian television and cinema, the religious depiction of Hindu gods and goddesses, and the high sales of skin bleaching products indicate a preference for light skin. This kind of discrimination is known as colorism. In this presentation, I will propose that colorism in India originated in the concept of varna, a Sanskrit term meaning “color” that came to designate the Hindu system of class distinction. In this project, I will analyze the traditional significance of varna in the earliest religious literature of India, the Vedas. Varna appears throughout the Vedas with varying interpretations like hue, loveliness, folk (race), and class. Different types of varna appear later in the Samhitas and Brahmanas, sections of the Vedas that lay the foundation of India’s hierarchical social order.

Hemingway the Feminist: "Hills Like White Elephants" and the Discourse of Abortion
Presenters: Rachel David '19, English Teaching
Mentors: Dr. Danielle Glassmeyer, English

Ernest Hemingway has been scrutinized as being a misogynist for years. The consistent failure of his personal relationships due to disloyalty, as well as the relative weakness of his female characters, work to prove this. Through a new historical and feminist analysis, I ask readers to realize the ambiguity of Hemingway's reputation. By exploring further into Hemingway's personal relationships, analyzing the feminist development of Jig in his short story "Hills Like White Elephants", as well as the historical context of the story, I plan on presenting the idea that Hemingway is not the misogynist we think of him as. Through my research, I found that Hemingway did not think less of women, but loved and admired the women in his life so much that his loyalty to one would be impossible for him. He was sympathetic towards women's oppressive situations in the early 20th century, especially towards the lack of options for pregnant women. This sympathy is exemplified through the story "Hills Like White Elephants," and therefore proves that Hemingway still belongs as a part of the American canon, and further, as a contributing member to the discourse of abortion in American society.

Sustainable and Renewable: Plastic Alternatives for the Modern World
Graduate Presenters: Nathaniel Dexter '17, Chemistry; Erik Larson '17, Chemistry
Mentors: Dr. Luke Haverhals, Chemistry and Biochemistry

To date, much research and development monies have been devoted to direct replacement of petroleum-based plastics (i.e., bio-polyethylene whose carbon source is plant matter). Unfortunately, these alternatives are often either cost prohibitive and/or not biodegradable. Natural Fiber Welding (NFW) is an extremely promising manufacturing technology that makes it possible to directly utilize bio-based materials in place of petroleum-based plastics with a low cost scalable process. In our presentation, we will demonstrate high performance materials with properties (i.e., mechanical properties) that meet or exceed those of the 'traditional' manmade synthetics but that are sustainably produced with large potential cost savings. These are compelling results that suggest economic and technological disruption within several multi-trillion dollar per year global industries.

Winner of the College of Liberal Arts and Sciences Award in the Humanities

The Essential Diversification of Media
Undergraduate Presenters: Sierra Doss '19, Television Arts, Spanish and Creative Writing
Mentors: Dr. Devin Murphy, English

This project notes comic book writer, screenwriter, and producer Dwayne McDuffie's efforts to bring diversity into mainstream entertainment, and how his work has affected my own. McDuffie saw the hesitancy of leading comic book companies to accurately portray minorities and decided to go out and start his own company, Milestone Media, focused solely on authentic representation of people of color. Milestone's success granted McDuffie a larger medium as a television writer and producer for DC Comics. There, he continued to bring his authentic, uncut voice to the superhero genre. Even in 2017, viewers wait with bated breath and crossed fingers to see how minorities will be portrayed in mainstream media. This project examines his influence on my own writing, refuting the idea that minorities cannot be marketed successfully to a large audience.

Winner of the President's Award - Undergraduate

Bradley Student Opinion on the Ethics of Genome Editing
Undergraduate Presenters: Katie Eckhoff '17, Biology, Ethics and Chemistry
Mentors: Dr. Keith Johnson, Biology

In 1953, Watson and Crick discovered the double helical structure of DNA and since then, new discoveries have helped humanity understand DNA and the genes that determine our traits and physical attributes. In 2003 the human genome was completely sequenced, and the idea of editing the genes that define us began. Diseases, both life threatening and debilitating, that are caused by an error in a gene could be cured by gene editing. Examples of these diseases include sickle cell anemia, breast cancer, and cystic fibrosis. Editing the genes of embryos will prevent these genetic diseases from being passed on to future generations. The technology could also be used to increase intelligence or strength, even choosing the hair and eye color of children. While stronger, smarter offspring would be more desirable, this creates several ethical issues. It could lead to positive eugenics, where one particular genetic trait is ideal and the rest are ostracized, or negative eugenics, where traits are eliminated. The process will be expensive, and it is possible only the rich would be able to afford the procedure. A survey of students at Bradley University, Peoria IL, found that approximately 80% of students supported using gene editing to cure life-threatening or debilitating diseases in adults, children, and embryos. It was also found that this support was less in embryos than adults or children. This show of support for gene editing to cure diseases in humans is what is expected from a liberal arts university.

Winner of the President's Award - Undergraduate

Dynamics of Nitrogen Runoff in a Restored Wetland at Wightman Lake
Undergraduate Presenters: Katie Eckhoff '17, Biology, Ethics and Chemistry
Mentors: Dr. Sherri Morris, Biology

Nitrogen levels have increased due to anthropogenic events such as modern agriculture practices and acid rain. The use of nitrogen fertilizers increase crop yield, but fertilizer in excess of plant need can enter creeks through runoff. Wetlands are able to take nitrogen out of the water through plant uptake and denitrification. Since the founding of Illinois in 1818, over 90% of Illinois' wetlands have been drained and turned into agricultural fields. Wetlands such as the wetland at Wightman Lake have been restored in order to create a buffer zone between the fields and rivers where excess nitrogen will affect a widespread area. This study took water and soil samples from 7 sites along Gimlet Creek and the wetland from late spring to early summer when it is expected that fertilizer runoff would be the greatest. Nitrogen content was analyzed in the water samples. Soil samples were analyzed for the carbon and nitrogen content. Nitrate concentrations were significantly lower in the output of the marsh than in Gimlet Creek for all collection dates in 2007 and 2016. This suggests that even with a significant increase in nitrogen going into the wetland, the wetland is still able to remove a significant amount of nitrogen from the water.

Delta-lactone Derivatives Induce Quorum Sensing Activity in *Agrobacterium tumefaciens*
Undergraduate Presenters: Dawn Ewald '18, Medical Laboratory Science and Chemistry
Mentors: Dr. Michelle Fry and Ana Champion, Chemistry and Biochemistry
Previous work by Andersh et. al has shown that synthetic δ-lactone derivatives exhibit bacteriostatic activity against *Acinetobacter lwoffii* and *Bacillus subtilis*. In this study, we probe the effects of the δ-lactone derivatives on the process of quorum sensing due to the structural similarity of these compounds to homoserine lactones, quorum sensing autoinducers in Gram-negative bacteria. Quorum sensing is under investigation in the area of antibiotic development, because quorum sensing modifiers may exhibit weaker evolutionary pressures on the bacteria to develop drug resistance. The quorum sensing activity of four chlorine-substituted δ-lactone derivatives was quantified using UV-Vis absorbance on an engineered biodetector strain of *Agrobacterium tumefaciens* NTL4(pZLR4). Submillimolar concentrations of the δ-lactones were shown to induce quorum sensing agonistic activity of *A. tumefaciens* natural autoinducers, trigger this response in the absence of cognate autoinducer, and decrease bacterial growth. We are analyzing the effect of the δ-lactone derivatives on the ability of *A. tumefaciens* to induce Crown Gall tumorigenesis in potato slices.

This project was made possible in part through support from the Sherry Endowment for Collaborative Student/Faculty Projects in the Liberal Arts and Sciences.

Does the presence of invasive garlic mustard (Alliaria petioalta) affect pine understory diversity at Sand Ridge State Forest?
Graduate Presenters: Alexander Faulkner '17, Biology
Mentors: Dr. Kelly McConnaughay, Dr. Sherri Morris, and Dr. Janet Gehring, Biology

Invasive plant species are non-native species introduced to an environment which have the potential to cause economic and ecological damage and alter biodiversity and structure of the resident community that it occupies. While a great deal of attention has been given to the negative effects of non-natives, research regarding the community-level effects in native Illinois natural areas is limited at best. We evaluate the consequences of invasion by European-native, garlic mustard (Alliaria petiolata), on pine plantation understory communities at Sand Ridge State Forest (SRSF; Mason County, IL). Garlic mustard is a biennial species possessing a multitude of characteristics that enable it to be invasive across much of the United States. In order to properly assess the community-level response of SRSF to invasion by garlic mustard, we followed natural and forced invasions on 72 plots subjected to various perturbations at sites with similar environmental characteristics. A vegetative census was conducted for all vascular plants and used to calculate species richness (S), equitability (J), and community diversity (H'), in order to evaluate the effect of garlic mustard on native plant populations. We found garlic mustard presence does affect understory diversity at our field site, though its effect varies and is dependent upon the life stage and environmental perturbation that the community has been exposed to. Interestingly within some of our treatments, garlic mustard had no significant impact on the understory community suggesting that reductions in diversity may be a consequence of other environmental factors. The results of this study may provide new approaches for better controlling and managing the effect of invasive garlic mustard on native flora.

Analysis of Computed IR Vibrational Modes of Several Benzene Derivatives
Undergraduate Undergraduate Presenters: Matthew Ferguson '19, Chemistry
Mentors: Dr. Wayne Bosma, Chemistry and Biochemistry

Density functional theory methods were used to calculate the vibrational modes of several benzene derivatives. Simulated IR spectra and vibrations were generated from computationally optimized structures. The computed normal vibrational modes were related to the Wilson numbering system for the vibrational modes of benzene. At each mode, consistencies and differences in IR frequencies relative to benzene were noted. Comparisons were also made to experimentally derived IR spectra. The computed vibrations and spectra were largely consistent with experimental values. However, there are some computed vibrational modes which are not well characterized using the Wilson numbering system, and increasing the number of large substituents on the benzene derivatives seems to decrease similarity to benzene's vibrational modes. Using such methods of computer modelling can allow for further clarification and understanding of experimental results.

Catalysis by Copper Oxide Colloid Embedded in Polydimethylisiloxane
Undergraduate Presenters: Matt Folkenroth '17, Chemistry; Keri Martinez '18, Chemistry and History; Miah Montes '20, Medical Laboratory Science; Max Palmer '18, Chemistry and Mathematics; Emily Brewer '18, Chemistry and Psychology
Mentors: Dr. Dean Campbell, Chemistry and Biochemistry

Metal nanoparticles, with sizes typically smaller than 100 nm, have been shown to catalyze a number of chemical reactions. Their high surface area and reactivity have made them the focus of many catalytic studies. One of the limitations of their use, however, is that the very small size of the particles makes their recovery from reaction systems very difficult. Synthesizing catalytic nanoparticles within a polymer contains these particles and allows for a cleaner, safer, and more reusable catalyst. The objective of this research was to synthesize copper oxide particles within the transparent polymer polydimethylsiloxane (PDMS). The particles were produced by using tetrahydrofuran solvent to carry dissolved copper(II) acetylacetonate into the PDMS. After the solvent was evaporated, the copper complex in the PDMS was thermally decomposed to produce metallic copper particles, which then reacted with oxygen in the air to form copper(II) oxide. The progress of these reactions could be observed visually and by visible light spectroscopy. The copper(II) oxide in PDMS was also studied for its ability to catalyze the oxidation of various primary alcohols to aldehydes in the presence of air. Preliminary data indicates that the oxide in PDMS can catalyze the oxidation of benzyl alcohol and cinnamyl alcohol, while bulk copper(II) oxide and bulk copper metal cannot.

Examination of the Physiological Effects of Ethylene Glycol Exposure on Muscle and Liver Tissue of the Leopard Frog, Rana pipiens

Undergraduate Presenters: Alexander Funk '17, Biology
Mentors: Dr. Erich Stabenau, Biology

Some industrial processes, such as hydraulic fracturing, use anthropogenic agents that may adversely affect ecosystem biodiversity. One of the chemical additives in fracturing fluid is ethylene glycol. To date, there is no information available of the effects of ethylene glycol exposure on aquatic organisms at concentrations used by the fracturing industry. Therefore, the present study examined the physiological effects of ethylene glycol exposure on Leopard frogs, Rana pipiens. Frogs were exposed to control water or to water containing 5.7 mM ethylene glycol for five days. Ethylene glycol-exposure significantly decreased the swimming time to exhaustion from 284.5±22.8 sec in control animals to 194.8±26.3 sec. Moreover, contraction of isolated gastrocnemius muscles was significantly less in ethylene glycol-exposed frogs when compared to control animals. Mitochondrial membrane potential was also significantly decreased in ethylene glycol-exposed frogs when compared to control animals, decreasing 40.1% and 42.4% in liver and muscle tissue, respectively. Culture of isolated satellite cells from skeletal muscle resulted in a dose-dependent, ethylene glycol-induced increase in cell proliferation and differentiation. Taken together, these data indicate that 5.7 mM ethylene glycol significantly reduced muscle and liver performance. We believe that the agent is altering mitochondrial function by reducing the available ATP for cellular processes.

Using Contextual Information for Predicting Student Grades

Graduate Presenters: Bhavana Galla '17, Computer Science; Neelo Tabassum '17, Computer Science
Mentors: Dr. Young Park, Computer Science and Information Systems

Predicting an individual student's performance in courses could be useful in a great number of different ways associated with the student's successful learning. In this project, we developed an application of recommender technologies, to provide personalized student grade predictions. For better predictions, we incorporated contextual information of courses into traditional collaborative filtering approaches – user-based collaborative filtering, item-based collaborative filtering and matrix factorization. We tested our system through experimentation on actual student grade data which consists of over 10,000 classes taken by ~600 individual undergraduate students enrolled in a Computer Science department at a large university over a 20 year time span. Our results indicate that contextual information can improve the grade prediction accuracy and there is a great deal of promise for using recommender technology towards predicting student grades for personalized academic success. As future work, we will investigate more contextual data in this application.

Establishing a Modified Model of PTSD in Adolescent Rats

Undergraduate Presenters: Amber Garrison '17, Psychology and Neuroscience; Emily Walsh '17, Psychology and Neuroscience; Elizabeth Wright '19, Psychology, Biochemistry and Neuroscience
Mentors: Dr. Timothy Koeltzow, Psychology

New diagnostic criteria for Posttraumatic Stress Disorder (PTSD) in children highlight the need to better understand the neurophysiological adaptations that trauma might elicit during development. The single prolonged stress (SPS) rat model of PTSD reliably produces an enhanced fear response and disrupted cortisol regulation similar to that typically observed in humans with PTSD (Wang et al., 2008; Knox et al., 2012). In addition, SPS has been shown to influence the response of rats to cocaine (Eagle et al., 2015), a finding that is relevant to reports of co-morbidity of PTSD with substance abuse disorders (Jacobsen et al., 2001). The current study seeks to investigate the possible long-term effects of exposure to a modification of the SPS model (two hours of restraint stress followed by 20 minutes of forced swim) during adolescent development. Dependent variables include spontaneous locomotor activity and responses to the elevated plus maze, a black/white chamber, and an open field. Preliminary data indicate that exposure to SPS in young adult rats results in a statistically significant increase in spontaneous locomotor activity and decreased exploration of the center of the open field among SPS rats compared to non-stressed controls when measured two weeks after the SPS exposure.

Hindu childhood rituals reveal about notions of childhood and children in Indian culture and religion.
Undergraduate Presenters: Veronica George '18, Psychology, Pre-Nursing, Criminal Justice and Religious Studies
Mentors: Dr. Daniel Getz, Religious Studies

The purpose of this project is to address the question of what Hindu childhood rituals reveal about notions of childhood and children in Indian culture and religion. An answer to this question requires an examination of the Samskaras (The Hindu Sacraments), which are the rites of passage that a person is expected to perform through life from childhood to adulthood. Hindus believe that through childhood Samskaras a child will be purified of his or her sins and lead a life of happiness. Furthermore, it is believed that the Samskaras will lead the child to develop certain character and behavioral traits. This project will in particular examine the following Samskaras: Jāta-karma (birth rite), Nāma-karaṇa (naming ritual), Caula (rite of tonsure), Karna-vedha (ear-piercing rite), and Vidyārambha (alphabet-learning ritual). Each of these rituals will be analyzed for underlying religious assumptions about childhood as well as explicit societal guidelines on child rearing.

Phosphorescence Erasure by Low-Energy Light
Graduate Presenters: William Getz '17, Chemistry; Danielle Wentzel '17, Chemistry
Mentors: Dr. Dean Campbell, Chemistry and Biochemistry

Upon excitation with an external light source phosphorescent compounds demonstrate long-lasting luminescence which persists after the light source has been removed. Transition metal-doped zinc sulfide phosphorescence has been widely studied and can be commonly found in glow-in-the-dark products. Exposure of the phosphor to light that is lower in energy than the minimum excitation energy can rapidly quench the persistent luminescence. A visible darkening of the phosphor material manifests in an effect akin to an ‘off switch’ or ‘eraser’ for the emitted light. This quenching effect can be exploited using either coherent or non-coherent low-energy light sources. However, the efficacy of quenching is largely dependent on the incident light energy flux: a function of wavelength of the light and the time-period over which the light is delivered. This hypothesis is further supported through observation of the effect in large band gap phosphors including strontium aluminate which requires a higher energy quenching light source. The darkening caused by low-energy light can be visually striking and useful in a variety of physical science demonstrations.

Synthesis of Limit Problems for Calculus
Undergraduate Presenters: Blake Glueck '19, Computer Science, Mathematics and German
Mentors: Dr. Chris Alvin, Computer Science and Information Systems

Most mathematics problems from Algebra through Calculus can be easily stated and solved using well-known techniques. However, the ability to construct mathematics problems can be a time-consuming task even for an experienced individual. The process of problem synthesis is an area of artificial intelligence that has received increasing attention in the past few years from both academic and commercial entities. In this project, we will investigate techniques to synthesize and evaluate limit problems encountered in a first semester Calculus course using a genetic approach. A genetic algorithm is a way to find a good solution to a problem in a way that mimics evolution in nature. Genetic algorithms consist of three major actions: selection, mutation, and crossover. These operations are performed on individuals which were limit problems in this case. Because mathematical expressions in the program are represented as binary trees, mutation is straightforward and has three cases: adding a node, removing a node, or changing a node. For crossover, two individuals swap random subtrees. For selection, the individuals with sizes closest to average limit problems have a higher chance of surviving to the next generation. After pruning out ridiculous problems, the program displays the new limit problems.

Software Systems to support students with disabilities at Smart University
Graduate Presenters: Namrata Golla '18, Computer Science; Narmada Rayala '18, Computer Science
Mentors: Dr. Vladimir Uskov, Computer Science and Information Systems

The overall goal of our research project is to design and develop a framework for Smart Universities and Smart Classrooms that supports students with disabilities. It will enable universities, schools and classrooms to incorporate unique “smartness” features such as adaptivity, sensing, inferring, learning, anticipation and self-organization by means of implementation and active use of assistive technology for students with visual impairments hearing impairments, learning disabilities (like dyslexia). This paper presents the up-to-date research findings and outcomes of the current project phase – a design and development of an ontology and design framework for Smart Universities and Smart Classrooms for students with disabilities.

The effect of facial injury on personal space

Undergraduate Presenters: Sarah Goodman '17, Sociology; Brittany Hooten '18, Psychology; Nicole Pearl '18, Psychology and Health; Clara Phillips '17, Psychology and Biology; Alexis Dockman '18, Psychology, World Languages & Cultures and Women & Gender Studies; Jay Madsen '18, Psychology

Mentors: Dr. Wendy Schwiegert, Psychology

The distance participants sat from a female confederate who had either a scar, bandaid or neither on her face was measured in centimeters when the participant sat at a table to take a Big Five personality survey. A 2 X 3 (gender by condition) between-subjects ANOVA was done; the gender and condition main effects were not significant, while the gender by condition interaction approached significance; $F(2, 40) = 2.682$, $p = .081$. Males moved further away from the confederate when she wore a bandaid, while females moved farther from the confederate when she had a clear face. Separate correlations were calculated between distance and five personality traits for each condition. The scar condition showed a moderate positive correlation between distance and openness, conscientiousness and emotional stability ($r = .463$, .460, and .556, respectively). The bandaid condition showed a moderately strong positive correlation between distance and emotional stability ($r = .773$). In the clear condition, no significant correlations were found between distance and the five personality traits.

The Effects of Social Dynamics at Undergraduate Parties on Alcohol Consumption

Undergraduate Presenters: Samantha Hanley '17, Psychology; Hollie Ferrer '17, Psychology; Shannon Dolan '17, Psychology and Social Work; Alison Huffman '17, Psychology

Mentors: Dr. Amy Bacon, Psychology

Ostracism is a social stressor affecting alcohol consumption in undergraduates. Drinking to cope is related to higher levels of heavy drinking and alcohol-related consequences (Park & Levenson, 2002). The present study examined the effects of two variables--ostracism and group size--on drinking motives in a hypothetical situation. Participants watched a video depicting a house party, poured the amount of pseudo-alcohol they would drink in that scenario, then completed a drinking motives measure. Participants ($N = 255$) were predominantly female (75%), white (81%), and < 21 years old (90%). A 2 (inclusion vs. exclusion) x 3 (attending alone, with one person, or a group) MANOVA was conducted with four drinking motives (coping, conformity, social, enhancement) as dependent variables. No significant results were observed on the combined dependent variables. Considered separately, individuals who were excluded ($M=0.68$, $SE=.08$) reported greater drinking to cope motives than those who were included ($M=0.44$, $SE=.08$), $F (1, 257) = 4.66$, $p = .03$, $\eta p2 = .02$. A significant exclusion by group size interaction indicated that the biggest exclusion vs. inclusion difference in coping motives occurred among those who arrived to the party with one other person, ($F (2, 257) = 3.12$, $p =.05$, $\eta p2 = .02$).

Developing Smart Pedagogy for Smart Classrooms

Graduate Presenters: Colleen Heinemann '17, Computer Science; Rama Rachakonda '17, Computer Science; Srinivas Karri '17, Computer Science

Mentors: Dr. Vladimir Uskov, Computer Science and Information Systems

As higher education is making the transition from traditional universities to Smart Universities, it is imperative to modify the approach to how information and material is presented to students. In essence, the teaching style must be updated to accommodate these changes and transitions. The new teaching style specifically for Smart Universities is known as Smart Pedagogy. This poster presents the outcomes of an ongoing research project regarding the development of Smart Pedagogy for Smart Universities and Smart Classrooms. An extensive literature review of current approaches to Smart Pedagogy and smart teaching styles took place first. The results are presented here. We then provide our recommendations for what approaches should be taken to implement Smart Pedagogy by universities transitioning to the Smart University environment. Lastly, it is shown how the recommended Smart Pedagogy approaches correspond to the 6 levels of Smart University "smartness"—adaptation, sensing, inference, self-learning, anticipation, and self-organization.

Shifts in Indian Nationalism
Undergraduate Presenters: Raegen Jackson '19, International Studies
Mentors: Dr. Daniel Getz, Philosophy and Religious Studies

Nationalism was a driving force in India's movement for independence from Great Britain. Although independence became official on August 15th of 1947, it was an event long in the making. During that process, Mahatma Gandhi emerged as the foremost leader of the independence movement. On August 8th, 1942, Gandhi delivered what has become known as the "Quit India" speech in which he set forth a compelling vision of India as a nation freed from British imperialism through non-violent protest. Like Gandhi, contemporary Indian leaders are using nationalism as a driving force in their campaigns. Their approach and end goals, however, could not be more different. Using discourse analysis, this presentation will compare and contrast the rhetoric and purpose of Gandhi's "Quit India" speech with Prime Minister Narenda Modi's speech that was delivered on Independence Day of 2016. I will analyze how these two important leaders have taken the single word "nationalism" and given it two entirely different meanings. Gandhi's vision for India will be explained as a situationalist nationalism grounded in civic ideals. Modi's nationalism, in contrast will be characterized as ethno-cultural primoridialism based on an identity politics deriving inspiration from Hindu fundamentalism. My analysis will include reflection on the significance that such a nationalism might have for India's development and future policies.

Winner of the Provost's Award - Graduate

Deconstructing the Boundaries of Material Reality: The Significance of Touchstone Characters in Theoretical Approaches to Magical Realism
Graduate Presenters: Sarah Kerrn '17, English
Mentors: Dr. Danielle Glassmeyer, English

In my research, I discuss the post-postmodern impacts of magical realist literature, an elusive and often overlooked genre, without smothering the genre's continuous evolution and theoretical footholds. My work considers how magical realism primarily relies on the portrayal of material reality within—its accuracy and accessibility by all readers from different backgrounds—though this aspect of the genre is often overlooked. I also highlight a problem: this realism cannot contribute to the impacts of magical realism if readers cannot understand the realistic storyworld, let alone distinguish between the magic and material realism within. I argue that despite the amorphousness of the genre, the majority of magical realists often employ a similar solution to this problem: a touchstone character. My research focuses on four of these: Úrsula from One Hundred Years of Solitude, Paul D from Beloved, George from Mama Day, and Yunior from The Brief Wondrous Life of Oscar Wao. Ultimately, my work concedes that touchstone characters reside in marginalized spaces, manifest the struggle between the material reality and magical, and provide a means for readers to grasp the realistic backdrop, magical intervention, and unique critique of the storyworld at hand that informs the broader, magical realist deconstruction of reality.

Pre-Exposure of Human Wharton's Jelly Mesenchymal Stem Cell to Factors Increases Chemotaxis Towards Ovarian Cancer
Undergraduate Presenters: Katherine Kessler '19, Biology and Spanish; Kaysaw Tuy '16, Biology
Mentors: Dr. Craig Cady, Biology

Ovarian cancer (OC) is the most fatal reproductive cancer in women. OC often goes undiagnosed until it has advanced resulting in chemotherapy with poor patient outcome. Recently, adult stem cells have become a subject of interest as a way to localized chemotherapy treatment. Along with their ability to differentiate into multiple cell types, adult stem cells have the ability to migrate towards cancer. Human Wharton's jelly umbilical cord mesenchymal stem cells (hWJMSC's) have the potential to function as a cell-based therapy due to their non-tumorigenic and low immunogenic properties. We have shown through previous chemotaxis assays that hWJMSC migrate to OC mediated by numerous cancer produced factors. In this study, enhanced migration was induced with physiological levels of factors produced by OC cells including interlukin-6 (IL-6), interlukin-8 (IL-8), tumor necrosis factor-alpha (TNF-α), and interferon gamma (IFN-γ). Exposure of hWJMSCs to these factors for 24 hours was shown to significantly increase chemotaxis towards OC conditioned media. We genetically engineered hWJMSCs to express cytosine deaminase (CD), an essential element of a potential cell based therapy. Treatment would begin with hWJMSCs expressing CD and would migrate to and concentrate at OC tumor sites. Concentrated hWJMSCs would release CD converting a non-toxic agent 5-fluorocytosine into an antineoplastic agent 5-fluorouracil at the tumor arresting tumor growth.

Republican Feminism in Modernity
Undergraduate Presenters: Olga Krapivner '17, Political Science, Women & Gender Studies and Religious Studies
Mentors: Dr. Amy Scott, Women and Gender Studies

In today's political atmosphere, assumptions and stereotypes are used to make quick judgments towards those that we encounter; this is especially seen towards women who identify as Republicans. These stereotypes are created and perpetuated by the media focusing on those that are the most extreme and outspoken within the Republican Party, without giving any regard to the various intersectionalities of the individuals. The problem is that those assumptions are not entirely accurate and can cause various harm to those individuals stuck in the confines of the assumption. In this paper, I will prove that Political Affiliation should be considered as a Stigmatized Concealable Identity, and how it can damage Republican Women who are assumed to be a part of the Democratic Party, and how they are demonized and forced to explain themselves for their party preference.

Ghandi's Ethics
Undergraduate Presenters: Logan LaFollette '18, Computer Science and Ethics
Mentors: Dr. Daniel Getz, Religious Studies

Throughout his life, Mohandas Karamchand Gandhi continually sought to orient himself towards truth. Inevitably, the truth that he was seeking led him to extreme ethical contemplation. Using his biography and other sources, this presentation will identify the ethical claims made by Gandhi and explore the culture and value systems from which they derived. Upon clarifying these claims, I will analyze the structure and integrity of Gandhi's philosophical, political, moral, and theoretical beliefs and point out some natural conflicts and differences these beliefs have with traditional western ideals. Specifically, I will consider how Gandhi perceived the connection between truth and moral value. Finally, I will reflect on how his beliefs as a political and social leader may have derived from this connection, as well as how the notion of "satyagraha" took such a strong hold with his followers.

Synthesis and Characterization of Fluorescent Dyes for the Purpose of Tagging Natural Fibers
Undergraduate Presenters: Lauren Lambach '17, Biochemistry and Mathematics
Mentors: D. Brad Andersh, Chemistry and Biochemistry

The development of new biodegradable plastics from naturally occurring fibers, such as cotton and lignin, is currently inhibited by the lack of proper visualization techniques. There are few dyes available that allow the monitoring of molecular movement during processing. Therefore, it is essential to create dyes that facilitate the identification of welded fibers to advance the development of bioplastics. Covalently bound fluorescent dyes provide a means to gain information about fiber interactions during the welding process. In this work, we investigated the use of coumarin derivative dyes to be used in fluorescent labeling of cotton. We also characterized the binding of fluorescent dyes to lignin. A cyanocoumarin dye and a hydroxycoumarin dye for labeling cotton were synthesized, purified, and identified by NMR spectroscopy and mass spectrometry. Cotton fibers were then tagged with the synthesized dyes. The cyanocoumarin dye is thought to covalently bind cotton while the interaction between cotton and the hydroxycoumarin is unknown. Lignin fibers were tagged with commercially available dyes, 3-azido-7-hydroxycoumarin and Chromeo 494 AzideTM. The bound dye was quantified using UV-visible spectroscopy and the fluorescently tagged fibers were viewed with fluorescence microscopy. Both commercial dyes are thought to covalently bind lignin, but require alkylating the lignin prior to tagging the fibers. Our future goal is to eliminate the alkylation step in tagging lignin by incorporating a synthetic monolignol into a plant's native structure.

Ritual Purity and Sanitation
Undergraduate Presenters: Madeline Lee '18, Nursing
Mentors: Dr. Daniel Getz, Philosophy and Religious Studies

Public sanitation is one of the major issues facing modern day India. In examining the causes of this problem, one clue can be traced back to the origins of the ancient Brahmanical class system that eventually gave rise to India's caste system. The caste system is an endogamous class structure that determines one's status in society based upon the family into which one is born. Within this system the "untouchables" constitute a caste that was traditionally deemed to be permanently impure. It is the belief of the higher caste members that coming into contact with various polluted objects like corpses or doing certain tasks such as cleaning a toilet will make them impure, which would take various ritual purifications to be restored to their proper state. Such tasks were therefore relegated to the Untouchables. This project will explore the conceptual and ritual origins of this system in early Hindu scriptures. It will further consider how these early concepts based on ritual purity might be related to current challenges in sanitation and public cleanliness.

The Effect of Social Dynamics and Gender at Undergraduate Parties on Alcohol Consumption
Undergraduate Presenters: Cecelia Lentz '18, Psychology and Spanish; Tessa Kamp '18, Social Work and Psychology; Taylor Baker '18, Psychology; Desirae Coleman '18, Psychology and Management and Leadership
Mentors: Dr. Amy Bacon, Psychology

Ostracism is a social stressor that could affect alcohol consumption in college students. Few studies have examined effects of ostracism on drinking behaviors, each drawing different conclusions (Bacon, Cranford, & Blumenthal, 2015; Bacon & Engerman, under submission; Rabinovitz, 2014). Bacon et al., (2015) found that ostracized women drank less than those who were included. Similarly, another study found that people believed being intoxicated was more socially acceptable for men than women (Visser & McDonnell, 2011). The present study examines combined effects of gender, ostracism, and number of people accompanying the participant to a hypothetical house party on estimated BACs at that party. Participants answered questions regarding their personality, emotions, and behavior at parties including drinking behaviors. Participants then watched a short slideshow depicting one of six house party situations, where the participants are either included or excluded after arriving to the party alone, with one friend, or a group. Next, participants are instructed to pour water representing the amount and type of alcohol they would consume within one hour at the party. Estimated BAC is then calculated based on participant's weight and drink consumption estimation. Data was collected using introductory psychology students at a medium-sized private university in the midwest; those who reported drinking in the last year ($n = 243$) are included in analyses. Our sample was primarily individuals under age 21 (90.1%), Caucasian (80.6%), and female (74.2%). A 2 (inclusion vs. exclusion) x 2 (male vs female) x 3 (attending alone, with one person, or a group) ANOVA was conducted. There was a marginally significant main effect for group ($F(2,183) = 2.801$, $p = 0.06$, $\eta\eta2 = 0.03$), being that there was a significant difference in eBAC between arriving alone ($M = .07$, $SE = .01$) and arriving with one person ($M =.04$, $SE = .01$) as well as between arriving with one person ($M =.04$, $SE = .01$) and arriving with a group ($M = .06$, $SD = .01$). There were no significant main effects or interactions related to gender or inclusion and exclusion. Results indicate that group and ostracism in conjunction may show stronger differences in eBAC than other variables.

Narcissism and Reactions to Interpersonal Transgressions
Undergraduate Presenters: Cecelia Lentz '18, Psychology and Spanish
Mentors: Dr. Anthony Hermann, Psychology

This study examined how narcissism is related to emotional reactions to one's own interpersonal transgressions. 103 participants completed the NPI and either imagined a scenario in which they violated a friend's trust or learned of a friend's personal problems. Participants were more upset with themselves in the transgression condition. Those high in narcissism were less upset with their friend in the transgression condition.

Why so fearless?: An explanation for potential differences in low fear in Factor 1 and Factor 2 psychopathy
Undergraduate Presenters: Danielle Lewis '17, Psychology and Criminal Justice; Jesus Ibarra '19, Psychology
Mentors: Dr. Lane Beckes, Psychology

The relationship between psychopathy and fear is one of confusion and contradiction. This study aimed to clarify how factors of psychopathy relate to low fear. Past studies have used different measures of psychopathy, different measures of fear, and different samples, all of which may be leading to the mixed results. Participants were put through a threat of shock paradigm and completed a psychopathy scale, in order to examine how different factors of psychopathy relate to fear response. We used two physiological measures to assess level of arousal as it relates to fear. Participants also completed self-report arousal scales in order for us to examine awareness of arousal and fear as an exploratory aspect of this study. We hypothesized varying levels of fear response dependent on which factor participants' personalities fell under.

The effects of elevated serotonin on antipredation behavior in sexually dimorphic stalk-eyed flies (Teleopsis dalmanni)

Graduate Presenters: Nadia Lovko '17, Biology
Mentors: Dr. Jaime Grace, Biology

The outcomes of aggressive interactions have demonstrable fitness consequences. For example, aggression levels affect survival rates during encounters with predators and determine access to resources and mating opportunities through intraspecific competition. Despite the fitness implications of aggression, much is still unknown about the underlying mechanisms. The biogenic amine serotonin has been implicated in modulating aggression and has been shown to influence intrasexual competitions. This project uses the stalk-eyed fly (Teleopsis dalmanni) to quantify the effects of elevated serotonin on insect aggression when facing a generalist predator. The effects of elevated serotonin levels on antipredation behavior and individual survival will be evaluated using forced proximity experiments with jumping spiders (Phiddipus johnsoni). Furthermore, quantitative PCR will be used to measure gene expression of the different serotonin subreceptors found in the insect brain to learn more about the relative roles of specific receptors in modulating aggressive behavior. The objectives of this project are to (1) systematically measure the baseline aggression levels in male and female stalk-eyed flies in a predator-prey interaction, (2) measure the aggression levels in male and female stalk-eyed flies in a predator-prey interaction when serotonin levels are elevated, (3) measure the expression of serotonin and serotonin receptors in the flies following interactions to ensure serotonin levels are being altered by the treatment and to see which receptors are being affected, (4) examine the relationship between elevated serotonin levels and survival in both males and females, (5) examine how elevated serotonin influences behavioral transition frequencies in males and females, and (6) examine how the effects of elevated serotonin differ between males and females.

This project was made possible in part through support from the BU Special Emphasis Fund and the BU Department of Biology.

Characterization of a double deletion mutant of Fusarium verticillioides lacking two putative trehalose-6-phosphate phosphatase genes

Undergraduate Presenters: Brandon McFarlin '17, Biochemistry; Paige Pierson '18, Biochemistry
Mentors: Dr. Kristi McQuade, Chemistry and Biochemistry

Fusarium verticillioides is a fungal pathogen known for its ability to infect corn crops via the production of fumonisins, a family of mycotoxins linked to diseases in both humans and livestock. In understanding the pathogenicity of this species, it is pertinent to understand the homeostatic mechanisms employed. Our goal is to characterize the role of the disaccharide trehalose in growth and stress response of F. verticillioides. Trehalose synthesis in fungi occurs via two steps, the first catalyzed by trehalose-6-phosphate synthase (TPS), and the second by trehalose-6-phosphate phosphatase (TPP). Previously, we found that trehalose synthesis is completely abolished in mutants lacking TPS. We report here that mutant strains lacking either one (ΔTPS2) or both (ΔTPS2/ΔTPS3) of the putative TPP genes in F. verticillioides retain the ability to produce trehalose, albeit at reduced levels. Additionally, the metabolic effects of osmotic and thermal stress, as well as morphological effects of cell wall perturbation stressors on these mutants are under investigation.

Winner of the College of Liberal Arts and Sciences Undergraduate Award in the Natural Sciences

The effects of commercial and native arbuscular mycorrhizal fungi on growth and production of *Echinacea purpurea* (Purple Cone Flower)
Undergraduate Undergraduate Presenters: Andie Miller '17, Environmental Science and Religious Studies
Mentors: Dr. Sherri Morris, Biology

The expansive diversity of North American prairies has lead to the development of extremely nutrient rich soils beneath them. Now more than 99% of prairie land, which once dominated North America, is used for agricultural practices. Many initiatives are focused on restoring prairie systems to ensure the stability of vital biotic communities. Restoration of native prairie requires restoring belowground communities, particularly mycorrhizal communities. To achieve this goal and speed restoration, private companies are now selling arbuscular mycorrhizal fungi (AMF) inoculum for use in prairie restoration efforts to help ensure a quick and productive restoration. Little research has been conducted to support that commercial inoculum does improve growth in native prairie plants, and many are concerned about the effects of introducing commercially inoculated species to a native area. In this study Echinacea purpurea was grown in greenhouse in native soils, soil of a prairie restored with commercial inoculum, and soils prepared with two commercial AMF products (products: AMF120 and Mykos; produced by Reforestation Technologies International). Understanding the effects of commercial products is of both ecologic and economic concern; the introduction of commercially produced organisms into a native ecosystem could result in exotic invasion and other adverse effects. Additionally, many private landowners use mycorrhizal products in an attempt to increase yield in both prairie and crop systems, and understanding the effectiveness of these products is of great interest to many people outside of academia.

Kama (Desire) in Hinduism: Root of Evil or Source of Liberation?
Undergraduate Presenters: Cody Mitzelfelt '17, Creative Writing, Literary Studies and Religious Studies
Mentors: Dr. Daniel Getz, Religious Studies

The Hindu tradition has consistently viewed kama (desire) as a negative force that constitutes the ultimate source of one's sinful actions. In observing kama's significance as a human goal compared to the other Hindu ways of artha (worldly success) or dharma (societal duty) on the path to one's moksha [liberation] from reincarnation, kama was initially identified as a legitimate and necessary objective within human life. However, as witnessed within the just cited passage from the Bhagavad Gita, the concept of kama came to take on a primarily sinister connotation within mainline Hindu tradition. This project will consider the development of the concept of kama in the ritual texts of the Rig Veda, the mythic narratives on Shiva in the Puranas, the discourses of the Kamasutra, and the sayings of various sages. It will argue that kama as well as its associated sexual activities as a whole should not be viewed as inherently negative but as a dualistic force that is both destructive and creative. With this in mind, kama will be shown to be analogic to the Hindu metaphor of fire that connotes the totality of Shiva's functions within the universe. Such an approach would allow kama to serve as legitimate a path as any other within Hinduism leading to the attainment of moksha.

Investigating the cellular and molecular response of the zebra mussel, Dreissena polymorpha, to chronic cold exposure and its implications on thermal tolerance
Graduate Presenters: Deanna Musaitif '17, Biology
Mentors: Dr. Jennifer Jost, Biology

For sessile ectotherms, environmental temperature fluctuations are unavoidable and often deleterious, resulting in reduced performance or survival. Little is known about thermal physiology on a cellular level in the invasive zebra mussel, Dreissena polymorpha, and most work has been on high temperatures, even though mussels spend months exposed to cold temperatures. Recent work showed significant increases in AMP-activated protein kinase (AMPK), a stress protein, during cold exposure. Since AMPK activity reflects changes in metabolic processes, these results suggest cold increases energy demands. However, the underlying physiological mechanisms are unclear. One explanation is that seasonal thermal acclimation to cold is stressful. Alternatively, cold exposure may cause cellular damage, increasing energy necessary for repair. To investigate this response, mussels were acclimated to either 10 or 26°C for two weeks and conditions were maintained for four weeks. Results show that total antioxidant capacity and hemolymph osmolarity did not vary with treatment, suggesting 10°C did not elicit oxidative stress or reduce osmoregulation. Change in dry tissue mass varied significantly with 10°C mussels losing mass while those at 26°C gained tissue. Western blotting will be used to measure AMPK activity levels, HSP70, and HSP22 to determine if cellular damage is occurring.

Factors Influencing Young Children's Curiosity in a Children's Museum Setting
Undergraduate Presenters: Amanda Nobis '17, Psychology and Religious Studies
Mentors: Dr. Derek Montgomery, Psychology

Curiosity is often the driving force behind the learning process; however, schools sometimes dampen natural curiosity more than draw it out. As such, informal settings like museums provide an excellent space to elicit children's innate curiosity. There are two methods museums might use to do so: using Wh questions by way of signs and presenting children with an exhibit that contradicts their expectations. While they both may elicit some levels of curiosity, it was hypothesized that the latter draws out a more comprehensive level of curiosity as defined by multiple measures of exploratory behavior. Results showed that the two methods were not significantly different from each other, though they followed the general anticipated trend of evoking curiosity.

Exploring the Role of Trehalose-6-phosphate Synthase in Oxidation and Desiccation Stress Tolerance of Fusarium verticillioides
Graduate Presenters: Nicole Oberlie '18, Biochemistry
Undergraduate Presenters: Sarah McMillan '19, Biochemistry, Psychology and Neuroscience
Mentors: Dr. Kristi McQuade, Chemistry and Biochemistry

Fusarium verticillioides is a pathogenic filamentous fungus that primarily affects maize. We are exploring stress response mechanisms in F. verticillioides, particularly the role of the disaccharide trehalose. Trehalose-6-phosphate synthase, coded for by the tps1 gene, catalyzes the first of two steps in trehalose synthesis. Past work in our lab indicated that an F. verticillioides Δtps1 mutant produces no trehalose and has reduced pathogenicity against maize. We report here that the Δtps1 mutant is sensitive to both oxidative and desiccation stress, suggesting a role for trehalose in stress tolerance. To determine if the stress sensitivity observed in this strain is due to the absence of trehalose or to the lack of some secondary function of the enzyme itself, we are exploring stress response and sensitivity of a deletion mutant complemented with a gene encoding a form of the enzyme expected to be catalytically inactive.

Women's Status in The Code of Manu
Undergraduate Presenters: Erin O'Brien '18, Community Wellness, Health and Religious Studies
Mentors: Dr. Daniel Getz, Religious Studies

The Code of Manu is an ancient religious and moral code of laws that dates back to 200 BC. It exerted influence in the formation of Hindu society and culture through history and is still used today to guide the spiritual and everyday lives of millions of Hindus across India. From a contemporary Western perspective, however, this text promotes controversial positions, particularly with regard to a woman's role in the home and society. In multiple sections pertaining to women, The Code of Manu evokes several recurring themes: women are to obey and honor the males in their lives and are to be taken care of through all stages of their life by their father, husband, or sons. In addition to that, there is a strong emphasis on the female's duties and on social boundaries that she should not overstep. In some sense, The Laws of Manu seems restricting on female freedoms while simultaneously stressing that women should be cared for because of their vulnerability and fragility. This brings up two interesting thoughts: are women to be carefully watched over and protected because of their crucial role in society and because they bring life into the world? Or should they be controlled because they are viewed as impure and as less than equal? This presentation will explore how these two questions might be understood in light of varying interpretations of The Code of Manu throughout history. Furthermore, this analysis will extend to a consideration how these traditional views of gender might be related to the causes underlying recent high profile incidents of assault and harassment of women as well as to the values expressed in the public response to these incidents.

Mughal Empire in India
Undergraduate Presenters: Maura O'Brien '17, Political Science, International Studies and Religious Studies
Mentors: Dr. Daniel Getz, Philosophy and Religious Studies

Islamic religion has been on the Indian subcontinent for over 1000 years. In that time Muslims in interaction with a Hindu majority have played a significant role in shaping Indian culture, society, and politics. Long periods of Muslim-Hindu cooperation have been punctuated by sporadic bursts of inter-communal conflict. Such conflict has become much more pronounced in the contemporary era, particularly in the last several decades. This project seeks to understand the religious, societal, and political causes for eruptions of Hindu-Muslim violence during this period. In particular this presentation will examine the conditions that led to the creation of the Bharata Janata Party (BJP) and its support of Hindu nationalism.

Oxidation Demonstrations Involving Combustion of Iron(II) Sulfate
Undergraduate Presenters: Max Palmer '18, Chemistry and Mathematics; Keri Martinez '18, Chemistry and History
Mentors: Dr. Dean Campbell, Chemistry and Biochemistry

Iron supplement tablets containing iron(II) sulfate heptahydrate can be used as a convenient, household source of small quantities of iron(II) ions that are useful for a variety of chemistry demonstrations. As the tablet is heated, oxygen in the air can oxidize the iron(II) in the tablet to iron(III). The products of the oxidation process often have the characteristic colors of iron(III) oxides and exhibit an increase, followed by a decrease, in magnetic susceptibility. The observed magnetic changes act as an indicator of oxidation. Analyzing these oxidized products with X-ray diffraction confirms that the most magnetic product is maghemite. Heating only iron(II) sulfate heptahydrate in air does not produce maghemite. Instead, hematite is produced. Therefore, other components of the supplement tablet, e.g., cellulose, interact with the iron(II) sulfate to preferentially form maghemite. Support for this hypothesis is found by heating mixtures of starch and iron(II) sulfate, which also produces maghemite.

Stereochemistry of Electrophilic Addition
Undergraduate Presenters: Madeleine Peterson '19, Psychology and Chemistry
Mentors: Dr. Brad Andersh, Chemistry and Biochemistry

We have developed a new experiment for undergraduate organic chemistry laboratories that is based upon previous research in our laboratory. The goal of this new experiment, which utilizes N-bromosuccinimide (NBS) and stilbene, is to help students understand the concepts of chemoselectivity (functional group selectivity) and stereoselectivity (spatial selectivity). When stilbene is used for the reaction, two competing reactions, electrophilic aromatic substitution and electrophilic addition, are possible. Comparison of experimental spectra of the product for this reaction to literature values indicates that electrophilic addition via a halonium ion is the major mechanistic pathway. To help the students understand why there is stereo- and chemoselectivity in this reaction, we are also developing a series of animations. These animations are being created using Spartan® molecular modeling software with goal of helping students better understand through visualization how the electronic and steric factors influence this reaction.

Winner of the College of Liberal Arts and Sciences Graduate Award in Computation and Mathematical Sciences

Innovative Software Systems for Smart Classrooms
Graduate Presenters: Rama Rachakonda '17, Computer Science; Colleen Heinemann '17, Computer Science; Annie Benitha Thomas '18, Computer Science; Durga Benitha Poojitha '18, Computer Science; Srinivas Karri '17, Computer Science
Mentors: Dr. Vladimir Uskov, Computer Science and Information Systems

The overall goal of our research project is to design and develop a framework for Smart Classroom – a new generation of classroom that will provide students with main “smartness” levels such as adapting, sensing, inferring, learning, anticipating and self-organizing. Innovative software systems for Smart Classrooms (SmC) include but are not limited to 1) pre-class learning content development systems for SmC, 2) in-class activities recording systems for SmC, 3) post-class activities’ supporting systems for SmC, 4) Web-based audio- and video-conferencing systems for SmC, 5) collaborative learning systems for SmC, 6) context awareness systems for SmC, 7) smart learning and academic analytics systems for SmC, 8) systems to support Smart Pedagogy, 9) systems for students with disabilities at SmC, and 10) systems for safety and security at SmC. The current phase of this research projects is focused at identification, evaluation, SWOT analysis, installation and/or testing of various types of software systems, equipment and technology to support Smart Classrooms. This paper presents the up-to-date research findings and outcomes about innovative software systems for Smart Classrooms.

MINDt: Medical Imaging Neurological Display of Temperature
Undergraduate Presenters: Ethan Ronne '17, Computer Science - Mobile Computing and Mathematics; Brock Schwartz '17, Computer Science and Management & Leadership; Jackson Babb '17, Computer Science; Anthony Eterno '17, Computer Science; William Packard '17, Computer Science and Mathematics
Mentors: Dr. Yun Wang, Computer Science and Information Systems

Brain temperature has an interactive relationship with brain neuron cell metabolism. Hypothermia treatment has been proven to be effective in reducing brain injury during strokes. Currently, no non-invasive methods exist to take reference temperatures of the brain to regulate hypothermia application. In order to provide a more effective treatment to stroke and head injury patients in the Illinois Neurological Institute, Dr. Wang et al. at the Stroke Center at OSF Saint Francis Medical Center propose a non-invasive MRI thermometry protocol and tool to generate a brain temperature map. MINDt, the proposed tool being developed, is an automated data processing and visualization software written in IDL. It opens and read DICOM files, the raw file format for MRI scans, and generates a temperature map based on equations for relationships between brain data stored in the files and temperature. An intuitive graphical user interface allows users to navigate through multiple brain slices, allowing them to view a map for every brain slice in a full scan. Statistical analysis, image manipulation, and region of interest selection provides the user with detailed information about each temperature map. The tool will support the clinical research and application of the non-invasive MRI thermometry protocol on stroke and head injury patients.

“Am I Enough?” Analysis of How Young Girl's Psychological Health is Affected by Self-Objectifing Commercials
Undergraduate Presenters: Brooke Rudolph '17, Psychology and Women & Gender Studies
Mentors: Dr. Amy Scott, Women and Gender Studies and Dr. Claire Etaugh, Psychology

A literature review and analysis on young girl’s psychological health and the affects that self-objectifying commercials have on them. The analysis will investigate different potential psychological problems that commercials create or enhance and then give possible solutions and tools to use in order to reduce self-objectifying in young girls. The analysis will focus on commercials in which women and role models are self-objectifying and that are airing on television programs that young girls will watch. The main psychological issue that will be discussed is eating disorders, but others will also be present.

Intrusion Detection in Wireless Sensor Networks
Undergraduate Presenters: Kyle Schaub '17, Computer Science; David Reeves '17, Computer Science and Business Administration; Zachary Jozwiak '17, Comptuer Science and Game Design; Ryan Nelson '17, Computer Science; Brian Rodgers '17, Computer Science; Robert Vishneski '17, Computer Science
Mentors: Dr. Yun Wang, Computer Science and Information Systems

A Wireless Sensor Network (WSN) consists of a collection of wireless sensors that collaborate with each other in a distributed way for monitoring, detecting, and collecting data in a wide range of applications. Intruder detection, as an important application in WSNs, utilizes randomly deployed sensors to monitor and detect mobile intruders that are traversing a field of interest. Intruders, equipped with environment learning and detection avoidance capabilities, may utilize different intrusion algorithms while invading a WSN. In this project, we aim to investigate the correlations between different intrusion algorithms and diverse WSN settings under various circumstances. Specifically, we revisited the widely adopted Linear and Random walk algorithms, refined the Follow the Gap, Simultaneous Avoidance, and Go Around algorithms, implemented the Reciprocal Orientation and A* algorithms, and finally compared their performance under various WSN settings. This work will provide insight into WSN deployment and configuration for various intruder detection application circumstances.

Comcierge Comic Recommender
Undergraduate Presenters: Nicholas Scheuer '17, Computer Information Systems; Clay Klinedinst '18, Computer Information Systems; Michael Matteri '17, Computer Science
Mentors: Dr. Young Park, Computer Science and Information Systems

Comcierge - A Webcomics Recommender Application for the Web The sheer volume of entertainment in the modern day is massive, and both finding and choosing a worthwhile piece of media to consume can be a daunting challenge as a result. This is especially true of webcomics, a relatively young medium which faces such difficulties as ephemeral Web hosting, limited or nonexistent marketing resources, and limited reliability in terms of continued updates, among others. To solve this issue, we have developed a Web-based application, named "Comcierge," that recommends webcomics via upon taste approximation heuristics. The heuristics we use depend on content identifiers - "tags" - that both administrators and users apply to comics contained within the Comcierge comics database. These tags are assigned weight values by means of comic ratings, as provided by the users themselves. Said rating-tag values are per-user, and as such do not alter application-wide recommendation behaviour except for cases where similar users' tastes are considered. Through this approach, we are able to take the subjective notions of taste and convert them into something far more objective, quantifiable, and - by extension - calculable. There are some limitations to our application, primarily in that we have limited our scope to only one hundred comics. With three comics recommended per serving, it would not be long before a user exhausted our total offerings, and even sooner when considering only those comics most directly applicable to their tastes. Despite this, we believe that Comcierge and its methods could contribute positively towards the still-burgeoning webcomics market.

Fluorescence Correlation Spectroscopy Studies of Chemical and Physical Properties for Colloidal Ceria Abrasives Used in Chemical-Mechanical Planarization
Undergraduate Presenters: Madison Smith '17, Chemistry and Management & Leadership
Mentors: Dr. Edward Remsen, Chemistry and Biochemistry

Fluorescence Correlation Spectroscopy (FCS) is applied in the characterization of representative ceria abrasives used in Chemical-Mechanical Planarization (CMP) by tagging the ceria via non-covalent adsorption with Rhodamine 110 (R110), a highly fluorescent dye. The kinetics of R110 adsorption on aqueous dispersions of ceria are evaluated for abrasives of differing mean particle diameter. In addition, FCS and dynamic light scattering (DLS) are used to characterize the effect of aging (one year) on the mean particle size of the ceria dispersions. Future studies will include detailed evaluations of the particle size distribution of the ceria dispersions using the Maximum Entropy Method (MEM) of analysis.

Fluorescent Studies on the Interactions between Industry-Relevant Polycations and Anionic Fluorescent Dyes
Undergraduate Presenters: Elijah Sowers '19, Chemistry
Mentors: Dr. Edward Remsen, Chemistry and Biochemistry

Polymers are widely used as materials and/or additives in industrial products. In order to understand how polymers interact with other compounds in a mixture, a model polymer's dye-binding behavior was investigated. This study employed Oregon Green (a xanthene dye) as a spectroscopic probe for characterizing the binding interactions with the cationic polymer, poly(methacryloxyethyltrimethylammonium chloride), commonly known as polyMADQuat. The spectroscopic techniques used in these analyses included static fluorescence emission and visible absorbance. The feasibility of using temperature-dependent, steady-state fluorescence emission spectroscopy as the basis for the determination of dye-polyMADQuat equilibrium binding constants and the related thermodynamic functions, ΔG, ΔS, and ΔH, are discussed.

Non-Linear Quest Generation
Undergraduate Presenters: Alex Stocker '19, Computer Science
Mentors: Dr. Chris Alvin, Computer Science and Information Systems

RPG and games have risen in popularity tremendously over the last 20 years. Elements of role-playing games such as character classes with individualized skills are so popular that game genres are being blended together to form interesting and popular games such as Borderlands (1, 2, and Pre-Sequel), Destiny: The Taken King, etc. With the advent of in-app purchases, this growth continues even with free distributions of games such as Star Trek Online, Neverwinter, etc. What is striking about many of these games is the linearity of quest and quest-lines. In this project, we describe a method for non-linear quest generation for parallel goal attainment while simultaneously supporting dependence among individual activities. We accomplish this goal using a hypergraph-driven technique. We first construct a set of `actions' using basic noun-verb pairings. Given this set of actions, we construct a linearization that captures dependence among the action set. Then, we construct a directed hypergraph which (brings about parallelism of actions in quests). Last, we analyze the particular hypergraph using graph-based characteristics to determine viability of the particular quest.

Smart Learning Analytics Systems for Smart University
Graduate Presenters: Annie Benitha Thomas '18, Computer Science; Venkat Sumnath Guduru '17, Computer Science; Durga Poojtha Bodduluri '18, Computer Science
Mentors: Dr. Vladimir Uskov, Computer Science and Information Systems

In 2012, the national average for full-time students at 4-year degree-granting institutions was 59 percent. Universities should work on their retention rate of students graduating and hence Smart Learning Analytics can overcome this challenge. The research involves a Course-level project which is 1) developing a framework that would enable students to check their performance and highlight the areas where attention is required. 2) Check the status of where he stands in the class (Peer-peer-review) 3) Predict the performance of the student by using predictive analysis, and keep the student well informed, so that he could prepare well. 3) Access to Educators to check the status of his students in the class, and their performance. 4) Access to Admin to check the performance of each department. This would give a detailed analysis of the students and would help students achieve better and help the university at its retention rate. This research paper gives us a detailed view of Smart Learning Analytics systems, its features and its use to Smart Universities.

Patterns of gene expression of wingless and defective proventriculus in three genera of stalk-eyed flies (Diopsidae) exhibiting varying levels of sexual dimorphism
Undergraduate Presenters: Melissa Uhl '17, Biology and Sociology
Mentors: Dr. Jaime Grace, Biology

Sexual dimorphism is prominent within the animal kingdom, with many examples of armaments and ornaments used to fight for or attract members of the opposite sex. This type of sexual dimorphism is commonly seen in males of the species wielding exaggerated traits that are selected for by females. This sexual selection drives the evolution of increasing sexual dimorphism within a species. The family Diopsidae contains many species of stalk-eyed fly, which hold a range of sexual dimorphism patterns in regards to length of eyestalks. Some species are monomorphic by which females and males appear identical, and other species are extremely dimorphic with males possessing eyestalks greater than the length of their body. The evolutionary origin of these patterns of monomorphism and dimorphism are disputed among the scientific community. Two genes, wingless and defective proventriculus, are thought to be involved in head development in these flies. This study seeks to discover if the expression of these genes correlate with eyestalk length in three species of stalk-eyed flies with varying levels of dimorphism. Quantitative polymerase chain reaction methods will be used to determine gene expression levels within the head tissue of male and female adult Spyracephela beccari, Teleopsis dalmanni, and Diasemopsis meigenii. A correlation of gene expression levels and eyestalk length would suggest a mechanism for the evolution of dimorphism in stalk eyed flies and involvement of these genes in eyestalk development.

This project was made possible in part through support from the Bjorklund fund and the BU Department of Biology.

Stress and Social Support
Undergraduate Presenters: Emily Unruh '18, Psychology and Neuroscience; Anthony Le '17, Psychology and Electrical Engineering; Casey Grage '17,Psychology; Lauren Jones '18, Psychology; Clara Philips '18, Psychology and Chemistry; Emily Brewer '18, Psychology and Chemistry; Dallas Garrison '17, Psychology and Neuroscience
Mentors: Dr. Lane Beckes, Psychology

We evaluated physiological response to threat during physical contact within a new relationship. Participants went through a haunted house with a confederate, who is either responsive by locking arms, or unresponsive and looking at their phone. The participant then underwent a shock threat procedure, where red X's indicated a 12% chance of shock, and blue O's indicated safety. We measured skin conductance in response to threat while alone or in contact with the confederate. Contact with responsive confederates is expected to reduce threat arousal.

The Impact of Environmental Enrichment in a Rat Model of PTSD
Undergraduate Presenters: Emily Walsh '17, Psychology and Neuroscience; Amber Garrison '17, Psychology and Neuroscience; Elizabeth Wright '18, Psychology and Neuroscience
Mentors: Dr. Timothy Koeltzow, Psychology

Post-traumatic stress disorder (PTSD) during adolescence represents an important diagnostic consideration, with prevalence rates, symptom severity and duration that differ significantly from adults (Merikangas et al., 2010). A modified version of the Single Prolonged Stress (SPS) model has been previously validated and was used in this study (Garrison et al., 2015). Environmental enrichment (EE) has been shown promote behaviors opposite of those produced by SPS (see Simpson & Kelly, 2011). The present study exposed adolescent Sprague-Dawley rats to the modified SPS procedure or to sham conditions. Behavioral testing was executed two weeks post-SPS induction to quantify responses to novelty and anxiety behavior. For four weeks, half the subjects were subjected to EE, after which all rats were subjected to another round of testing. In addition, because substance use disorders are frequently comorbid with PTSD, rats were subsequently tested for the locomotor response to cocaine (15 mg/kg). It was hypothesized that EE would rescue the behavioral consequences of SPS, as well as the response to cocaine, due to its effect on dopamine transmission. The results indicate that EE may be capable of rescuing effects of SPS in certain environments, and that EE does not decrease SPS-induced hyperactivity in response to cocaine.

This project was made possible in part through support from the Psychology Honors Program, the LAS Research and Artistry Fellowship, the O'Grady Grant and the Psi Chi Summer Research grant. Tremendous thanks to the college of Liberal Arts and Sciences and the Psychology Department for their support of this project.

Winners of the College of Liberal Arts and Sciences Undergraduate Award in Computation and Mathematical Sciences

A Curve Interpretation and Rule Based Program for CAT Loaders and Haulers
Undergraduate Presenters: Matthew Weiss '17, Computer Science and Management & Leadership; Jeremy Carter '17, Computer Science and Math; Whittaker Gramly '17, Computer Science; Aidan Kennell '17, Computer Science
Mentors: Dr. Steven Dolins, Computer Science and Information Systems; Sanat Talmaki, Caterpillar, Inc.

Current techniques for collecting data on civil engineering job sites need improvement. Them main technique for collecting data is having operators manually keep track of how many loads they have dumped or how many trucks they have loaded. This technique has a limitation because the operators may not accurately keep track of the data. The goal of this project is to have software analyze job site data, from an excavator or truck, and be able to determine statistics, such as how many buckets of material an excavator has dug up or how many loads a truck has dumped in a specific time frame. We developed software to analyze sensor data and then used simple rule based programming to identify loader and hauler activities. In the future, automating the identification of these activities in the data can then be used to determine the efficiency of operators and trucks at worksites.

Winner of the College of Liberal Arts and Sciences Graduate Award in the Natural Sciences

The Synthesis and Analysis of 3-Oxo-Delta Lactone Derivatives
Graduate Presenters: Danielle Wentzel '17, Chemistry;
Undergraduate Presenters: John Kuhns '18, Chemistry
Mentors: Dr. Brad Andersh, Chemistry and Biochemistry

Gamma-carbon-alkylation of a β-dicarbonyl compound is most commonly accomplished by trapping the preformed dianion of a β-dicarbonyl compound with an electrophile such as an aldehyde. Traditionally, highly reactive bases such as lithium diisopropylamide, sodium hydride, and n-butyl lithium have been used for this transformation. We have found that equilibrating bases such as carbonates and alkoxides can be used in place of these strong bases for gamma-carbon-alkylation resulting in the formation of δ-lactones from β-ketoesters. This discovery provides a simple and greener alternative for performing regioselective alkylations of β-dicarbonyl compounds. Results from β-ketoesters substituent studies and attempts to isolate side-products will be presented.

Winner of the College of Liberal Arts and Sciences Award in the Humanities

The Evolution of the National Identity of the Islamic State
Undergraduate Presenters: Andrea Winn '17, International Studies and Political Science
Mentors: Dr. Charles Bukowski, International Studies

The Islamic State (IS) is a terrorist organization which claimed territory in Iraq and Syria with the primary objective of creating an Islamic state. Its extreme methods of violence have resulted in the deaths of many people in different countries. The IS has the potential to destabilize the region and ensue chaos. This research design examines the evolution of its identity in three timelines: (1) the creation of the Islamic State of Iraq in 2006 to the re-branding as the Islamic State of Iraq and Syria in April 2013, (2) the re-branding of its name to the proclamation of the self-appointed Caliphate in June 2014, and (3) the proclamation of the Caliphate to the leak of the Islamic State Manual for state creation in December 2015. The hypothesis is: as the Islamic State achieves more objectives and becomes larger, its identity becomes more encompassing. The data includes attacks, territory, speeches, and released/leaked documents. The data demonstrates that, as the IS achieved its objectives, it became more inclusive and focused on state creation. Because the organization is a new phenomenon, understanding how its identity has emerged/evolved might assist in understanding this organization and others, to better plan for the future.

Tetrahymena Ageing and Senescence
Undergraduate Presenters: Tamie Yost '18, Medical Lab Science and Anthropology
Mentors: Dr. Naomi Stover, Biology

Cellular senescence is a consequence of ageing in most types of cells. Recent studies in yeast have shown that senescence involves the activation of transposons and an increase in chromosomal lesions. Ciliates like Tetrahymena undergo senescence as well, as cells lose their ability to mate after several hundred generations. It has been hypothesized that the loss of chromosomes in their macronucleus contributes to this phenomenon. However, in light of the new studies in yeast, we are looking to rule out chromosomal abnormalities such as lesions as a reason for senescence. This long term study requires us to standardize optimal mating conditions so we can determine when cells lose this ability. In this experiment, we have observed mating preferences for seven strains of Tetrahymena, corresponding to each of the seven mating types in this species. This allows us to rule out background problems, allowing future research to focus on internal cellular reasons for senescence.

The role of AbrB phosphorylation as a secondary signal for expression of aphA during the formation of bioflims in Bacillus subtillis
Undergraduate Presenters: Joelie Zwick '17, Biology and Chemistry
Mentors: Dr. Melinda Faulkner, Biology

In order to survive in harsh environmental conditions, bacteria must be able to protect themselves. Because bacteria live in the presence of oxygen, they can come in to contact with reactive oxygen species, which can damage DNA and proteins and cause cell death. In order to provide protection, bacteria make peroxide detoxifying enzymes that enzymatically attack these reactive oxygen species. Nine different potential enzymes have been identified in B. subtilis, and it is possible that each may help to protect the cells during different phases of growth. One of these enzymes, alkylhydroperoxide reductase (AhpA) is the focus of this study. Previously, we have shown that cells of B. subtilis do not use AhpA during exponential growth or stationary phase. However, AhpA is expressed in biofilms. The regulatory protein responsible for controlling the expression of ahpA is AbrB. However, it is still not clear why ahpA is expressed in biofilms of B. subtilis but not in stationary phase. It is possible that one of three kinases (PrkC) that controls phosphorylation of abrB is the additional signal needed for the expression of ahpA in biofilms. Our objective is to determine the secondary signal that is necessary for expression of ahpA during the process of biofilm formation.

The Caterpillar College of Engineering and Technology

Winner of the Caterpillar College of Engineering and Technology Graduate Award in Mechanical Engineering

The effects of roughness on the principal components of friction at the micro- to nanoscales
Graduate Presenters: Omer Ahmed '17, Mechanical Engineering and Design
Mentors: Dr. Shannon Timpe, Mechanical Engineering

Contact between surfaces occurs on multi and single asperity interactions. The phenomenological details of these interactions govern the highly scale-dependant interfacial properties such as friction. In the current research, the static friction of polycrystalline silicon is investigated on the multi and single asperity scales. In order to provide surface property gradients, surfaces were exposed to a chemical etchant known to affect the micro- and nanoscales differently. Experiments on the multi asperity scale were conducted on a microelectromechanical tribometer, while the single asperity scale experiments were conducted using atomic force microscopy. The effect of surface roughness on the force of adhesion at the multi asperity scale shows an inversely proportional relationship due to the increase of surface separation as roughness increases. At the single asperity scale, the roughness process resulted in polishing of the substrate reducing the single asperity adhesion force. This divergence in trends from multi to single asperity scale occurs at the grain size. At both the multi and single asperity scales, the static coefficient of friction exhibits a nonlinear dependence on the external normal force. The mechanism of friction on the multi asperity scale is dominated by the effect of the adhesion force and not asperity interlocking. However, at the single asperity scale, the surface modification procedure led to smaller contact area, resulting in a contact pressure that approached yield values. This results in a vanishingly small friction force for the rougher surface. Results are interpreted in light of the factors dominating the interfacial properties and the phenomenological shifts between the micro- and nanoscales.

This project was made possible in part through support from the Illinois Space Grant Consortium and the Bradley University Special Emphasis Program.

Electrokinectic transport of microorganisms in subsurface environments
Graduate Presenters: Mohammed Ali '17, Civil Engineering
Mentors: Dr. Krishnanand Maillacheruvu, Civil Engineering and Construction

Bioremediation is a technical term to describe a family of waste treatment/management techniques that involve the use of microorganisms to remove or neutralize pollutants from a contaminated site. Electrokinetics-enhanced bioremediation is a novel technique to transport microorganisms and nutrients under low-strength electric fields to the site of contamination below the ground surface. This in-situ technique eliminates the need for expensive excavation and other ex-situ methods and provides an approach to have minimum disturbance to the surface while treating subsurface contaminants. The goal of the research will be to determine how effectively bacteria are transported by Electrokinetics in aerobic and anaerobic condition and to determine how effectively these bacteria remove the contaminants in the soil. This research will utilize a hazardous waste medium, resembling the contaminated soils found in industrial areas. A mathematical model has been developed to stimulate the migration of micro-organisms under the effect of electric current. The transport rate of microorganisms under different electric field strengths for sand will be measured and recorded. Contaminants (PAHs) will be analyzed using the UV-Vis Spectrophotometer to assure that the break down process is effective. Results from this research will be used to verify and validate the one-dimensional mathematical model presented in an earlier section of this abstract. A goal of this research is to develop a predictive tool for modeling the Electrokinetic transport of microorganisms in sand and the subsequent removal (break down) of contaminants present in such soil matrices at brownfields and hazardous waste sites.

Time-frequency analysis of surface electromyography signal from resting lumbar myofascial tissue
Graduate Presenters: Suhail Altaib '17, Mechanical Engineering
Mentors: Dr. Kalyani Nair, Mechanical Engineering Dr. Yufeng Lu, Electrical and Computer Engineering

Ankylosing spondylitis (AS) is a rheumatological disorder that often develops in early adolescence and intensively damages spinal mobility. Human resting myofascial tone (HRMT) is defined as the stiffness of resting muscle that helps maintains posture and is integral to movement and resistive activities. Our preliminary studies indicate that excessive axial (lumbar) myofascial tonicity/stiffness occurs in patients with established diagnoses of AS. Our research analyzed the passive resting stiffness of lower lumbar extensor myofascia in young subjects as well as the surface electromyography (sEMG). Our study aims to apply signal processing techniques to analyze the sEMG signals which can better correlate their variations with HRMT in normal vs. AS subjects. Various signal processing algorithms have been utilized in biomedical signals. Nevertheless, it remains challenging to analyze the sEMG signal due to the nonstationary nature of sEMG signal and the strong interference of Electrocardiography (ECG) in the recorded data. In this project, empirical mode decomposition is applied to extract intrinsic mode functions from the recorded data, subsequently the dominant echoes associated with ECG are eliminated. To facilitate our data analysis, Short-time Fourier transform, commonly used for non-stationary signal analysis, is applied to show the signal residue in a joint time-frequency domain.

Winner of the Caterpillar College of Engineering and Technology Undergraduate Award in Mechanical Engineering

Optimization of Polycaproiactone-Collagen Nanofiber Scaffolds for Tissue Regeneration Utilizing Autologous Adult Stem Cells
Undergraduate Presenters: Jack Blank '19, Mechanical Engineering and Biology; Jonathan Tiessen '18, Biology and Chemistry; Jaclyn Conway '19, Biology
Mentors: Dr. Craig Cady, Biology; Dr. Kalyani Nair, Mechanical Engineering

Integration of autologous stem cells into scaffolds for tissue regeneration has become an increasingly relevant topic in clinical settings. Efforts have been made to find suitable scaffolds for clinical use that aid in the proliferation and eventual differentiation of these adult autologous stem cells. Electrospinning of the biocompatible polymer polycaprolactone and collagen, a structural protein found in connective tissues, has allowed for the fabrication of a hybrid extracellular matrix that can implement autologous stem cells. Fabrication and prediction of the mechanical characteristics associated with differing degrees of the polymer and protein concentration in these scaffolds can allow for successful and repeatable stem cell proliferation and eventual differentiation. SEM, AFM, tensile testing, and degradation testing were all done in order to characterize the varying properties of the scaffolds as collagen concentrations were increased in different scaffolds. These mechanical properties were then utilized to construct a novel finite element model to predict the macroscale mechanical properties of future PCL-collagen nanofiber matrices. Proliferation and integration of the stem cells into the fibers was confirmed through fluorescence microscopy and done in order to relate this growth to the mechanical properties of different nanofiber scaffolds. These scaffolds and their characterization show promise for making highly repeatable and optimized nanofiber scaffolds for use in regenerative medicine.

Winner of the Caterpillar College of Engineering and Technology Undergraduate Award in Electrical and Computer Engineering

Experimental Validation of Distributed Algorithms Using Kilobots
Presenters: Anthony Birge '18, Electrical Engineering
Mentors: Dr. Jing Wang, Electrical and Computer Engineering

Recent years have seen a significant progress in the study of distributed algorithms for multi-agent systems due to their potential applications in decentralized environment monitoring, power systems coordination, optimal deployment of sensor networks, et.al. Fundamentally, the distributed algorithm relies on simple control design and local information exchange among agents. The objective of this project is to further validate the effectiveness of distributed algorithms through experimental implementation on a large set of Kilobots. A Kilobot is a tiny and affordable robot which has an infrared sensor for communication with its peers. The robot maneuver is done through sending control signals to two vibration motors. In the experiments, a number of classical consensus algorithms were programmed and tested. An overhead controller was used to wirelessly deploy the control algorithms to all robots at the same time. Through communication among neighboring Kilobots, the behaviors of synchronization and orbiting as well as distant-based signal transmission have been tested. In addition, a leader-follow line movement control has also been implemented. Those experimental results provide a useful guideline for future real applications of distributed algorithms.

Microwave Transistor Modeling Measurements
Graduate Presenters: Vivek Vardhan Bonangi '17, Wireless Communications and Robotics
Mentors: Dr. Prasad N. Shastry, Electrical and Computer Engineering

This project involves the development of a user interface to automate the measurements of DC I/V characteristics of a microwave transistor using the Keysight Visual Engineering Environment Programming (VEE Pro) software as a platform. The drain to source current (Ids) versus drain to source voltage (Vds) as a function of gate to source voltage (Vgs) of a microwave FET (Field Effect Transistor) are measured using the VEE program. The S-parameters of the FET are measured using the wafer probe station connected to a Network Analyzer in the advanced microwave engineering laboratory. The measured Sparameters and DC I/V characteristics of the FET are compared to the data predicted by the FET model implemented in the Computer-Aid-Design (CAD) tool Advanced Design System (ADS).

Experimental Investigation of Nanofluid Thermal Conductivity
Undergraduate Presenters: Michael Castelluccio '18, Mechanical Engineering; Chris Golden '17, Mechanical Engineering
Mentors: Dr. Saied Vafai, Mechanical Engineering

The focus of this research is to experimentally investigate the effects of temperature, base liquid, concentration and characteristics of nanoparticles such as shape, size, and material on the thermal conductivity of the nanofluid. It is necessary to optimize the characteristics of the mixture of the base liquid and nanoparticles to obtain the most promising nanofluid with highest thermal conductivity. Thermal conductivity improvement has a significant role on enhancement of forced convection heat transfer in the nano scale.

Design of Improvements for the Bradley University Simulation Labs
Presenters: Jackson Cavett '17, Mechanical Engineering; Zach Aldinger '17, Mechanical Engineering; Dustin Vilcek '17, Mechanical Engineering; Jon Weber '17, Mechanical Engineering, Management & Leadership and Entrepreneurship; Lacy Majors '17, Mechanical Engineering
Mentors: Dr. Jacqueline Henderson, Mechanical Engineering; Dr. Janet Jackson and Dr. Amy Grugan, Nursing

The Bradley University Nursing Department stated a need for designs and solutions capable of improving the fidelity of their simulation labs to give nursing students vital experience in a nursing setting before they begin their clinicals. This interdisciplinary project involved three parts: creating programmable thermometers, reducing the inhibitory compressor noise during simulations, and, finally, designing a clubbed finger model for the mannequin. Currently, a temperature is taped over the thermometer screen and changes can only be seen on a monitor. The newly designed thermometers use a phone app to communicate with the handheld thermometers and can be used by simply typing in the temperature they would like to display To combat the disruptive noise which has rendered the headwall useless, a system was developed which moved the compressors out of the Adult Simulation Lab through the wall, and allowed the headwall to be used in the same manner as before. The final element of the project involved designing a removable model to show the distinct characteristics of clubbed fingers. Originally, a picture was placed on top of the mannequin's hands; however, now the realistic model will point students toward potential underlying causes of the condition.

Distributed Vision-Based Target Tracking Control using Multiple Robots
Undergraduate Presenters: Ryan Clue '17, Electrical and Computer Engineering; Anthony Le '17, Electrical and Computer Engineering
Mentors: Dr. Jing Wang and Dr. In Soo Ahn, Electrical and Computer Engineering

In this project, a distributed vision-based control system is designed for multiple mobile robots to address the target tracking problem while maintaining the specified formation among robots. The system mainly consists of two modules. One is for target identification and the other is for target tracking and formation control. In the target identification module, the robot is controlled to pivot around its center and perform the survey of the environment using its on-board vision sensor. Specifically, an image is acquired every 15 degree and processed based on the use of image thresholding and blob detection techniques. Once the target is detected, the coordinates of its centroid are then taken as the input to the target tracking and formation control module. The switching between two modules is coordinated through a state flow mechanism. A leader-follower control strategy is further adopted to solve the formation control problem of multiple robots. The proposed distributed vision-based control is experimentally tested using three QBot2s from Quanser, Inc. The QBot2 is a standard two-wheel differential drive mobile robot and operates using a host-target structure. The Kinect RGBD camera on the QBot2 is used to detect the target, a yellow ball in the experiments. The overall system is programmed using MATLAB/Simulink on the host computer, which is further integrated with QUARC for the real-time interface with the target computers on the robots. The experiment results validated the proposed design.

CAT Diesel Particulate Filter Project
Undergraduate Presenters: Samantha Dando '17, Mechanical Engineering; Kyle Wexell '17, Mechanical Engineering; Anjian Chen '17, Mechanical Engineering; Alex Rambke '17, Mechanical Engineering
Mentors: Dr. Richard Johnson and Dr. Julie Reyer, Mechanical Engineering; Scott Sells, CAT Dealer Service Tools

In a serviceable diesel particulate filter (DPF), when the engine malfunctions and causes an overload of particulate matter to be delivered to the filter, the system is cleaned by an outside source. Some clean emissions modules (CEM) have been recreated to be "built for life", meaning the module lasts the life of the engine. Due to this, there is no service port on the CEM, and no process or tooling kit readily available to clean the C7.1 DPF through the CEM encasement when the filter is overloaded. The current options for customers are to purchase a new CEM (cost of $10,000), bearing the risk of it overloading again, or using a different machine to complete their work. The project objective was to design a service process that will clean the C7.1 DPF within the C7.1 module encasement using the CAT portable DPF cleaner. The main deliverables included cleaning attachments that will allow the CAT DPF cleaner to be applied to the C7.1 model, reseal lids to close the two service access ports, and a service manual of the updated process. As a stretch goal, the team was asked to design a formulated service process for the non-serviceable C9.3 DPF-DOC model.

This project was made possible in part through support from the BU Caterpillar College of Engineering ME Senior Project Program and the CAT Dealer Service Tools Engineering department.

EMG-Based Human Machine Interface System
Undergraduate Presenters: Thomas DiProva '17, Electrical and Computer Engineering; Jon Moron '17, Electrical Engineering; John Cochrane '17, Electrical and Computer Engineering
Mentors: Dr. Yufeng Lu and Dr. In Soo Ahn, Electrical and Computer Engineering

Electromyogram (EMG) signals are generated by muscles when activated by the nervous system which generates electric potential. These signals then cause contraction of the muscle and cause the body to move. These EMG signals can be read through the use of surface EMG electrodes (sEMG) to assess the muscle use by reading the signals from the skin above the desired muscle. EMG signals can be useful for developing systems that can help the disabled. This assistance can be performed through the development of prosthetics. The medical field has benefited from intensive research in EMG signal analysis in the past couple decades, which has improved the ability of living for those with psychomotor skill disabilities. This project aims to develop an EMG-based human machine interface system for in home assistance, especially for disabled people. A wearable Wi-Fi sensor board is used to record sEMG signals and send out wireless control commands. A wheeled robot is controlled wirelessly and equipped with feedback vision system. The video monitoring system assists the user for navigation of the robot. The system has potential applications in improving the quality of life for those with physical disabilities.

Case study of a landslide model with a shear band propagation using unsaturated soil parameters
Graduate Presenters: Vijaya Ananda Jessie Elepe '17, Civil Engineering
Mentors: Dr. Sihyun Kim, Civil Engineering and Construction

Most analyses on translational landslides use a traditional infinite slope theory. However, its simplicity hinders accounting for essential field observations; for example, the size of landslide, the slide velocity, and the matric suction of the soil, are not adequately reflected in the infinite slope model. In this regard, we applied our model, which was initially developed for the submarine condition, to see if it can properly simulate subaerial cases as well. The model considers landslide as a dynamic process of shear band propagation at a failure surface. Consequently, first, dynamic fracture mechanics is employed to describe the dynamic features of landslide process such as the landslide failure size and the initial slide velocity. Secondly, unsaturated soil parameters are used to demonstrate the impact of subaerial moisture condition on strength and stiffness of the sediment. A case of translational, subaerial landslide is revisited in this study: Seattle landslide (2006, Washington State). This is selected based on available field observations (i.e., soil strength, soil type, slide geometry, matric suction measurement, and sliding velocity). The model successfully reproduces the observed characteristics of the landslide with reasonable assumptions. Therefore, our model has a potential to simulate subaerial cases properly as well as the submarine ones.

Effect of pH on Green Tea Catechin Adsorption onto Protein Functionalized Surfaces
Graduate Presenters: Mohammed Elmakki '17, Mechanical Engineering
Mentors: Dr. Shannon Timpe, Mechanical Engineering

A Quartz crystal microbalance (QCM) was used to estimate the adsorbed mass of catechins from crude green tea and pure (-)-Epigallocatechin Gallate (EGCG) solutions onto bovine serum bovine albumin (BSA) functionalized surface at different pH levels. The Sauerbrey equation was used to estimate the adsorbed mass from the measured change in natural frequency of resonating gold crystals. Three pH levels were chosen - one at the BSA isolelectric point (4.9), one slightly more acidic, and one slightly more basic. The highest adsorbed mass was found to be at the isoelectric point followed by pH below pI, while pH above pI resulted in the lowest adsorbed mass. The lower adsorbed mass at pH level below the isoelectric point can be attributed to the disassembling of the hydrophobic binding pockets of the BSA protein located in subdomain III. The reduction in adsorbed mass above the isoelectric point is due to the instability and degradation of green tea catechins at pH levels above 5. Both crude and pure solutions showed the same trends regarding the effect of pH on the adsorbed mass. However, catechin adsorption from crude extract solutions displayed a higher magnitude of adsorbed mass at each pH level, indicating that green tea catechins, other than dominant EGCG, are also binding to BSA at other binding sites on the protein.

Vision Based Autonomous Control of a Quadcopter
Undergraduate Presenters: Zach Engstrom '17, Electrical Engineering; Caleb Gill '17, Electrical and Computer Engineering and Business Administration; Zack Woods '17, Electrical Engineering and Business Administration; Jeff Deeds '17, Electrical and Computer Engineering and Business Administration
Mentors: Dr. Yufeng Lu, Dr. Jing Wang, Dr. In Soo Ahn, Electrical and Computer Engineering

A useful application of Unmanned Aerial Vehicles (UAVs) is to sense and locate persons during an emergency. Imagine using UAVs to locate a hiker lost in the mountains or to spot people isolated in a dangerous area. The real-time video feed and accurate location information from a fleet of UAVs is invaluable for decision makers to efficiently distribute resources and dispatch rescue workers. In this project, an autonomous vision-based control system for a quadcopter is designed to execute a mission plan using a vision system. Our system includes a Raspberry Pi 3, an onboard embedded system that communicates with the Pixhawk, an onboard autopilot. The Raspberry Pi and the Pixhawk are physically connected and communicate through serial communication via DroneKit-Python, which is a Python Application Programming Interface (API) that utilizes the MavLink protocol. The Raspberry Pi executes a video processing algorithm to locate a target, in this case an AprilTag, a type of two-dimensional bar code. The mission plan of the quadcopter is to autonomously take off to a specified altitude, fly to a waypoint with a predefined GPS coordinate, locate the target displayed by an AprilTag, position itself over the target, and land near the target. If the target is not detected or the UAV cannot position itself within tolerance, the UAV returns to the takeoff point.

Visualization of Soil Boring Logs
Undergraduate Presenters: Sanaa Fidahussain '17; Computer Science; Jacob Gruener '17, Computer Science; Austin McKeever '17, Computer Science; Dustin Moore '17, Computer Science; Joseph Sorgea '17, Computer Science
Mentors: Dr. Steven Dolins, Computer Science and Information Systems; Dr. Pelin Gultekin and Dr. Sihyun Kim, Civil Engineering and Construction

Many civil engineering problems can be challenging when soil composition and water levels are unknown or logged wrong. To help combat these difficulties, we developed an application that will allow engineers and construction workers to visualize soil boring logs in 3D space. By using this application, engineers and workers will be able to see soil composition, water levels, soil layers, latitudes and longitudes, and soil types in measured detail for any section of land in the Peoria area that has been bored. The application will approximate these values for lands not yet bored into or that are physically located in between the soil boring logs. A “Map View” will allow a user to look at a map and locate/search for specific soil boring logs, and they can select and transfer them to a “Model View” to see the model and details of the logs selected. Excavated soil volume, number of excavators needed and their bucket size, the cost of renting said excavators, and travel times of moving soil from location to location will be computed. Soil boring log data is difficult to analyze, but with the help of this novel application, civil engineers and construction workers will be able to visualize their work environment and to determine what steps they need to take to complete their project in an efficient and cost-effective manner.

Winner of the Caterpillar College of Engineering and Technology Undergraduate Award in Civil Engineering and Construction

Assessment of Landslide Susceptibility using a Catastrophic Failure Model
Undergraduate Presenters: Brian Fiedler '17, Construction Management
Mentors: Dr. Sihyun Kim, Civil Engineering and Construction

The pre-demonstrated landslide model with dynamic fracture propagation (catastrophic failure) is capable of describing the observed landslide parameters much more practically when compared to the more traditional infinite slope model. For example, the catastrophic failure model can predict the landslide size and velocity that the traditional model cannot. However, most of landslide hazard maps are still either based on the traditional model or a purely stochastic approach. This preliminary study suggests a framework to design and construct a landslide susceptibility map based on the catastrophic failure model. This study utilizes the unsaturated soil properties and rainfall intensity collected from the previous studies but replaces the traditional infinite slope model with the catastrophic failure one. Monte-Carlo simulations were conducted with both models to estimate the landslide susceptibility of the studied area, and reveal that the catastrophic failure model indicates a higher susceptibility of rainfall-induced landslide.

Theoretical Investigation of Nanofluids Thermal Conductivity
Undergraduate Presenters: Chris Golden '17, Mechanical Engineering; Michael Castelluccio '18, Mechanical Engineering
Mentors: Dr. Saeid Vafaei, Mechanical Engineering

The purpose of this research is to: review the existing theoretical models on the thermal conductivity of nanofluids, and understand and review the effects of the concentration and characteristics of nanoparticles on thermal conductivity of nanofluids. This research also attempts to show how base liquid material, characteristics of nanoparticles such as shape, size, material, coating, and possibly the surfactants will affect the thermal conductivity of nanofluids. Formulate the highest nanofluid thermal conductivity by modifying the concentrations and characteristics of nanoparticles, base liquids and possible surfactants. Compare the existing theoretical models by using existing experimental data. Investigate the level of accuracy of existing theoretical models, using existing experimental data. Suggest the best theoretical models for given conditions and characteristics of the nanofluids.

Winner of the 2017 Distinguished Graduate Scholarship Award

Develop Fuzzy Logic Based Model to Predict Carbon Fiber/Polypropylene Hybrid Composite's Shrinkage
Graduate Presenters: Guan Gong '17, Manufacturing Engineering
Mentors: Dr. Joseph Chen, Industrial and Manufacturing Engineering and Technology

This paper proposes a fuzzy logic based model that can predict the Carbon Fiber (CF)/Polypropylene (PP) hybrid composite's shrinkage in the injection molding process. Five factors, wt% of CF, injection speed, packing pressure, packing time, and melt temperature, were chosen to conduct design of experiment (DOE). Based on the Taguchi and Analysis of variance (ANOVA) methods, wt% of CF, injection speed, and melt temperature, were found as top 3 rank that have significant effect on the shrinkage values. Therefore, these three parameters were used as the input variables of the model, while the shrinkage was the only one output variable. Membership functions and rule bank were constructed based on both the experiences and experimental data. The results predicted by the model showed more than 99% accuracy compared to both experiment data and validation testing data. So, this model is capable of predicting CF/PP hybrid composite's shrinkage when wt% of CF, injection speed, and melt temperature are decided.

Winner of the President's Award - Graduate

Pavement Roughness Prediction using Neural Network Modeling
Graduate Presenters: Leela Sai Praveen Gopisetti '17, Civil Engineering
Mentors: Dr. Mohammad Hossain, Civil Engineering and Construction

Road pavements become rough due to exposed distresses such as cracks in the pavements. Pavement distresses are caused by climatic conditions such as moisture, as well as mechanical conditions such as traffic load. International Roughness Index (IRI) is the indicator of pavement roughness. The goal of this study is to predict the pavement roughness using Artificial Neural Network (ANN) Modeling. The ANN model will be useful for transportation agencies to predict IRI for pavements without measuring distresses from the field. For this study, climatic and traffic data are collected from the Long-Term Pavement Performance (LTPP) database from wet freeze, wet no freeze, dry freeze and dry no freeze climatic zones. The ANN model is trained using 50% of climatic, traffic, and IRI data and then rest 50% climatic and traffic data is used to validate the model by comparing predicted and measured IRI. The trained model and the validated model are compared by calculating Root Mean Square Error (RMSE). A 7-9-9-1 ANN model using Hyperbolic Tangent Sigmoid transfer function generated the best prediction model. The best network is employed for ten flexible and ten rigid pavements located in four climatic zones. Promising results are achieved while comparing predicted and measured IRI values.

Navigation and Mapping of Indoor Autonomous Robots using Customized RFID Trilateration
Undergraduate Presenters: Erik Guetz '19, Electrical and Computer Engineering; Jon Jellison '19, Electrical and Computer Engineering; Morgan Fields '19, Electrical Engineering; Jacob Phillips '19, Electrical Engineering
Mentors: Dr. Suruz Miah, Electrical and Computer Engineering

The main problems of mobile robots that are usually addressed in the literature to date are localization, motion control, mapping, and path planning. The navigation task of mobile robots is performed by addressing the former two problems. Navigating mobile robots in indoor environments using open hardware/software architecture is still among the main challenges in the field of robotics. Despite the fact that many indoor mobile robots are commercially available in the market, however, the cost to implement a simple navigation task using such robots is often more costly than the robot itself. Here, we propose an open hardware/software architecture for navigating a mobile robot in an indoor environment using cost--effective off-the-shelf components available in the market. The robot is supposed to localize itself using radio frequency signals received from radio transceivers placed in the robot's operating space. It then simply navigates through a set of 2D points using a tool of computation intelligence to mimic much like an indoor delivery robot, for example. The performance is expected to be demonstrated in an indoor laboratory setting using a differential-drive mobile robot.

BU ME 3rd World/Solar Fruit Dryer
Undergraduate Presenters: Austin Hanse '17, Mechanical Engineering; Jacob Martini '17, Mechanical Engineering; Brandon McCormick '17, Mechanical Engineering and Business Administration; Colton Wojnowski '17,Mechanical Engineering
Mentors: Dr. David Zietlow, Mechanical Engineering

The Solar Food Dryer Project provides information and knowledge directly impacting efforts to provide an effective solution to help low-income farmers reduce food spoilage. Specifically, this project will work towards reducing food waste in Thailand. Students participating in this research project will gain hands on experience in areas such as budgeting and project planning, data collection and analysis, as well as the engineering design process. Involved students will also develop an indepth understanding of key engineering principles. Small sized farmers in Thailand are losing 60% of their crops due to a lack of preservation techniques resulting in wasted food, time, and resources. The purpose of this project was to work with Education Concerns for Haiti Organizations (ECHO) to research and implement a realistic, repeatable, and reliable Solar Food Dryer design. Our team consists of 8 senior level engineers that are well equipped in design and optimization principles. Further, our advising professor is Dr. David Zietlow who is helping to steer our design in the right direction. A previous prototype will be used as a baseline as the research team will increase the thermal storage (in order to continue drying throughout the night) and decrease drying time. A market analysis is also being conducted to determine how our Solar Food Dryer will affect the market. The EES models are completed and will assist in designing the new prototype after the experimental results are gathered. The prototype will be improved and tested until the end of the 2017 Spring Semester.

Quantifying Neck Flexion in Children While Using Smart Phone and Tablet
Graduate Presenters: Daksha Haridas '17, Manufacturing Engineering; George Kuria Vineeth '17, Manufacturing Engineering
Mentors: Dr. Regina Pope-Ford, Industrial and Manufacturing Engineering and Technology

The advancement of technology has made it possible to access information anytime, through mobile technology such as smart phones and tablets. These devices are used on a daily basis, especially by children, for leisure activities as well as for gaining knowledge. This study emphasizes the physical means used by children while using the mobile technology, which often results in a prolonged state of static posture. The focus is on children 10 to 12 years of age. Six participants were observed. Data is collected using a goniometer for measuring the neck flexion and a measuring tape for holding distance. A smart phone and a tablet are used for the study.

Intelligent Open-Source Range-Only Mapping and Navigation for Mobile Robots
Undergraduate Presenters: Kyle Hevrdejs '17, Electrical and Computer Engineering; Jacob Knoll '17, Electrical and Computer Engineering
Mentors: Dr. Suruz Miah, Electrical and Computer Engineering

Navigation (localization and motion control) of a mobile robot while mapping the operating environment remains a significant challenge to date. In previous works, the simultaneous localization and mapping (SLAM) problem for mobile robots has been addressed without taking into account the robot's motion control or by using expensive hardware. However, motion control strategies are well-established, but they either (i) rely on sophisticated hardware, (ii) assume noise-free environments, or (iii) are validated using computer simulations only. The current work solves the mobile robot navigation and mapping issues by using range-only measurements from a network of radio sources. The hardware platform used in this work is cost-effective and easy-to-implement, addressing the aforementioned issues in developing motion control strategies. Here, the robot first estimates its pose (position and orientation) and builds a map of its operating environment using radio frequency (RF) signals received from radio sources. The robot then navigates through a path defined by a set of waypoints on the ground using a motion control and computational intelligence strategy, acting much like an indoor delivery robot. This proposed robot navigation and mapping scheme is tested in an indoor laboratory environment and its performance is compared with a computer simulation.

Winner of the Caterpillar College of Engineering and Technology Graduate Award in Electrical and Computer Engineering

A Multiagent Reinforcement Learning Control Approach to Environment Exploration
Graduate Presenters: Mohammad Imtiaz '17, Electrical Engineering
Mentors: Dr. Jing Wang, Electrical and Computer Engineering

Reinforcement learning (RL) is an area of machine learning and a branch of artificial intelligence (AI). In RL agents freely interact with environment and learn through trial and error with reward and punishment provided by the environment where agents exist. The method is inspired by behaviorist psychology, and similar to how living beings learn by trial and error. An important aspect of RL is that agents aim to maximize end cumulative reward not immediate reward. This is a very important feature as it allows RL to be applied to complex problems where immediate results are very different to final end outcomes. For example, individual moves in a business deal could incur loss, but an overall strategy over time could result in net gain. Such complex problems are well suited to RL. Most RL studies deal with single agent acting in an environment; here we deal with a more efficient paradigm where multiple agents act and cooperate in the environment to maximize the final outcome. A multiagent reinforcement leaning (MARL) can be very effective in finding solutions to complex problems.

Winner of the Caterpillar College of Engineering and Construction Undergraduate Award in Industrial and Manufacturing Engineering and Technology

Bacteriophage Viruses used as Antibiotics
Presenters: Tyler Kauffman '19, Manufacturing Engineering and Business Leadership & Management; Anna Hanson '18, Nursing
Mentors: Dr. Kalyani Nair, Mechanical Engineering

Background: Bacteriophages are viruses that are specialized at targeting specific bacteria's. Bacteriophages are utilized in Eastern countries before WWII to compensate antibiotics during wartime. After the war, Eastern countries like USSR continued research on bacteriophages while Western countries like USA continued using antibiotics. With antibiotics becoming obsolete to some forms of bacteria, scientists are looking at new ways to combat the impending epidemic. Western counties have 50+ years of research and development of bacteriophages, but they are not always willing to work with Eastern countries. The objective of this study was to review literature over bacteriophages and overview the effects of them as antibiotics. Also numerical analysis was carried out to better understand their behavior for applications in future bacteria treatment of diseases. Methods: Most of the articles are based in Western countries like Georgia. Dzata was collected from various articles and reference papers that quantified and analyzed the infection times and forces required for infection. The articles were examples of applications of bacteriophage treatment that is currently being utilized. Finite analysis was performed to quantify the biomechanical behavior of bacteriophages. Results: According to the data examining the efficiency of diminishing bacterial populations through bacteriophage use, cost analysis compared to antibiotic treatment, as well as the bacteriophage strength necessary for infection, and finite element analysis indicated that bacteriophage treatment should be investigated further for use in the United States as a supplement to antibiotics. Conclusion: Bacteriophages are good at specific infections of one strain of bacteria. They are not as effective at attacking various forms of bacteria on a common infection, but they are more efficient at one specific type of bacteria. Bacteriophages have the possibility of replacing antibiotics in specific infections.

Flow in Concentric Helical Pipes
Graduate Presenters: John Kennedy '17, Mechanical Engineering
Mentors: Dr. Ahmad Fakheri, Mechanical Engineering

In this study, coil diameters, aspect ratio and fluid properties are varied in order to understand the factors influencing friction factor and heat transfer in concentric helical pipes. Simulations are performed using the open source software OpenFOAM. The Geometry is created using Creo, then imported and meshed using a standard mesher (Ansys Workbench), and then imported into OpenFOAM and numerical solutions are obtained. An experimental investigation is also conducted and compared with the numerical studies. In this study, we examine extending the concept of modified friction factor that uses the geometric mean of the coil diameter and tube hydraulic diameter as the relevant scale for friction factor, to concentric helical pipes. Using this scale, the modified friction factor becomes only a function of Dean number, and the effects of the other two parameters, the coil diameter and the ratio of the inner to outer diameters appear to be wrapped into the new scaling and individually seem to have minimal impact on the modified friction factor.

IEEE SouthEastCon 2017 Hardware Competition Robot
Presenters: Kendall Knapp '17, Electrical and Computer Engineering; Cameron McSweeney '17, Electrical and Computer Engineering; Brian Roskuszka '17, Electrical and Computer Engineering; Daniel Hofstetter '17, Electrical and Computer Engineering
Mentors: Dr. Jing Wang, Dr. In Soo Ahn, Dr. Yufeng Lu, Electrical and Computer Engineering

The 2017 IEEE SouthEastCon Student Hardware Competition requires participants to build a robot that autonomously navigates through a Star Wars themed arena. The robot dimensions are constrained by a 12-inch cube. It must complete four tasks within four minutes. In Task 1, the robot must approach a stage with six copper pads on it. Five of the pads are connected to five different electronic components and the sixth is common to all of the components. The robot must determine the position of each of the components. In Task 2, the robot must detect the magnetic field present in the arena when it is turned on. The robot must strike a lightsaber when the magnetic field is on. In Task 3, the robot must turn a knob in alternating directions governed by the component position code determined in Task 1. In Task 4, the robot must deposit up to three Nerf darts into a hole on the far side of the arena. Based on those competition guidelines, our robot was constructed with four modules to perform four tasks. Two microcontrollers were programmed for the basic functions of robot navigation, components measurements, magnetic field detection, servo motor control for the gripper and swing arm, and dart firing. The robot is equipped with infrared sensors, ultrasonic distance sensors, contact sensors, and wheel encoders for navigation. Each module was implemented individually and all were integrated on a robotic platform. The robot was thoroughly tested to ensure it would meet the requirements of the IEEE SouthEastCon Hardware Challenge.

An Electrical Engineering Perspective of the Human Heart
Presenters: Nicholas Krol '17, Electrical Engineering
Mentors: Dr. In Soo Ahn and Mohammad Imtiaz, Electrical and Computer Engineering

This research project looks at aspects of human biology from an electrical engineering perspective. The goal of this project is to help medical professionals gain a better understanding of the human heart and to simulate cardiac interactions with specific drugs and irregularities based on patient specific data. The first phase of this project uses the empirical research of the Hodgkin-Huxley mathematical model which explains the ionic mechanisms underlying the initiation and propagation of action potentials in a cell. By defining a cell as an electrical system, it is possible to simulate how action potentials in cardiomyocytes send action potentials to stimulate heart contractions. The final phase of this project is to simulate a 2D sheet of cardiac muscle cells under different conductions, such as drug interactins and physical defects within part of the heart.

2D Time-averaging Infrad Spectrometer
Presenters: Brent Leinonen '17, Electrical Engineering
Mentors: Dr. Aleksander Malinowski, Electrical and Computer Engineering; Dr. Luke Haverhals, Chemistry and Biochemistry

An Infrared Spectrometer is an instrument mainly used by chemists to allow the identification of chemical bonds within molecules and some ionic materials. Many types of chemical bonds absorb unique sets of frequencies of the infrared light. One can use that knowledge to determine when there is a certain bond (and therefore a certain type of molecule) in the researched material. The main drawback of standard infrared spectrometers is that the instruments are configured to only allow the interrogation of a relatively small portion of the material (i.e., the average spectroscopy within a relatively narrow region of interest). Here, we detail the development of an infrared spectrometer that enables much larger two-dimensional areas to be interrogated ‘pixel by pixel’. This allows much more sophisticated analyses of various types of materials to be performed.

Mechanical characterization and investigation of correlation between Rockwell Hardness and Tensile strength of PLA-Carbon fiber composite from injection molding process
Graduate Presenters: Muralidhar Reddy Lingam '17, Manufacturing Engineering
Mentors: Dr. Gangjian Guo, Industrial and Manfuacturing Engineering and Technology

Polylactic acid (PLA) is a biodegradable plastic material derived from renewable sources. Commercial grade PLA is available to replace conventional plastics that are derived from nonrenewable petroleum reserves. Studies were conducted on PLA composites to enhance the application of bioplastic material. Carbon fiber (CF) reinforced PLA is suitable for various structural application but the current fabrication techniques for CF reinforced composites is not well suited for mass production. This paper will investigate the mechanical properties of PLA-CF composite produced in direct injection molding process that is suitable for mass production. A correlation between tensile strength and material hardness at different fiber loading levels are determined. Also, the effect of fiber loading on surface quality is shown.

Enhancement of Heat Transfer Coefficient by Introducing Nanofluids
Graduate Presenters: Andrew Maki '18, Mechanical Engineering
Mentors: Dr. Saeid Vafaei, Mechanical Engineering

As the demand for miniaturized and more powerful heat exchangers are needed for microscale devices, research on heat transfer properties of nanofluids have become more prevalent in achieving a more compact design. In this research, the heat transfer coefficient was analyzed over nondimentional length and Reynolds number to maximize the heat transfer coefficient for given conditions. An experimental setup is being built to conduct single phase flow heat transfer in circular microchannels with inner diameters of 50μm, 100μm, and 200μm. The purpose of this experiment is to understand the effects of flow regime, characteristics of channels, base liquid, surfactant, concentration and characteristics of nanoparticles on heat transfer coefficient and critical heat flux.

Winner of the Office of Sponsored Programs Graduate Award for Multidisciplinary Integration

Cost benefit analysis; A comparison analysis of two companies.
Graduate Presenters: Aaqib Ashraf Mohammed '17, Mechanical Engineering
Mentors: Dr. Regina Pope-Ford, Industrial and Manufacturing Engineering and Technology

This is a conceptualized study that provides an opportunity to understand the basic fundamentals of engineering cost analysis. Economic hardship and volatile market conditions have caused many industries to struggle to remain profitable as well as competitive in the world market. In order to maintain stability and growth, a few economic factors should be emphasized. The economic concepts of engineering decisions including techniques of obtaining cost data, cost allocation and product costing, break even analysis, before and after tax analyses, depreciation, inflation, financial analysis and investment analysis are studied. An example that considers the economic factors is shown. This study benefits the owners, investors or individuals who want to invest in an organization or run a firm but are unaware of the economic factors, financial conditions or market conditions.

Internet of Things Smart Calendar
Graduate Presenters: Jason Morris '17, Electrical Engineering; Cole Lindeman '17, Electrical Engineering and Computer Science
Mentors: Dr. Aleksander Malinowski, Electrical and Computer Engineering
Many university professors like to post their schedule and office hours right outside their door so that students know when they can find them. Unfortunately, sudden changes to a professor's agenda can make it hard to keep that schedule up to date. The Internet of Things Smart Calendar seeks to offer an easy solution. The Internet of Things Smart Calendar is a device that interfaces with Google Calendar and keeps an updated display of the professor's Google Calendar. It provides the service of displaying a professor's office hours, advertisements, announcements, and other relevant information that the professor would like the students to know about. "By the time I got back from printing my new calendar, it was already out of date." - Dr. Aleksander Malinowski.

Passive RF Energy Harvester at 5.8 GHz
Undergraduate Presenters: Mitchell Pericak '17, Electrical Engineering
Mentors: Dr. Brian Huggins and Dr. Prasad Shastry, Electrical and Computer Engineering

RF to DC Converter (Rectifier) is the most important component in a wireless power transfer system. This rectifier will harvest Radio Frequency (RF) energy at 5.8 GHz and convert that power into a DC voltage. It utilizes two diodes capacitors, an inductor, and a charge pump. This passive system will have a SMA connector to connect a receiving antenna.

A Literature Review on Permeable Pavement Materials and Mix Design, and Hydrological Analysis
Undergraduate Presenters: Alaina Pluhar-Schaeffer '18, Civil Engineering; Brian Ivancich '17, Construction Management and Business Management
Mentors: Dr. Mohammad Imran Hossain, Civil Engineering and Construction

Permeable pavement is a type of asphalt concrete pavement that allows for drainage to occur without or with minimal runoff. Permeable pavement design is becoming increasingly popular because of its positive environmental impacts such as reducing runoff from the road and walkways, eliminates water retention and storm water systems that result in a reduction in water treatment plants. In this study, a literature review is done to understand the design of permeable pavements regarding layers of pavements used to drain and retain water, materials' specifications required to design the pavement layers, and other physical and mechanical properties of the materials utilized in the pavement. It was observed that very few states in the USA are currently using permeable pavements and the use is limited to low-volume local roads or parking structures. A hydrological analysis is also done to understand the permeability of different layers. The hydrological design is done considering storm intensity around Peoria, and the structural design is considered according to the pavement layers' information available in the literature. It has been observed that the second layer of the pavement plays a significant role in draining water from pavement rather than the first layer of the pavement.

Analysis of Force Applied on Dentists while Performing Dental Procedures.
Graduate Presenters: Himanshu Prasad '17, Industrial Engineering; Anantha Padmanapan Narasimhan '17, Industrial Engineering
Mentors: Dr. Regina Pope-Ford, Industrial and Manufacturing Engineering and Technology

The traditional activities of dentists during dental procedures make them vulnerable to operate in postures which produce enormous loads in the cervicothoracic junction. The static postures held while performing dental tasks increase the risks of developing cumulative trauma disorders. This study investigates the internal musculoskeletal forces at the cervicothoracic junction by assuming a linear three dimensional model generated isometrically through creo software. To formulate the results, motion analysis is used to collect data of neck positions. Data were collected from 12 dentists each performing eight trials of cavity preparation. This study could help in the diagnosis and treatment of C7-T1 degenerative disc disease, herniation, osteo-arthritis, forminal stenosis and spinal-stenosis with myelopathy. The results from these studies could help biomechanical engineers and surgeons develop complex cervical disc implants and other instruments.

Wireless Client Localization
Graduate Presenters: Nicholas Pratt '17, Electrical Engineering and Religious Studies; Michael Stanczyk '17, Electrical Engineering; Nathan Ruetten '17, Electrical Engineering and Business Administration
Mentors: Dr. Aleksander Malinowski, Electrical and Computer Engineering
Many organizations, including Panduit, currently utilize various types of wireless sensors for many applications such as temperature and pressure measurements throughout an environment. It can be advantageous to know the physical location of these wireless sensors. Conventional location determination systems, such as the Global Positioning System (GPS), cannot be used in certain environments and a different solution is needed. In some cases, sensor locations can be manually assigned and fixed. However, for deploying a great number of sensors, it would be easier to have this location be determined automatically and allow the sensors to be moved through a closed environment. Our research focuses on designing a location determination system using IEEE 802.11 Wi-Fi to determine the location of a sensor with an accuracy of 1 meter or less in two-dimensional or three-dimensional space.

Planar Ultra Wideband Bi-Conical Antenna
Graduate Presenters: Pumichat Raksaphaen '17, Electrical Engineering
Mentors: Dr. Prasad N. Shastry, Electrical and Computer Engineering
In this project, a novel planar ultra-windband(UWB) bi-conical antenna has been designed and analyzed. The antenna geometry will be optimized for best performance over a wind frequency. The antenna will be fabricated and measured. The antenna characteristics obtained from am EM (Electromagnetic) simulator will compared with the measured data. Such an antenna is modeled in ultra-windband or high speed wireless systems.

Bending-Additive-Machining Hybrid Manufacturing of Sheet Metal Structures
Graduate Presenters: Ragha Vendra Kalyan Rapthadu '17, Manufacturing Engineering
Mentors: Dr. Ye Li, Industrial and Manufacturing Engineering and Technology

The ever-increasing industry innovation demands a paradigm of the manufacturing process that is capable of accomplishing multiple tasks on a single component. The majority of structural parts require bending of metal sheets with a high degree of accuracy. In many applications, bent parts with additional features are sought out for various special purposes. Clearly, there is a need calling for the integration of different manufacturing processes to reach a synergistic effect. Traditionally a combination of additive manufacturing and machining is used to alleviate the constraints set forth by machining alone. However, this hybrid approach is still constrained by both the limited cutter accessibility and gravity-imposed deposition direction. This paper presents a new Hybrid Manufacturing configuration by combining bending, deposition and machining processes. The major advantage of this new approach hinges on the deliberate use of bending process by providing additional accessibility that is not available on traditional additive – machining setup. Essentially the accessibility issue is overcome by introducing an intermediate bending step so that both metal deposition and removal can be conducted in the process-required orientation. As bending is part of this new hybrid process, springback is also inherent to this new hybrid manufacturing approach. This research incorporates the consideration of both springback compensation and cold hardening effect in the selection of intermediate bending step. Examples are also provided to show the efficacy of this new hybrid manufacturing approach.

Sustainability Assessment and Benefit-Cost Analysis of Permeable Pavements
Undergraduate Presenters: Anne Riemann '17, Civil Engineering; Sarah Elderzi '18, Civil Engineering
Mentors: Dr. Mohammad Imran Hossain, Civil Engineering and Construction

A permeable layer is placed on top of an Asphalt Concrete (AC) pavement to facilitate pavement runoff. This research is done to assess sustainability regarding calculating pavement runoff and subsequent groundwater recharge from the permeable pavement. The benefit-cost analysis is done considering a reduction in crashes due to reducing the hydroplaning and low accumulation of snow on the permeable pavements in the winter season. The Peoria City is chosen as the model City with approximately 229 miles of highway roads, assuming that the pavements are constructed as permeable pavements. The Santa Barbara Unit Hydrograph (SBUH) method is used to calculate the runoff from the permeable pavements. A 24-hour rainfall depth of 3 inches is chosen based on the 2-year 24-hour rainfall for central Illinois. For the permeable pavements, it is observed that the maximum runoff depth is 0.0162 inches at 7.83 hours which is approximately nine times lower than the conventional AC Pavements. The benefit-cost analysis considers a reduction in accident rate on the pavements in the winter and the monsoon that caused by the slippery pavements and hydroplaning, respectively. The cost of permeable pavement construction is 1.4 times higher than conventional AC Pavements in Peoria City. Though, the benefits calculated from reduce crashes, save human lives, reduce property damage, reduce snowplow operation, and reduce the use of deicing salts proves benefits of constructing permeable pavements. It has been quantified that the benefit-cost ratio of constructing permeable AC pavement is more than ten times higher compared to the conventional AC pavements.

This project was made possible in part through support from the Illinois Asphalt Pavement Association

The Effect of Interfacial Voltage on the Evolution of Surface Properties at Microdevice Contacts Under Dynamic Impact Loading
Undergraduate Presenters: Christopher Roseman '17, Mechanical Engineering
Mentors: Dr. Shannon Timpe, Mechanical Engineering

This study explores the tribological effects of contact-mode microelectromechanical systems under dynamic impact loading. Large surface area to volume ratios on the micro-scale lead to an increased importance of surface properties that can cause device failure. A polycrystalline silicon micro-tribometer was tested by cyclically impacting the contact surfaces. Changes in surface properties were tracked by monitoring the static adhesion through periodic tests. Devices experienced two distinct periods throughout the dynamic lifetime: a run-in phase with little surface modification and a degradation phase with significant surface modification and corresponding increases in the measured adhesion force. In addition, the effect of a potential difference placed across the contacting interface was examined. Different degradation mechanisms were observed for non-interfacial voltage as compared to those devices tested with an interfacial voltage. Non-interfacial voltage tests experienced spatially dominated degradation. Spatial degradation occurs when similar levels of damage severity occur across an increased area. Spatial degradation mechanisms include the breakdown of nano-asperities and the increase of real contact area. Conversely, with a voltage across the contact interface during testing, devices experienced severity dominated degradation. This occurs when similar area sizes experience differing severity of surface damage. Severity dominated degradation occurs in the presence of an interfacial voltage due to the added mechanisms of charge trapping at nano-asperities and additional thermal energy due to electron flow. Results are interpreted in light of the principle mechanisms of mechanical, thermal, and electrical degradation at the contact interface.

Real-time Electrocardiogram Monitoring
Undergraduate Presenters: Edward Sandor '17, Electrical Engineering and Mathematics; Calvin Walden '17, Electrical Engineering; Nicholas Clark '17, Electrical Engineering and Business Administration
Mentors: Dr. In Soo Ahn and Dr. Yufeng Lu, Electrical and Computer Engineering

An arrhythmia is an irregular heartbeat that occurs when the electrical signals controlling the heart's muscular contractions becomes malformed. Patients often wear a Holter monitor at home to collect the electrocardiogram (ECG) data to identify any number of arrhythmia. During a subsequent doctor’s visit, the data is analyzed to diagnose arrhythmia. The project aims to develop a wearable medical device for real-time arrhythmia detection. The device can acquire the ECG data through three-lead sensors with sampling rate 360 Hz. It performs ECG signal processing in real-time and alerts the patient’s doctor of an arrhythmia via wireless messaging. At the current stage of project, premature ventricular contractions (PVCs), a common form of arrhythmia, is being identified. The Pan-Tompkins and wavelet-based Template-Matching algorithms have been implemented for PVC detection. When three or more consecutive PVCs are detected, a short-message-service (SMS) system is activated to alarm a patient’s care provider immediately. In the experimental study, the design has been successfully validated using benchmark records from the MIT-BIH arrhythmia database. Additionally, low-cost digital signal processor and embedded Linux system are used for implementation. This study suggests a viable, low-complexity solution for real-time heart monitoring and arrhythmia detection.

iCoursePlanner: Automated Planning for Ad-Hoc Education Programs using Mobile App
Graduate Presenters: Siavash Tahmatan '18, Industrial Engineering; Sravan Kumar Bhamidimukkula '17, Manufacturing Engineering
Mentors: Dr. John Jung-Woon Yoo, Industrial and Manufacturing Engineering and Technology

Massive Open Online Courses (MOOC) have enabled students with specific goals to design customized education programs, called ad-hoc programs. The goal of the research is to automate the design process of ad-hoc education programs by utilizing an Automated Planning based approach. To facilitate the course planning process in MOOC environment, iCoursePlanner, an Android-based mobile app, is developed. This research focuses on the architecture and implementation details of the mobile app for automated course planning. The case study demonstrates the advantages of the features of iCoursePlanner.

Self-Activating Fall Alarm
Undergraduate Presenters: Maisha Talukder '17, Electrical Engineering and Management & Leadership; William Kelly '17, Electrical Engineering and Entrepreneurship & Innovation; Michael McGrath '17, Electrical Engineering and Entrepreneurship & Innovation
Mentors: Dr. In Soo Ahn, Dr. Jing Wang, and Mohammed Imitiaz, Electrical and Computer Engineering

The self-activating fall alarm is an "invisible" wearable device which clips on to the waist of the user (i.e through belt, waistband, etc.). This device automatically detects falls with the goal of shortening fall response times, which can prevent serious injury. The self-activating fall alarm utilizes a bluetooth module (Bluetooth Mate Gold) directly connected to an Inertial Measurement Unit (IMU) to transmit sensor data to a laptop. The data from the three axis-accelerometers, -gyroscopes and -magnetometers, built-into the IMU, are analyzed by a fall-detection algorithm to determine if a fall has occurred. Once a fall has been detected, the system runs a fall-response algorithm through Matlab, which notifies the user's caregivers and EMT, and reassures the user that help is on the way. The final portion of the algorithm, involves storing the user's data allowing for physicians to analyze and interpret the fall occurrences in order to prevent future falls from happening.

Winner of the Caterpillar College of Engineering and Technology Graduate Award in Industrial and Manufacturing Engineering and Technology

Design of Workplace and Workspace to Meet the Physical Characteristics of the Workers at a Local Printing Company
Graduate Presenters: Chaitanya Tatineni '17, Industrial Engineering; Sri Jagannadh Dwaram '17, Industrial Engineering;
Mentors: Dr. Regina Pope-Ford, Industrial and Manufacturing Engineering and Technology
In industrial workplaces, many workers perform jobs in a standing posture for long periods of time. Standing for long periods of time can lead to discomfort, muscle fatigue, and occupational injuries. This study performed anthropometric measurements on 21 workers at a local printing company. Data measurements were taken for the neck angle at the anatomical posture and the working posture, height, weight and dimensions of the various body regions. The workplace was assessed using the Rapid Upper Limb Assessment (RULA) tool and a survey of the study population. Multiple regression was used to analyze associations between neck angles, height, and weight and work experience. Based upon their work posture and work experience; over the years likely developed a forward neck disorder. Forward neck was identified in the initial stages using the developed regression equation. Based on the major associated risk factors, engineering, administrative controls and OSHA guidelines were proposed to the workplace to minimize work related health problems.

Winner of the Caterpillar College of Engineering and Technology Graduate Award in Civil Engineering and Construction

Analysis of contaminant transport in the low electric flux intensity medium
Graduate Presenters: Chandra mouli Tummala '17, Environmental Engineering
Mentors: Dr. Krishnanand Maillacheruvu, Civil Engineering and Construction

The application of micro-organisms for sub surface treatment has grown in the recent years. Despite of the uncertainties involved, this process yields reliable results in the treatment of contaminated soils and ground water. Modeling of microbial transport has become more complicated by including all the variables even if it has low effect on the process. The impact of these variables is also an important criterion in the modeling process. Degree of influence of different variables on the transportation process is presented in this work. The results prove that parameters relating to electrophoretic mobility and bacterial decay rate had the largest impact on microbial transport under low-strength electric fields.

Altered Biomechanical Properties of the L3-L4 Myofascial Tissue in Ankylosing Spondylitis Patients
Undergraduate Presenters: Allison White '19, Mechanical Engineering with a Biomedical Concentration; Hannah Abbot '19, Mechanical Engineering with a Biomecial Concentration
Mentors: Dr. Kalyani Nair, Mechanical Engineering

Ankylosing spondylitis (AS) is a degenerative rheumatological disorder that mainly affects the spine. It has been reported that different degrees of human resting myofascial tone (HRMT) would affect spinal stability and may predispose to the respective curvature deformities of adolescent idiopathic scoliosis (AIS) and the enthesopathy of ankylosing spondylitis (AS). Although osteoligamentous impacts are prominently recognized in many chronic spine and low back conditions, no research has been performed on the possible role of passive axial (spinal) myofascial tone as a causative factor. In this particular study, the passive muscle properties of the lower lumbar regions of 24 healthy adults and 24 adult AS subjects were examined. Our recent publications examined the stiffness among normal and AS subjects. In this study, those analyses are expanded to include detailed analysis and correlations of all three biomechanical properties of stiffness, tone (frequency) and elasticity (decrement). Analyzed data supports the hypothesis that resting muscle properties of the lower lumbar muscles hold significance in differentiation of human back health between healthy and diseased subjects, but more experimentation should be performed to strengthen this study's results.

An Experimental Investigation into Additive Manufacturing for Use in Pressure Vessel Design
Undergraduate Presenters: Matthew Wurster '17, Mechanical Engineering; Christopher Roseman '17, Mechanical Engineering; Eric Stoll '17, Mechanical Engineering; Corey Stallings '17, Mechanical Engineering
Mentors: Dr. Kelly Roos, Mechanical Engineering

Additive manufacturing techniques, including fused deposition modeling (FDM), are rapidly expanding for use in not only rapid prototyping but also for functional part production. This project explores the material limitations and properties of additive manufactured Polylactic Acid (PLA) and Acrylonitrile Butadiene Styrene (ABS) for use in functional long term pressurized gas storage systems. Inspired by this application, an array of material properties are being explored that include mechanical creep, permeability, and bulk strength properties. A Wanhao Duplicator i3 printer is used to produce all test samples. Findings to date have presented several interesting challenges for future AM design of pressurized parts. Creep rates at 2000psi of applied stress can be rapid and are highly dependent on the printing structure, material, and the orientation of material deposition paths with respect to the applied stress. Inherent interstitial gaps resulting from the FDM process create micro-channels that allow for pressurized gas to traverse through PLA and ABS AM cylinders. Weak layer-to-layer bonding strength is the limiting stress component for cylinders pressurized to failure. Future research and design considerations are discussed in light of these findings.

Molecular Dynamics Study to Understand Contamination of Polycyclic Aromatic Hydrocarbons from Pavements
Graduate Presenters: J P Sasankavalli Yadavalli '17, Civil Engineering
Mentors: Dr. Mohammad Hossain, Civil Engineering and Construction

Polycyclic Aromatic Hydrocarbons (PAHs) are well known for their strong mutagenic and carcinogenic properties. Pavement runoff studies indicate the presence of harmful concentrations of PAHs in soil and water. Asphalt binder which is a mixture of complex organic molecules is the major source of PAHs in the pavement runoff. In this study, Molecular Dynamics (MD) simulation is used to predict the release of PAHs from pavements due to temperature, moisture, and vehicle tire pressure. Naphthalene and Fluoranthene PAHs are individually simulated with asphalt component Asphaltene Phenol. The bond stretching energy loss and the total energy loss comprehends the release of PAHs from the Asphaltene Phenol. At 5% moisture content and no tire pressure, the bond stretching energy loss is 91% for both Naphthalene and Fluoranthene compared to 0% moisture content. While moisture content increases from 0% to 5% and no tire pressure, Naphthalene loses 90% of the total energy, while Fluoranthene loses 88% of total energy. The total energy loss is approximately 85% and 88% for Naphthalene and Fluoranthene, respectively, at 0.68 MPa tire pressure. Results show that PAHs will release from pavements and contaminate soil and water with an increase in moisture content and lower tire pressure.

The Foster College of Business

Protecting your Assets: Results and Recommendations from a Student-led Security Assessment
Undergraduate Presenters: Alexander Alicea '17, Management Information Systems and Management & Leadership; Steven Kellerhals '17, Management Information Systems; Zach Sells '17,Management Information Systems and Management & Leadership; Ethan Supler '18, Management Information Systems, Finance and Management & Leadership; Alex Sutter '17, Computer Information Systems and Management & Leadership; Matthew Weiss '17, Computer Science and Management & Leadership; Maggie Tracy '18 Computer Information Systems and Management and Leadership
Mentors: Dr. Jacob Young, Entrepreneurship, Technology & Law

We will present the most critical vulnerabilities identified during a security assessment for a small business located in the Peoria, Illinois, area. This security assessment was performed over the course of the spring semester of 2017 by a team of undergraduate students as part of an Advanced Ethical Hacking course offered in the Management Information Systems (MIS) program at Bradley University. Discussion of the methods employed, security implications, and remedies for each of the vulnerabilities will be provided.

Testing Capital Asset Pricing Model
Undergraduate Presenters: Zach Evans '18, Finance
Mentors: Dr. Amit Sinha, Finance and Quantitative Methods

The widely used financial theory, capital asset pricing model, is the evaluation of systematic risk and expected rate of return for an asset. I have selected a list of stocks and used their historical data to test this financial model. Finally, I have concluded with my thoughts about this financial model and how it relates to the group of assets that I have selected.

Winner of the Foster College of Business Undergraduate Award in Behavioral Areas

The Development of an Applied Ethical Hacking and Security Assessment Course
Undergraduate Presenters: Samantha Johnson '17, Management Information Systems; Kerstyn Campbell '17, Management Information Systems, Social Media Marketing and Management & Leadership; Angelica Fanti '17, Management Information Systems and Social Media Marketing; Zach Sells '17, Management Information Systems and Management & Leadership; Alex Sutter' 17, Computer Information Systems and Management & Leadership
Mentors: Dr. Jacob Young, Entrepreneurship, Technology & Law

Information security education in higher education has made substantial progress. However, despite advancements in pedagogy and the technology used in the classroom, students often yearn for more applied opportunities. Further, small businesses are likely to have inadequate information security postures due to limited budgets and expertise. In order to address both issues, we have developed and are currently piloting an advanced course in ethical hacking which allows students to perform security assessments for local businesses. This project will assist academics in the implementation of similar courses, which not only improves security education for students, but can also increase opportunities for local businesses to receive affordable security assessments.

Winner of the Foster College of Business Graduate Award in Behavioral Areas

Help! I Need Somebody: Managing Others' Cognitive Dissonance
Graduate Presenters: Jan Kotik '18, Business Administration
Mentors: Dr. Jennifer Robin and Dr. Heidi Baumann, Management and Leadership

Research conducted on cognitive dissonance since Festinger's (1957) introduction of this theory has contributed to many areas of the Organizational Behavior literature. However, despite its importance, little has been investigated regarding whether one can manage others' dissonance and what tactics one can use. Before conducting a full-scale study on this topic, it was first necessary to determine if people can indeed identify significant others who helped them reduce their cognitive dissonance. Thus, I conducted an exploratory study to address this question. The results of this study showed that people can identify such significant others and the tactics used – out of 157 respondents, 92 indicated so. Through content analysis, these 92 responses were divided into six sources of dissonance reduction (e.g., family, friends, leaders). What is more, it was found that there were six basic tactics that were used by the significant others to reduce others' cognitive dissonance (e.g., empathy, coaching, reassurance). Furthermore, the study revealed some demographic trends. Specifically, gender of the respondent was related to choosing one of the six sources of dissonance reduction and particular tactics; age and race were not related to these choices. Implications and future research are discussed.

The Bottom Line and the Environment
Undergraduate Presenters: Jessica Kress '17, Finance, Economics and Decision Analysis
Mentors: Dr. Amit Sinha, Finance and Quantitative Methods

Today's businesses focus on Corporate Social Responsibility much more than in previous years. There is pressure from consumers for businesses to take a stand in their communities and the environment. This paper focuses on when a business takes an environmentally friendly stand, how that in turn affects their finances. Do they see any financial benefits or losses? Looking into this matter, I found that there are many benefits that outweigh the high costs of being environmentally friendly. Companies that are willing to spend more on environmentally friendly practices see higher costs, but tend to see higher sales. In the long run, the higher costs pay for themselves. Ultimately, environmentally friendly practices do not hurt a company's finances.

The Gini Index and Statistical Distributions
Undergraduate Presenters: Jamesina Riendeau '17, Mathematics, Business Studies and Management & Leadership
Mentors: Dr. Michael McAsey, Mathematics

My research focuses on extending research done by Joseph Gastwirth and presented in his paper "Estimation of the Lorenz Curve and Gini Index." The Gini Index is a tool, which uses Lorenz Curves, to measure inequality of resources in a given population. Gastwirth created Lorenz Curve formulas for populations following different statistical distributions. I have computed the Gini Indices for these distributions. Furthermore, I am working towards following Gastwirth's model to create a Lorenz Curve formula for a population with a Beta Distribution.

A Case for Technical Analysis
Undergraduate Presenters: Preston Stary '17, Finance
Mentors: Dr. Amit Sinha, Finance and Quantitative Methods

The purpose of this research report is to provide the reader with a better understanding of technical analysis in the finance field and to make a case that technical analysis can be used to successfully earn positive returns in the stock market. To do this, this report will provide evidence from expert technical analysts as well as some primary sources of information. This project will not disprove the effectiveness of fundamental analysis, but rather provide information in an attempt to prove that although fundamental analysis is a legitimate tool for selecting investments, investors do not always need to consider all of the information that fundamental analysis considers and can actually be quite successful when only considering the information considered within technical analysis. Finally, technical analysis may not be the best option for all investors. Therefore, this report will also discuss why it may not be appropriate for some particular investors.

Winner of the Foster College of Business Award in Quantitative Areas

Alternative Forms of Shareholder Compensation
Undergraduate Presenters: Rachel Teague '17, Finance, Spanish and Management & Leadership
Mentors: Dr. Amit Sinha, Finance and Quantitative Methods

Shareholders are vital to the success and longevity of corporations. After all, the objective of financial executives should be to maximize shareholder wealth, which also entails satisfying their demands and expectations as owners of the company. Needless to say, shareholders expect to be compensated, and there are a variety of ways to accomplish this demand from the perspective of the entity. While there are many diverse options, this paper will focus on two of the most prevalent compensation methods: dividends and share repurchases. These two concepts are the most well-known and commonly used by corporations around the world. This paper will analyze each method, while comparing and contrasting the respective advantages and disadvantages of each. Various studies will be cited in this investigation, and will support the hypothesis of this paper that public firms should consider share repurchases to be the superior method of shareholder compensation, and that if firms have existing dividend payout policies, they should considering replacing those practices with a policy or strategy of share repurchase.

Testing the Momentum Based Asset Pricing Model

Undergraduate Presenters: Alex Weiss '17, Finance
Mentors: Dr. Amit Sinha, Finance and Quantitative Methods

Finding the most optimal portfolio for investing needs is a problem that has plagued the financial services world since its' beginning. That is why investors use models and forecasts to make investing decisions. The moment based asset pricing model is no different. Because it uses different moments in time it allows investors to find the most optimal portfolio based on the different moments. This allows investors to successfully change the percentage of each stock in the portfolio based on the time the decision is being made. I have analyzed this model and successfully identified the most optimal portfolios using the DOW 30 stocks. The moments used were on a yearly basis and I used beta deciles and coskewness deciles to pick out the optimal portfolio. As for every financial model, it has its inaccuracies but through my research, it has proven to be a useful tool for investors.

The College of Education and Health Sciences

Bacterial Contamination of Hand-Cut Produce
Undergraduate Presenters: Jessica Bahling '18, Dietetics; Sara Petty '18, Dietetics; Ashley Fetch '18, Dietetics
Mentors: Dr. Theodore Fleming, Biology

Approximately 46% of the reported cases of foodborne illness that occurred from 1998-2008 could be attributed to fresh produce consumption6. It is likely that a lack of education of consumers about the importance of food safety and safe handling of produce is a major contributor to foodborne illness. Because much food eaten on a regular basis is stored and prepared at home, consumer kitchens can pose a threat to health if food is not handled carefully1. One study noted that, while 81% of participants reported washing produce, risky and/or ineffective techniques were often being used5. Therefore, the purpose of this study was to look at the amount of bacteria transferred from the outside of unwashed potatoes and lemons to the inside of the produce when sliced. Contamination was noted in cut potatoes but not cut lemons. The results of this study can be used to determine the importance of washing fresh produce.

Evaluation of a Meal Planning Worksite Wellness Program
Undergraduate Presenters: Jessica Bahling '18, Dietetics; Sara Petty '18, Dietetics; Erin O'Brien '18, Community Wellness, Health and Religious Studies; Kari Pauli '17, Community Wellness and Health
Mentors: Dr. Teresa Drake, Family and Consumer Sciences

Background: Eating out is a major contribution to American dietary patterns. Food consumed away from the home has been shown to result in an increase in overall body weight (Lin & Guthrie, 2012). Furthermore, fast food and table-service restaurants are often less cost effective than food prepared at home. Meal planning can be used to avoid eating out by creating easy, nutritious meals at home. *Purpose*: The purpose of this study was to evaluate a worksite wellness program about meal planning. Method: Participants were employees of a local non-profit organization. An interactive, 30 minute presentation providing tips for meal planning and goal setting was developed. A pre-/post-test design was used to assess self-efficacy and likelihood of planning meals. *Results*: Results are pending, but scores are expected to increase from the pre- to the post-test.

Winner of the College of Education and Health Sciences Award in Health Sciences

Effects of an Individualized Exercise Program on Physical and Psychosocial Factors in an Individual with Multiple Sclerosis: A Case Study
Graduate Presenters: Hanna Booker '18, Physical Therapy; Patrick Finn '18, Physical Therapy; Lauren Galick '18, Physical Therapy
Mentors: Dr. Melissa Peterson, Physical Therapy and Health Sciences

Study design: Case study **Objective**: Investigate the effects of an 8-week individualized exercise program and 8-week HEP in a 64 YOF with advanced MS. **Background:** Research has found that people with multiple sclerosis (PwMS) may experience improvements in physical and psychosocial factors with individualized exercise programs. Few studies have examined the effects of an individualized exercise program in moderate-severe PwMS. **Methods:** Exercise program consisting of two sessions/week for 8 weeks in clinic followed by an 8 week home exercise program. The program consisted of aerobic, resistance, and balance training. Three qualitative and four quantitative outcome measures (OM) were used for evaluation before, during, and after the exercise program. **Results:** The most meaningful improvements were seen in the Six Minute Walk Test, Berg Balance Scale, Timed Up and Go, and Functional Assessment of Multiple Sclerosis. No clinically significant improvements were observed in the remaining OM. **Conclusion:** Results showed improvements in gait endurance. Psychosocial outcome measure scores did not reveal clinically significant changes. The patient reported improved confidence in ability to perform physical activities and decreased fatigue levels upon completion of the exercise program at end of the first 8-week session, but these were not maintained during the home program.

Cervical Spine Thrust Joint Manipulation, Education, and a Home Exercise Program for Temporomandibular Disorder: A Case Series

Graduate Presenters: Jamie Brown ' 18, Physical Therapy; Grace Gilfillan '18, Physical Therapy
Mentors: Dr. Breanna Reynolds, Physical Therapy and Health Sciences

Background: Temporomandibular disorder (TMD) is the 3rd most common chronic musculoskeletal pain condition. Symptoms include pain in the jaw, head, or neck, restricted motion, and loss of function. While treatment options may be limited, some evidence supports physical therapy (PT) interventions for patients with TMD. The purpose of this case series is to describe the effects of cervical spine thrust joint manipulation (TJM), behavioral modification, and a home exercise program in patients with TMD. Methods: Five participants with TMD were seen for 3 sessions of physical therapy (baseline, 1 and 4 weeks). Pain pressure threshold (PPT), range of motion (ROM), functional scales, and Global Rating of Change (GROC) scores were measured. All participants received atlanto-occipital (OA) and C2-3 cervical spine TJM, behavior modification, and a home exercise program. Results: Three of five participants (60%) reported symptoms at least "moderately better" (≥ 4 GROC). Friedman's related samples test showed statistically significant change for PPT of the right temporalis muscle and right rotation of the cervical spine. Conclusion: While cause and effect relationships cannot be determined, the outcomes from this study indicate the approach may be effective in the TMD population. Future studies should explore larger samples and consider randomized interventions.

Nutrition Knowledge of Student Athletes, Coaches and Conditioning Specialists

Graduate Presenters: Laurel Dix '17, Dietetics; Dan Larson '17, Dietetics; Gerald Ernat '17, Dietetics
Mentors: Dr. Magdalena Sas, Family and Consumer Science

Previous studies have identified limited nutrition knowledge amongst student athletes, and concluded this may reflect a lack of nutrition emphasis from athletic coaches and trainers (Andrews et al, 2016; Torres-McGehee et al. 2012). Nutrition plays an important role in both refueling and allowing the body to recovery appropriately. It is crucial that athletic staff and athletes possess appropriate nutrition knowledge, and have access to nutrition related resources, to help not only enhance athletic performance but also prevent injuries. The purpose of this study is to identify levels of nutrition knowledge present in collegiate and high school student athletes and coaching staff. This study utilized a cross-sectional survey design. Researchers have achieved Committee on the Use of Human Subjects in Research (CUHSR) approval to administer a previously validated sports nutrition knowledge questionnaire to student athletes, coaches, and athletic trainers at Bradley University and Peoria Notre Dame High School. Should the results indicate low levels of nutrition knowledge for students or training staff, we would highlight how adequate nutrition knowledge may lead to habits that may positively influence performance and athlete health.

Where do people get their diet/nutrition information?

Graduate Presenters: Jessica Dolan '17, Dietetics
Mentors: Dr. Amanda Newell, Family and Consumer Sciences

INTRODUCTION: The internet has increased the accessibility of information to the consumer. People are using it to seek information on all things, including health and nutrition. The purpose of this study was to determine what sources people are using for diet/nutrition information and assess their familiarity with the My Plate concept. METHODS: The survey was designed using current research to assess where people get their diet/nutrition information and their familiarity with My Plate. Data was collected using Qualtrics Survey Software. The survey was posted on Facebook for 10 days. A total of 119 respondents 18 years and older participated in the survey. RESULTS: In total, 80.2% of respondents used the internet in the last year to seek information on diet/nutrition. The internet was cited as the most frequently used source by 57.4% of respondents. More than 61% of participants recognized My Plate as the current USDA food guide, yet 59.2% indicated they are most familiar with the Pyramid food guide. Only 22.5% of respondents have visited the My Plate website. DISCUSSION: As with similar studies, this study found that the internet is the most popular and most frequent source for diet/nutrition information, but it is not the most trusted. The websites visited vary, and despite more than half of respondents know about My Plate, just over 20% have ever visited the My Plate website. CONCLUSION: It is concluded from this study that people are relying on the internet for their nutrition/diet information but they are not visiting the My Plate website, nor are they very familiar with that food guide.

Emotion Intelligence and the Ability to Use Positive Self-Talk
Undergraduate Presenters: Dzeneta Dujkovic '18, Family & Consumer Science; Kelsey Cave '17, Family & Consumer Science and Health; Samantha Gajdel '18, Family & Consumer Science and Health
Mentors: Dr. Teresa Drake, Family and Consumer Sciences

Background: Emotional intelligence (EQ) is the ability to understand emotions, particularly one's own emotions. Taking steps to improve EQ brings immediate benefits to the health, relationships, work, and the quality of people's lives (Bell, 2017). Purpose: The purpose of this study was to evaluate the participant's likelihood, after getting better acquainted with the concept of Emotional Intelligence (EQ), of using positive self-talk to improve their self- efficacy and esteem. Method: This program will be implemented based on the social cognitive theory. The constructs that will be applied include self-regulation, self-control, self-efficacy, and reciprocal determinism all participants were chosen based according to a convenience sampling. Participants were given a pre-test at the beginning of the program. Information about emotional intelligence was provided during the 30 min presentation which was followed by an activity. An emotional intelligence test was administered. A post-test was given at the end of the program. The pre- and post- assessments identified a change in participant's knowledge and give feedback on the program's overall effectiveness. Results: The results are pending.

Concussion Management in High School Female Athletes
Graduate Presenters: Kristin Gatliff '18, Physical Therapy; Andrew Lerch '18, Physical Therapy
Mentors: Dr. Robert Bertram, Physical Therapy and Health Sciences

Purpose: Parents play an important role in recognizing and managing concussions in their children. Improper management can have long lasting, negative effects. The purpose of this study was to learn about parents' ability to recognize symptoms of a concussion in their child and their opinions regarding treatment protocol and eligibility to return to play. Methods: The survey was developed using Qualtrics software. Distribution was through Facebook and coaches emailing athletes' parents. Eligible participants needed to be a parent of a female athlete enrolled in a public or private high school participating in a sport sponsored by her school. Results: 84 participants recognized an average of 62.5% of concussion symptoms tested. Parents receiving concussion training scored significantly better than those without. Parents of children planning to continue their sport after high school would make their child stop that sport after significantly more concussions than those whose children didn't plan to continue. Conclusion: Parents need more concussion education and parents of athletes planning to continue their sport after graduation are more likely to disregard their child's safety following a concussion.

Winner of the College of Education and Health Sciences Award in Education

Collaborative Strategies Enhancing Social-Emotional Growth in the Classroom
Undergraduate Presenters: Katherine Hart '17, Special Education; Roxanne Parks '17, Elementary Education
Mentors: Dr. Helja Antola Crowe and Dr. Patricia Nugent, Education

A wealth of research exists in the world of academia to support collaboration in the classroom. At present, students are growing and thriving in a global society where collaboration is both necessary and critical for achievement. In response, we see many educators embedding collaborative activities within instruction to prepare students for these demands; however, few of these educators are providing proper scaffolds and supports for student success. It is crucial, for this reason, that teachers model effective collaboration, teach necessary skills, and provide students with tools to conduct these interpersonal transactions effectively. When this is accomplished, educators observe greater development of social-emotional growth as well as interpersonal and intrapersonal skills. Students are also better equipped to establish trusting relationships built upon understanding, acceptance, empathy, patience, etc. Through our research and various classroom experiences, we are able to affirm the necessity and advantages of positive, collaborative environments. Our project aims to highlight the benefits of these experiences for teachers and students; address the often ignored Social Emotional Learning Standards with which these collaborative practices are aligned; identify the necessary foundations for effective collaboration to occur; and discuss the hidden curriculum which envelopes each of these qualities.

The Effects of a Maternity Support Binder on Pregnancy-Related Low Back Pain in Activities of Daily Living
Graduate Presenters: Haley Hoerr '18, Physical Therapy; Carly Miles '18, Physical Therapy
Mentors: Dr. Stacie Bertram and Dr. Melissa Peterson, Physical Therapy and Health Sciences

PURPOSE: Fifty percent of pregnancies result in back pain. Maternity support binders attempt to provide external support to decrease back pain. This study aims to determine the effects of a maternity support binder during daily activities in pregnant women in their third trimester. METHODS: Seven pregnant women in their third trimester participated in this study. Participants self-reported on their pain for the three week duration of the study using a questionnaire designed by the authors and the Oswestry Disability Index (ODI). Week 2 was the only week they wore the maternity support. All seven participants' data were combined per activity per week. RESULTS: Our data suggests decreased activity symptoms occur in week 2 compared to week 1 as reported by the daily journal. The ODI results do not suggest that the maternity support relieves pain and disability in week 2 as compared to week 1. CONCLUSION: Maternity supports may be beneficial for decreasing daily activity symptoms in pregnant women in their third trimester. Further research should be conducted in order to better understand the effectiveness of maternity support binders.

The Effect of Sugar vs. Sugar Alcohols in Baked Oatmeal Bars
Undergraduate Presenters: Jaelen Hull '18, Dietetics and Business Administration
Mentors: Jessica Nigg, Family and Consumer Science

Background: Evaluation of the effect sugar alcohols has on tenderness, chewiness, sweetness, moisture content, and overall acceptability in baked oatmeal bars. Objective: The purpose of this study is to decrease the amount of sugar in a baked oatmeal bar recipe, while also determining the maximum level of sugar alcohols that can be incorporated into the recipe with favorable sensory characteristics. Methods: A basic oatmeal bar recipe was followed for three separate batches, with the variable ingredient being the type of pancake syrup used (regular, reduced-sugar, and sugar-free). Once cooled and cut into six equal-sized pieces, one piece from each batch was used to test tenderness with a penetrometer, and another piece from each batch was used to test moisture with a wettability test. Each batch underwent a nutrient analysis to identify differences in nutrient quantities between recipes. One piece from each batch was also presented to a set of five sensory panelists, where tenderness, sweetness, chewiness, and overall preference were evaluated and recorded on a scorecard. All objective and subjective evaluation results were recorded using provided charts and/or scorecards. Results: Results pending. Discussion: Discussion pending due to lack of results.

Using Yoga in a Worksite Wellness Program to Reduce Stress
Undergraduate Presenters: Jaelen Hull '18, Dietetics and Business Administration; Sadie Pierce-Mulligan '18, Dietetics; Kara Schwinke '18, Community Wellness and Health; Ashli Evans '18, Community Wellness and Health
Mentors: Dr. Teresa Drake, Family and Consumer Sciences

Background: According to the American Institute of Stress (2015), 80% of workers feel stress while at work, nearly 50% say they need to be educated on how to manage stress, and 42% say their coworkers also need help in this area. Yoga can provide many benefits including reduced stress levels. Objective: The purpose of this study was to evaluate a worksite wellness program on practicing yoga for stress management. Methods: An interactive worksite wellness program was developed to encourage yoga and breathing techniques to manage stress. Participants were a convenience sample of employees at a non-profit organization. Pre-/post-test design was used to assess knowledge of stress management techniques and likelihood of using yoga. Results: Results are pending but an increased likelihood of using yoga to manage stress is expected following the program.

God As My Only Witness: The effect of religion and accountability on antisocial behavior
Undergraduate Presenters: Robert Hutton '17, Psychology and Sociology
Mentors: Dr. Lane Beckes and Dr. Anthony Hermann, Psychology

Past research shows that religiosity has a positive association with prosocial behavior and a negative association with antisocial behavior. However, certain factors reduce these effects significantly. One condition that has yet to be thoroughly studied is accountability. The study examines the interactions of religious motivation and accountability on cheating behavior in a game. Participants will be left alone under the conditions of a religious or neutral prime and of anonymity or accountability. We hypothesized that religious motivation will be a key factor in the behaviors of religious individuals, such that those high in intrinsic religiosity would be more influenced by religious prime than by accountability. In contrast, we predicted that those high in extrinsic religiosity would be more influenced by accountability than by religious prime. The null hypotheses were accepted on all counts. Implications, limitations, and future directions are discussed.

Concurrent Validity of the VirtuSense Gait Analysis System for the Quantification of Spatial and Temporal Parameters of Gait

Graduate Presenters: Laura Jarrett '18, Physical Therapy; Patrick Tan '18, Physical Therapy
Mentors: Dr. Andrew Strubhar and Dr. Melissa Peterson, Physical Therapy and Health Sciences

Objective: To assess the concurrent validity of the VirtuSense® Gait capturing program by comparing it to two gold standards, the GAITRite® computerized gait mat and manual pedograph. Design: Concurrent validity study. Methods: 27 healthy, young adults performed 4 walking trials at a self-selected pace on a level surface. In 3 trials, stride-length, step-length, and velocity data were collected simultaneously from the VirtuSense® and GAITRite®. In the first trial, stride-length and step-length data were collected simultaneously by the VirtuSense®, GAITRite®, and pedograph. Results: A statistically significant and high correlation was found among each gait parameter measure by all 3 methods: GAITRite® and VirtuSense® velocity (r=0.854,p<.001), left stride-length (r=0.924,p<.001), right stride-length (r=0.986,p<.001), left step-length (r=0.974,p<.001), and right step-length (r = 0.904,p<.001), VirtuSense® and pedograph left stride-length (r=0.957,p<.001), right stride-length (r=0.945,p<.001), left step-length (r=0.888,p<.001), and right step-length (r=0.926,p<.001). Conclusion: The VirtuSense® Gait capturing program, as compared to the GAITRite® and pedograph, demonstrates high concurrent validity for measuring gait parameters (stride length, step length, and velocity).

Examining the Hypoalgesic Changes Following Spinal Thrust Joint Manipulation: A Systematic Review and Meta-Analysis

Graduate Presenters: Michael Jewell '18, Physical Therapy; Matthew Miller '18, Physical Therapy
Mentors: Dr. Cheryl Sparks, OSF Hospital; Dr. Bre Reynolds, Physical Therapy and Health Sciences

Background & Purpose: Spinal thrust joint manipulation (TJM) is commonly used across many professional disciplines for the treatment of musculoskeletal disorders. A simple search yields increasing quantity of scientific publications examining associated effects of manipulation. The aims of this review were to provide a concise summary of the hypoalgesic effects of manipulation since publication of a similar review in 2012, and provide summative evidence for integration into practice. Methods: A systematic search of the literature was performed using CINAHL, PsycINFO, SPORTDiscus, MEDLINE, PubMED, and UIC SUMMON databases from May 2011¬- May 2016. Search terms were all inclusive related to TJM and pain. The methodological quality of each study was examined and effect size estimates were calculated using meta-analysis software. Results: A total of 759 studies were identified through the search. Eleven studies were included for appraisal, ten were appropriate for meta-analysis, and all included effects of TJM on clinical participants. Medium to large effect sizes were observed in all but 2 papers. Discussion - Conclusions: While the exact mechanisms by which TJM exerts hypoalgesic effects remain unknown, the current evidence supports the use of this intervention for pain reduction in individuals with cervicogenic headache, neck, shoulder or acute low back pain.

Effects of an App-Based Home Exercise Program on Adherence

Graduate Presenters: Matt Kresnicka '18, Physical Therapy; Samantha Schuckles '18, Physical Therapy
Mentors: Dr. Melissa Peterson and Dr. Brenda Pratt, Physical Therapy and Health Sciences

Purpose: To compare the effects of a paper home exercise program (HEP) vs. an app-based HEP on home exercise adherence. Methods: 3 patients: two males, one female (mean age 55), were seen in a student-led pro-bono clinic. Delivery system of the same HEP was progressed every 2 weeks beginning with stock videos, progressing to individual videos and ending with chat features. Adherence was measured by compiling the number of days exercises were completed both from the paper copy and the app. A survey was given after study completion asking patients perceptions of the two HEP methods. Results: Adherence varied widely across the participants. 2/3 patients were 100% adherent with the paper. The highest adherence noted with the app was 40%. Qualitatively, 2/3 patients preferred the app to the paper copy. One patient cited usability issues, which made them prefer the paper copy. Conclusion: Overall, the adherence rates for all three patients did not appear to be linked to any specific condition, and adherence as a whole was relatively low. This could have been attributed to issues with the Blue Jay app. No conclusions about effectiveness for increasing adherence could be elucidated.

Reliability of VirtuBalance in Scoring Components of the Functional Movement Screen (FMS)
Graduate Presenters: Kyle Lucca '18, Physical Therapy; Derek Nunamaker '18, Physical Therapy
Mentors: Dr. Steve Tippett, Physical Therapy and Health Sciences

Objectives: The study's objective was to determine the reliability of the VirtuBalance® motion analysis system in measuring components of the Functional Movement Screen (FMS) in healthy subjects. Background: VirtuBalance is an infrared three-dimensional motion analysis system that captures movements in real time and stores video and descriptive data of subject performance in a variety of functional tests for the physical therapy client. VirtuBalance has been validated for assessment of gait, balance and reach functional activities, however, no research has validated the reliability of scoring the FMS. Methods: Subjects were recruited from a sample of convenience. Following informed consent, each subject performed five of the seven FMS tests including: Deep Squat, Hurdle Step, Inline Lunge, Shoulder Mobility, and Active Straight-Leg Raise. Performance was simultaneously assessed and recorded by two human testers, as well as by real time motion analysis via the VirtuBalance system. Functional tests were performed according to testing procedures as outlined in Movement (Cook 2010). Results: Data collection is currently being completed. A One-Way ANOVA statistical analysis will be performed using SPSS comparing reliability of VirtuBalance to the two human testers. Statistical differences, if any, will be noted after finalizing analysis. Conclusion: Will follow data collection and analysis.

Winner of the Office of Sponsored Programs Undergraduate Award for Multidisciplinary Integration

Students Engaging Students to Improve Learning: Using Student-Led Focus Groups to Gather and make Sense of Assessment Evidence
Undergraduate Presenters: Kevin Mikolajczak '18, Interactive Media and Theater; Kelsey Vogt '18, Finance
Mentors: Gregory Haines, Director, Academic Exploration Program; Jon Neidy, Assistant Vice President for Student Affairs

The project was developed to engage two students, with a team of three others, in an educational research project of broad significance to Bradley University. The project aims to analyze institutional assessment data aligned with our Core learning outcomes through the use of peer-led student focus groups. The students and their mentors - two professional staff from Student Affairs – will refine the research plan in consultation with external experts and in collaboration with the Director for Institutional Improvement and the Director of the Bradley Core Curriculum. Student learning gains, research outcomes, and institutional outcomes will be tracked and assessed using direct and indirect measures.

Stress Full to Stress Free: A development of a work site wellness program
Undergraduate Presenters: Katherine Moey '17, Community Wellness and Sociology; Rachel Jones '17, Community Wellness and Health; Ivonne Gutierrez '18, Dietetics; Jessica Goble '19, Dietetics
Mentors: Dr. Teresa Drake, Family and Consumer Sciences
Stress is a physical, chemical, or emotional factor that causes bodily or mental tension and may be a factor in disease causation. The number one cause of stress in the United States is job pressure (APA, 2016). The purpose of this study was to develop and evaluate a work site wellness program to manage stress. The 30 minute stress management program was developed using Social Cognitive Theory as a framework, including the constructs of self-efficacy and behavioral capability. The interactive program provided an opportunity for participants to practice stress management techniques. Pre-/post-test design was used to assess participant confidence in performing the stress management techniques. Results of this program are pending.

Child Life from OSF to St. Jude and back - a case study of a pediatric patient's journey with FCS students through service learning

Undergraduate Presenters: Aimée Moy '18, Family & Consumer Science and Sociology; Jennifer Miller '17, Family & Consumer Science

Mentors: Dr. Magdalena Sas, Family and Consumer Science

In September 2016, as part of our FCS 346 Resource Management class our group of two was assigned a task that required us to reach out to a community organization, and conduct a needs assessment. We identified Dee Gaines, Child Life Specialist at the Children's Hospital of Illinois, who advised us of the need for sensory activities for pediatric patients, to help decrease their stress levels brought on by hospitalization. Our implementation of a sensory activity using shaving cream and small fall objects was a success - even previously reserved children at the hospital were asking for the game after we left, to their parents' surprise and relief. Soon after, we were asked by Dee to continue our project with a family with a special story. However, the child, with whom Dee has made great progress, was transferred to St. Jude Research Hospital in Memphis, Tennessee for a serious medical procedure, for 3 months. In an effort to continue Dee's work, we made the trip to Memphis and provided a new sensory activity to the child, using stress bottles this time. The activity was a wonderful ice breaker that initiated a 3-hour conversation with the child, as well as texts and calls once we traveled back to Peoria. We secured Committee on the Use of Human Subjects in Research approval to conduct a case study evaluating the effects of Child Life programming on the outlook of a child suffering from a serious illness. We will shed light onto the importance of the Child Life profession through this case study, which demonstrates how simple activities and acts of kindness can transform the social and emotional well-being of a child, and her family.

Retrospective Reports on Mealtime Interactions with Mothers and Fathers

Graduate Presenters: Kaitlin Murphy '17, Dietetics

Mentors: Dr. Rachel Vollmer, Family & Consumer Science

Although parents are clearly important in developing life-long habits through food exposure and attitudes about child weight, little research has been done to determine the differences in maternal and paternal behaviors. Thus, the purpose of this study was to explore the relationship between young adults' eating behaviors and parental (both mother and father) mealtime behaviors during childhood. Additionally, this study aimed to determine young adults' perception of parental weight attitudes during childhood. One-on-one, semi-structured phone interviews were conducted with Bradley students (n=20) to understand mealtime interactions with mothers and fathers during childhood. Participants were predominantly white (95%), females (75%), and 18-22 years old (average 20.65 years). Transcripts of phone interviews were coded and themes were identified. Results will be presented. Findings from this study will be useful in future family-focused nutrition interventions.

Step in Time: Gait Parameters for Children Under the Age of Five

Graduate Presenters: Karissa Neihouser '18, Physical Therapy; Callie Myers '18, Physical Therapy; Nicholas Burke '18, Physical Therapy

Mentors: Dr. Priscilla Weaver, Physical Therapy and Health Sciences

Purpose: The purpose of this ongoing study is to develop a normative sample of spatiotemporal gait parameters in children 1-4 years old and examine changes that occur between age groups. Methods: A total of 49 children were recruited from the community. Child's height and weight were measured and 4 barefoot walks were completed at a self-selected pace using the GAITRite. Children were categorized into 4 groups for analysis (12-23, 24-35, 36-47, 48-59 months). Correlation coefficients were examined for bilateral variables then averaged. Normalized means by height were calculated for each group then compared for significant differences ($p<0.05$) using one-way ANOVA. Results: The normalized gait parameters of step length, stride length, step time, stance time, and single support time all increased from 1-4 years and cadence and base width decreased with age; velocity and double support time mean trends were variable. There were no significant differences between gait parameters and age groups. Conclusions: The result of increasing step length and stride length means with age are consistent with previous studies. Previous studies examining parameters in young children have been limited and variable. This study aims to further inform normative gait parameters and examine if any significant differences exist between age groups.

Sensory Evaluations of Black Beans, Mushroom, and Spinach Enchiladas with Mango Salsa
Graduate Presenters: Erin Ortiz '17, Dietetics
Mentors: Dr. Amanda Newell, Family and Consumer Sciences

Based on the literature the prevalence of Type 2 diabetes mellitus in Mexican and Mexican- Americans has increased by 20% over the past three decades. Many factors, including diet, have been associated with these recent increases. Data collected from the 2006 Mexican National Health Survey revealed that Mexican diets are high in refined carbohydrates and low in vegetable intake. Studies have shown that diets high in whole grains, fiber, fruits, and vegetables are associated with lower risk of developing Type 2 diabetes mellitus. The purpose of this study was to perform a cross sectional taste test examining the taste, smell, appearance, and overall acceptance of black bean and spinach enchiladas topped with mango salsa. A scorecard was developed by the researcher and was based upon the literature. Enchiladas and mango salad will be prepared in Bradley Hall's Foods lab. Participants will each be given a sample and asked to rate it using a scorecard. Data is forth coming.

Stopping Bullying One School at a Time
Undergraduate Presenters: Jeffrey Pagano '18, Elementary Education; Jenna Dellaria '18, Elementary and Special Education; Roxanne Parks '17, Elementary Education; Alysen Newton '17, Secondary Education
Mentors: Dr. Twila Lukowiak, Teacher Education

In October 2016, five STRETCH (Students Ready To Make Change) members traveled to New York City. The primary purpose of the journey to New York was to assist K-8th grade students in understanding the detriments of bullying and encourage them to perform daily acts of kindness. We performed presentations for hundreds of students in schools in the boroughs of New York, primarily Brooklyn and the Bronx. While we were in New York we also created two videos which will be distributed complimentary to schools in Peoria and surrounding areas. These videos (one age appropriate video for elementary students and one age appropriate video for junior high / high school students) captured the personal stories of STRETCH members as they detailed their experiences with bullying and how they persevered through these times, often reaching out to trusted adults for support. These videos also consisted of STRETCH members performing acts of kindness and activities to assist students in understanding the enormous benefits of demonstrating kindness and acceptance to all individuals. The trip had remarkable impacts, not only in the lives of the K-8 students, but also to STRETCH members.

Effects of ascorbic acid powder as compared to lemon juice on the browning and palatability of guacamole
Undergraduate Presenters: Sara Petty '18, Dietetics
Mentors: Jessica Nigg, Family and Consumer Science
The enzyme activity seen after fruits and vegetables are cut or in some way processed not only changes the appearance and visual acceptability, but can also affect flavor and nutritional value (Holderbaum, Kon, Kudo, & Guerra, 2010). Because the color tends to turn so quickly, minimally processed produce (that has been cored, peeled, or cut in some way) has a shelf life that is significantly shorter than that of the whole, intact version (Rocha & Morais, 2003). Specifically in avocado puree, the enzyme activity can lead to organic acid release as the avocado breaks down. These acids often lead to a bitter or sour flavor that is unpleasant and undesirable (Jacobo-Velazquez & Hernandez-Brenes, 2011). Many of the recommended methods for at-home cooks to prevent browning of avocados do not preserve shelf-life as well as commercial methods. The purpose of this experiment is to compare the effects of two methods used to prevent browning in homemade guacamole by evaluating acceptability and browning differences in guacamole prepared with lemon juice and ascorbic acid powder. Both objective and subjective methods (including colorimetry and a live taste panel) will be used to evaluate color changes, taste and acceptability of the samples prepared. Results are pending.

The Effects of Trigger Point Dry Needling on Delayed-Onset Muscle Soreness in Healthy Individuals
Graduate Presenters: Michael Slack '18, Physical Therapy; Zachary Kovacevic '18, Physical Therapy
Mentors: Dr. Joseph Kelly, Physical Therapy and Health Sciences

Introduction: The purpose of this study is to determine the effects of trigger point dry needling (TDN) on pain, pain pressure threshold, and biomechanical properties of the gastrocnemius following exercise protocol-induced delayed-onset muscle soreness (DOMS). Methods: Six healthy participants of a planned sample of 50 have been enrolled in the study. Pre- and post-test measurements including Visual Analogue Scale (VAS), pain pressure threshold (PPT), and biomechanical properties (stiffness calculated via the Myoton-Pro) were collected. Following baseline testing, the participants performed 10 sets to fatigue of right-sided calf raises on a Smith Machine with an external load equivalent to half of their body weight. TDN was performed one time on the following day at the most tender area of the gastrocnemius in subjects with DOMS. Repeat measurements were collected on days 1-3 following exercise protocol. Results: Data collection still in process.

Perceptions of Snacks among Fathers of Preschoolers
Graduate Presenters: Jessica Rembles '17, Dietetics
Mentors: Dr. Rachel Vollmer, Family & Consumer Science

Research regarding paternal influence on a child's diet quality has been emerging in the previous five years. Because fathers are highly involved in child feeding, this study aimed to examine fathers' perception of snacks and their child's food preferences. Fathers of preschoolers (n = 47) responded to 6 open-ended questions regarding snacks via Qualtrics. To assess child food preferences, fathers also completed the Preschooler Adapted Liking Survey (PALS). Demographic information was collected. Survey responses were coded and themes were identified. Children's preferences for fruits, vegetables, and high sugar/fat foods were analyzed using SPSS version 19.0. Most fathers were white (85%), well educated (72% had Bachelor's degree or higher), and married (98%). Three overarching themes were discovered, including 1) snack characteristics, 2) snack time decisions, and 3) snack rituals. It was also found that children had the highest preference for fruit, followed by high sugar/fat foods, and vegetables. Nutrition education programs to improve children's diet quality should also include fathers, as they may make decisions about snacks for their child.

Nutrition and Women's Health: Beliefs and Attitudes of Women that Prompt them to Seek Nutrition Intervention
Graduate Presenters: Ellery Rydin '17, Dietetics
Mentors: Dr. Amanda Newell, Family and Consumer Sciences

BACKGROUND: The periconceptual time-period may be a time when women are more likely to engage in nutrition-related behaviors [7] . Almost half of physicians said they avoided nutritional treatment due to absence of time and awareness of treatment possibilities [8] . It is unknown if women are interested in receiving additional nutrition services beyond what their physician can provide. METHODS: Cross-sectional survey design was utilized. Participants were pregnant and nonpregnant women ^{3}18 years old and were receiving care at a women's health clinic in March 2017 (n=71). A survey was developed by the researcher in conjunction with the literature and it contained 29 questions. Data was analyzed utilizing SPSS, version 23. RESULTS: Most participants obtained their nutrition information from the internet/online (83.1%). The primary topic of interest to participants was physical activity (84.5%). The event in which they focused on nutrition most was having a baby (63.4%). About 87% would prefer to receive nutrition services from the same office as their women's health doctor. CONCLUSIONS: According to this study, 95% of participants reported there were times they have focused on nutrition more, and specific nutrition topics and events were of interest to the participants. Only 4% of practicing entry-level registered dietitians work in private practice [4] . The current study indicates women are interested in nutrition related to specific events and topics beyond what their physician can provide. Further research on women's behaviors and attitudes that prompt them to seek nutrition intervention would help support the integration of registered dietitians into a physician's office setting.

Dosing Parameters in a Student-Run Pro-Bono Clinic: A Descriptive Study
Graduate Presenters: Patricia Shadid '18, Physical Therapy; Kaitlynn Holshouser '18, Physical Therapy
Mentors: Dr. Brenda Pratt, Physical Therapy and Health Sciences

Purpose: The purpose of this study is to describe the physical therapy services provided to individuals with neurological conditions in a student-led pro-bono clinic. Methods: Data were collected on the physical therapy services of 4 individuals with chronic neurological disorders during an episode of care. Descriptive statistics were used to describe physical therapy services including percentage of time spent in specific functional activities and non-functional activities. Results: Mean number of physical therapy sessions attended was 7 sessions with 77 minutes (mean) per session. Non-functional activities (education, environmental set-up, rest) were performed most frequently followed by functional and pre-functional (flexibility, strengthening) activities (38%, 32% & 29% of total treatment time respectively). Mean number of goals per client was 5 with, on average, 1 goal achieved. Discussion: In this student-led pro-bono clinic, 61% of treatment time was spent in hands-on patient interventions. Thirty-two percent of the hands-on interventions practiced functional activities while 29% addressed needs at the impairment level (flexibility, strengthening). Current research indicates high amounts of repetition and greater intensity of functional activity practice are needed to induce improvements in neurological patients. Care provided by student physical therapists can be more efficient and effective when appropriate goals and interventions are selected.

Evaluation of a Worksite Stress Management Program
Undergraduate Presenters: Anna Smith '18, Dietetics; Jamie Livaudais '18, Dietetics; Kim May '18, Community Wellness and Health; Anya Stratynski '17, Community Wellness and Health
Mentors: Dr. Teresa Drake, Family and Consumer Sciences

Stress eating can be defined as the increase in food intake in response to negative emotions. Many adults have over eaten or eaten unhealthy due to stress and these adults may even engage in these behaviors on a weekly basis or more. The objective of this study was to assess the confidence in completing and likelihood of using a food log when stressed following a worksite stress eating management program for employees at a local non-profit organization. Convenience sampling was used to recruit employees at the organization. The program included a 30-minute interactive presentation along with instruction on how to complete a food log. Pre- and post-tests assessing confidence levels and likelihood of using food logs were administered before and after the stress management program. Results are pending but confidence level and likelihood of use are expected to increase following the program.

Nutrition Facts Label Knolwedge, Attitudes, and Use among College Students
Undergraduate Presenters: Anna Smith '18, Dietetics
Mentors: Dr. Teresa Drake, Family and Consumer Sciences
The Food and Drug Administration (FDA) published the final rule for an updated Nutrition Facts label to reflect new scientific information and improve use among consumers. The purpose of this study was to assess knowledge, attitudes, and label use among college students using the newly updated label format and information. Cross-sectional design with an online survey was utilized for this study. The 45-item instrument was intended to measure knowledge, attitudes, and behaviors regarding Nutrition Facts labels among college students. The convenience sample of 403 college students was 76.1% female and 23.9% male with mean age of 20.8 years. Most respondents (83%) were Caucasian. The mean knowledge score was 4.23 (out of a possible 12). While 96% of participants agreed the label was useful, 43% of participants reported rarely or never using the label to fit a food into their diet. Although college students believe the label is useful, they are still not widely utilized among the group. These results suggest that while more education on food labels and nutrient claims is needed, additional research is also necessary to determine the reasons why college students are not using the label.

Investigating the Factors Affecting Food Neophobia
Undergraduate Presenters: Carolyn Stewart '17, Hospitality Leadership, Entrepreneurship and Management & Leadership
Mentors: Dr. Kara Wolfe, Family & Consumer Science

Food neophobia is the willingness to try new or unfamiliar foods. Many factors that could affect food neophobia levels have not be tested. This study conducted focus groups and a survey of students enrolled in North American universities to investigate what factors may affect food neophobia in college students. The survey included the Food Neophobia Scale and the shortened version of the Big 5 Inventory. Students with higher levels of openness and conscientiousness were less food neophobic. Students from the United States were also less food neophobic than students from Canada. Results showed correlation between future intent to try new foods and neophobia. These discoveries could have implications for restaurant managers and college food service operators.

Winner of the College of Education and Health Sciences Graduate Award in Family and Consumer Sciences

The Relationship between Breakfast Consumption and Mood among Undergraduate College Students *Graduate Presenters:* Kari Sunnarborg '17, Dietetics
Mentors: Dr. Amanda Newell, Family and Consumer Sciences
Breakfast has been the subject of many research studies and its role as a part of a healthy lifestyle has been well established. However, breakfast's effect on college students and mood is an area where further research is needed. The purpose of this study was to explore the relationship between eating breakfast and mood in undergraduate college students. Participants were recruited from three undergraduate general education classes. Participants completed a survey developed by the researcher to assess breakfast habits and the widely used Bond-Lader Visual Analogue Scale to assess mood. Seventy-five participants took part in this study. Not eating breakfast the morning of data collection was correlated with decreased feelings of alertness ($r = -0.245$, $p < 0.05$). Seventy-two percent of participants agreed or strongly agreed that breakfast is part of a healthy lifestyle. Eighty percent of participants responded that eating breakfast increases or somewhat increases their mental activity. Despite awareness of the importance of breakfast, only 38.7% of participants had eaten breakfast the morning of data collection. Since the benefits of breakfast has been well documented, helping individuals realize the effect breakfast has on their mood and mental status many encourage better adherence.

Winner of the College of Education and Health Sciences Undergraduate Award in Family and Consumer Sciences

Analysis and Improvement of a hospitality house meal program through service learning and internship
Undergraduate Presenters: Sarah Wagner '18, Dietetics
Mentors: Dr. Magdalena Sas, Family and Consumer Science

Background: Healthcare hospitality homes provide temporary, low cost lodging to individuals or families who have a friend or family member in the hospital or outpatient medical care. Some hospitality homes offer meal programs that provide home-cooked meals and snacks to guests to satisfy basic physical needs, while also providing a sense of community. Purpose: The purpose of this presentation is to describe the multiple modes of improvement of a meal program at a healthcare hospitality house. Methods: Analysis and evaluation were completed through action research in the form of an eight-month internship, which resulted in a survey co-designed by this author and the Executive Director of the organization. The survey has been sent to 800 guests with a 5% response rate, and will be sent two more times to gather more responses. Results: The staff, hospitality committee, and volunteers at the hospitality home in conjunction with the student have provided a framework for continuous improvement of the meal program. The surveys provide valuable information for improvement and provide valuable information regarding guests' experiences and opportunities for improvement.

Replacement of All-Purpose White Flour with Coffee Flour in Brownies
Undergraduate Presenters: Sarah Wagner '18, Dietetics
Mentors: Jessica Nigg, Family and Consumer Science

Background: There is limited published research about coffee flour. Coffee flour has higher levels of protein, fiber, and iron when compared to all-purpose flour. Replacing all-purpose flour with coffee flour may have nutritive and environmental implications. Objective: The objective of this study is to examine the highest ratio of coffee flour used in brownies to yield the highest consumer acceptability in brownies. Methods: A convenience sample of 5 participants will be used. Participants will be instructed to evaluate acceptability of brownies using affective and descriptive methods using a provided scorecard.

Evaluation of a Community Work Site Program to Improve Sleep Hygiene
Undergraduate Presenters: Dakota Zamora '17, Community Wellness and Health; Sarah Wagner '18, Dietetics and Biology; Kathryn McDermott '17, Community Wellness and Health
Mentors: Dr. Teresa Drake, Family and Consumer Sciences

Social workers are at high risk of experiencing stress in the workplace and stress affects quality of sleep. Sleep hygiene education is a low-cost, practical means of improving sleep quality. The purpose of this study was to develop and evaluate the quality and effectiveness of a program using sleep hygiene education to reduce stress and improve sleep. Employees at a non-profit organization were asked to participate in a thirty minute program on sleep hygiene practices and stress. The Theory of Planned Behavior was used to design the program in order to address the employees' attitudes regarding sleep and stress as well as their intentions to utilize a sleep journal. Pre- and post-tests were administered to assess attitudes regarding sleep and confidence in and likelihood of using a sleep journal. The results of the program are pending.

The Slane College of Communications and Fine Arts

Character Creation Systems and their Portrayal of Race, Gender, Body Types, Disabilities, and Age
Undergraduate Presenters: Zachary Abbott '18, Game Design and Creative Writing; Trent Cornwell '17, Game Design
Mentors: Dr. Monica McGill, Interactive Media

In recent years, video games have become an increasingly large part of everyday media, with US video games sales reaching over 22 billion dollars in 2014 (Entertainment Software Association). The level of impact on the economy is mirrored by the impact that it has on culture. The research conducted for this study focuses around the concept of character creation systems, and their portrayal of race, gender, body types, disabilities, and age. One may look towards the effect that games have on self-identification across the age spectrum. Because of the diverse group of players a game may have, one may expect to see a range of race, gender, body types, disabilities, and age in video games. This study focused on the concept of character creation systems in regards to these five categories. The most important find is that body customization in games had no effect on gameplay. Additionally, only 36% allowed the player to customize their age while. This being said, neither categories affected gameplay in any way. Disability was the most underrepresented of all the categories, with only 20% of games providing the option for players to create characters with a disability, and these disabilities had no effect on gameplay.

Maze Escape
Undergraduate Presenters: Matthew Allers '19, Game Design
Mentors: Tanya Melendez and Dr. Devin Monnens, Interactive Media

My project is a first-person, maze style puzzle video game. It is designed to be a quick and fun time killer for use on laptops. It combines easy to understand game play elements with levels steadily increasing in difficulty to create a fun, but not tedious experience. The project is still in development, but all the core aspects are completed.

Winner of the Slane College of Communications and Fine Arts Award in Interactive Media

Rewards
Undergraduate Presenters: Pooja Arhsanapally '18, Interactive Media and Entrepreneurship & Innovation
Mentors: Dr. Ethan Ham, Interactive Media

I am going to create a prototype of an app that will make shopping more convenient for customers. It will be focused solely on grocery stores and convenient/pharmacy stores such as CVS or Walgreens. This mobile application will combine different reward cards including the stores' gift cards (if applicable) into one, simple location. The purpose is to help customers manage their store cards and not having to worry about losing a card or not having it with them when purchasing an item(s), and to also promote more deals if the app is used in the transaction. This will help create partnerships with other companies that also use the system. We also want to go green and help eliminate the use of plastic cards.

Umbrella
Undergraduate Presenters: Victoria Corder '20, Animation; Akira Williams '20, Animation; Kia Woods-Wall '20, Animation
Mentors: Dr. Brent Wiley, Interactive Media

Umbrella tells the story of a sad young girl. She ventures out and finds herself in a library; there, she meets a special, whimsical companion who will help her understand her feelings and regain her happiness. As animation students, we have had the chance to watch numerous animated films, shorts, and cartoons. In doing this, we noticed the lack of African-American and minority female character representation. In addition, the animation industry is filled with men telling the story of females struggling and overcoming. Since we are females ourselves, we felt the telling of this type of story, should be put into our hands. In this animatic, our group hopes to provide a voice for African-American and other minority females. We want to uplift and inspire girls and women to be strong, to seek out higher education, to learn how to deal with complex emotions, and to let their voices be heard. Our group's goal is to show other females that we have the ability to create great things, that we have talents, and that we know how to use them to reach out to our specified audience.In the end, the product will be an entertaining yet informative animatic that shall reach out to females to provide them with light and hope in a scary world.

Antagonists' Physical Characteristics in Video Games: Comparing Villains From 2006 and 2015
Undergraduate Presenters: Hannah Evers '17, Game Design and Studio Arts
Mentors: Dr. Monica McGill, Interactive Media

Video games of today's generation have many different types of characters involved in gameplay. One of the most important characters is the antagonist. Today's video games are full of stereotypes, although researchers have only recently begun looking at stereotypes relating to gender, race, and body-type in video games. Thus far, previous studies have examined representation of gender, body type, and race in antagonists from various forms of media such as television and film, which leaves out information from video game antagonists throughout the years. When comparing data from 2006 and 2015 it is clear that the certain characteristics of the antagonists has changed over the decade for these games. In both 2006 and 2015 as well, most of the human antagonists' races were white males. White antagonists have begun to appear more over the course of 10 years. Based off of previous research as well as our own, there appears to be a pattern when it comes to male antagonists in various forms of media, such as video games. We also found that body types of antagonists have become more varied in 2015 as compared to 2006.

Lunchbox Moments: The Asian-American Experience as Told by Food
Undergraduate Presenters: Katherine Folan '19, Organizational Communication and Professional Writing
Mentors: Dr. Dan Smith and Dr. Elena Gabor, Communications

This study seeks to demonstrate a need for greater intercultural sensitivity and awareness in American school cafeterias through an exploration of the contrasting roles of food within the communication and culture of Asian-Americans and non-Asian-Americans living in the United States. This project specifically examined the problem's manifestation through the unique phenomenon of lunchbox moments. Asian ethnicities studied in primary research include Chinese, Vietnamese, Indian, Pakistani, and Hmong. Data collection methods involved autoethnography and a series of 5 interviews with Asian-American young adults. Additional cultural information was gleaned from scholarly articles, blog posts, journalistic articles, and testimonial videos. The study uses a cross-cultural theoretical framework to suggest that cultural values plus historical events produced contrasting roles of food catalyzed by the production of traditional Asian cuisine in an American context. Findings indicate that intercultural insensitivity in schools, though more vocal and bluntly expressed at earlier ages, still imprints a sense of cultural alienation among Asian-Americans into adulthood and offer suggestions for institutional and individual correction and empathy.

Robo Ragnarök
Undergraduate Presenters: Tyler Gould '18, Game Design; Caleb Sams '18, Game Design; James Klock '18, Game Design; Luke Brinker '18, Game Design
Mentors: Tayna Melendez, Interactive Media
Robo Ragnarök is a game currently being developed to strive towards the creation of an experience that achieves enjoyment of the players. The desired goal of developing the game is to have the players have fun while playing a game that is about controlling a robot in a multiplayer gladiator fight. We addressed this by prototyping a simplified version of how the product would equate to be. With testers offering feedback we continue to pursue on ideal outcome. Responses with our base design using picavoxel, a 3D cube style, gave proper footing in the endeavor. While development is still under way we are currently pleased with the current progress as our testing audience overall enjoyed the game. We are advancing with more progress to ensure that the game continues to offer enjoyment in the category of robot gladiator gameplay that is somewhat lacking in mainstream gaming.

Action | Reaction: Collaborative Paintings
Undergraduate Presenters: Fantasia Graham '17, Art; Duncan Katlack '18, Political Science and Art; Kane Fulton '17, Art; Mason Fulton '17, Art; Imani Evans '18, Art, International Business and Marketing; Noah Otten '17, Art; Allison Walsh '17, Art, Spanish and Philosophy
Mentors: Dr. Heather Brammeier, Art

This presentation explores the collaborative paintings made by painting students and Professor Heather Brammeier. The process for each collaborative painting was that each student began their painting without preliminary discussion, and then alternated painting with the professor. Each artist had total freedom to add, change, or cover over anything previously painted during their painting session. Relevant photographic references and sketches were discussed when the painting was returned to the other artist. A cycle of exchanges took place, in which each artist would respond to the other artist's creative decisions. The number of turns was not pre-determined, rather agreement was reached between the pair when a painting was resolved. Students strove to maintain their own expression and reinforce their personal vision, while interacting with Professor Brammeier's visual language. The creative problems each artist proposed had to be solved in tandem, resulting in synthesis of unique imagery. This raised the question, when is the painting resolved? The process generated visual empathy—a substantial understanding of the other artist's choices and vision. The project culminated in an exhibition at the Peoria Art Guild.

Autism in Video Games: With an Analysis of Characters
Undergraduate Presenters: Luke Grebe '17, Interactive Media Game Design and Computer Science Game Technology
Mentors: Dr. Monica McGill, Interactive Media

Autism Spectrum Disorder is a neurological disorder with a diagnosis rate that has been rising over the past decade from 1 in 150 children to 1 in 68 children in the United States. Those with autism have some representation and misrepresentation in the older forms of media, but the question is how they are represented in newer media. Specifically, the question is on how they are represented. So far, there seems to be no complete research on ASD being represented in video games. That is, are they efficiently and fairly represented as playable characters in games or are they underrepresented or misrepresented? The results show that most characters (68.2%) each show 1-3 of the characteristics of ASD. There are a few that do not have any of the listed symptoms built in, but are player choice. However, if measuring by built-in symptoms, most of the characters have very few ASD symptoms and therefore do not display characteristics of ASD. The study determined that video games do not under-represent or misrepresent people with ASD if measuring by player choice.

Ageism in Video Games: The Relationship Between Age and Character Roles
Undergraduate Presenters: Matthew Heerdegen '17, Interactive Media Game Design; Alexander Hambly '16, Interactive Media Game Design
Mentors: Dr. Monica McGill and Tanya Melendez, Interactive Media

In our society people often unconsciously establish a list of tropes and archetypes for other people and events in our lives, and these tropes establish a series of stereotypes along with a certain status quo within both the media and reality for how characters and, by extension, the people they represent should act [22]. Society is extremely adept at unconsciously observing stereotypes in media that will be accepted unconsciously as something perceived to be normal in our world. These stereotypes often form from misrepresentation in media and they can be very harmful. Misrepresentation of groups in media often stems from negative or limited roles that are assigned to characters representing them. The research question at the center of this study was: what relationship, if any, is there between age and the role characters are assigned in video games? The results show that while there were no elderly characters in a "player" role, 63% of recorded elderly characters had what qualified as 'minor' roles in the games played for this study. The study found 91% of characters with determined age consisted of adults or young adults. The study also found that 73% of recorded elderly characters were male. Similar to previous data, adults were a majority in all archetypes and occupied a definitive majority of the player characters. We found that our data largely matched the results of previous studies for films, tv, and books and only differed in a few minor areas.

SkyQuest
Presenters: Tyler Hitchings '18, Interactive Media
Mentors: Tanya Melendez, Interactive Media

SkyQuest is a platforming game currently in prototype status. It is built using techniques I learned from Devin Monnens, but I am expanding it beyond what I have been taught in his courses and has become a personal project. The Final Product will be released for PC, Mac and IOS Devices, and will focus on traversing an obstacle course while avoiding obstacles and manipulating various kinds of platforms to solve puzzles and proceed.

Winner of the Slane College of Education and Fine Arts Award in the Digital Arts

Bradley University Hollywood Semester Fall of 2016: Music Video Project, "The Day" (Gesaffelstein Remix) by Moby
Undergraduate Presenters: Madison King '17, Advertising and Graphic Design; Katie Sainz '17, Advertising, Spanish and Creative Writing; Jonathan Perera '17, Television Arts; Matt Slifka '17, Music Business; Pablo Iglesias '17, Sports Communication; Erin Bendle '18, Interactive Media Animation and Visual Effects; Bryce Schwerbrock '19, Creative Writing; Ellie Rhodes '17, Television Arts
Mentors: Jacob Huberman, Doug Frank, Bryan Yokomi, and B.J. Lawrence, Hollywood Semester

The Bradley University Hollywood Semester program allows students to live, learn, and intern in Los Angeles for a semester. As a final capstone project for the program, our Fall of 2016 group was challenged to create a music video using a song by the electronic artist, Moby. The concept and execution of our video was a collaborative and creative process. The song our group chose for the video is titled “The Day” (Gesaffelstein Remix). The song is about drug addiction and depression. We captured the meaning behind this song by focusing on character development and the use of dream-like sequences. Our music video follows the forming relationship between the two lead characters— as they change their relationship from acquaintances to potential lovers. Through a synced drug induced sequence, we watch their relationship begin as they face their demons together. The Bradley University Hollywood Semester funded this project and has decided to use our video as a marketing tool for the program. Currently, Madison King, the director of the video, is running an online social media campaign to promote the video. We are premiering the video online on Friday, April 7th. To better assess the potential student engagement the video provides, will be showing the results of traffic and online reach at our booth as well.

2014-15 Video Game Character Census
Undergraduate Presenters: James Klock '18, Game Design; Caleb Sams '17, Game Design
Mentors: Dr. Monica McGill, Interactive Media; Tanya Melendez, Communication

The number of people who play video games has been increasing steadily in the past few years. In 2014, for example, 59% of US citizens were found to play video games (ESA, 2014). In 2009 Williams, Martins, Consalvo, and Ivory conducted a study on racial diversity in video games and found that the population of video games vastly underrepresented the american population. This follow-up study was designed to see if any progress has been made in racial diversity in video games since 2009. The award winning games in The Game Awards 2014 and 2015 were examined for their portrayal of characters and diversity of races as well as how the races are represented within their context (2014). White females increased in the video game population by 5% from the 2009 study but were still vastly under represented. There was a lack of Hispanic/Latino representation, only 0.46% in both primary characters and all characters. Racial diversity was found to be statistically different from the 2009 study and the U.S. census. Although race as a whole improved since the 2009 study, it did not match the 2010 U.S. census. Primary player representation also differed significantly from the U.S. census. Hispanic/Latino characters were the least accurately represented race, although this might be due to limitations.

enTOWERed: The Game
Presenters: Trevor Kory '19, Game Design
Mentors: Tanya Melendez and Devin Monnens, Interactive Media

enTOWERed is a '2.5 Dimensional' platformer created in IM_289 - Game Production I, and has been worked on outside of class as a personal project. Players are tasked with escaping rising tides as they scale large towers. Each level spans a section of tower, and players must outrun a flood of water that will kill them Players are challenged both by deadly waters, and an ever-present timer that tracks your every move. This timer serves as both a dynamic mechanic for posterity (to know how long it took players to complete the level) AND as a competitive measure for players pitting their times against others, or even themselves, to become more and more efficient. You have been enTOWERed, Scale walls and utilize every obstacle with wit and quick thinking to escape with your life intact!

Winner of the Provost's Award - Undergraduate

Introducing DonorClimate by TrinixCreative - Payment Processing, Integrated Custom Donation Forms, and Donor Management
Undergraduate Presenters: Kevin Mikolajczak '18, Interactive Media and Theater
Mentors: Tanya Melendez and Dr. Devin Monnens, Interactive Media
TrinixCreative serves small to mid-size non-profit organizations who work to improve the lives of their communities through environmental initiatives, education, mentoring, financial support, and other services. For these organizations, donation processing and donor retention are two of the most time consuming activities. TrinixCreative currently provides custom software that allows these organization to accept financial donations at the lowest possible rates. TrinixCreative intends to develop a cloud-based financial software product that will process donations, track transactions, allow users to build integrated customized donation forms, and oversee donor relationships.

This project was made possible in part through support from the BU Special Emphasis Student Travel Fund.

Making Subtext: An Animated Expedition
Presenters: Grant Palmore '17, Interactive Media: Animation & Visual and Studio Art
Mentors: Scott Cavanah, Interactive Media

The purpose of this research is to determine the most effective plugin scripts for character animation in Adobe After Effects. Adobe After Effects is an animation program with capabilities to insert external scripts to elicit specific styles of motion assign to artwork loaded into the program. The goal for this project was to apply the research so character rigs could be built for a short original animated film. The findings of this research demanded the juxtaposition of several different rigging systems to achieve the desired motion for the characters. The three plugin scripts studied in this project include Duik produced by Rainbox, RubberHose produced by BattleAxe, and Joystick 'n Sliders produced by Michael Overbeck. The studies were conducted through various tutorials made available by each producer and teaching programs from the School of Motion. These online tutorials were combined with practical experimentation and personal application to original characters. Each rigging system offered different advantages and defects. Consequently, each plugin script was used for different portions of the final character animation. The results of this study were used to build the characters in the film, Subtext. This film demonstrates the versatile abilities of each motion style exhibited in a creative outlet.

Winner of the Slane College of Communications and Fine Arts Award in Communications

Urban Artifacts Advertising Campaign Plan
Undergraduate Presenters: Katie Sainz '17, Advertising, Spanish and Creative Writing; Brandon Seyller '17, Advertising, English and Creative Writing; Madison King '17, Advertising and Graphic Design
Mentors: Dr. Stephen Banning, Communications
Since 2012, Urban Artifacts has specialized in providing the Peoria area with an eclectic selection of vintage and imitation vintage items ranging from home decor to apparel. However, many Peorians are unaware of the shop due to lack of visibility from a high-trafficked street, a weak brand voice, and low social media engagement. The purpose of our project is to create an advertising campaign that will inform Peorians of the store's location and hours, build brand by identifying brand voice and increasing their social media presence, and persuade residents of Peoria that Urban Artifacts is their source for vintage goods and hometown pride. Through extensive research of the industry, consumers, products, and competitors, we have analyzed the store's strengths, weaknesses, opportunities, and threats. We have applied our findings to identify a target audience and to create a year-long media plan which will use tactics such as radio ads, direct mail, promotional stickers, wall murals, signage, and Facebook and Instagram posts to achieve our communication objectives. Through creative executions centering on the big idea "make the past your next beginning" we hope to establish Urban Artifacts as the leading vendor of vintage goods in the Peoria area.

Playouse Zoetrop Project
Undergraduate Presenters: Hannah Stiff '19, Animation and Drawing ; Karalyse Hagen '19, Animation and Photography
Mentors: Scott Cavanah and Ethan Ham, Interactive Media

We are presenting our work constructing a large scale zoetrope to be featured in the Peoria Playhouse Museum. This past fall, we took courses on the History of Animation and Hand Drawn Animation which sparked our interest in the zoetrope and what animation was like prior to film and television. After learning about many early forms of animation, we wanted to explore what those methods might look like today. Encouraged by our professors, we partnered with the Playhouse to build a zoetrope for their future exhibit, with our focus being on educating children about the persistence of vision through animation. To build it, we are repurposing an old aquarium, giving the zoetrope a modern look that is kid friendly and interactive. In addition to the zoetrope itself, we will also be creating multiple interchangeable strips of animation for museum guests to view and enjoy. Our goal is to build a unique and interactive display for the Peoria Playhouse Museum and to grow as animators and professionals through our partnership with them. This is an ongoing project and we are excited to share our progress today.

Peoria Historical Society
Undergraduate Presenters: Michael Walker, Jr. ’17, Interactive Media and Graphic Design
Mentors: Tanya Melendez, Interactive Media

My project was created for my ART 306 Graphic Design class. We were required to create a redesign for the Peoria Historical Society. My group member wasn't able to participate in the Expo but we redesigned the website, along with their brochures, and Facebook header. We also created a banner that they would be able to hang around Peoria for advertising.

Winner of the Slane College of Communications and Fine Arts Award in the Fine Arts

Parallel Lines - An art documentary
Undergraduate Presenters: Allison Walsh '17, Studio Art, Spanish and Philosophy
Mentors: Dr. Margaret LeJeune, Art

The film, Parallel Lines, is a documentary art video that explores the lives and viewpoints of residents along the U.S.-Mexico border. It focuses on the border towns of El Paso, Texas and Juarez, Mexico, which some see as “one big city.” The purpose of this film is to show humane, nuanced perspective of the border instead of heightened political discourse and misleading news stories. The film will present my artistic approach to the border through visual metaphors of the people, culture, and environment of the borderlands. In January 2017, I travelled to the border to capture footage including interviews (in Spanish and English), performance works, and imagery of the landscape. Currently in post-production, the film’s anticipated release is September 2017. International distribution and presentation of the film will include online and traditional screenings, lectures, and group discussions.

The Cultural Beliefs Associated with Mental Illness and Medicine
Undergraduate Presenters: Megan Whitford '17, Public Relations
Mentors: Dr. Dan Smith, Communications

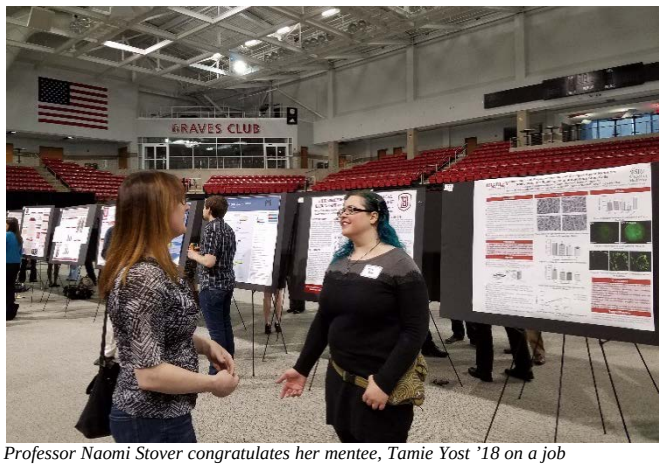
The World Health Organization has found that over 450 million people in the world suffer from the symptoms of mental illness, yet there are many cultures with varying beliefs surrounding the treatment and actual existence of these illnesses. In fact, 450 million people is drastically low, as the stigmas and disbelief attached to mental illness result in fewer seeking treatment and reporting their illness. This paper seeks to discover how medicine functions within various cultures as a deep structure institution, using theories and information from the disciplines of medicine, psychology and intercultural communication. There are three primary cultural beliefs on mental illness and medicine, ranging from those that believe in both, to those that do not believe in either. The root of the issue is that science has proven mental illness exists, yet the disbelief surrounding it creates stigmatization that prevents individuals from seeking treatment, thus leaving them to suffer in silence. Kluckhohn and Strodtbeck’s value orientations and Hofstede’s value dimensions are used to analyze the reasoning behind each cultures' beliefs, resulting in a greater understanding of differences, more tolerant behaviors, and easier communication.

Exploring Responsible Satire Through "The Simpsons
Undergraduate Presenters: Nathan Wiesehan '18, Organizational Communication, Spanish and French
Mentors: Dr. Sara Netzley and Dr. Elena Gabor, Communications

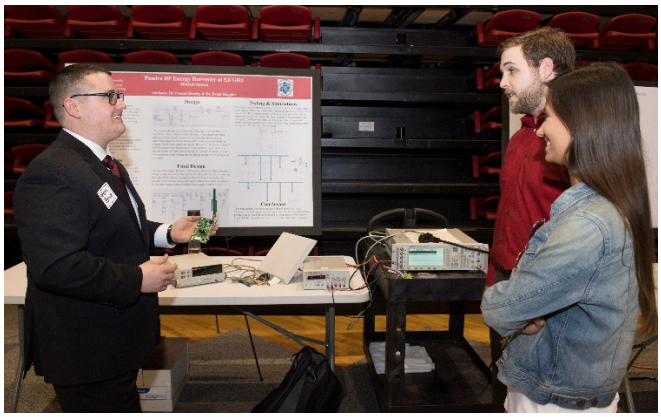
Since its premiere in 1989, "The Simpsons" has provided a cunning satire of American lives and families. Its subtle brand of satirical humor has never been duplicated. However, its approach to satire has occasionally left some of its subjects offended by portrayals they consider offensive. In my work, I analyze the aspects of satire and how to create an effective satire without causing unnecessary offense.

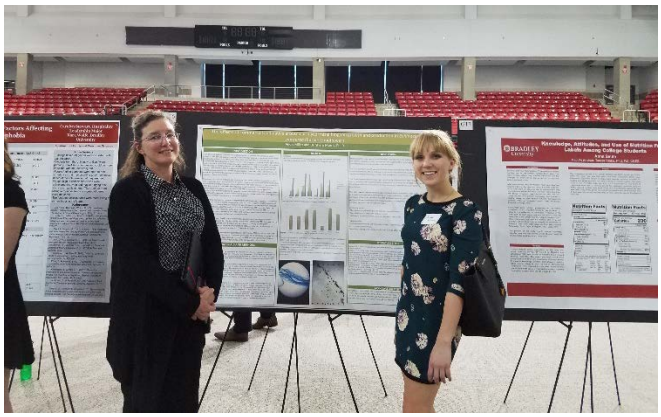
Photos from the 2017 Student Scholarship EXPO


Fantasia Graham '17 discusses her artwork with a guest.



Professor Naomi Stover congratulates her mentee, Tamie Yost '18 on a job well done.


Michael Pericak '17 takes a question from a peer


Dr. Sherri Morris and her mentee, Andie Miller '17 pose next to Andie's winning project.


Cameron McSweeney '17 and Brian Roskuszka '17 share their robot based off of the STAR WARS movies.


Max Palmer '18 poses for a photo with his family.

The 2017 Student Scholarship Expo Advisory Board

Bradley's Student Scholarship Expo is an annual campus-wide event that celebrates the research, scholarship, and creative contributions of Bradley University undergraduate and graduate students from across the disciplinary spectrum. The Student Scholarship Expo is made possible by the work of the Student Scholarship Expo Steering Committee and the Student Scholarship Expo Advisory Board.

The Student Scholarship Expo Advisory Board, comprised of faculty and professional staff representatives from across campus. The Board is charged with: (1) advising and guiding the Student Scholarship Expo Steering Committee (comprised of the professional staff and graduate assistants in the Office of Sponsored Programs and Center for Teaching Excellence and Learning) in designing, organizing, and implementing the event; (2) actively encouraging faculty and student participation in the event; (3) recruiting external judges to participate the event; and (4) participating themselves in the event as judges, faculty mentors, facilitators, or in some other meaningful capacity.

The 2017 Student Scholarship Expo Advisory Board Representatives:

Representatives from the Caterpillar College of Engineering and Technology
Dr. Prasad Shastry, Electrical and Computer Engineering
Dr. Mohammad (Imran) Hossain, Civil Engineering and Construction
Dr. Jacqueline Henderson, Mechanical Engineering

Representatives from the College of Education and Health Sciences
Dr. Kevin Finson, Teacher Education
Dr. Magdalena Sas, Family and Consumer Science
Dr. Brenda Pratt, Physical Therapy
Dr. Deborah (Deb) Erickson, Nursing

Representatives from the Slane College of Communications and Fine Arts
Dr. Elena Gabor, Communications
Dr. John Orfe, Music

Representatives from the College of Liberal Arts and Sciences
Dr. Melinda Faulkner, Biology
Dr. Danielle Glassmeyer, English
Dr. Daniel Getz, Asian Studies
Dr. Edward Remsen, Chemistry

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Dr. Jeff Bakken, Associate Provost for Research and Dean of the Graduate School
Dr. Megan Jaskowiak, Sciences and Health Sciences Librarian
Alison Morrissey, Associate Vice President for Advancement
Dr. Rick Smith, Senior Director for Employer Services; Career Advisor for the Caterpillar College of Engineering and Technology

Special Acknowledgements:

The OSP EXPO Advisory Board and the Event Organizers would like to offer our special thanks to Barbara Kerns and Dr. Jeff Bakken for contributing financially to the event; to the professional staff of the Instructional Design & Learning Technology Division of the Center for Teaching Excellence and Learning for their help in planning for and setting up EXPO; to Sharon Rast and Lucas Burton from the Office of Sponsored Programs for managing most of the event's details; to Lindsay Evens and her staff in the Renaissance Coliseum for their expert help in preparing the space and helping with event logistics; to Dining Catering Services for their support and beverage services; to CityBlue Technologies (http://www.citybluetechnologies.com/) for offering exceptionally fast, reliable, and affordable poster printing services for our students; and to all of the student presenters and faculty mentors who truly are the heart of the event and continue to astound us annually with their accomplishments.

The 2017 Student Scholarship Expo Judges

We are especially grateful to our judges who volunteer two to three hours of their time to view student presentations, evaluate their skills, and help us determine the award recipients for the EXPO. The 2017 Student Scholarship Expo Judges are listed in alphabetical order by last name:

Dr. Portia Elizabeth Adams, Director of the Social Work Program, Bradley University
Andrew Agostini, Founder and Research Lead, Scious Inc.
Dr. Chris Alvin, Assistant Professor, Computer Science and Information Systems, Bradley University
Mr. Shabeer Amirali, Director of Marketing, Recruitment, Student Success and Partnerships, The Graduate School, Bradley University
Aaron Amstutz, Chief Technology Officer, Natural Fiber Welding, Inc.
Jan Art, Recruitment Manager, Caterpillar, inc.
Dr. Jeff Bakken, Associate Provost for Research and Dean of the Graduate School, Bradley University
Dr. Jennifer Barajas, Assistant Professor of Spanish, Bradley University
Tony Ramirez Barron, Technology Support Specialist, Center for Teaching Excellence and Learning, Bradley University
Dr. Heidi Baumann, Assistant Professor, Management and Leadership, Bradley University
Laura L. Blackaby, Executive Director, The Family House
Dr. Céine Bourhis, Lecturer, Department of English, Bradley University
Paul Buck, PE, Retired, Caterpillar, Inc.
William Butler, Executive Director, Contemporary Art Center of Peoria
Monica Calugar, Six Sigma Black Belt, Caterpillar, Inc.
Scott Cavanah, Assistant Professor, Interactive Media, Bradley University
Mr. Eric R. Cochrane, PE General Manager, Belcan Engineering Group LLC
Rachel Corrigan, Physical Therapy Resident, OSF HealthCare
Margaret Cover, Expanded Family Nutrition Education Educator and Supervisor, Illinois University
Jack Daleske, Museum Educator, Peoria Riverfront Museum
Mrs. Scarlet Daoud, Hardware Platform Engineer, Caterpillar, Inc.
Dr. Lusine Demirkhanyan, Research Associate, University of Illinois College of Medicine, Department of Cancer Biology and Pharmacology
Michael Dillon, Instructional Designer, Instructional Design & Learning Technology Division of the Center for Teaching Excellence and Learning, Bradley University
Teresa Drake, Assistant Professor, Family and Consumer Sciences, Bradley University
Pamela Durr, PT, DPT, Assistant Professor, Physical Therapy and Health Sciences, Bradley University
Michelle Eaton, Advancement Services Director, Bradley University
Gina Edwards, Vice President of Marketing and Communications, Heart of Illinois United Way
Amy Fairfield, Undergraduate Recruiting Coordinator, Foster College of Business, Bradley University
Dr. Melinda Faulkner, Assistant Professor, Biology, Bradley University
Sylvia Findlay, Ph.D. Candidate, Illinois State University
Kevin D. Finson, Professor, Education, Bradley University
Jim Foley, Director, Turner Center for Entrepreneurship, Bradley University
Michelle Fry, Associate Professor and Associate Chair, Mund-Lagowski Department of Chemistry and Biochemistry, Bradley University
Elena Gabor, Associate Professor, Organizational Communication, Bradley University
Dr. Daniel A. Getz, Jr. Associate Professor, Philosophy and Religious Studies, Bradley University
Marjorie Getz, Associate Professor, Methodist College
Dr. Mae Gilliland, Director of Marketing and Communications, National Railroad Hall of Fame
Geoffrey Ginzel, Product Manager Engine and Power Systems, Caterpillar, Inc.
Susan Goodrich, Bradley Retiree and OLLI Member, Bradley University
Dr. Jaime Grace, Assistant Professor, Biology, Bradley University
Mr. Tony Grichnick, Visiting Scientist, Bradley University Intelligent Systems Lab, Caterpillar, Inc.
Tom Gunter, Director of Graphic Design, Bradley University
Sandra Guthrie, Executive Editor, Marketing and Publications, Bradley University
Dr. Peter Gyamati, Assistant Professor, University of Illinois College of Medicine
Ethan Ham, Chairperson, Interactive Media, Bradley University
Geri Hammer, Director of Employee Services, Peoria Public Schools
Dr. Luke Havherhals, Assistant Professor, Mund-Lagowski Department of Chemistry and Biochemistry
Will Helmick, Partner and Architect, PCM+Design Architects

2017 Student Scholarship Expo Judges, Continued:

Dr. Jacqueline Henderson, Associate Professor, Mechanical Engineering, Bradley University
Mrs. Karen Henderson, Adjunct Instructor, Music, Bradley University
Dr. Anthony Hermann, Associate Professor, Psychology, Bradley University
Marilyn Holt, PT, MHS, GCS, CEEAA, LTC Support; Affiliate Instructor, Physical Therapy, Bradley University
Dr. Imran Hossain, Assistant Professor, Civil Engineering and Construction, Bradley University
Wes Jacobson, Retired Technology Manager of Integrated Power Systems, Caterpillar, Inc.
Dr. Megan Jaskowiak, Science and Health Sciences Librarian, Bradley University
Marci Jett, Alum from the College of Education and Health Sciences, Bradley University
Don Johnson, President and CEO, Goodwill Industries of Central Illinois
Lori Johnson, Director of Program Services, Goodwill Industries of Central Illinois
Jim W. Johnson, Vice President (Retired), Caterpillar, Inc.
Kim Keenan, Co-Director of the Gifts in the Moment Foundation and Preceptor for the Bradley University Dietetics Internship Program
Raymond Keithley, Photographer and Retired Business Executive
Jan Kepple, Peoria Market President, The F&M Bank
Renae Kerrigan, Planetarium Curator, Peoria Riverfront Museum
Dr. Sihyun Kim, Assistant Professor, Civil Engineering and Construction
Dr. Edward Lamoureux, Professor, Department of Interactive Media and Department of Communication, Bradley University
Jerelyn Maher, Director of Legal Studies, Bradley University
John Marino, Assistant Professor, Biology, Bradley University
Luke Martin, University Relations Recruiter, GROWMARK, Inc.
William Mayo, Retired, Caterpillar, Inc.
Todd E. McAllister, LP, CP, FAAOP, Comprehensive Prosthetics and Orthotics
Mr. John McDonald, Owner, Kallister Realty
Kristy McFaul, Campus Recruiter, Baker Tilly
Kristin McHugh, Executive Director, Peoria Area World Council
Eric McMasters, Vice President, Cintal, Inc.
Kristi McQuade, Associate Professor, Mund-Lagowski Department of Chemistry and Biochemistry, Bradley University
Jeffrey M. McSweeney, Executive Director, Central Illinois Youth Symphony
Mr. Ross Miller, Director of Technology Commercialization, Illinois SBDC at the Turner Center for Entrepreneurship; Director of the Institute of Innovation through Collaboration, Bradley University
Jackee Mooney, Operations Administrator, O'Shea Builders
Alison Morrissey, Associate Vice President, Advancement, Bradley University
Rev. Mr. Paul M. Neakrase, Deacon, Diocese of Peoria; Retired Biology and Advanced Biology Instructor, Washington Community High School
Amanda Newell, Ph.D., RDN DI, Assistant Professor & Dietetic Internship Director, Family and Consumer Science, Bradley University
Spencer Null, Mechanical Engineer, Natural Fiber Welding, Inc.
Alison Oswalt, Recruiting Coordinator, IMEG Corp./KJWW Engineering
David Pardiek, Educational Consultant
Jason Pearce, Caterpillar, Inc.
Melissa Peterson, Associate Professor, Physical Therapy and Health Sciences, Bradley University
Ms. Stacy Peterson, Communications Specialist, City of Peoria
Heather Placko, Group Tours, Public Programs, & Volunteer Coordinator, Peoria Riverfront Museum
Dr. Regina Pope-Ford, Assistant Professor, Industrial and Manufacturing Engineering and Technology, Bradley University
Mrs. Marilyn Ragler, Retired Educator, Peoria Public School District 150
Dr. Edward E. Remsen, Associate Professor, Mund-Lagowski Department of Chemistry and Biochemistry, Bradley University
Mike Render, Retired Caterpillar Managing Partner, Illinois Math Academy
Juan A. Rios Vega, Assistant Professor, Teacher Education, Bradley University
Jennifer Robin, Associate Professor, Center for Professional Excellence, Bradley University
Dr. R. D. Rocke, Retired, Caterpillar, Inc.
Jacob Rockhold, Associate Engineer, Caterpillar, Inc.
Becky Rossman, CEO, Neighborhood House
Charlie Roy, Director of Development for the College of Liberal Arts and Sciences, Bradley University
Dr. Magdalena Sas, Assistant Professor, Family and Consumer Sciences, Bradley University
Tricia Saylor, PT, CLT-LANA, OSF Rehabilitation

2017 Student Scholarship Expo Judges, Continued:

Julie Schifeling, Credentialing Coordinator. College of Education and Health Sciences, Bradley University
Dr. Amy Scott, Director of Women's and Gender Studies, Bradley University
Ashley Simper, MS, RD, LDN, Community, Outpatient Dietician, OSF Medical Center at the Riverplex
Rick Smith, Senior Director for Employer Services; Career Advisor for the Caterpillar College of Engineering and Technology
Shelly Smith, Senior Director of the Bradley Fund, Bradley University
Mr. Dan Smith, Lecturer, Communications, Bradley University
Eric Sparks, PT, MPT, Physical Therapist, Professional Therapy Services
Callie Stark, Solutions Accountant Associate, The HON Company
Sandy Stemler, Retired Teacher, English Department, Illinois Central College
Dorothy Strickler, Supervisor of Foreign Language Student Teachers, Retired, Illinois Western University
Chelsie Tamms, Owner and Graphic Designer, Lettering Works, Inc.
Ege Turen, Talent Manager and OD Specialist, ATS
Tiara Vamer, Business Development/Recruiting Manager Advanced Cad/Cad Service, Engineering People
Dr. AJay Wagner, Assistant Professor, Communications, Bradley University
Dr. Jing Wang, Assistant Professor, Electrical and Computer Engineering, Bradley University
Brant Watson, Communications Representative, Caterpillar, Inc.
Ms. Angela Weck, Faculty, Institute of International Studies, Bradley University
Shawn Weck, Chief Engineer for Embedded Controls, Advanced Components & Systems Division, Caterpillar, Inc.
Dr. Chuck West, Adjunt Faculty, Management Information Systems, Bradley University
Brent Wiley, Assistant Professor, Interactive Media, Bradley University
Carl Williams, Senior Vice President, Chapin Davis Investments
William Willmingham, Retired Math Teacher, Illinois Central College
Dr. Bob Wolffe, Professor, Education, Bradley University
Dr. Jacob Young, Assistant Professor, Management and Information Systems, Bradley University