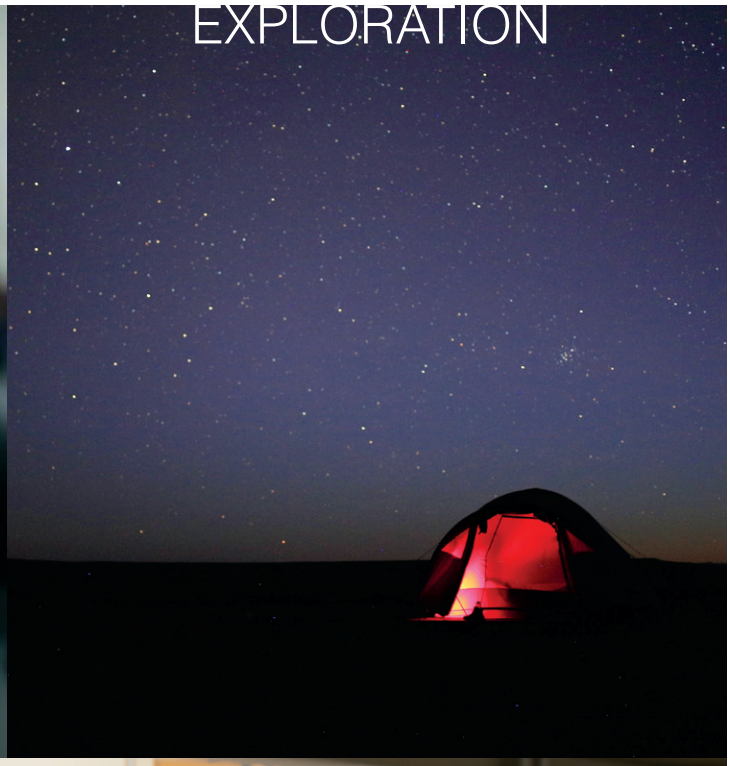

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Focus on Creative Inquiry

12th Annual Poster Forum
April 5-6 2017

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CREATIVE INQUIRY

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12th Annual Focus On Creative Inquiry Poster Forum

The 2017 Focus on Creative Inquiry Poster Forum displays a selection of the projects accomplished by Clemson University students in their Creative Inquiry teams.

What is Creative Inquiry? It is small-group learning for all students, in all disciplines. It is the imaginative combination of engaged learning and undergraduate research – and it is unique to Clemson University.

In Creative Inquiry, small teams of undergraduate students work with faculty mentors to take on problems that spring from their own curiosity, a professor's challenge, or the pressing needs of the world around them. Students take ownership of their projects. They ask questions, they take risks, and they get answers.

Since its start in 2005, Creative Inquiry has supported more than 1000 projects enrolling approximately 25,000 undergraduate students.

Students may join Creative Inquiry teams as early as freshman year and continue through graduation and afterwards as graduate student mentors. They hone critical thinking and problem-solving skills as they learn to work in a team - sometimes as leaders, sometimes as followers. They develop communication skills as they present their work at professional conferences and to the external community, where they field questions from experts and decisionmakers.

Creative Inquiry alumni praise their experiences for exposing them to real-world work experiences not available in the classroom, providing hands-on research experiences, preparing them for their future careers and providing opportunities to work closely with faculty.

Indeed, Creative Inquiry is a campus-wide, cross-disciplinary culture that makes the Clemson experience relevant, engaging and extraordinary.

Learn more about Creative Inquiry in the annual Decipher magazine at clemson.edu/ci

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ACKNOWLEDGEMENTS

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THE WATT CENTER

Welcome to the Watt Family Innovation Center, Clemson University's newest and most versatile academic building which opened in January 2016. The Watt offers a setting and resources that promote cross-disciplinary interactions and collaborations among faculty, students and industry. The 70,000 square foot building harbors 191 high definition touch computer screens, 3D video walls, table and window whiteboards, and more than 73 collaboration spaces. Software allows users to share screens and to communicate anywhere in the world via virtual connectivity. The Watt is Clemson's epicenter for innovation and cross-disciplinary engagement, thus it is a natural home for Creative Inquiry.

The Watt is the vision of Clemson alumnus and founding director, Dr. Charles Watt '59. His experience in education, government and industry molded his conviction that students should experience cross-disciplinary, collaborative environments, as well as depth of knowledge in their majors, to better prepare themselves for careers after graduation. He recognized that students need breadth of understanding, entrepreneurial outlook, communication skills, critical thinking and the ability to work in diverse teams.

Thus the Watt is a building and a mission – to help students develop the skills they need by facilitating cross-disciplinary engagement opportunities and collaborations among industry partners, faculty and students. The Watt brings disciplines together in a collaborative environment, to spark research and innovation.

The Creative Inquiry offices are now housed in the Watt, emphasizing our commitment to interactive cross-disciplinary student research. All Creative Inquiry projects – and all Clemson's students - are encouraged to consider how they can use the Watt's unique technology to advance their projects. Students said it best, the Watt is an "Overall Awesome Facility [that] encourages higher learning, innovation and collaboration." on skills, critical thinking and the ability to work in diverse teams.

SCHEDULE OF EVENTS

5 APRIL WATT ATRIUM

8am-9:30am Students Setup/Install Posters (Posters 1-52)

10am-12pm Morning Poster Session

1pm-3pm Afternoon Poster Session

6 APRIL WATT ATRIUM

8am-9:30am Students Setup/Install Posters (Posters 53-104)

10am-12pm Morning Poster Session

1pm-3pm Afternoon Poster Session

3pm-4pm Plenary Session, Watt Center Auditorium
Welcome - Cora Allard-Keese
Featured Speaker - Dr. Michael Sehorn, *Genetics and Biochemistry*
Award Announcements - Cora Allard-Keese

4pm-5pm Students Remove Posters

Digital posters 'A' are in the AM session and 'B' are in the PM session.

SPEAKERS

Michael G. Sehorn

Associate Professor of Genetics and Biochemistry

Dr. Sehorn is a biochemist whose NIH-funded research is focused on understanding the repair of DNA damage and genome maintenance by homologous recombination. Homologous recombination is a conserved error free DNA repair pathway used by cells to repair DNA double stranded breaks. His students contribute to research projects that investigate the underlying mechanisms of homologous recombination in yeast, human and the eukaryotic pathogen *Entamoeba histolytica*. Dr. Sehorn is the faculty advisor for the Colleges Against Cancer American Cancer Society Relay for Life and for the Alpha Epsilon Delta (AED) The Premedical Honor Society. Dr. Sehorn has supervised the research of six graduate students, 43 undergraduates, three visiting undergraduate researchers, and over 430 Creative Inquiry students.

Cora Allard-Keese

Associate Director, Creative Inquiry

Cora Allard-Keese earned her M.S. in Entomology at the University of Kentucky and a B.S. in Biology at Millikin University. Currently, she is working on her doctorate in Wildlife and Fisheries Biology at Clemson University studying the impact of microclimate variations on the breeding phenology of the wood frog, *Lithobates sylvatica* and the impact if local resident knowledge on research and conservation efforts in highly dissected mountain landscapes. Cora joined the Office of Creative Inquiry and Undergraduate Research as the Associate Director in the fall of 2015. She has been a collaborator on several funded grants to enhance the pre-college learning experiences in the state of South Carolina, including grants through the Howard Hughes Medical Institute Precollege and Undergraduate Science Education Program. Though diverse disciplines compose her professional background, a reoccurring theme of engaging students in science and research via diverse and innovative methods is prevalent.

The Phil and Mary Bradley Award for Mentoring in Creative Inquiry

The *Phil and Mary Bradley Award for Mentoring in Creative Inquiry* is presented each spring in recognition of outstanding work with undergraduate students. Nominations are accepted from student participants in Creative Inquiry Initiative team projects. The award is made possible by a generous gift from Phil and Mary Bradley, and consists of a plaque and a salary supplement.

- **2016 — Michael Sehorn, Genetics and Biochemistry**
- **2015 — Michael J. Childress, Biological Sciences**
- **2014 — Heather Walker Dunn, Animal and Veterinary Sciences**
- **2013 — Molly Kennedy, Materials Science and Engineering**
- **2012 — John DesJardins, Bioengineering**
- **2011 — Delphine Dean, Bioengineering**
- **2010 — June J. Pilcher, Psychology**
- **2009 — Karen Kemper, Public Health Sciences**
- **2008 — Susanna Ashton, English**
- **2007 — Mark Charney, Performing Arts**

PLENARY LECTURE

Dr. Michael Sehorn

DNA double-strand breaks can result from exposure to endogenous sources such as free radicals and collapsed replication forks or through exposure to exogenous sources such as ionizing radiation. Efficient repair of these breaks is important to maintain genome stability. Homologous recombination (HR) is one of two major pathways that repairs DNA double-strand breaks. Homologous recombination is a major pathway that utilizes a template to mend DNA double-stranded breaks. This pathway contains numerous proteins including the RAD51 and DMC1 recombinases. My laboratory strives to understand the mechanism of homology-directed repair of DNA double-strand breaks mediated by RAD51 and DMC1 in *Saccharomyces cerevisiae*, *Entamoeba histolytica*, and humans. Dr. Sehorn recruits Clemson undergraduates into his lab to provide an opportunity for the student to not only learn molecular biology and biochemical laboratory techniques but also how to think critically about problems using the scientific method.

5 April-Digital posters 'A' are in the AM session and 'B' are in the session.

Poster #0

One Disorder, Many Understandings: How Culture Affects Perception of Autism Spectrum Disorder

Mentor: Jennifer Bisson, Psychology

Students: Grace Grantland, Kelsi Gwinn, Kristen Baldo

The purpose of this study was to examine cross-cultural differences in attitudes towards autism. This study explored the factors that affect attitudes including collectivism, individualism, knowledge, gender, and age. We were especially interested in the self-reported definitions of disease, disorder, and autism and how the participants recorded causes, symptoms, and treatment of autism. 300 participants from China and Ireland were recruited through Lightspeed GMI, a worldwide digital data collection group. Participants completed a survey constructed of the Auckland Individualism-Collectivism Scale, the Autism Awareness Survey, an IAT, and open-ended questions developed by the researchers. We will perform independent t-tests to determine differences between China and Ireland in how they view autism. We will be able to see if there is a significant difference in the knowledge (causes, symptoms, and treatment) of autism between the two countries and whether their cultural views affect their perception of autism.

Poster #1

Hydraulic Jump Instabilities

Mentors: Daniel B Fant, Mechanical Engineering, Joshua Bostwick, Mechanical Engineering

Students: Taylor Nichols, Blake Smith, Edwin Wentzky

Hydraulic jumps are ubiquitous in nature and appear over a large range of length scales, from the kitchen sink to tidal basins and dam spillways. In this study, we use carefully conducted experiments to characterize the geometry of the hydraulic jump as it depends upon flow rate, fluid properties, and weir geometry. When water is used as the working fluid, smooth, circular (Type I) jumps are reported. In contrast, when ethylene glycol is used the jumps display remarkable polygonal shapes (Type II) that are achieved by a careful balance of viscous, inertial and surface tension forces. Future iterations of the experiment will involve non-circular weir geometries, viscosity variations using glycerol/water mixtures, as well as image analysis to reconstruct the complexity of the jump surface.

Poster #2

Shell Organisms From Clemson Area Lakes

Mentor: Carlos Barrios, School of Architecture

Students: Joseph Busher, Thomas Curry, Max Faykus, Jared Frager, Jillian Gaskins, Nicholas Hafner, Justin Horne

This research in progress presents initial findings in the research of living shell organisms in the lakes surrounding Clemson. Special attention is given to shells and snails. This research studies their habitat and aims to maps the location and density in lakes Hartwell, Keowee and Jocasee.

Poster #3

Improving Quality of Life for Those with Dementia and Their Family Caregivers

Mentor: Cheryl Dye, Public Health Services

Students: Erica Ball , Elizabeth Cox, Natalia Gonzales, Cameron Nolan, Tyler Nguyen, Legare Passailaigue, Julia Pikula, Madison Tracey, Emma Tuttle, Emily Young, Karina Edwards, Addie Merritt, Emily Nance

Following a comprehensive dementia care training, CI students implemented strategies to promote quality of life of those with dementia in a community-based setting. They developed dementia appropriate interactive activities to promote cognitive stimulation and social engagement. Students implemented the dementia appropriate activities for eight weeks in fall 2016 and ten weeks in spring 2017 at a community respite center that serves approximately 10 individuals with dementia. They collected data using the Cincinnati Observation Check-list to measure participants' level of engagement in the activities. Based upon their observations, students then developed personalized activity programs for the family caregivers to implement with their care recipient in the home. While their care recipients were engaged in the activity program, family caregivers participated in a best practice caregiver education program offered by the CI mentors. Students assisted the mentors in analyzing pre- and post-intervention data to determine changes in family caregiver knowledge and attitudes regarding their caregiving role.

Poster #4

Teaching Induction and Deduction: Effect of Class Size

Mentor: Benjamin R Stephens, Psychology

Students: Elizabeth Irvin, Hyewon Seo

One of the primary objectives of our university's Quality Enhancement Plan is to assist undergraduates in the development of their critical thinking skills. Our study examined the effect of class size on the impact of an intervention designed to enhance critical thinking. We expected that there would be increases in posttest scores among all class sizes but that smaller class sizes will show larger increases. Participants (n=120) were randomly assigned to one of our four class sizes. The participants took a pretest that consisted of 12 inductive and deductive arguments each with eight response alternatives. Then participants were shown a tutorial explaining inductive and deductive reasoning, followed by a posttest containing 12 novel items. There was a significant interaction between pretest/posttest and type of response ($p<0.0001$). The interaction indicates that our training module improves critical thinking scores, which is likely due to improved understanding inappropriate answers. That pattern was the same for all class sizes.

Poster #5

Antimicrobial Effect of Volatile Organic Compound Capturing Nanoparticles

Mentors: Kristi Whitehead, Biological Sciences, Krista R Rudolph, Biological Sciences

Students: Kyleigh Connolly, Jonnise Macomson, Anthony Santilli, Daniel Whitehead

The advancement of nanotechnology in society has profound effects on multiple industries, including cleaning products. Nanoparticles are used in cleaning products to produce films to keep surfaces clean, enhance soap to reduce environmentally harmful byproducts, and act as antibacterial agents. Dr. Daniel Whitehead's lab has successfully designed nanoparticles that capture volatile organic compounds in the atmosphere. Our lab is focusing on testing modified versions of these nanoparticles as antimicrobial agents. Our lab conducted weekly assays at 0 and 120 minutes and monitored the growth of *Escherichia coli* and *Staphylococcus aureus*. At 0 minutes, the cultures were analyzed by spectrophotometer, diluted and plated at the 10-5 to 10-7 dilutions, and then the nanoparticle was added. At 120 minutes, the cultures were plated at the same dilution. Effectiveness of each drug was determined by the number of colony forming units on the plates between 0 and 120 minutes. There is no significant decrease in the growth of either microbe with added nanoparticle. We plan on running new nanoparticles with *E. coli* and *S. aureus* as well as testing all nanoparticles with more bacteria.

Poster #6

Spatial Analysis of Deaths in Pickens County, SC

Mentor: Katherine Weisensee, Sociology and Anthropology

Students: Amanda Marcotte, Anne Shillinglaw, Aaron Whetstone, Elizabeth Rhodes, Kylie Anderson, Madison Lucas, Madison Schweikert, April Couch Hoffman

This project uses geospatial methods for examining demographic trends of deaths in Pickens County, SC beginning in 1968. Coroner records from Pickens County, SC are currently stored in paper files at the coroner's office. ArcGIS software is used to create a relational database with geospatial information of death's in the county. This project serves Pickens County by preserving coroner records in a digital archive. The geospatial data also allows for patterns of death in the county to be examined both temporally and spatially. The death records are used to examine questions related to changes in cause and manner of death over time and across the county, variation in drugs and types of weapons associated deaths over time and across the county, and socioeconomic indicators related to deaths. A detailed understanding of mortality patterns provides important insights into the broader social trends. This project was supported by funding from the Creative Inquiry at Clemson University.

Poster #7

Sustainable Hydronic Heat Extraction and Use in a Closed Greenhouse System

Mentors: Geoffrey Zehnder, Plant & Environmental Sciences, Shawn Jadrnicek, Plant & Environmental Sciences

Students: Alexander Abare, Caleb Beigay, Fredrick Carruth, Karli King, Lillian Kome, James Koon, Meredith McSwain

The goal of these experiments was to analyze and compare various methods of heat extraction and its targeted release into a greenhouse system. Modifications to last year's barrel series compost heat exchange apparatus were made to improve efficiency allowing for more accurate comparison between the BTU generation of the plastic and metal barreled systems. Both systems have similar mechanisms, filled with water, acting as batteries to charge and then release their energy in the form of heat. These utilizations of both solar energy and thermal energy from the compost pile are intended to be cost effective ways to reduce the need for traditional, more expensive, and less sustainable heating methods.

Poster #8

The Fantastic in Hispanic Film

Mentor: Graciela Tissera, Spanish

Students: Elouise Cram, Rebecca Mcconnell, Robert Campos, Megan Courage, Michelle Fuentes, Hannah Gilliam, Danielle Haight, Colin Jones, Rachel Rogers

This project will focus on the genre of science fiction and fantasy through films by world renowned Hispanic film directors. The analysis will explore uncanny and marvelous elements related to parallel worlds, urban legends, the Lazarus syndrome, extrasensory perception, and dissociative identity, among other topics, as well as cinematic conventions and themes in fantastic films. With historical, cultural, political, and scientific contexts, this project will analyze supernatural phenomena as presented in films to determine the line between reality and unreality and the gateways between alternate worlds in order to forge an understanding of the unknown.

Poster #9

Views of a General Education ePortfolio: STEM versus Non-STEM Majors

Mentor: Benjamin R Stephens, Psychology

Students: Eva Diaz, Cierra Stanton

Before graduation, Clemson undergraduate students completed a general education eportfolio, but the requirement was removed for its unpopularity. We examined how students valued three different types of learning goals (major specific, central to major, and not central to major) in their eportfolio and took into consideration STEM and non-STEM majors' perspectives. They were asked to rate the value of each type of learning goal to their specific major. Our findings suggest, students valued learning goals more if they were related to their major. Students also rated the relevance of all learning goals, and the results showed that Non-STEM majors rated social science, cross-cultural awareness, and ethical judgment as more relevant. STEM majors rated natural sciences and technology in society as more relevant. The unpopularity of eportfolios could be due to its requirement to include learning goals not related to students' majors. We argue that eportfolios should be major specific.

Poster #10

Bamboo Reinforced Concrete

Mentor: Weichiang Pang, Civil Engineering

Students: Grace Brokaw, Mitchell Cook, Lee Davis, Mayank Patel, Austin Repp, Emma Ressler, Charles Spong

Recent investigation shows strong promise in the use of bamboo as an alternative reinforcement. Steel rebar, the primary structural reinforcement in the United States, is too expensive to successfully implement in Haiti, leaving Haitian infrastructure with little to no structural reinforcement. As seen with Haiti's 2010 Earthquake, this poor infrastructure can lead to thousands of deaths in times of natural disaster. Our preliminary research and tensile strength tests have shown bamboo to have the ability to work as a comparable substitute for steel rebar. However, unlike steel rebar, bamboo is inexpensive and can be locally grown, thus making it optimal for Haiti. Additionally, this group is constructing and testing bamboo reinforced walls to determine the effectiveness of bamboo as a steel rebar substitute. This Creative Inquiry project is sponsored by Clemson Engineers for Developing Countries and is headed by Dr. Weichiang Pang.

Poster #11

Natural Collaborations: Pathway to Beautiful Books

Mentor: Suellen Pometto, Plant & Environmental Sciences

Students: Alston Badger, Caroline Brittingham, Willie Coleman, Rachel Mangan, Allison Stoiser, Savannah Wood

Our CI team originated from outstanding written and visual work submitted for an entomology assignment. We combined the talents of these students from various majors with English and Visual Arts majors to produce educational children's books about nature. Our goals are to use written and visual arts to convey biological concepts in trade books for science education, and to captivate youth with the wonders of nature. Our methods begin by teaming up illustrator with author. Through group discussion, all students contribute to development of the written and visual elements. We decide on the design of each book, and then combine the elements on a story board for placement of text and images, with alignment to learning objectives. When the planning is complete, we construct the book using InDesign which results in a pdf version for printing. Students are investigating options for publishing. Students will present the finished books to preschool and elementary students with lessons designed to build connections with nature. In addition to providing engaging nature books, this plan can be implemented as an interdisciplinary STEAM project at the high school level.

Poster #12

Engineers Without Borders

Mentor: Mark A. Schlautman, Environmental Engr & Earth Sci

Students: Hayley Braun, Elizabeth Brigham, Katherine Bellino

Engineers Without Borders is teaming with El Serrano, Nicaragua—a small, rural village of 3,000 people—to design sustainable solutions to improve the community's access to clean drinking water and rebuild a bridge. The existing water system consists of two rain-fed mountain sources piped into a concrete storage tank and distributed to homes. However, this system is highly dependent on seasonal fluctuations and is estimated to provide only 30,000 gallons per day in the six-month dry season compared to 200,000 gallons per day in the wet season. This insufficient seasonal supply, coupled with *E. coli* contamination, warrants the design and installation of a production well and a water treatment strategy/system. In addition, a new walking bridge is required to cross a river that divides the community. The current bridge poses a safety threat and is inaccessible for several weeks during the wet season due to flooding. The team is in the design phase for the water and bridge projects, and will utilize existing infrastructure and locally sourced materials. The team would like to thank Synterra Corp, Creative Inquiry, Boeing, and EWB-USA for their support of this project.

Poster #13

Nitrogen Loading and Coliform Bacteria in Eighteen Mile Creek

Mentor: Scott E Brame, Environmental Engr & Earth Sci

Student: James Wykel

Eighteen Mile Creek (EMC) is a perennial stream that starts in Easley, SC and empties into Lake Hartwell. This study analyzed the contributions of tributaries to the cumulative nitrogen load and bacterial count in EMC. Eight sites were sampled along the length of the creek. Mass rates of transport were calculated for nitrate, nitrite, ammonia and phosphate. Escherichia coli and total coliform counts were calculated to determine the fecal load. It was found that two locations, Nettles Park and the bridge on Pendleton Road, had higher concentrations and fecal counts compared to the other sampling sites. Nettles Park is located directly next to a dog park. This would indicate that canine fecal matter and possibly fertilizer used at the park are contributing to the degradation of water quality. The Blackbottom Road site also had elevated concentrations of coliforms. A land assessment in Google Earth was performed and no source contributing to the elevated levels of coliforms could be discovered. The potential for eutrophication in the EMC was also investigated. A determination was made that it is not in danger because the highest nitrate concentration found was just under three parts per million. The United States Geological Survey defines streams being in danger of eutrophication if they contain a nitrate concentration of five or more parts per million. Water quality in EMC could be improved if fecal matter entering the creek was limited. This could be done by preventing runoff from the dog area at Nettles Park.

Poster #14

Aspects of Trapping

Mentor: Webb M Smathers Jr, Plant & Environmental Sciences

Students: John Bryan, Matthew Honeycutt, Bailey Baldridge, Sarah Caldwell, Melody Reynolds, Gill Wilson

For our creative inquiry, we focus on learning and implementing the aspects of trapping. We trap in order to keep the population of nuisance animals at a manageable number and to prevent environmental degradation. These animals can cause a lot of damage to the areas that are most important to us, especially in the forest and water areas. Wild hogs, beavers, coyotes, carpenter bees and many other animals and insects reproduce at a very quick rate, and they can do a lot of damage. Many people have come into contact with a nuisance animal, but they may not be aware of it. If someone were to have a mouse in their house, what is the first thing they would do? Set up a mouse trap of call someone to remove it. That is what we are doing in this creative inquiry, but on a much larger scale.

Poster #15

Interpretation of Mylonites and Other Ductile Shear Indicators from the Six Mile Quad, SC

Mentor: Scott E Brame, Environmental Engr & Earth Sci

Student: Katelyn Marcacci

Like much southern Appalachian geology, the structural geology of the Six Mile Quad is complex and convoluted. Thrust faulting in the Six Mile Quad resulted in structural deformation along Six Mile Creek. Kinematic indicators, associated with ductile shear zones, are evident in the structurally distorted biotite gneiss and mica schist. Shear stress in the area is indicated by rotated poryphyroblasts, biotite sericitization, and hydrothermal mineralization of botryoidal goethite. Several asymmetric and overturned folds show evidence of localized distortion. In this area, thrust faulting had an oblique motion resulting in ductile shear and localized distortion. Thrusting was primarily lateral but also had horizontal motion resulting in the kinematic indicators mentioned above. These results are congruent with the zipper tectonic model where ductile shear is the result of rotational continental collision.

Poster #16

Using Educational Outreach To Reduce Human-Elephant Conflict In Myanmar

Mentor: Christie Sampson, Biological Sciences

Students: Mary May, Alexandra Scott, Gabriella Carpenter

As part of an ongoing series of projects, the Human-elephant Conflict Creative Inquiry team created a children's alphabet book which intends to address and mitigate the human-elephant conflict in Myanmar. The book has the goal of humanizing elephants in order to abate fear of the animals beginning at a young age. It will utilize colorful illustrations and an age-appropriate story about an elephant who is traveling throughout Myanmar. Each page of the book focuses on one letter of the alphabet and advances the story using culturally relevant words that begin with that letter.

Poster #17

An Educational Model of an Atomic Force Microscope

Mentors: Vladimir Reukov, Bioengineering, Aleksey Shaporev, Bioengineering

Students: William Bagnal, Thomas Roberts, Fletcher Roberts

The Atomic Force Microscope (AFM) is an important tool in modern nanoscience, capable of producing surface maps at resolutions below 1nm, which is not possible using other microscopy methods. Although AFMs are highly used, the process is difficult to visualize because the measurements and mechanics of the machine take place at a micro- and nano- scale. Headed by Dr. Vladimir Reukov, this Creative Inquiry project aims to create a macro scale model of the AFM. This model will act as an educational tool to show the principles behind the AFM to students who are unfamiliar with the technique. Currently a fully automatic microprocessor-controlled surface scanning block has been built and successfully tested. The stage moves in two directions while a cantilever beam deflects off of a surface, moving the attached laser in response to differing elevation levels of the surface. A program in MATLAB has been created to convert the video from the deflection of the laser into a real-time, three dimension topographic rendering. Continued work includes refining the stage movement, refining the rendering code, and refining the mechanical components of the model.

Poster #18

Tiger Gardens: Educating Future Generations on Health and Sustainability

Mentor: Dilrukshi Thavarajah, Plant & Environmental Sciences

Students: Jonathan Anderson, Jonathan Chaney, Martha Chapman, Brodie Cox, Dallas Erwin, Anna Fisher, Joshua Kay, Meredith Mcswain, Haley Moore, Jance Shine, Alexander Abare

Tiger Gardens is a student led initiative designed to produce tangible community enrichment through hands-on education of elementary students, by focusing on sustainable gardening and nutrition. This program has already established Tiger Gardens at Clemson University, Pendleton Elementary, and has begun restoration at Central Elementary. The project strives to combat childhood obesity and the micronutrient deficiency that results from food insecurity. This is done by creating experienced youth, in Title I schools and surrounding communities, who are eager to start sustainable gardens at their own homes. Other key objectives of Tiger Gardens include preparation and preservation of produce, and vegetable cultivation by providing recipes and guides to determining the nutritional value of a variety of foods.

Poster #19

Intact Composite Intervertebral Disc Scaffolds Developed by Decellularizing Bovine Tail Caudal Discs

Mentor: Jeremy Mercuri, Bioengineering

Students: Alexandra Boulez, Victor Casler, Courtney Doyle, Alexander Garon, Noah Minton, Christopher Rood, Tyler Watt, Nicole Wyman, Austin Hensley, Jess Rames

Intervertebral disc (IVD) degeneration (IDD) is a multifactorial process which, in the long-term, can lead to the structural and functional demise of the nucleus pulposus (NP) and annulus fibrosus (AF), resulting in lower back pain and significant socioeconomic distress [1,2]. Current treatments are palliative and do not regenerate the IVD. Thus, the development of an intact, composite scaffold that can be used to regenerate a disc in its entirety (containing both NP and AF tissue) and is mechanically similar to a living IVD would be of significant therapeutic benefit. The objective of this research was to develop a decellularization (decell) protocol that could be used to remove host cells from an intact bovine IVD in order to create a scaffold that mimics the human IVD and could eventually support stem cells for IVD regeneration. Significance**:** A simple and scalable decell method was developed in order to create a complex, intact IVD scaffold having both intact NP and AF regions, dimensions, and ECM which mimic the native human lumbar IVD. Taken together, this biomaterial scaffold could be used in conjunction with stem cells to generate a living total IVD replacement for patients suffering from late-stage IDD.

Poster #20

The Effects of Low-Dose Radiation on Various Cell Types

Mentors: Delphine Dean, Bioengineering, Endre Takacs, Physics and Astronomy

Students: Bryana Baginski, Suzanne Bradley, Katelyn Truong

Radiation is commonly used for many medical applications, including cancer therapy and diagnostic imaging. It has been assumed that these doses of radiation have negligible effects on human tissue. However, our study aims to determine how low-dose radiation affects cell proliferation, protein production, and gene expression in a wide variety of cells. A unique x-ray radiation source provided by Clemson's Physics Department was used to irradiate the cells, and proliferation tests were performed. Preliminary data shows that at low doses, Osteoblasts (bone cells) saw a decrease in proliferation, while Fibroblasts (connective tissue cells) increased dramatically over time. Furthermore, Endothelial (heart cells), and MCF7's (breast cancer cells) showed no change in proliferation. Based on these results, more research needs to be done to compare the effects of radiation on the various cell types and to analyze if these effects are due to improper gene expression or protein production.

Poster #21

The Machined Shoe

Mentor: David Lee, School of Architecture

Students: Patrick Danahy, Eric Bell

From an ideological perspective, 3D printing presents a global accessibility, the possibility for individuals to produce customized designs at the push of a button. Recognizing marketing potential in this, the footwear industry has pursued additive manufacturing in the hopes that access to footwear becomes ubiquitous. The parameters inherent to this technology are the machine's ability to increase customization of designs at little to no additional cost. The manufacturing implications are profound; at the click of a button a digital file of a shoe that is specifically designed to an individual's foot can be sent across the world and locally manufactured, without any human interference. But are there implications beyond fashion and high dollar athletic performance apparel? The increase in demand for customized footwear has caused the custom orthotics industry's prices to remain high; meanwhile, access to free services such as Dr. Scholl's® Custom Fit™ Kiosks allow anyone to generate detailed digital imagery that can be used as an input to design a customized, 3D printed shoe. My research investigates the combination of the aforementioned available technology and software in combination with parametric modeling software to create customized consumer products at very low cost. This research pushes to create a functioning supply chain, based on accessible services, to bring affordable manufacturing and mass customization to the individual. The furthering of this research, in the form of physical iterations, as well as increased efficiency in the digital supply chain and communication could create a universality of footwear.

Poster #22

Novel Antioxidant Conjugates Based On Nanocrytalline Ceria And Sod/Catalase

Mentors: Vladimir Reukov, Bioengineering, Dmitry Gil, Bioengineering

Students: Jeannette Rodriguez Gonzalez, Nicholas Tourville, Brendan Ward

Congestive heart failure affects 6 million Americans and results in a 35% mortality rate in the year immediately following diagnosis; one of the most common causes of heart failure is the loss of myocardial function. Success of treatment methods depend on the extent of oxidative damage to the myocardium caused by reactive oxygen species (ROS). Sufficient amounts of ROS in the myocardial environment may lead to incomplete regeneration of myocardium by stem cells. In order to decrease oxidative damage, superoxide dismutase (SOD) or catalase, two classes of enzymes, provide pronounced antioxidant effects. However, SOD and catalase activity are inhibited by their dismutation products. It is herein proposed that nanocrystalline cerium dioxide (ceria) is used with SOD to scavenge peroxide ions, and with catalase to scavenge superoxide radicals. Nanocrystalline ceria was synthesized via solvothermal method and characterized by means of X-ray powder diffraction, transmission electron microscopy (TEM), and dynamic light scattering (DLS). SOD-nanoceria conjugates and catalase-nanoceria conjugates were prepared by mixing the individual parts. The conjugates' antioxidant activity was assessed via enzymatic activity assays and was found to have significantly higher antioxidant activity when compared to non-functionalized nanoceria and pure SOD/catalase.

Poster #23

Screening Gene Deletion Library Of Cryptococcus Neoformans To Elucidate The Role Of Septin Proteins In Cytokinesis

Mentor: Srikripa Chandrasekaran, Genetics and Biochemistry

Students: Jessica Zielinski ., Elena Huey, Alexander Rubin, Elizabeth McCormack, Lukasz Kozubowski

Cryptococcus neoformans is a pathogenic fungus that is known to cause cryptococcal meningitis primarily in immunocompromised patients. One potential target for drug development to treat cryptococcosis is the septin group of proteins. Septin proteins are known to play a key role in cytokinesis during fungal cellular division. In *C. neoformans*, septins are essential for growth at the host's internal temperature and when a stress response phosphatase calcineurin is inhibited. However, not much is known regarding *C. neoformans* cytokinesis and how exactly septins contribute to this essential part of cell division. Approximately 4,500 *C. neoformans* deletion strains were screened to identify genes that could be involved with the septin pathway or play another significant role in cytokinesis. Two conditions of growth were tested: 1) host temperature and 2) inhibition of the phosphatase calcineurin. Candidates were selected based on a characteristic phenotype similar to that of the septin deletion strain - inhibition of growth and elongated morphology, resulting from cytokinesis failure. A total of 25 candidate genes were identified including 5 genes that have been previously described as involved in cytokinesis.

Poster #24

Development of an Organic Light-Emitting Diode for Biomedical Application

Mentors: Vladimir Reukov, Bioengineering, Dmitry Gil, Bioengineering

Students: Taylor Gustaveson, Alison Markley, Kelsey Palsgrove, William Scammon

Currently, OLEDs are widely used for fabrication of displays, and can be used to build numerous electronic and photonic devices. Their wide use can be attributed to many factors, including low power consumption, wide gamut array, high contrast ratio and better picture quality when compared with conventional displays. Additionally, because of the "sandwich" structure, OLEDs possess flexibility that increases their functionality in biomedical devices, allowing for flexible light sources and detectors. Due to these advantages, there has been an increased demand for OLEDs in the field of biomedical engineering. Therefore, the goal of this study is to develop and manufacture durable OLED patches capable of emitting in the red and near infrared range of spectra. To achieve this goal, we first focused on the development and synthesis of the appropriate luminophore.

Poster #25

Joining the Resistance: Microbial Presence and Antibiotic Resistance in Student Exercising Environments

Mentor: Shiou-jyh Hwu, Chemistry

Students: Natalie Alvarez, Cody Lefort, Xiuping Jiang

Universities are a breeding ground for disease. There are many reasons college students specifically are more susceptible to getting a disease, including overcrowded living conditions, poor hygiene, high travel, and compromised immune systems. Colleges do their best in order to prevent disease, such as offering immunizations, but they are not always successful. In this study, we investigate how effective one college, Clemson University, is at controlling the levels of bacterial species at their athletic facility, Fike, an area that comes into contact with a very large number of students every day. We were also interested in the diversity and antibiotic resistance of species present. After taking samples by swabbing various equipment and locations in Fike, we grew the microbes on agar plates to count the number and to test for resistance. We also tested for fecal contamination. It was found that the microbial load was very low for the sample areas with no recorded recall contamination, that most of the methicillin resistant strains isolated were what appeared to be a gram positive staphylococcus or yeast and gram-positive bacilli, and that all the tetracycline isolates were gram positive cocci. It was also found that even in open air environments, cocci or yeast still predominated. We hope to soon sequence the 16S RNA and, in the case of yeast, 18S RNA genes to determine species and plan to test for multidrug resistance. We also plan to expand our study to the other athletic facilities on campus where the cleaning procedures are controlled by a separate department and are drastically different.

Poster #26

Change the Name, Change the Game: Cyberbullying Changes with Platform

Mentor: Robin Kowalski, Psychology

Students: Mona Doghman, Mackenzie Foster, Madeleine Franchi, Eliza Geary, Ashley Hughes, Courtney Luber, Sarah Nash, Hailey Bednar, Kelsey Crawford, Brooklyn Garrett, Bailey Pitts, Ashley Brady

While the use of information and communication technologies (ICTs) can be beneficial, it can also come at a cost, one of these being cyberbullying. The current study, supported by Creative Inquiry, examined the use of four social media platforms among college students and the extent to which each of these social media platforms is a vehicle for

cyberbullying victimization and perpetration as well as witnessing cyberbullying. Forty-seven male and 156 female students indicated whether they had an account on Instagram, Snapchat, Facebook, or Twitter and whether they had ever been a victim, perpetrator, or witness to cyberbullying on each of these social media platforms. Almost a third (31%) reporting having experienced electronic bullying during their lifetime. Snapchat users reported the lowest victimization and witnessing prevalence rates and among the lowest perpetration rates even though they were the most frequently represented platform. This likely reflects the hidden nature of the Snapchat platform.

Poster #27

The Effects of Cardiovascular Emotional Dampening on Risk-Taking Behavior

Mentor: James A McCubbin, Psychology

Students: Rachel Demas, Lindsay O'Toole, Rachel Basiura, Gabrielle Cummings, Kenneth Whitesides, Kyla Davis

Elevated resting blood pressure (BP) is associated with emotional dampening. Several current models of health behavior suggest that perception of threat is a critical motivator in avoidance of risky health-damaging behavior. We hypothesize that that blood pressure-associated dampening of threat assessment may influence decision-making, and may be especially important in propensity for various risk-taking behaviors. Blood pressures were determined in healthy adults over a 10 minute rest period. Participants then played a simulated lottery task involving ten paired-choice decisions to assess propensity for financial risk-taking. Multiple regression predicting lottery risk-taking from systolic and diastolic blood pressures indicated that higher resting systolic blood pressure was associated with increased risk-taking ($B= -.075$, $t= -2.215$, $p= .033$). These data suggest that cardiovascular emotional dampening may be associated with increased financial risk-taking. Better understanding of the integration of CNS circuits that influence visceral, emotional, motivational and, hence, cognitive function may give more insight into individual differences in propensity to engage in risk-taking behavior. This approach to understanding risk-taking may provide new strategies for basic and translational research to reduce health-damaging behaviors, and thus reduce risk for multiple chronic diseases related to unhealthy lifestyle choices.

Poster #28

Changes Of Patients With Parkinsons Disease When Participating In Boxing

Mentor: Julia A Eggert, School of Nursing

Students: Courtney Deaton, Brooke Escoe, Haley Fulton, Patricia Greene, Jessica Harris, Rebecca Vaughn

Purpose: Determine impact of boxing on PD symptoms (cognitive, emotional, physical) and quality of life of participant and significant other; evaluate student experience.

Method: 30-minute focus groups: G1. Discuss symptoms (cognitive, emotional, physical) and quality of life. G2. Discuss quality of life. G3. Discuss intensity of student boxing class. Results: Currently incomplete. Anticipate: improved quality of life for PD participants and significant others, increased cognitive scores, improved emotional outlook and physical capabilities for PD participants. Anticipate range in class difficulty based on student's current level of physical health. Conclusions: Anticipate: positive correlation between frequency of attendance and quality of life for PD participants, decrease in PD symptoms, improvements in quality of life for significant others, outcomes for students depend on level of physical health and viewed as strenuous for PD patients.

Poster #29

Leadership Formality and Cultural Diversity in Space Missions

Mentors: Marissa Shuffler , Psychology, Pamela Farago, Psychology, Michelle Flynn, Animal & Veterinary Sciences, William Kramer, Psychology, Nastassia Savage, Psychology, Dana Verhoeven, Psychology

Students: Adelia Rye, Joann Demos

As NASA prepares for missions to Mars, it is important for research to be conducted in order to prevent conflict. The present study analyzes critical incidents that have occurred during historical space missions, focusing on leadership formality and cultural diversity. Preliminary results show that incidents with informal leadership tended to have positive leader-crew interactions and positive outcomes. The results also showed that crews with cultural diversity tended to have positive interactions and outcomes as well. Primary implications are that these results will be taken into consideration during the selection and training of the crews for Mars missions.

Poster #30

Planned Squirrelhood: Is Zinc Toxicity A Possible Side Effect Of Orally Contracepting Eastern Gray Squirrels?

Authors: Adkins, K., Hippler, K., Hitchner, C., Chao, W.[1] Dunn, K.M., [&] Bridges, W.[2]
[1]Forestry and Environmental Sciences, [2]Mathmatical Sciences

Gnawing and bark stripping by eastern gray squirrels (squirrel) cause damage to both trees and shrubs on Clemson's campus. A non-lethal study was conducted to reduce squirrel reproduction and population by administering an oral bait contraceptive via hoppers. The goal of this project was to determine whether erosion of the hopper's galvanized coating resulted in Zinc toxicity for squirrels who consumed bait. To determine whether a correlation existed between bait consumption and increased Zinc concentrations for squirrels consuming bait, Zinc concentrations were calculated for squirrels, and bait both collected from and never exposed to hoppers. Zinc toxicity for rats was observed at 9.8mg/kg and it was anticipated that results would show squirrels consuming bait would reach that threshold. Zinc concentrations for squirrels fluctuated and toxic levels were found in squirrels never exposed to hoppers, therefore, it was concluded additional exposure occurred in their natural environment.

Poster #31

Martian Soil Simulants – Mechanical Properties and Feasibility as Building Blocks

Mentors: Qiushi Chen, Civil Engineering, Zhengshou Lai, Civil Engineering
Students: Michael Burden, Bradley Burden, Cameron Johnstone, Naisha Mcdaniel, Philip Merry

Efficient in-situ resource utilization is a critical component of NASA's current and future Mars exploration missions. In this CI project, the team aims to develop innovative, energy efficient and sustainable Mars-compatible processes to transform in situ Martian resources and long-term space mission organic wastes into construction materials for functional building blocks. In particular, this year's focus is on two different processes of synthesizing Martian regolith-based materials: 1) epoxy-soil composite, and 2) bio-cementation. The team aims to develop the general processing procedures of synthesizing these two kinds of materials. The manufactured materials are then characterized with advanced imaging based techniques (SEM, X-Ray CT) and are tested for their engineering properties through thermal and mechanical experiments.

Poster #32

Artificial Nest Structures And Estimation Of Submersed Aquatic Vegetation Forage For Waterfowl In Coastal South Carolina

Mentors: Richard Kaminski, Belle W Baruch Forest Sci Inst, Greg K Yarrow, Forestry & Environment Conserv
Students: David Barron, Adam Brown, Taylor Byars, Sean Byrd, Jessica Eidson, Ryan Frazier, Charles Gallman, Ethan Hinkle, Zachary Hughes, Robert Leland, Caroline Sharpe

Waterfowl are ecologically and economically important worldwide. South Carolina's state duck is a wood duck, and mottled ducks established a population along our coast in the 1970s. Creative Inquiry students, working under Clemson's James C. Kennedy Waterfowl and Wetlands Conservation Center, have worked on three research and outreach projects during 2016-2017: erection and monitoring of wood duck nest boxes and hen houses for mottled ducks; and evaluation of techniques and tools to estimate biomass of submersed aquatic vegetation, an important forage for waterfowl in natural wetlands for wintering ducks. As of spring 2017, we have found multiple successes in wood duck box reproduction and no use of the hen houses by mottled ducks. Thanks to James C. Kennedy's endowment, our professional experiences have aided us in earning jobs in our profession and will make us competitive candidates for graduate school or employment.

Poster #33

Developing Rope Pumps for Agricultural Use

Mentor: Nathan Conroy, Mark Schlautman, Environmental Engineering & Earth Science
Students: Zachary Girvin, Connor McCormick

Engineers Without Borders is working to significantly improve the ease of supplying water to the Brufut Women's Garden in The Gambia. There are fourteen ground wells from which the women must hand draw the water and carry it to their plots. During the dry season, they must take even more trips due to the lack of supplemental rainwater. Our project team will be installing rope pumps into the wells throughout the women's garden to address this need. A prototype was developed and installed during one of the team's previous trips. The chapter developed a new, closed-loop guide box made primarily from PVC. Currently, our project team is building five more of these pumps to install in the periphery garden wells. A fabrication shop in the Gambia will build two of the rope pumps to encourage sustainability of the pumps and provide a skilled source to repair any damage that occurs. These pumps will provide the women with an easy and reliable means of accessing the water they need from the wells and promote further community development. Our team would like to thank Creative Inquiry and EWB-USA for sponsoring this project.

Poster #34

Inhibiting the Starch Utilization System of Bacteroides spp. as a Therapeutic Target for Type 1 Diabetes

Mentors: Kristi Whitehead, Biological Sciences, Daniel Whitehead, Chemistry

Students: Elizabeth Dawson, Hunter Owen, Emily Peters, Megan Floyd, Anthony Santilli, Neal Patel

Type I diabetes is an autoimmune disorder characterized by the destruction of insulin-secreting β-cells in the pancreas. Recent research indicates that the onset of this autoimmune response may be partially attributed to host-microbe interactions in the gastrointestinal tract. Several studies show a possible correlation between the onset of Type I diabetes and an increased presence of Bacteroidetes. These microbes use many different carbohydrate sources for metabolism, but employ the starch utilization system (SUS), and similar SUS-like systems, in order to effectively degrade polysaccharides. Our research focuses on reducing the abundance of Bacteroidetes through the inhibition of the SUS. We are currently investigating the use of acarbose, an α-amylase inhibitor. Under normal circumstances, upregulation of the SUS locus activates SUS amylase proteins on the cell surface and in the periplasm, which degrade starch. When the SUS system is exposed to acarbose, however, the breakdown of starch is inhibited. By utilizing an α-amylase inhibitor to prevent the catabolism of polysaccharides, we hope to better understand the capabilities of using acarbose for inhibition of SUS for potential therapeutic gain.

Poster #35

Healthy Children's Food Product Development

Mentors: Margaret Condrasky, Food, Nutrition & Package Sci, Duncan Darby, Food, Nutrition & Package

Students: Jake Adair, Bryan Andrew, Elizabeth Babson, Mark Bartz, Matthew Baxley, Alex Bernhardt, Carson Buzhardt, Kaylee Cobb, Jonathan Dillard, Rachel Downs, Anna Eades, Savannah Marsh, Amber Martinez, Charles Mattocks, Kelli Murphy, Nicole Russell, Anna Whitlow

Over the years societies views on meal times have changed from sit down dinners to small snacks while on the go. Changes to society such as these have an impact on not only the adults who are changing the way it was but the children who will know only know the way it is. Growing up knowing the "on-the-go" lifestyle poses a threat to children receiving adequate meals during mealtime. The members of the Healthy Children Creative Inquiry were tasked with the creation of a nutritionally sound recipe that could serve as a snack or small meal. The students were broken up into teams; one student from the four majors represented applied their knowledge to help in the development of the products. The majors represented were food technology, culinary science, and nutrition. The teams following the Stage-gate process developed four novel products; black bean Sliders, a cauliflower based alfredo sauce, a mini quiche in a cone, and hummus avocado dip. The products were developed using team synergy while keeping nutrition of the product as a main focus. Each product was presented to a group of 2nd to 4th graders at an Upstate South Carolina School, and sensory evolutions were completed. The evaluations focused on five main points, appearance, small, taste, texture, and overall rating. These results were compiled and are being used to adjust the products to appeal further to the children.

Poster #36

The Effects Of Anti-Aging Agents On The Regulation Of Proteostasis

Mentors: Yuqing Dong, Biological Sciences, Min Cao, Biological Sciences

Students: Katherine Brand, Damaris Collier, Eric Freebern, Reece Moore, Lindsey Richardson, Taylor Staley

Proteostasis is the concept that all cellular proteins constitute a balanced proteome and function in a specific conformation, concentration, and location. Disruption of proteostasis is causatively associated with many degenerative illnesses, including Alzheimer's disease (AD). In this project, we will employ C. elegans as a model to assess the capability of several anti-aging agents in proteostasis maintenance. Outcomes of this research will not only help identify the potential anti-AD agents, but also build the foundation for the further mechanistic studies.

Poster #37

New Histological Techniques for Exploring the Fine Structure of Insect Mouthparts

Mentors: Charles E Beard, Plant & Environmental Sciences, Peter H Adler, Plant & Environmental Sciences, Konstantin Kornev, Materials Science&Engineering, Suellen Pometto, Plant & Environmental Sciences

Student: Alison Arling

We are exploring the mouthparts of fluid-feeding insects to determine if their diverse structural elements have similar functions that can inspire materials engineering. Proboscises of horse flies (Diptera: Tabanidae) consist of cutting blades and sponging labellae for blood feeding. The labellae have small tube-like channels (pseudotracheae) that carry food to the food canal. In contrast, the proboscises of butterflies and moths (Lepidoptera) consist of a long tube for acquiring nectar. Capillary action of the proboscis cuticular ridges putatively functions like pseudotracheae. To compare the fine structure of proboscises of Diptera and Lepidoptera, microscopic sections must preserve both tough cuticle and soft tissues in the same sections. The protocol we developed uses Bouin's fixative, tert-butyl alcohol, and LR White acrylic resin for sectioning. Modeling of these structures are uncovering similar functions. Engineers are using these structure-function relationships to design new materials

Poster #38

Slow And Steady: Speed-Accuracy Tradeoff During Sleep Deprivation

Mentors: June Pilcher, Psychology, Drew Morris, Psychology

Students: Emily Scircle, Margaret Wilkes, Kyra Diehl, Emily Smith

The goal of this study was to examine the varying effects of partial sleep deprivation and total sleep deprivation on the speed-accuracy tradeoff using a reaction time paradigm during two studies. In study one, thirty-two participants completed simple and stress-inducing reaction time tasks during partial sleep deprivation. In study two, thirty-three participants completed the same tasks during total sleep deprivation. Results from the simple task indicate that reaction time increases with time in the total sleep deprivation condition, but did not change in the partial sleep deprivation condition. Results from the stress task are more variable. This suggests that the speed-accuracy tradeoff is impacted by both the type of sleep deprivation and by tasks that induce considerable stress. Occupations require a balance of speed and accuracy, and sleep deprivation could limit both which could result in costly mistakes.

Poster #39

Neonatal Abstinence Syndrome (NAS) Website Development

Mentor: Heide Temples, School of Nursing

Student: Lauren Drum

Neonatal Abstinence Syndrome, or NAS occurs when babies are born with opioid dependence from mothers using opioids during late pregnancy. The South Carolina State's Office of Research and Statistics, reports 5.4 of every 1,000 hospital births in 2012 were NAS babies. At some hospitals, babies of mothers who were being treated for addiction to opiate-based drugs such as heroin or prescription painkillers had to exhibit symptoms before treatment could begin. This remains standard practice at many hospitals. For the past eight years, under Dr. Hudson's leadership at Greenville Health Systems (GHS), withdrawal treatment has started at birth. Rather than long stays in intensive care, these NAS babies typically go home after one week to bond with their families and continue to receive a slow medication wean at home. In the MAiN (Managing Abstinence in Newborns) model, outpatient physicians and visiting nurses monitor the four-week home treatment process. This Creative Inquiry project supports the MAiN model by developing a new website for the GHS/ CU research project and entails interviewing different staff members, especially nurses, at GHS, AnMed, and Clemson to gather their ideas for the new MAiN 2.0 website.

Poster #40

Development of Organic Light-Emitting Diode (OLED) for Biomedical Application

Mentors: Vladimir Reukov, Bioengineering, Dmitry Gil, Bioengineering

Students: Rashed Abdel-Tawab, Taylor Gustaveson, Alison Markley, Erin Mcauliffe, Grace Mcnamara, Elizabeth Newell, Kelsey Palsgrove, William Scammon, Lucas Tatem

Currently, OLEDs are widely used for fabrication of displays, and can be used to build numerous electronic and photonic devices. Their wide use can be attributed to many factors, including low power consumption, wide gamut array, high contrast ratio and better picture quality when compared with conventional displays. Additionally, because of the "sandwich" structure, OLEDs possess flexibility that increases their functionality in biomedical devices, allowing for flexible light sources and detectors. Due to these advantages, there has been an increased demand for OLEDs in the field of biomedical engineering. Therefore, the goal of this study is to develop and manufacture durable OLED patches capable of emitting in the red and near infrared range of spectra. To achieve this goal, we first focused on the development and synthesis of the appropriate luminophore.

Poster #41

Using a Mobile Eddy Covariance Tower to Measure CO2 Flux

Mentor: Scott E Brame, Environmental Engr & Earth Sci

Student: Sharlen Nguyen

In 2014, a former Clemson student researched eddy covariance methods using a hand-built eddy covariance tower to obtain CO2 flux data. The current project expanded on this work by assembling an eddy covariance tower equipped with a Licor infrared gas analyzer (IRGA) integrated with a Gill Windmaster sonic anemometer. These instruments are positioned 4.9 meters above the ground surface. To make the system portable, the tower and components were mounted on a 6' x 10' trailer and powered with a solar panel. This design facilitates the process of monitoring different sites throughout the year without dissembling the tower and setting it up in a different location. To test the new design, the system was deployed in two different fields. One field is managed intensively for agriculture and the other is managed for hay production. Data was only collected during the dormant winter season. The raw data was corrected using the Licor EddyPro software suite. The corrections that were applied included spike removal, angle of attack, and coordinate rotation. The results show that the CO2 flux values peak during the night and drop during the day. The flux values drop markedly when the sun comes up and then rise when the sun goes down. These results suggest that plant respiration during daylight hours consumes a significant part of the CO2 flux even in the winter. The mobile system design has demonstrated its ability to collect high precision data and has the flexibility to extend carbon flux research in different settings.

Poster #42

Bacterial Transfer and Survival on Lemons

Mentor: Paul Dawson and Ahmet Buyukyavuz, Food, Nutrition, and Packaging Sciences

Students: J.Freeland, S. Garrison, A. Taylor, J. McClary, F. Monitto, T. Nguyen, K. Polte, M. Suffern, A. Thurmond, M. MacInnis, A. Kurtz, C. Mattox, D. Riggs, R. Down and V. Ellis

The objective of this study was to determine the transfer and survival of bacteria during the handling and storage of lemon and lemon slices. Lemon slices are prepared and stored in public eating places and used by consumers in their beverages. During handling and storage the contamination and growth of bacteria may occur leading to the spread of disease. To fulfill the objective, hands were inoculated with *Escherichia coli* prior to handling of wet and dry whole. *E. coli* transferred to whole lemons after handling. The CFU per lemon and percentage of *E. coli* transferred were greater for wet lemons -6123 cfu and 4.62% compared to 469 cfu and .2% for dry lemons. In the second experiment, lemons were inoculated with *E. coli*, then sliced and stored at 4 or 22C and tested at 0, 4 and 24 hr. lemons stored at room temperature (22C) had an increase in *E. coli* population after 24 hour while those stored under refrigeration had a decrease even though bacteria did survive on lemons in either case.

Poster #43

Medical Technology for Developing Countries

Mentors: Delphine Dean, Bioengineering, John D DesJardins, Bioengineering

Students: Ryan Gilbert, Zachary Hargett, Kaleb Guion, Casey Young, Jacqueline Rohde, Grant Wilson, Holly Erickson

This Creative Inquiry team is dedicated to designing medical devices that are functional in low-resource settings. Our approach is motivated by the lack of medical devices that satisfy the needs of the developing world; namely, the need for devices to be robust, low-cost, reusable, and independent of energy grids. This CI is an interdisciplinary team that includes bioengineering, computer science, and microbiology undergraduate students. The team is divided into four subgroups that are currently developing a hand crank patient monitor, a respiratory rate monitor, and a rapid bacterial diagnostic kit. These devices are developed from initial concepts and proceed through iterative rounds of prototyping and verification. The CI team also works with Arusha Technical College in Tanzania to validate device needs and scope this existing medical landscape. This research is valuable because it provides underserved populations with much-needed medical care and expands the perspectives of Clemson students. This CI research is made possible by the Clemson Creative Inquiry Program.

Poster #44A

Let Hearing Deficits Be Heard

Mentor: Terry H Busby, School of Nursing

Students: Kelsey Kuehn, Rachel Osiason

The purpose of this research is to understand the barriers and limitations with current hearing screening methods used at Head Start programs and to find more effective methods for screenings. Hearing screenings on preschool-age children are an important part of pediatric medical care to ensure that problems with a child's hearing are detected at the youngest age possible. Early treatment could reduce the risk of complications associated with hearing deficits. Head Start, a government-run preschool, mandates these screenings for its students to detect potential hearing issues. However, generally due to a lack of resources, Head Start programs do not have a way to accurately and efficiently screen all children in a timely manner. The problem this research addresses is current issues with screening methods including: 1) limited testing space available at Head Start locations, 2) distracting testing environments, and 3) lengthy screening procedures. As discovered from this research, new screening methods should be user-friendly and allow multiple children to be screened at one time. Implementing these new methods at Head Start could improve the efficiency and accuracy of the screenings. Additionally, a survey was distributed to participants who have performed hearing screenings at Head Start locations in the Upstate of South Carolina to gather information on which issues are most prevalent.

Poster #44B

Interactions Between Horse Sensitivity and Rider Ability

Mentors: Kristine Vernon and Rebekah Strunk, Animal & Veterinary Sciences

Students: Carra Eisenbies, Emily Jones, Shelby Rogers

The purpose of this study was to determine rider ability and horse reactivity effects on joint angles of the rider. Beginner and advanced riders and reactive and non-reactive horses were pair-matched and placed into one of 4 blocks. Rider and horse combinations (n=16) were videotaped at the trot, and both rider levels rode both horses of the block. Videos were analyzed using MATLAB to determine the elbow, hip, and knee angles of the riders during the trot. Data were analyzed using JMP to determine the effects of horse rider level, horse reactivity and the interaction between the two. Statistical differences were noted at $p \leq 0.05$. There was a statistical interaction of rider level and horse reactivity on the elbow angle, an effect of horse reactivity on the hip angle, and a rider effect on the knee angle (all at $p \leq 0.05$) . These results are useful when training equestrians for competition and to promote functional riding techniques by pairing rider level with appropriate, safe horses.

Poster #45A

Brain Activity Characteristics of ADHD

Mentor: Dotan Shvorin and Kevin Taaffe, Industrial Engineering

Students: Ethan Zakian, Cole Barker, Evan Johnson, Beau Schelble, Danika Christensen

Students diagnosed with ADHD struggle to achieve academic success all over the country. Currently, the only available treatment is through medication. Our team is responsible for the analysis of brain wave activity of students with ADHD, while they perform different tasks at hand. The first step in our research is to focus on one case study in order to gain a firm understanding of the overarching problem and possible solutions. We are currently developing cognitive tests that will help us identify critical performance characteristics within the brain activity of those diagnosed with this disorder. While the student is performing these tests, we will record his/her brain wave activity. In the final phase, we will utilize experimental design to develop training methods constructed to help the student improve control over his/her symptoms and assess performance over time.

Poster #45B

Interactive Tour of the Pendleton School Nature Trail

Mentors: John R Wagner, Environmental Engr & Earth Sci

Students: Jacob Archer

Pendleton Elementary School is unique in that a portion of the school property includes a large woodland area surrounding a small stream system. This woodland, with its varied ecosystems, provides multiple opportunities for outdoor inquiry activities and hands-on learning experiences for students in all grade levels at the school. Sub-groups of Clemson students researched specific sites along the nature trail, and then designed class activities that would allow the Pendleton students to apply their scientific knowledge and skills to various outdoor investigations. All of this work has been documented into one succinct website. On the site, one can find a tour of the trail, pictures, lesson plans, and complete documentation of all work that has gone to it. This website was then made available to the teachers to use as a learning tool for their students. This work was supported in part by the Clemson University Creative Inquiry Program and by the NSF-funded Clemson Geopaths Project.

Poster #46A

Clemson Bionics: Design and Development of Novel, Low-Cost Bionic Prosthetics

Mentors: Melissa McCullough, Tyler Harvey and Jorge Rodriguez, Bioengineering

Students: Rebecca Dorsey, Christopher Hicks, Alexander Ormerod, Matthew Roach, Andrew Sedler, Marissa Strohl, David Mcleod, Jonah Robison, Sean Aitken

Worldwide, approximately 185,000 new amputations occur every year (Ziegler-Graham 2008). Modern bionic prosthetics often come with a hefty price tag. These prosthetics are out of reach for those who need them most, including children and individuals in low-resource settings. Clemson Bionics is dedicated to the creation of easily constructed, repairable, and inexpensive devices that meet the needs of these amputees. This semester, we produced another iteration of our base transradial bionic prosthesis prototype, based on shortcomings we identified internally. We refined the mechanical design using CAD software and hybrid deposition manufacturing (HDM) techniques, created a system of underactuated phalanges, implemented an eight-channel electromyography (EMG) armband for control, and integrated sensors to provide haptic feedback. Clemson Bionics has been an excellent environment for students of all backgrounds to teach and to learn new skills while defining and addressing real needs.

Poster #46B

The effects of climate change regarding South Carolina's Industry and Infrastructure

Mentors: Kelly Lazar, Environmental Engr & Earth Sci, Stephen Moysey, Environmental Engr & Earth Sci, Victoria Sellers, Environmental Engr & Earth Sci

Student: Alexandria Curtis

Visualizing climate change impacts to tourism and agriculture is critical for communicating potential change to South Carolinians. These industries are vital to the state's economy, and only slight changes can negatively impact crops, create rising sea levels, introduce problems for the state's port city Charleston. Publicly available data, aerial photography, and 360 degree images will be combined within the visual presentation applications ArcGIS Story Maps to effectively communicate projected impacts of climate change in South Carolina in new and engaging ways. This research is supported by NSF-GEOPATHS grant.

Poster #47A

What is the Campus Climate for the LGBTQ+ Community?

Mentor: Jennifer Ingle, Philosophy and Religion

Students: Emily Amey, Jacob Bearer, Frances Crouse, Katie Ferguson, Rachel Hodge, Hannah Horowitz, Tiana Johnson, Mary Lifsey, Bonnie Miller, Stephanie Pechthalt, Christina Simpson, Rachel Skidmore, David Neyens

Through data collection and analysis, the project aims to determine actionable issues in the Campus Climate for LGBTQ+ individuals. In Fall 2016 an undergraduate student group conducted research for a class project on the LGBTQ+ climate for Clemson University's faculty. From that project, it was not clear that LGBTQ+ individuals feel accepted as part of the Clemson Family and thus there is a need to determine the perceived problems in our Campus Climate and address those problems. From this need, a new Creative Inquiry was formed in Spring 2017 with the goal of examining the LGBTQ+ climate on Clemson University's campus. Phase one of the project will be gathering data on the current state of the campus climate by surveying the Senior class of Clemson students. After data analysis, the CI will move forward with a list of actionable items and collaborate with various campus resources including administration in order to improve the overall climate on Clemson's campus for the LGBTQ+ community.

Poster #47B

Smart and Savvy Students: Life Hacks

Mentor: June Pilcher, Psychology

Students: Madison Boyk, Zoe Anzola, Arsalan Kouser, Brandon Mcintyre, Madison Schweikert, Dorothy Askins

Smart and Savvy Students work to better understand everyday occurrences from psychological studies and transform them into life-improvement techniques. Our goal is to thoroughly read articles and summarize their main points so that anyone can understand them. We pride ourselves on being scientific communicators, spreading awareness to college students about how to live a better life. Common topics that we review include psychological well-being, exercise, smoking, pets, music, etc. Life hacks we advocate range from improving working memory to advice on being more socially active to improve one's mental health. We discuss the potential benefits and detrimental effects of social media, caffeine, and more! Underlying all our tips and reviews is a focus on understanding the world around us and how it affects us physically, emotionally, and psychologically.

Poster #48A

Petrographic Analysis of Ultramafic Rocks in the Blue Ridge and Inner Piedmont of South Carolina

Mentor: Scott E Brame, Environmental Engr & Earth Sci

Student: Matthew Seigler

Discrete outcrops of ultramafic rocks are found from Alabama to Maine in a northeast to southwest trend. They occur in both the Blue Ridge Mountain and Inner Piedmont physiographic provinces and are believed to represent remnant traces of oceanic crust not consumed during continental collisions that occurred over 250 million years ago. For this study, samples were collected from every known site in the South Carolina upstate and made into thin sections for petrographic analysis. Three samples were collected from the Blue Ridge and eight from the Inner Piedmont. The results demonstrate that relict olivine is most abundant in the Blue Ridge, and it is rare to absent in the Inner Piedmont. Hydrous mineral phases, including talc, serpentine, chlorite, and the tremolite-actinolite solid solution series, are minor components in the Blue Ridge but the Inner Piedmont ultramafics are almost entirely of them. Degree of hydration increases eastwardly over the Inner Piedmont. These results infer that ultramafic minerals in the Inner Piedmont have metasomatically recrystallized from the reaction of the protolith with hydrothermal metamorphic fluid.

Poster #48B

Prevalence of Single Nucleotide Polymorphisms (SNPs) on CYP2D6 in non-White Hispanic Populations

Mentors: Julia A Eggert, School of Nursing, Bohua Wu, English as 2nd Language Cntr

Students: Jacob Martin, Emily Smail

Antidepressants are effective for only 38% of those prescribed them, and non-white Hispanic populations are more likely to suffer from depression than white populations. Evidence reveals that gene *CYP2D6* codes for the metabolism of many drugs, including antidepressants, in humans. Completed research focuses on a variety of antidepressants, including: nortriptyline, escitalopram, citalopram, and bupropion; in which side effects and drug efficacy have been analyzed. There is a deficit in pharmacogenomic research involving Hispanic populations, among other diverse populations, as current research has primarily involved the non-Hispanic, white population. This information may direct future pharmacogenomics research to focus on less researched populations and the subsequent effect variant genotypes have on drug efficacy. The purpose of this project is to examine single nucleotide polymorphisms (SNPs) on gene CYP2D6, specifically in Hispanics, to better predict metabolism rates related to antidepressant efficacy.

Poster #49A

Creating a mHealth Device for the Monitoring and Treating of Plantar Fasciitis

Mentors: Vladimir Reukov, Bioengineering, Ilya Safro, School of Computing, Aleksey Shaporev, Bioengineering

Students: Omar Abdeladl, Elyssa Bakker, Isaac Baum, Edward Bear, Paul Garson, John Mcgreevey, Benjamin Shumpert

Plantar fasciitis is a condition that causes inflammation of the plantar fascia. The upshot of this affliction is chronic pain when walking, standing, or performing other mundane tasks. Current products on the market manage the symptoms, but do not actively seek to monitor and treat the disease. The purpose of this project is to develop an apparatus that effectively monitors and encourages patient compliance for those undergoing treatment for the condition plantar fasciitis. The apparatus utilizes a RedBearLabs Blend Micro chip and conductive rubber to measure the stretch of the plantar fascia. Afterwards, the data is sent to an app that tracks the progress of the patient and allows for communication between the clinician and patient. It was found that the apparatus outputs data that effectively and accurately corresponds to the amount of stretch by the tendon after being tested on members of the lab.

Poster #49B

Translating Herbal Supplement Research for Patient Education

Mentor: Rosanne H Pruitt, School of Nursing

Students: Adam Carroll, Ashley Lemanski

The purpose of this research is to compile information about herbal supplements and to organize this information into a chart that can be easily referenced by healthcare professionals in clinical settings. This chart will specifically address information pertaining to herbal supplements such as: uses, the quality of evidence related to efficacy, and precautions for individuals between the ages of 18-65. A literature review was conducted examining recent research related to the use of 44 popular herbal supplements in the general public. Human clinical trials and meta-analyses were preferred while research with animal models were included if human trials were not available. Each herb researched was ranked on a safety scale: green meaning generally safe, yellow meaning use caution, and red meaning avoid use. The completed chart will include research on popular herbal supplements. Several herbs from each safety category will be outlined. Two commonly used herbs that are categorized under generally safe are milk thistle and ginseng. Milk thistle is used to treat chronic liver disease, decrease nephrotoxicity, decrease cholesterol and atherosclerotic plaques, decrease blood glucose. Milk thistle is also renal protective.

Poster #50A

Festival Materialities: Assembling Cool from Chaos

Mentors: Anastasia Thyroff, Marketing, Robert Fitzwater, University Relations

Students: Madison Allen, Erin Andrews, Hannah Maisel, Arianna Mcguire, Melissa Nenninger, Lauren Stabler

Music festivals have been around since ancient Greece, yet an understanding of relationship between music and lived experience has been left under-explored. Further, music festival assemblage from a marketing perspective has been left unexamined. Therefore, using the context of Lollapalooza, we explore how materialities successfully assemble in a context that is continually battling the forces of chaos. To study this, we conducted an exploratory study via ethnography and depth-interviews, with an eye for human (e.g., music artists, attendees, volunteers, security, medical attendants, organizers, media) and non-human (e.g., fashion, music, technology, water, bathrooms, trash, sound equipment, stages, bodily fluids) materialities. What we find is that festival market structure develops through the presence of seven complex tensions or paradoxes (i.e., experience, culture, wisdom, stability, types, approach and location). Suggestions from marketing managers and academics are then discussed.

Poster #50B

FitDesks for Finals: Movement and its Benefit on Grades

Mentors: June Pilcher, Psychology, Drew Morris, Psychology

Students: Arya Soman, Paige Harrill, Timothy Hulett, Jacob Spencer, Jessica Cashman, Eva Diaz

Studies have shown that reducing sedentary behavior using light activity could be linked to academic performance. The purpose of this study is to determine if FitDesks, a low-intensity activity, while studying has an effect on academic performance in college students. Students at Clemson University completed two hours of studying per week for eight weeks. Twenty-eight students studied at a FitDesk and thirty-three students studied at a traditional desk. The students' first and fifth exam scores in their Introductory Psychology course were assessed. A two-way ANOVA showed that low-intensity movement while studying is associated with an increase in exam scores. FitDesk participants scores significantly higher ($p=.011$) on their last exam ($M=84.65$) compared to their first exam ($M=78.19$). The traditional desk participants showed no increase between their first ($M=80.33$) and last ($M=80.44$) exam. This study has shown that reducing sedentary behavior had a positive impact on academic performance. The findings support that combining reduces sedentary behavior with light activity could positively impact academic performance in real world settings.

Poster #51A

Oyster Reef Restoration

Mentors: Caye Drapcho, Environmental Engr & Earth Sci, Rachel Thurmes, Environmental Engr & Earth Sci

Students: Michael Calfe, Michaela Christine Cattell, Martha Davis, Chavone Garza, Jennifer Hibberts, Kaitlyn Hillard, Samantha Ihm, Abbey Kirkland, Gabriella Stefano, Rachel Thurmes, John Walker, Savannah Willis

Oysters provide vital ecological services to their environment. They are filter feeders and thus improve local water quality. They also create reefs and provide structure for other organisms in their habitat, including fish and shellfish, and they reduce erosion on nearby shorelines. Oyster populations around the globe have been rapidly declining due to overharvesting, rising water temperatures, and other environmental changes. By developing methods to restore these reefs, the increase in oysters can improve the ecological balance of affected ecosystems, improve the water quality, and improve local ecotourism and fishing industries. The Clemson CI team has focused on different ways to improve current restoration efforts. Most recently, the team tested different materials, including concrete, mortar, coated wire, and bare wire, to determine what was the most effective material for oyster spat (baby oysters) fixation. The CI team placed structures coated in the different materials into oxygenated tanks, and inoculated them with collected oyster larvae. Algae was also placed into the tanks in order to aid the oyster larvae"s growth The tanks and structures were observed over a period of four months, and unfortunately no oyster larvae appeared to fixate on any material or survive into adulthood. This experiment is being replicated in the Spring semester and will be upscaled to be placed in a protected habitat in the Ace Basin.

Poster #51B

Paving the way: A simulation based methodology for self-driving car research

Mentors: Drew Morris and June Pilcher, Psychology
Students: Marion Campbell, Grant Wilson, Jason Erno, Hannah Maad, Jessica Meloy

The goal of this study was to examine whether a traditional driving simulator could be used as a proxy for self-driving vehicle research. Twenty-eight participants completed one manual driving task and two automated driving tasks using a high fidelity driving simulator. The simulator was programed to drive the participants through a series of simulated environments with a varying amount of risk-taking behavior such as speeding and drifting out of the lane. The effectiveness of the system as an autonomous vehicle simulator was measured in terms of participant psychophysiological stress. Results show that participants do have an increased psychophysiological stress response when the vehicle drives autonomously as compared to when the users are in control. These findings suggest that users perceive a degree of risk while the simulator imitates autonomous driving, allowing traditional high-fidelity simulators to still be used as tools for this modern research topic.

Poster #52

Robust Real-time Face Recognition with PCA, LDA, and ICA

Mentor:Melissa Smith, Electrical and Computer Engineering

Students: Benjamin Shealy, Colin Targonski

Although face recognition software exists today, real-time recognition is not as prevalent due to several challenges in a real-time environment, such as variation in pose and illumination. Therefore, we are developing a system to recognize faces in real-time with high accuracy against variation in pose and illumination. The system will employ a variety of well-developed algorithms to perform pre-processing, feature extraction, and classification, and these algorithms will be accelerated by a GPU so that the system can process a video stream in real-time. Accuracy will be demonstrated first on standard datasets such as the ORL database, the Yale database, MNIST, and the FERET database, and then we will develop metrics to demonstrate real-time accuracy.

Poster #53

Disable the Label: A Study of the Effects of Labeling Disability Categories

Mentor:Jennifer Bisson, Psychology

Students: Bradley Rikard, Angela Vatrano, Hannah Martin

This study is the first to measure explicit attitudes towards individuals with disabilities specifically examining the impact of the label itself. Participant's explicit associations were indexed by using a modified version of the Attitudes Toward Intellectual Disability questionnaire. Participants were 11 students at a large Southeastern University. They were shown to brief description of 8 individuals with the following disabilities: Quadriplegia, Multiple Sclerosis, Blindness, Deafness,Schizophrenia, Addiction, Depression, and Anxiety. Six of the participants were provided with labels along with descriptions, and five participants only saw the descriptions. Independent t-tests were used to compare differences between label and non-label conditions. For physical disabilities,there was a significant trend, $t(9)=1.89$, $p=.091$; there was more discomfort for non-label ($M=2.17$,$SD=.56$) versus label ($M=1.50$, $SD=.60$) conditions. There was no significant difference for mental disabilities, $t(9)=1.18$, $p=.270$. A total of 60 participants will be included by April.

Poster #54

Probiotics and Fat Storage: A *C. elegans* model

Mentors: Min Cao, Biological Sciences, Yuqing Dong, Biological Sciences

Students: Carson Moore, Kenneth Whitesides, Morgan Dimery, Andrew Gitto, Kajal Patel, Miranda Klees

Probiotics are bacteria that confer health benefits to the host when ingested, yet the full physiological effects of different strains of probiotics have not been fully classified. Using *Caenorhabditis elegans* as a model, various *Bacillus* and *Lactobacillus* strains were tested for their effect on host physiology. The main interest was fat storage, as recent research has shown a crucial role of lipids (both fat distribution and saturation level) in the health and longevity of *C. elegans*. Total body triglyceride levels were quantified in young adult wild-type and mutant *C. elegans* fed with the probiotic strains. Increased fat storage was seen in those fed with *Lactobacillus plantarum* and *Lactobacillus fermentum*, with no change being observed when fed with *Bacillus coagulans* compared to the control *Escherichia coli* OP50. Further studies of total triglyceride levels and other physiological studies (i.e. brood size determination) will be conducted using other probiotic strains. Because of the 30% genomic homology between *C. elegans* and humans, we hope to better understand host-probiotic interaction and host-microbiome interactions.

Poster #55

The Impact of the Finding Your Voice Camp on Middle School Girls

Mentor: Denise Anderson, Parks Rec and Tourism Managment

Students: Emily Bedenbaugh, Lauren Fleming, Rachel Janson, Anna Johnson, Miranda Mims, Madeline Nance, Bailey Oliver, Megan Sease, Morgan Shuey, Olivia Stapleton, Carly Watt, Dorothy Whitney, Madison Workman

Past studies have shown that adolescent girls are more susceptible to low self-confidence and body image. Finding Your Voice is a free weekend camp for middle school girls that focuses on developing self-efficacy through nontraditional sport. The purpose of this project was to develop and evaluate a camp that provides adolescent girls with the opportunity to foster self-esteem, self-expression, and self-efficacy through outdoor recreation. Activities included kayaking, backpacking, self-defense, rock climbing, and yoga. The methods used to gather data were a pre- and post Youth Experience Survey (YES) and focus group interviews inside the cabins led by counselors. Results concluded that girls leave the camp feeling an improved self-confidence and sense of empowerment, and an increase in health, strength, and confidence in body and ability. The results showed that the absence of males allowed the girls to feel more comfortable trying new activities as they weren't worried about their appearance, and it allowed them to build new and strong relationships with the other girls.

Poster #56

Examining Burnout in Medical Extreme Teams

Mentors: Marissa Shuffler , Psychology, Pamela Farago, Psychology, Michelle Flynn, Animal & Veterinary Sciences, William Kramer, Psychology, Nastassia Savage, Psychology, Dana Verhoeven, Psychology

Students: Erin Moran, Shelby Richter

There is a great deal of information surrounding the functioning of typical work teams and the burnout that occurs within them, but not much in the realm of extreme teams, such as medical teams. Research in this area is needed, since burnout in these scenarios is dangerous and high-risk. To study this, we reviewed the relevant research. Findings indicate that burnout in extreme teams is more probable and has a larger impact than burnout in less extreme settings. Errors made by surgeons are more significant than errors in other workplaces. Even with high levels of autonomy that help manage the stress, performing the tasks frequently creates strain that leads to higher levels of burnout. In any workplace, burnout is undesirable. In extreme teams, burnout can be dangerous and even deadly. Our research explored the causes and effects of burnout in extreme teams already outlined in the literature in the hopes of conducting future studies on minimizing its occurrence as much as possible.

Poster #57

Soil Judging Project

Mentor: Elena Mikhailova, Forestry & Environment Conserv

Students: Robert Baldwin, Lloyd Barringer, Jeffrey Brady, William Hinson, Dalton Infinger, Carlos Morales, Bennett Porter, Caroline Sherbert, Thomas Sigmon, William Sumwalt

Soil Judging Project teaches students important skills for field identification of soil types, their properties, and interpretations for use. Soil Judging Project can be beneficial to students as well as government agencies and private sector. The objective of this study was to learn how to describe the soil morphological properties (e.g. horizons, texture, color, structure, consistency, and redoximorphic features), interpret soil profile properties (e.g. infiltration, hydraulic conductivity, available water, soil wetness class), identify site characteristics (e.g. position of site, parent material, slope, surface runoff, erosion potential), and classify soil. A Southeastern Region Soil Judging Handbook was used by students from various disciplines (e.g. business, accounting, etc.) to master the skills of soil description, identification and interpretation in the field. Soil Judging Project can significantly improve soil education and mitigate problems associated with land use management.

Poster #58

Development of a Protein Polymer Blend for 3D Printing

Mentor: Vladimir Reukov, Bioengineering

Students: Audra Atwood, Nicholas Baxter, Matthew Burt, Joseph Garand, Jonathan Lopiano, Seth Mccall, Randall Snipes, Samantha Williams, Benjamin Young

Modern 3D printers allow people print everything from jewelry to home décor to kid's drawings at home or over the Internet. Plastics such as PLA and ABS are the primary types of polymers being used in additive manufacturing. The widespread growth of 3D printing has caused an increase in plastic pollution. The goal of the Creative Inquiry is to develop a polymer with enhanced biodegradation, while still maintaining sufficient mechanical properties. The current objective is to establish a system which contains an optimal mixture of polymers and rendered proteins that can be extruded into a usable filament for Fused Deposition Modeling printing. After integration, mechanical tests will be performed to show relative equivalence of the mixed extrusion to polymer filament. There is a linear relationship between the advancement of the additive manufacturing industry and the pollution affecting the world. With the utilization of the enhanced bio-degradable product, we will reduce the environmental impact of 3D printing.

Poster #59

Taking a Bite from the Mindless Margin

Mentor: Eric R. Muth, Psychology

Students: Joann Demos, Heather Guercio, Tiffany Hwang, Phillip Jasper

Proportion of overweight and obese adults has risen to 36.9% for men and 38.0% for woman, globally (2013). New methods of weight management are required to combat this upward trend. These new methods must address issues of traditional approaches, mitigate external influences that lead to unhealthy eating behaviors, and embrace advances in technology. The purpose of this study is to determine: 1) the "mindless margin" as measured in number of bites taken, 2) at what bite target level people will stop changing their bite size, 3) and if an alarm at an undisclosed level will prevent bite size change, regardless of level. Data will be collected from 196 participants eating a meal of macaroni and cheese in a laboratory setting. In a 2x6 design, the participants will eat a meal in the laboratory with others and will be given an instruction on how much to eat. Participants will receive bite count feedback via a wrist-worn energy intake monitor. Participants will either be instructed to take a certain number of bites (range: 12-22), or they will be instructed to eat

until an alarm sounds. Grams consumed will be measured post meal as the main dependent variable along with number of bites, bite size, and post meal satiety. It is hypothesized that the mindless margin will be between 16 and 20 bites. Furthermore, it is hypothesized that bite size change will occur between 14 and 16 bites. Finally, it is hypothesized that an alarm, instead of a verbal instruction on how many bites to take will prevent bite size change.

Poster #60

Boys and Book Clubs: Increasing Reading Motivation

Mentors: Leslie Roberts, Education & Human Dev, Koti Hubbard, Teacher Education

Students: Amanda Bolton, Jordanne Harpster

Purpose: Reading motivation has shown to be critical to reading success (Morgan & Fuchs, 2007). Studies suggest that students who are motivated to read are more likely to engage in reading behaviors (Guthrie & Wigfield, 2000) and increased time spent reading leads to increased success in reading (Guthrie & Humenick, 2004). As teachers and students are immersed in testing culture, authentic and enjoyable literacy practices may take a backburner to skill and drill practices (Lerkkanen et al., 2012), therefore leading to a decrease in student's motivation to read.

Poster #61

Improving the Efficiency of a Savonius Wind Turbine Learning Module Experiment

Mentors: Todd Schweisinger, Mechanical Engineering, John R Wagner, Mechanical Engineering

Students: Zachary Bowers, Dhruval Patel, Lamar Bostick, Christopher Knippenberg, Hunter Lee

To improve student outcomes in a wind energy course, a mobile wind energy experiment and learning module for distance learning was prototyped. A Savonius wind turbine design consists of two semicircle cups placed around a shaft to create an s-shaped rotor, often attached to a geared generator. The electrical power generation of this prototype wind turbine was evaluated using a blower at three different wind velocities; 16.9m/sec, 19.8m/sec, and 21.9m/sec. The peak electrical power output at the maximum wind speed tested was 2.7 Watts, which was 40% less than the theoretically predicted output. To improve performance, the team focused on changing the rotor geometry. The redesigned turbine consists of two elliptically-shaped Savonius rotors that are stacked atop of each other, and offset from one another. An accompanying field study in North Western South Carolina was initiated to determine the availability of wind power for wind turbine investment.

Poster #62

The Effect of Compression on Stereotyped Behaviors in Children with Autism

Mentor: Jennifer Bisson, Psychology

Students: Kelsey Bennett, Samantha Simpson

The homeostatic theory suggests that stereotyped behaviors (e.g. rocking and tapping) serve a regulatory function in individuals with autism. Compression clothing is marketed as a product for decreasing stereotyped behaviors, with no empirical data to support or refute its effectiveness. We video recorded children for 10 of their ABA therapy sessions. For half of these therapy sessions, the child was asked to wear a compression suit. Therapists captured 15 minutes of each session (the first 5 minutes, middle 5 minutes, and the last 5 minutes). Each video was coded for stereotyped behaviors. Our data included information from seven children, ages 4-10, with an official autism diagnosis. A repeated measures t-test was run to look at differences in stimulatory behavior between the control and treatment groups. Preliminary data found no significant effect of compression clothing on stereotyped behaviors, $t(6) = 1.73$, $p=.134$. A repeated measures ANOVA was used to explore change in behaviors over time during therapy sessions and showed a significant change, $F(2,12) = 9.77$, $p=.003$. With no literature on the subject, even a finding of no significance is meaningful.

Poster #63

The Future Of Medicine Unseen

Mentors: Vladimir Reukov, Bioengineering, Aleksey Shaporev, Bioengineering

Students: Omar Abdeladl, Mariah Carp, Colin Fair, Mary Gaston, Benjamin Glace, Martin Groke, Reagan Leonard, Krystal Magwood, Rebecca Schrody, Catherine Smithdeal, Joseph Stephenson, Maria Portilla Rodriguez

In order to combat the leading cause of lower extremity amputation, or Peripheral Arterial Occlusive Disease (PAOD), a Near Infrared Camera prototype has been constructed to improve the process of examination of diabetic foot ulcers. Through the use of a Raspberry Pi System with optical filters, venous blood build up can be detected and photographed because deoxygenated blood is detectable at a near infrared wavelength. In combination with a MATLAB, photos can be processed and the progress of an ulceration can be determined by measuring the change in diameter of the blood vessels via an photo analysis code. Often times, patients who suffer from diabetic ulceration have a loss of sensation to their peripheral limbs which results in the unrecognized progression of an ulceration. To prevent the development and advancement of an ulceration, a handheld and low cost prototype was developed, which can be used as a preventative care device in contrast to costly and frequent medical evaluations. The ultimate goal of the prototype is that it could be available to diabetic patients for their own use, which can enhance preventative measures of an ulcer formation.

Poster #64

Collages of Ashville

Mentors: Carlos Barrios, School of Architecture, Ufuk Ersoy, School of Architecture

Students: Diego Bazzani, Travis Dale, John Owens, Andrew Ramsey, Caleb Roberts, Tyler Rodgers, Harrison Greer

A collection of visual imagery of the city of Ashville in relation with architectural design is presented to showcase how a city is perceived by the users.

Poster #65

Clemson University Retrieval of Explants Program and Registry in Orthopaedics (CU-REPRO)

Mentor: Melinda Harman, Bioengineering

Students: Lauren Adams, Madeline Bebler, Madyson Coggins, Mary Gaston, Zachary Hargett, Haley Leslie, Elizabeth Marrs, Hieu Nguyen, Whitney Schroeder, Elizabeth White, Lucy Young

The Clemson University Retrieval of Explants Program and Registry in Orthopaedics (CU-REPRO) is a repository of explanted joint replacements collected from 11 hospitals in South Carolina. The purposes of CU-REPRO are: 1) to conduct research related to the performance of joint replacements; and 2) to increase awareness of bioengineering in orthopaedics by engaging in community outreach. CU-REPRO research addressed the question of how total knee replacement (TKR) designs provide for a stable knee joint. Two methods were used to characterize TKR stability, including measurement of geometric conformity and measurement of constraint (ASTM F1223) resisting anterior/posterior translation (AP) and internal/external rotation (IE). The varied geometric conformity for the TKR designs resulted in different magnitudes of AP and IE constraint. CU-REPRO outreach involved four activities targeting recruitment of STEM students. Additionally, CU-REPRO met with surgical staff at three hospitals to discuss our program. These activities led to publication of a brochure to better communicate CU-REPRO objectives to healthcare professionals and the general public.

Poster #66

Dress to Impress? The Impact of Attire on Hiring-Related Outcomes

Mentors: Jamie Fynes, Psychology, Patrick Rosopa, Psychology

Students: Maryalice Burke, Allison Gallman, Chelsea Pastore, Kayla Stevens, Lindsey Williams

This study examines the effects that traditionally masculine and feminine clothing have on raters' perceptions of a female applicant's attractiveness, competence, likability, and hirability. Further, it observes how raters' levels of social conservatism and adherence to sex roles are related to these perceptions. The purpose of our study is to find out if the clothing a female applicant wears to an interview elicits bias during the hiring process. Participants, who completed a survey through Qualtrics, were recruited through Amazon's Mechanical Turk. The authors measured four different outfits, all with the same resume; applicant outfit was randomized. This study is currently in the data analysis stage of the research process, but the team will have a complete study to present at FoCI. If there is a difference in perceptions based on applicant clothing, it could suggest that there are biases present in the selection process against women who wear a particular clothing style; however, results could also reveal the "best" clothing style to wear to an interview in order to give off a positive impression.

Poster #67

Relationship of Equine Conformation to Stride Length at the Trot

Mentors: Kristine Vernon, Animal & Veterinary Sciences, Rebekah Strunk, Animal & Veterinary Sciences

Students: Julia Gates, Madison Starnes, Katelyn Williams

Horses are selected for conformation, as it is linked to efficiency in movement and longevity of athletic career. The purpose of this study was to determine if conformation affects overall stride length. Stride length is evaluated as a selection criterion for the horse, being indicative of efficiency of movement. Horses ($n = 6$) were palpated and targeted locations on each joint were marked. Limb measurements were taken in triplicate using 1 photo of each horse. Horses were ridden and 5 videos per horse were captured and analyzed in triplicate for stride length analysis. To obtain correlations between variables, simple correlation and step-wise multiple regression models were used in SAS JMP. The step-wise regression revealed ($r2 > 0.80$) that the combination of the following strongly affect stride length: wither to hip, front leg length, stifle and hock angles. It appears that these variables may be useful predictors of stride quality for more informed selection decisions in horses.

Poster #68

Annual and Seasonal Patterns of Stream Fish Body Growth

Mentor: Yoichiro Kanno, Forestry & Environment Conserv

Students: Daniel Jones, Alexander Michaeli, William Hobbie, Ryan Martin, Edward Stello, Kasey Pregler, Seoghyun Kim

The purpose of this study is to assess a correlation between seasonality and fish growth rate by proxies of temperature and time of year. We studied growth rates of local stream fishes in Todd and Indian Creek using individual mark recapture survey from September 2015 – January 2017. A total of 4,458 fish were collected using backpack electrofishing and were marked individually using 8mm Passive Integrated Transponder tags. We found that firstly, growth rates tended to be higher at early stages of a fish's life, secondly, that fish grew more in the summer months and lastly, that higher temperature led to an increase in fish growth. This study allowed us to draw comparisons between spatial and temporal patterns of fish body growth. Isolating the cause of fish growth can help to better manage small stream fisheries and to understand the effect that rising global temperatures can have on these ecosystems.

Poster #69

The "Cooling" Effect of Language: The Relationship Between Eardrum Temperature and Cerebral Blood Speed

Mentor: Claudio Cantalupo, Psychology

Students: Kyla Davis, Emmaline Paschall, Brynn Hentschel, Paige Kennett, Patrick Kilcommons, Victoria Neckles, Madison Ott, Alisha Rice

During linguistic tasks, arterial blood velocity is increased to the left side of the brain. Interestingly, the temperature of the left eardrum tends to be lower than the right one in linguistic tasks. However, no study has directly assessed whether cerebral blood velocity and eardrum temperature are related. Furthermore, the factors affecting eardrum temperature are still unclear. To address these questions, we used transcranial Doppler Sonography and bilateral tympanic temperature measures in 9 participants. We found evidence, overall, of a greater cooling in the left eardrum compared to the right one. Our data provides novel insights into the causes for changes in temperature by referring not only to arterial blood but also venous blood dynamics. The preliminary results from the combination of both blood velocity and eardrum temperature measures will be presented. Our research advances basic knowledge in developing new procedures to measure brain asymmetry in applied settings.

Poster #70

Vaccine Refrigeration from Solar Thermal Energy

Mentor: Jennifer Ogle and David Vaughn, Civil Engineering

Students: Chase Gabbard, Jack Cauthen, Clara Bono, Skylar Bobadilla, Amanda Steel, Matthew Warrington

This project team is creating a reliable refrigeration system that will address the global issue of vaccine spoilage. The project team has created a solution design, built a solar tracking platform, confirmed that it can produce the needed thermal output, and performed research to create designs for heat collection and heat transfer to the generator. The project team is a creative inquiry project organized through Clemson Engineers for Developing Countries, a service-learning organization that has been sponsored by Eastman Chemical Company.

Poster #71

Increasing Student Resiliency through the Aspire to be Well Program

Mentors: Martha Thompson, Public Health Sciences, Diamond Brown, Student Health Center, Jennifer Goree, Student Health Center, Chloe Green, Student Health Center, Hailey Palmer, Student Health Center

Student: LaRoweshia Uzell

Developing Peer Delivered Initiatives to Foster the Promotion of a Healthy Campus Creative Inquiry focuses on the Aspire to Be Well Program. A Clemson University new student requirement, Aspire, highlights the topics of mental health & suicide prevention, alcohol & other drug misuse, and interpersonal violence prevention. Students learn warning signs, symptoms and bystander intervention strategies to help maintain a safe campus and community. In connection to mental health, the Aspire to Be Well Program and CI have an increased emphasis on resiliency and factors that can increase a student's toolbox in overcoming difficult situations, the significance of grit.

Poster #72

How Many Can You Find? : The Effect of an Autism Spectrum Disorder on Object Perception

Mentor: Jennifer Bisson, Psychology

Students: Karissa Collins, Mona Doghman, Chelsea Campbell, Joanna Kwon

The perceived uses or the potential actions that an object suggests to an individual are known as affordances. The current study compared affordances for typically developing individuals and individuals with autism spectrum disorder (ASD). Previous research shows that individuals with ASD can have limited interest in human interaction, difficulty socializing, and preoccupation with objects. The researchers thus hypothesized that individuals with ASD would perceive more overall affordances but less socially acceptable affordances of an object. Participants were recruited using social media to take an online survey. They were presented with pictures of a rubber band, tennis ball, hairbrush, mug, and two novel objects. For each object, they were asked to list the ways they could interact with each object and list all of the socially acceptable ways they could interact with each object. Preliminary data from 4 participants showed that individuals with ASD perceived more overall uses of the object than typically developing individuals, but less socially acceptable uses. These findings suggest that issues with affordances may be a primary symptom of ASD.

Poster #73

An Experiment with SDN-based Traffic Analysis Resistant Network (TARN) Architecture

Mentor: Kuang-Ching Wang, Electrical & Computer Engr

Student: Joseph Porter

Today's Internet Protocol (IP) networks are vulnerable to traffic analysis; making Internet censorship, man-in-the-middle (MITM) attacks and network surveillance possible. The presence of clear-text source and destination IP addresses in TCP/IP headers makes communications flows easy for adversaries to detect and attack. A software defined networking (SDN) based solution called TARN has been proposed to remove the basic traffic analysis vulnerability. To resist traffic analysis, TARN binds communication sessions to randomized, short-lived, perpetually changing IPv4/IPv6 addresses using a SDN at the network edge and by leveraging BGP routing. Using the National Science Foundation's Global Environment for Network Innovations (GENI) and the Pairing Emulated Experiments with Real Inter-domain Network Gateways (PEERING) testbeds, multiple experiments were run to evaluate its effectiveness. Results indicate end-to-end communication can be achieved over the Internet with TARN, while avoiding server IP detection and censorship. Sponsored by NSF award #1643020

Poster #74

Lifestyle Modification Within an Underserved Population: A Case Study Analysis

Mentors: Caitlin Moore, Clinical Ed/Pract&Med Surv Pro, Nancy K Meehan, School of Nursing

Students: Heather Berg, Gibbs Wiksell, Michelle Tomevi

Adherence to a healthy balanced diet and physical activity are essential components for the management and reversal of chronic disease. First Line Therapy (FLT) implements lifestyle modification and health coaching techniques while utilizing this framework over a twelve-week period. This research investigates the effect of dietary and lifestyle modifications on 3 voluntary FLT program participants of low socioeconomic status diagnosed with various chronic diseases. The cases highlight varied patient successes including: patient compliance with program completion, patient noncompliance with partial program completion, and patient noncompliance with program cessation. Throughout the program, clients were analyzed through Bioelectrical Impedance Analysis (BIA) as part of their nutritional assessment. The patient who completed the program experienced a weight loss of 13.0 lb, a fat loss of 3.2 lbs and a BMI decrease of 1.9 kg/m^2. The two patients who did not complete the 12 week program experienced no measurable improvement. Factors influencing program compliance and completion include social support systems, financial means, and subjective stressors. This study concludes that completion of a full 12-week lifestyle modification program produces measurable results within an underserved population and are evidence that the field of lifestyle medicine intervention programs are of increasing importance in a local clinical setting.

Poster #75

Water Purification on a Cart: Mobile Laboratory Experiments to Teach about Membrane Separations

Mentor: Christine Duval and Scott Husson, Chemical & Biochemical Engineering

Students: Christine Mullan, Coker Price, Joseph Riggs, Shannon Roberson, Cody Ruff, Brenna Westbrook

In this Creative Inquiry (CI), the students researched, designed and constructed mobile laboratory experiments that can be used for K-12 outreach demonstrations and within the Department of Chemical and Biomolecular Engineering. K-12 students will learn the basics about a common way to purify drinking water while chemical engineering students will learn fundamental principles of mass-transport. Over the past 2 years, the CI students constructed two experiments: reverse osmosis (RO) and pressure retarded osmosis (PRO). Access to clean drinking water is a fundamental human need. The RO cart was designed and constructed to demonstrate salt water desalination using membranes. With the demand for clean electrical power growing, electrical output is expected to nearly double by 2040. The PRO cart was designed

and constructed to demonstrate a potential source of clean energy that utilizes pressure created by osmosis to generate electricity.

Poster #76

Soil Inventory of Private Lands in South Carolina

Mentors: Elena Mikhailova & Christopher Post, Forestry and Environmental Conservation

Students: Austin Green, Richard Kneece, Halle Murphy, Ashley Padgett, Thomas Rogers, and Ethan Tisdale

Most of South Carolina's land is currently owned by private families or individuals. The objectives of this study were to conduct soil inventories of private lands in various locations in South Carolina using the Web Soil Survey, to collect soil samples, to analyze these collected soil samples using Clemson University Agricultural Service Laboratory, and to make management recommendations. Various soil series were identified within the private lands and rated based on their suitability's and limitations (e.g., building site development, land classifications and management, vegetative productivity and waste management). Soil nutrient analysis recommendations are discussed to maximize agricultural productivity, while minimizing environmental impact.

Poster #77

Characterizing Genotype Specific Responses To Chilling And Heat For Predicting Spring Bud Break In Peach

Mentor: Douglas Bielenberg, Biological Sciences

Students: Kallison Cook, Georgianna Scott, Hannah Spencer

Peach [Prunus *persica* (L.) Batsch] varieties differ in their need for a quantitative exposure to low temperatures (chilling requirement, CR) prior to spring bud break. Whether peach varieties also differ in their quantitative requirement for warm temperatures (heat requirement, HR) following chilling is unknown. Estimating HR of buds for bloom is complicated by the apparent ability of excess chilling to partially substitute for HR. We selected seven peach cultivars with a range of CR (200-1050 hours) and exposed stem cuttings from these trees to chilling temperatures (5 C) for multiple durations starting less than the expected CR of each cultivar through an excess of chilling to saturate the CR response. Following each chilling interval, a group of stems were forced at warm temperatures (20 C) and bud break progress was observed for up to six weeks. Bud break progress in response to heat accumulation will be used to estimate HR for bud break of each cultivar. Results of this work will be used in phenology models to will aid grower decision making and facilitate prediction of tree behavior under future climate scenarios.

Poster #78

Vegetable Recipes that Families Choose

Mentor: Margaret Condrasky, Food, Nutrition & Package Sci

Students: Landon Flowers, Heather Forbes, Gracen Hudachek, Tricia Jordan, Carson King, Alexa Longobardo, Shannon Mahoney, Vanessa Marshall, Jillian Richardson, Kristian Thomas, Erik Wendt

This creative inquiry focuses on developing appropriate vegetable-focused recipes for over 250 low-income families in upstate South Carolina. Our Culinology and Nutrition undergraduate students collaborate in efforts to develop and evaluate recipes for the Choosy Kids Program. Choosy Kids is a nationally recognized program that provides professional development training in early care and education as well as healthy promotion. The CI has created 10 recipes with step-by-step visual and written instruction for the children and their families to complete at home. These recipes are written, tested, evaluated, and revamped by the team in order to achieve maximum acceptance by the young children and families. Through these recipes, the CI has supported families to increase vegetable recognition, cooking at home and consumption through the bench top development and formulation of healthy recipes.

Poster #79

Color-Coding for Hospital Stockrooms

Mentors: Hannah Cash, Bioengineering, Delphine Dean, Bioengineering, Kayla Gainey, Bioengineering

Students: Kaitlyn Long, Hannah Maad, Kacie O'Neill, Giorgia Bergamasco

With rapid advancements in technology and growing demand for better healthcare, hospitals are struggling to find a balance between providing the best possible care and maintaining a responsible budget. This issue is especially evident in small hospitals lacking resources and infrastructure to keep up with ever-increasing, modern technology. The Engineering for Modern Healthcare Creative Inquiry is a multidiscipline collaboration between Industrial Engineering and Bioengineering students, which allows for promotion of different ideas and solutions to our goals. We have partnered with a hospital in Virginia and have identified a complex problem plaguing nurses: retrieving items from the stockrooms in a timely manner. As a result, the hospital is ultimately losing money, and the nurses are frustrated with the complex systems that they are expected to use. We are working to develop a better stockroom system that utilizes color-coding to improve the experience for nurses while helping prevent the hospital from losing money. Thus far, we have performed a study and shown that color-coding decreases the amount of time needed to retrieve items.

Poster #80

Promoting Health and Wellness on Clemson's Campus

Mentors: Crystal Burnette, Student Health Center, Martha Thompson, Public Health Sciences

Students: Laura Andrews, Chandler Arms, Justine Dipasquale, James Graham, Hannah Henson, Angela Loiselle, Justine Polomski, Lauryn Smith

The Alcohol and Other Drugs creative inquiry team focuses on presenting information that is gathered from the National Collegiate Health Assessment across the country, and more specifically Clemson's campus data. We highlight the health topics including, but not limited to, alcohol and other drug use, sexual behavior, disease and injury prevention, nutrition and exercise, and mental health of Clemson students. Students learn to analyze and tailor the data to various campus stakeholders to increase preventative measures and promote overall wellness.

Poster #81

Extending Half-lives of Peptide Hormones by PEGylation

Mentor: Modi Wetzler, Chemistry

Students: Jessica Cannon, Victoria Haberman

Vasopressin, its mammalian analog lypressin, and oxytocin are cyclic peptide nonamers that are critical in governing social behavior and development. They play critical roles in pathologies ranging from autism spectrum disorders to neurodegenerative diseases to sexual function and mental health, yet are surprisingly not the subjects of significant pharmaceutical focus in the U.S. This oversight is likely due to their lack of oral bioavailability and vanishingly short lifetimes in plasma, which would complicate dosing. Modification of proteins and peptides with polyethylene glycol (PEGylation) is a proven method to increase their lifetimes and prevent degradation, but site-specific post-synthetic PEGylation of peptides is cumbersome, requiring juggling of orthogonal protecting groups. Instead, by utilizing pre-PEGylated Fmoc-glutamine and lysine with 1-3 PEG chains each, we readily synthesized a small library of PEGylated vasopressin, lypressin, and oxytocin analogs. The branched nature of the PEGylation represents a novel approach to peptide PEGylation and demonstrates a new approach to fine-tuning the pharmacokinetics of these potential drug candidates.

Poster #82

A Biometric Sensor Approach to Analyzing Rett Syndrome's Abnormal Episodic Behavior

Mentors: Delphine Dean, Bioengineering, Kevin Champaigne, Bioengineering, Brian Dean, School of Computing

Students: Dennison Larue, Jared Wells

The purpose of this research is to design and develop a wearable device which utilizes several biometric sensors to identify and monitor patients diagnosed with Rett syndrome. Videos of 10 volunteers mimicking common symptoms such as hand wringing, mouthing, and tapping were recorded as the wearable device simultaneously collected motion data, electrodermal activity, electromyography and heart rate. Subsequently, video of the 10 individuals documented the participants completing tests intended to elicit emotional responses while the wearable device again recorded motion, galvanic skin response, and heart rate data. We then performed FFT's on the motion and EMG data to acquire the frequencies at which the device was moving. The cyclic motion data verified by changes in either heart rate or electrodermal activity denotes an abnormal episode. These abnormal episodes containing the hand washing, tapping, and mouthing movements are what our clinicians are interested in quantifying. Our device combined with EEGnet allows us to successfully determine abnormal episodic behavior in Rett Syndrome patients.

Poster #83

A Closer Look at Faculty Stressors and Recovery

Mentor: Gargi Sawhney, Psychology

Students: Anna Borders, Carly Boyle, Hannah Duncan, Linda Harley, Dacia Moreh Jones, Jack Wilkes

University faculty are exposed to a number of stressors, such as high workload, job insecurity, and poor leadership, among others. These stressors can result in adverse outcomes, such as burnout and reduced job satisfaction. To deal with stressors, faculty often engage in recovery strategies. For the purposes of identifying 1) faculty-specific stressors and their implications on the lives of faculty, and 2) recovery strategies, semi-structured interviews were conducted with 20 university faculty. Faculty were asked to indicate the most common stressors they faced as a part of their job, and the recovery strategies they employed to deal with these stressors. Results of the thematic decomposition analysis indicated a total of 14 faculty stressors and 13 recovery methods. The present study has several theoretical and practical implications, including theoretical advancement, possibility of interventions to improve access to resources, and reduction in stressors experienced by the faculty.

Poster #84

Optimal Performance of Electric Cart with Solar Panel Installation

Mentor: Rajendra Singh, Electrical & Computer Engr

Students: James Bruce, David Canady, Tomarquis Griffin, Elizabeth Zanin

With a highly volatile fossil fuel market, along with increasing greenhouse gases from fossil fuel based vehicles, electric vehicles are becoming the optimal solution for transportation. At Clemson University, some carts used by departments are fully electric. While these carts have decreased fuel costs, there are improvements that can be made for optimal performance. The scope of this creative inquiry is to install a solar panel on the roof of an electric cart to improve drive time and distance. In order to meet these requirements, the electric cart will be tested both without and with a solar panel using the same route. During each experiment, distance, drive time, solar irradiance, windage, and temperature will be recorded. This CI will provide an opportunity for existing and future electric vehicles to improve performance and educate individuals on the importance of reducing greenhouse gases and the cost energy.

Poster #85

Spider Silk Scaffolds: Impact of Varying Silk Properties on Cellular Response

Mentors: Marian Kennedy, Materials Science&Engineering, Delphine Dean, Bioengineering

Students: Johnnie Catoe, Hannah Maeser, Katherine Hafner

Spider silk has been shown to be a viable biomaterial for cell growth and differentiation. Since each cell type can respond differently to the silk surface, it is important to characterize dental pulp cells. In the study, we analyzed cells on dragline silk from different spider species to determine if varying silk properties impact cellular response to silk. Specifically, we studied the response of different cell lines to dragline silk, to silk sterilized with UV radiation, and to silk from spiders kept in stressful conditions. An initial step was to develop and calibrate an automated silk-collection system to control spacing between collected silk lines and to predict the impact of spider position on the angle and spacing of the silk lines. Cells were shown to adhere and align to silk despite environmental stress on spider and without negative effects from UV radiation on silk. We are grateful to the Clemson University Creative Inquiry program (project #437) for financial support.

Poster #86

Generation of Cardiomyocyte-Like Cells from Adipose Tissue-Derived Stem Cells

Mentor: Agneta Simionescu, Bioengineering

Students: Anthony Alerre, Benjamin Banaszak, Alexandra Boulez, David Evans, Erin Mcauliffe, Anderson Patrick, Yvette Ramirez, Amanda Robertson, Emily Wood, Wei Zheng, Joseph Busher, Spencer Marsh

Cardiovascular diseases are some of the leading causes of death in today's society. This includes problems with the heart and/or blood vessels, leading to myocardial infarction and ultimately heart failure. Mesenchymal stem cells derived from adipose tissue have the potential to differentiate into cardiomyocytes (cardiac cells), especially in 3D spheroid cultures that closely resembles in vivo tissues. Our studies aim to regenerate cardiac-like microtissues to serve as in vitro studies of cardiac tissue pathologies and could possibly be used for further tissue engineering to create larger and life sized tissues. Human adipose tissue-derived stem cells were cultured in 3D Petri dishes to form spheroids. They were treated with 5-azacytidine to differentiate them into cardiomyocytes. Using immunofluorescent techniques, the cells stained for connexin 43, a gap junction protein considered a marker for cardiomyocytes. Cardiomyocyte differentiation is shown to be possible from adipose tissue-derived stem cells, so these cells could be implemented into the heart and replace the dead cells after myocardial infarction.

Poster #87

Tigers Together: Examining the Efficacy of a Suicide Prevention Advocacy Training

Mentors: Heidi Zinzow, Psychology, Martha Thompson, Public Health Sciences

Students: Cierra Stanton, Kristen Farrenkopf, Kristin Free, Amelia Fritsche, Brienne Krug, Martha Fields, Laura Bogardus

Suicide is the second leading cause of death among college-aged youth, necessitating the need for robust prevention initiatives on college campuses. Tigers Together to Stop Suicide was developed to promote suicide prevention and awareness across campus. In 2015-2016, Tigers Together implemented a suicide prevention advocacy training to educate students, faculty and staff about suicide prevention.This study utilized training participant assessments at pre-, post-, and 3 month follow-up stages to assess the efficacy of the advocacy training. Results from repeated measures ANOVA and McNemar's tests showed that participants' attitudes and knowledge of suicide prevention, as well as suicide prevention behaviors, improved with advocacy training from pre- to post- stages. Effects remained above pre-training knowledge levels at follow-up. The results of this study may inform future advocacy training program development to reduce suicide and related behaviors on college campuses.

Poster #88

Insect Ambassadors

Mentors: Michael Caterino, Plant & Environmental Sciences, Michael Ferro, Plant & Environmental Sciences, John Morse, Plant & Environmental Sciences

Students: Nathan Arey, Alex Copeland, Jenna Crowder, Ashley Gaynor

Our goal is to educate the public on the importance of insects as well as promote the Clemson University Arthropod Collection (CUAC) and the research it facilitates. Our subprojects tell stories about the role that insects play in our global ecosystem and the scientific process of entomology. We use museum insect specimens, live insects, and engaging activities that transform complex entomology ideas into lessons that the viewers can apply in their daily life. All of the images, storyboards, and displays we use are original and specifically designed to be both visually appealing and informative. Our outreach-based CI stimulated an incredibly positive response with teachers and students asking for more resources about entomology and the CUAC specifically. As a result of Insect Ambassadors, we were able to interest, educate, and get the community and students excited about insect diversity and the science of entomology.

Poster #89

Quantifying the Effectiveness of a Portable PIT Tag Antenna at Detecting Stream Fish

Mentor: Seoghyun Kim and Yoichiro Kanno, Forestry & Environmental Conservation

Students: Alisha Smith, Parker Johnson, Brett Kelly, Joshua Cary, Yoichiro Kanno, Kasey Pregler, Seoghyun Kim

Passive Integrated Transponder (PIT) tags have been used to infer demography and behavior of stream fish, but their application has mostly been limited to salmonids. We studied the efficiency of the Biomark BP Plus Portable antenna at detecting two non-game species in a small upper Piedmont stream (2.4 m mean wetted width) in South Carolina. Detection efficiency was compared between tag size (8 and 12 mm) and species (Mottled Sculpin *Cottus bairdii* and Creek Chub *Semotilus atromaculatus*). A 280 m stream reach was blocked off under baseflow condition in September 2016, and 67 Creek Chub (60-140 mm TL) and 65 Mottled Sculpin (60-90 mm TL) were tagged using PIT tags (half 8 mm tags and half 12 mm tags).The reach was sampled twice daily for five consecutive days using the portable Biomark wand with a new user on each sampling event. A set of logistic regression models was constructed and compared to identify factors affecting detection efficiency. Mottled Sculpin, a benthic species, implanted with 8 mm and 12 mm PIT tags had detection rates of 56% and 79% respectively, and Creek Chub, a water column species, had 3% and 16% detection rates for 8 mm and 12 mm tagged individuals. The effect of body length on detection efficiency varied by species. This study showed that detection efficiency of a portable antenna depended on tag size, body length, and species, and 8 mm tags can be a viable option for a sedentary, small-bodied benthic species in a small stream.

Poster #90

Sustainable Design - Oyster Reef Restoration

Mentors: Caye Drapcho, Environmental Engr & Earth Sci, Rachel Thurmes, Environmental Engr & Earth Sci

Students: Michael Calfe, Michaela Christine Cattell, Martha Davis, Chavone Garza, Jennifer Hibberts, Kaitlyn Hillard, Samantha Ihm, Abbey Kirkland, Gabriella Stefano, Rachel Thurmes, John Walker, Savannah Willis

With the effects of stronger storms and other weather events due to global warming, and pollution entering our waterways from a multitude of sources, oyster reefs across America's coastline have been being wiped out. Oyster reefs are the focus of this Creative Inquiry team because of their natural ability to slow coastal erosion and act as natural filters for water. This project was originally the senior design project of a former Biosystems Engineering student and has since transformed into the CI because of the complexity of the entire process. Over the years, different sub-groups have focused on topics such as; water quality, structural design, structural adhesion and oyster spawning to name a few. Data from each of those topics has gotten the group to its current position. The focus of the project this semester is on the implementation of structures in South Carolina's ACE Basin because the structure design was recently approved by the SC Dept. of Natural Resources after years of rejections by the Army Corps of Engineers. Methods for eliminating field bias, anchoring the structures and gathering data throughout the summer are currently being finalized. With different environmental problems becoming more and more prevalent, sustainable design is a way of thinking that can complete an important task while at the same time, have a positive impact on the environment.

Poster #91

Adipose Tissue-Derived Stem Cell Differentiation Into Beta-Cells

Mentor: Agneta Simionescu, Bioengineering

Students: Gabriella Brown, Ashley Haney, Lauren Jackson, Thomas Knight, Sanjana Mandilwar, Kirsten Scalera, John Shearin, Brittany Walker, Spencer Marsh

Approximately 29.1 million Americans are affected by diabetes with almost 1.4 million new diagnoses every year. Despite its prevalence, a cure has not been found. Our studies are focused on a new method for combating diabetes using a tissue engineering approach. Adipose tissue-derived stem cells were 3D cultured and treated with a differentiation cocktail

containing 10 uM Nicotinamide, 4 uM Activin A, 10 nM GLP-1, and 1 g/L Glucose. Cells in spheroids were constantly monitored for viability (Live/Dead fluorescent staining) and for their beta cell characteristics (using human beta-cells as control). An enzyme-linked immunosorbent assay (ELISA) was performed to determine the insulin production. Although the differentiated spheroid was clearly different from the control and showed beta cell-like structures, the ELISA did not show statistically significant data for insulin production. In the future, we would like to repeat this experiment based on successful cell culture and spheroid formation. Once these beta cells are effectively differentiated and produce insulin, we will be one step closer to replenish the deficient beta cells.

Poster #92

Investigating Avatar Transformations and Perception in Virtual Reality

Mentors: Christopher Pagano, Psychology, Brian Day, Psychology, Leah Hartman, Psychology

Student: Hope Wegner

In virtual reality an avatar is a depiction of yourself. Past research has revealed noticeable benefits in perception in VR when actors are given a self-avatar. This study focuses on the effects of transformed (i.e. lengthened arm dimension) avatars on human perception and action abilities in a virtual reality setting. This study is a between-subject design with a reaching task where the control group uses an *unaltered* avatar (i.e. scaled to their own body dimensions) and the experimental group interacts with the environment through a *transformed* avatar (i.e. an avatar with an extended arm that is 30 cm longer). Participants will reach to targets presented at various locations, and their actions will be tracked. The expected results should demonstrate that the experimental group will adjust to the transformed avatars and this effect will carry over and impact the use of an unaltered avatar. Alongside that, participants are expected to adjust more quickly from feedback with the normal avatar setting to the transformed setting then from the transformed long arm, to the normal arm length setting with no feedback. The results of this study could enhance training in virtual reality.

Poster #93

Anti-Cancer And/Or Anti-Inflammatory Effects Of Marine Protist Matelized Materials

Mentor: Yanzhang Wei, Biological Sciences

Students: Hiba Kouser, Megan Polito, Justin Schumacher

Thraustochytrids are a diverse group of marine protists and have recently gained attention due to their ability to produce nutraceuticals (e.g., docosahexaenoic acid-DHA and eicosapentaenoic acid-EPA), lipids [e.g., palmitoleic acid (C16:1) and oleic acid (C18:1)] for biodiesel production. A marine protist, *Thraustochytrium striatum* was found by Dr. Zheng to be able to metalize a wide spectrum of carbon and nitrogen sources to produce high-value bioactive macromolecules, such as extracellular polymeric substances (EPSs). Other studies have demonstrated that EPSs bear anti-cancer and/or anti-inflammatory activities. We, therefore, would like to evaluate the potential anti-cancer or anti-inflammatory activity of the EPS materials from Dr. Zheng's lab. The anticancer activity of the samples were determined by the inhibition of cell growth of human prostate cancer cell DU-145 and human breast cancer cell MDA-MB-231 using MTS cell proliferation assay, while the anti-inflammatory activity of the samples were screened by the decreased Nitric Oxide (NO) production of human macrophage cell RAW-264.7 after stimulation by lipopolysaccharides (LPS). After adding marine protist samples to the B16 and DU-145 cancer cell lines, it was observed that there was a dose-dependent suppression of the tumor cells. These results followed the trend that higher concentrations of protist samples led to a higher suppression of tumor cell growth. Currently, MCF-10A and NL20 (non-tumor epithelial cell lines) and MDA-MB-231 (breast cancer cells) are undergoing further investigation to confirm trends seen in B16 and DU-145 cell line. Also, under investigation is RAW 264.7, a macrophage, to observe anti-inflammatory effects of these marine protist samples. Based on these findings, the extracellular polymeric substances from marine protist byproducts may represent a future drug for cancer and/or inflammation and should be further analyzed to confirm these findings.

Poster #94

Design Improvements to a Squirrel Feeder & Field Testing Prototypes

Mentors: Todd Schweisinger, Mechanical Engineering, Kristina Dunn, Aquaculture, Fish and Wildlife

Students: Robert Baumgardner, Morghan Davidson, David Romba, Daniel Rowell

The purpose of this research project is to redesign the current feeder being used to administer an oral contraceptive to eastern gray squirrels (squirrel) on Clemson University's campus. Our goal is to minimize consumption of bait by any species other than squirrels. Engineering students assessed the original feeder design and defined a list of both criteria and constraints which included mechanical design aspects as well as environmental conditions and safety concerns. The group developed four design modifications, prototypes were fabricated, and then field tested. Each prototype was placed in a tree with an original feeder and all feeders had camera traps on them to record consumption. Photos were analyzed to determine if the modifications allowed squirrels to consume bait while reducing non-target access. The next iteration of prototypes was manufactured based on the results and are currently being field tested to assess whether the new prototypes will successfully fulfill our goal.

Poster #95A

Personality Differences in Exploration and Activity in Captive Callitrichine Primates

Mentors: Brett Frye, Biological Sciences, Lisa Rapaport, Biological Sciences

Students: Tara Brown, Megan Delorenzo, Corey Schultz, Jocelyn Jahn, Margaret Keener

Consistent behavioral differences between individuals, or personality, is a topic of interest across many disciplines. However, little experimental research has been conducted regarding this phenomenon in nonhuman primates. Within the field, there has been debate over whether commonly used behavioral tests precisely measure the same component of personality, as is often assumed. This project aims to investigate exploration, an element of personality, in common marmosets (*Callithrix jacchus*) and golden lion tamarins (*Leontopithecus rosalia*) using behavioral responses to novel foods, novel objects, and a threatening stimulus. Marmosets housed at the Southwest National Primate Research Center and lion tamarins at several zoos were were exposed to a series of novel foods and objects. We assigned investigation, activity, and agitation scores for each animal and determined behavioral consistency among trials. We predict that agitation and activity scores will be negatively correlated with investigation scores. If these monkeys have distinct personalities, we expect that individuals' investigation, activity, and agitation scores will be positively correlated across experimental contexts. This project may help to validate experimental techniques to measure personality in nonhuman primates.

Poster #95B

Testing the Effects of Keels on Stability and Maneuverability in Aquatic Turtles

Mentors: Richard Blob, Biological Sciences, Christopher Mayerl, Biological Sciences

Student: Lucy Stevens

During swimming, animals experience a variety of destabilizing forces, which can result in decreased energetic efficiency and locomotor performance. Many aquatic species exhibit external structures that, like the keels of boats, may increase their hydrodynamic stability. For example, juveniles of many turtle species possess small keels on the top of their shell, with some maintaining the keels into adulthood. To test if keels could provide similar stabilizing forces for turtles as they do for boats, we designed and affixed 3-D printed keels to the carapace of a non-keeled turtle species, the painted turtle (*Chrysemys picta*). We used high-speed video to record turtles as they followed a prey stimulus. We then compared the performance between non-keeled swimming and swimming with keels of four size-shape configurations that span the range of those observed in nature. We found no substantial change in stability following the addition of any keel, although turning performance decreased.

Poster #96A

Mind to Machine Additive Manufacturing

Mentor: Hugo Sanabria, Physics and Astronomy

Students: Eric Strohl, Giandre Acosta, Perry Bolick, Collin Sech

Can the use of CAD programming in additive manufacturing be eliminated through the synchronization of human thought and machine output? In answering this challenge, we aim to humanize and optimize additive manufacturing processes. As a Creative Inquiry, we have evaluated the multitude of EEG (Electroencephalograph) headsets to learn how the human mind can be read and provide output to a computer. The project's long term goal is to create an environment of manufacturing directly from mind to material. The current objective of the team is to use the output from the EEG to control at will the step motors of a home built 3D printer. The elimination of limitations due to the use of CAD software creates new possibilities in the innovation of additive manufacturing. Research is also being conducted to fully utilize the brain's neural plasticity and ability to learn and adapt.

Poster #96B

Design of Assistive Needs Devices for Kids in Sport

Mentors: John D DesJardins, Bioengineering, Meredith Owen, Bioengineering

Students: Benjamin Banaszak, Robert Benson, Samuel Coeyman, Brendan Elie, Mitchell Grant, Helena Guo, Jordan Harley, Haven Hendrix, Melanie Horkan, Emily Nance, Eliot Teal

The ARCHER (Accessible Recreational Creations to Highlight Educational Reach) Design Works group was developed in collaboration with Anderson School District 4 to develop engineering solutions that will allow k-12 students with physical disabilities to participate and compete in the archery section of physical education (PE). Five k-12 students were selected by the Anderson4 physical therapist, occupational therapist, and special services coordinator to participate. Teams of 3 CI students were paired with each k-12 student. The individual needs of each k-12 student were assessed and custom assistive devices were designed and developed to allow for more complete and independent participation in the PE archery section. Initial prototype devices were demonstrated at the completion of the fall semester. One device was submitted to the National Archery in Schools Program (NASP) for approval to use in competition. Further development for each assistive device is being conducted during the Spring 2017 semester. Special acknowledgements to Anderson School District 4, the SC DNR, and the Clemson CI Program.

Poster #97A

Human Performance Engineering: Decision Making in Virtual Reality

Mentor: Dotan Shvorin and Kevin Taaffe, Industrial Engineering

Students: Harrison Albo, Alex Berg, Courtney Lee, Liam Mcgill, Paul Rosenberger

Every year, over 200 million surgeries are performed in hospitals and surgical facilities all around the world. In each one, there are various steps that are carried out by specific personnel in a particular order. The surgical team is required to work together to achieve precise medical results, while also keeping safety and efficiency in mind. Our Human Performance Engineering (HPE) Creative Inquiry (CI) research group examines how the operating room design influences the decision-makingprocess. To achieve this objective, we are utilizing technological, wearable innovations such as a wireless EEG (electroencephalogram) Emotiv EPOC headset, HTCVivevirtual reality headset, and Empatica human sensing device. We utilize these technological assets to design the operating room in virtual reality, record the participant's cognitive load when performing a certain task, and correlate their brain activity with their bodily function. This research is initiating a data collection scheme to enhance a current Agency for Healthcare Research & Quality (AHRQ) grant, led by the Clemson Architecture department, in collaboration with the Medical University of South Carolina (MUSC), as well as the Industrial Engineering department and Computer Science department at Clemson University.

Poster #97B

Human Performance Engineering: Team Performance Priming Effect

Mentor: Dotan Shvorin and Kevin Taaffe, Industrial Engineering

Students: Michael Knotts, Dalton Williams, Connor Cink, Alexis Holt

Working as a team for the first time presents many challenges. This study presents insights about team performance when looking at team members' electrical brain wave activity as they work to overcome a series of cognitive challenges. A comparison between a primed group, who had previous experience, and an unprimed group, who did not have previous experience. The primed group overcame the challenges quicker than the unprimed group, and both groups demonstrated unique functions of brain wave activity in specific areas of the brain. The primed group demonstrated better communication skills and more efficient resource allocation than the unprimed group. This higher level of team performance indicates that there are many beneficial aspects of prior teamwork experience.

Poster #98A

Development of a Brain Model for Neurosurgery Pre-Operative Planning and Training Stage II: Integration of Cerebrovascular System

Mentors: Jorge Rodriguez, Bioengineering, Delphine Dean, Bioengineering

Students: Savannah Dale, Ryan Branco, Evan Keating, Peyton Tharp

The goal of this project is to create as realistic of a synthetic brain model as possible; by incorporating the tissue, veins, blood flow, surface tension, mechanical properties, and similar tactile properties, a near exact imitation can be constructed. The integration of the veins of the brain begins with obtaining a porcine brain to extract a cerebrovascular system. The tissue is corroded using solutions of sodium hydroxide and acetone, leaving a cast of the veins. Uniaxial unconfined compression tests are performed to compare the mechanical properties of the original brain arteries and the synthesized cerebrovascular system. A current model of the cerebrovascular system is currently in the works, but the determining factor of our progress is how closely the model mimics the mechanical properties of the brain vessels and the durability and ease of consolidation into the current brain model. This project is important because even though diagnoses have become more accurate and planning has become much easier with recent technological advances, the only true preparation for the intricacies of neurosurgery is experience acquired through practice. Thus having a brain model that is customized with each patient could be advantageous for neurosurgeons preparing for intensive and complex surgeries. The next step will be to implement circulatory features into the cerebrovascular system as feedback for practicing surgeons.

Poster #98B

Elucidating Fluconazole Based Aneuploidy in *Cryptococcus neoformans*

Mentor: Lukasz Kozubowski, Genetics and Biochemistry

Students: Diana Fang, Charles Simmons, Damiana Al Tamirano

Cryptococcus neoformans is a pathogenic yeast that causes lethal cryptoccocal meningitis in immunocompromised patients. One of the challenges in treating cryptococcosis is in its ability to develop resistance to an antifungal drug, fluconazole, which is used to treat it. In previous studies, we found that fluconazole leads to the failure of cytokinesis and/or final cell separation during mitosis, which may contribute to formation of aneuploidy and fluconazole resistance. From our results, treatment with fluconazole leads to a gradual inhibition of growth while permitting progression through the cell cycle and inhibition of cytokinesis. To investigate which part of cytokinesis has failed in *C. neoformans*, we monitored the dynamics of the key cytokinetic components, the actomyosin ring (AMR) and septin cdc10. Our data show heterogeneous responses to fluconazole in terms of timing and rate of constriction of the AMR. After the constriction of the AMR, a

septum was usually formed between the mother and daughter cells. Septin dynamics were not perturbed. Therefore, these findings suggest that even in the presence of fluconazole, the AMR does constrict and septin assembly is normal. However, a final degradation of the septum between mother and daughter may not occur, resulting in the lack of complete separation between the cells.

Poster #99A

Sleeping Hard or Hardly Sleeping: Differences in Nighttime Waking for Children with an Autism Spectrum Disorder

Mentor: Jennifer Bisson, Psychology

Students: Caroline Fant, Carrie Tomberlin, Cameron Keramati

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by severe challenges with social interaction, repetitive behaviors, speech and nonverbal communication. Research has shown that over half of children with ASD experience some kind of sleeping problem or disorder (Williams, 2004). The purpose of our study was to explain the difference between nighttime waking between children with and without ASD. In a cross sectional study, parents were recruited, voluntarily, through social media advertisement and were asked to complete an online survey. Twenty-four parents whose children met the age restrictions of our study were included in the final dataset (13 parents of children with ASD and 11 parents of children without ASD). An independent t-test was used to compare individuals with ASD and typically developing (TD) individuals. Our results show a trend; the ASD group woke up more often in the first five months of life ($M = 3.92$) compared to the TD group ($M = 2.55$), $t(22) = 2.00$, $p = 0.058$. Our team will recruit more participants to further explore our research hypothesis.

Poster #99B

Creative Play

Mentor: Carlos Barrios, School of Architecture

Students: Augustus Abbey, Lucas Helander, Lorne Southern, Kevin Stanhope, Peter Sterckx

Creative play presents a series of models using the LEGO brick system where students explored relations between scale, space and form using building blocks of specific size

Poster #100A

Soil Stabilization Using Native Grasses and Herbs

Mentor:Patrick Hiesl and Donald Hagan, Forestry & Environmental Conservation

Students: Johnny Capps, Jacob Fowlkes, William Ridlehuber, Lawton Stalvey, Jonathan Cantrell, Micah Chinnis, John Fletcher, Thomas Beadie, Patrick Hiesl

Forest roads are needed to provide access for forest management and forest recreational activities. Erosion on forest roads contributes to sediment runoff into streams which affects water quality. The best way to prevent erosion is to stabilize loose soil along forest roads by planting grass like species. Currently, Best Management Practices (BMP) manuals across the Southeastern US recommend to plan species which have been listed on the invasive species list. The goal of this Creative Inquiry project is to find alternative grass and herb species that are native or non-invasive but still provide adequate soil stabilization functions. A portable rainfall simulator was constructed to carry out controlled experiments using a variety of grass and herb species as well as different slope angles. Results from this Creative Inquiry project will be used to update BMP manuals in South Carolina and the surrounding states.

Poster #100B

Participant Outreach for Frist Line Therapy Program at Rural Women's Clinic

Mentors: Caitlin Moore, Clinical Ed/Pract&Med Surv Pro, Nancy K Meehan, School of Nursing

Students: Lauren Palermo, Anna Smith

This research studied the recruitment of underserved women between the ages of 18 and 40 to the First Line Therapy Program funded by the Joseph F. Sullivan Center. There is a deficit in support and education for women in the rural Upstate South Carolina related to one's health and overall wellbeing. The goal of this program is to educate and support these women, so that they and their families can improve their health status, even on a limited budget. The participant population was drawn from the participants of the Foothills Pregnancy Care Center. Twenty-one participants were contacted over the period of a month, and two participants expressed interest and participated in the program. These participants received Bioelectrical Impedance Analysis and a personalized food plan based on the results of the analysis. Client participation and compliance proved to be a challenge, but several interventions were discovered that will help improve results in the future.

Poster #101A

Active Not Distractive: The Effect of Bouncy Band Use on Classroom Behavior

Mentors: June Pilcher, Psychology, Jennifer Bisson, Psychology, Sarah Sanborn, Psychology

Students: Emma Benfield, Kelsey Bennett, Linda Harley, Shelby McGill, Harriet Pruitt, Lindsay Renwick
Research shows that physical activity in the classroom can lead to improved memory and attention. The use of Bouncy Bands in the classroom allows children to be active without being distractive to themselves and other students. The purpose of this study is to see whether the use of Bouncy Bands helps improve attention and behavior in children. Twenty-seven 3rd and 4th grade students were recruited through an after school program. Each grade had bouncy bands for half of the time. Each student completed the d2 measure of attention at the beginning, midpoint, and end of the study. A 3(time point) x 2(grades) mixed ANOVA was used to analyze the impact of band use on children's attention, but there was no main effect of grade and no significant interaction. The behaviors (e.g., on-task/off-task, head orientation, body orientation) of the students are currently being analyzed. Although attention was unaffected, we expect that Bouncy Bands will promote positive classroom behavior.

Poster #101B
Tesselations
Mentors: Carlos Barrios, School of Architecture, Brandon Ross, Civil Engineering
Students: Corey Day, Rayshad Dorsey, Danielle Drinkuth, Liam Johnson, Matthew Krider, William Polk
This project presents studies in formal composition based on mathematics and geometry. Repetition and symmetry are studied to present forms and compositions of striking beauty

Poster #102A
Compendium of Research on *Bellamya japonica*, a New Invasive Species in the Savannah River Basin
Mentor: John Hains, Biological Sciences
Students: Jacob Bartell, Joanna Bauer, Jeffrey Brady, Cody Davis, Michael Elbrecht, Richard Mahon, Edwina Mathis, Taliyah Smith, Harold Taylor
Creative Inquiry into the biological and ecological characteristics of *Bellamya japonica* has continued for approximately 8 years. During this time CI teams have explored many hypotheses, performed experimental investigations that were the first of their kind, and currently pursue several lines of investigation for which there are no comparable studies in the literature. This presentation summarizes all of the work that has been completed, currently pursued, and planned for the future. In this manner we demonstrate the essential questions, the motivations, the strategy of these investigations, and the results that we've achieved so far.

Poster #102B
Childhood Obesity: A Systematic Review and Meta-Analysis
Mentor: Janice Lanham, School of Nursing
Students: Catherine Boyd, Hannah Cureton, James Gibbs, Silas Holmes, Philip Johnston, Margaret Robelen
The prevalence of obesity continues to be a health concern for children and adolescents in the United States. Obesity increases the risk of many diseases and health conditions, e.g.coronary heart disease, Type 2 diabetes, hypertension (high blood pressure),dyslipidemia (for example, high total cholesterol or high levels of triglycerides), stroke. The purpose of this Creative Inquiry project is to develop, implement and evaluate a culturally appropriate and linguistically competent community health promotion and disease prevention programs for physical activity/ fitness, nutrition and weight management for children, adolescents and teenagers in a community-based setting targeting minority population. Overweight adolescents often become obese adults. Although the United States has the highest prevalence of obesity among the developed nations, it is not alone in terms of trends. Increases in the prevalence of overweight and obesity among children and adults have been observed throughout the world.

Poster #103
Forecasting the Future of Coral Reef Communities
Mentor: Michael Childress and Kylie Smith, Biological Sciences
Students: Thomas Guryan, Ashley Ehlert, Randi Sims, Isabella Dubnicka, Abigail Ehlers, Sydney Whitaker, Sara Rolfe, Haley Krachman, Caroline Stroud
Coral reefs are one of the most biodiverse yet threatened ecosystems on the planet. Overfishing, pollution and habitat loss have triggered drastic declines in coral cover. In this presentation, we highlight our research examining the impacts of coral loss on reef biodiversity in the Florida Keys. The ancient structure of nearshore reefs represent communities of the past when corals flourished, while offshore reefs show signs of accelerated coral decline. Nearshore reefs have higher abundance and/or diversity of damselfish, parrotfish, lobsters and cleaner gobies, than do offshore reefs. Our results suggest that coral reefs of the future may be dominated by soft corals, fleshy algae and generalist herbivores. Behavioral observations of social interactions, however, suggest that reef fishes and lobsters show a high degree of behavioral plasticity which may help them adjust to future changes in reef community structure. Funding for this project was provided by Clemson's Creative Inquiry.

Poster #104

Caterpillar Viruses And Insects In Biotechnology

Mentor: Matthew Turnbull, Biological Sciences
Students: Alexa Corker, Valerie Hinsch, Daniel Howard, Yolanda Howard, Richard Melton, James Nietering, Jessie Parker, Margaret Reilly, George Stuart, Peng Zhang

Insects are models in developmental and cell biology, and important in their interactions with human society. They also have use in biotechnology. Students in this CI are using insect viruses to examine a vertebrate growth regulator in caterpillar cells, and to investigate functional significance of membrane potential changes induced by host-virus interactions. Others are investigating bioelectrical processes and underlying mechanisms in tissue remodeling, using caterpillar gut model during molting to examine patterns and processes. The confluence of virus, biotechnology, and insects is exemplified by a group using transgenic fruit flies to investigate a different virus and its virulence factors. These studies are advancing our knowledge of insect biology, evolution of developmental mechanisms, and may contribute to manipulation of insect populations.

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