4-9-2013

8th Annual Focus on Creative Inquiry Poster Forum Program

Clemson University

Aha!

Creative Inquiry

CLEMSON

eighth annual

Focus on Creative Inquiry

forum

Tuesday, April 9, 2013
Hendrix Center, Clemson University

Sponsored by:

Undergraduate Studies | The Graduate School | Calhoun Honors College

8th Annual
Focus on Creative Inquiry
Poster Forum

April 9, 2013
Sponsored by
Undergraduate Studies
The Graduate School
Calhoun Honors College

The poster forum today displays a few of the more than 400 projects initiated by Clemson University Creative Inquiry teams.

What is Creative Inquiry? It is small-group learning for all students. It is the imaginative combination of engaged learning and undergraduate research. Ultimately, it is the creation of an Ah-ha! Moment — and it is unique to Clemson University.

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

Students may join Creative Inquiry teams as freshmen and continue through graduation.
They hone critical-thinking and problem-solving skills as they learn to work in a team — sometimes as a leader, sometimes as a follower. They present their work at national and international conferences, where they field questions from professionals and researchers.

These are the skills today's employers are seeking. "We want all of our graduates to be thinkers, leaders and entrepreneurs," says Provost Dori Helms. "We want them to be able to approach a task or problem and figure out how to solve it."

Indeed, Creative Inquiry is more than an add-on to a few students' education; it's a campus-wide, cross-disciplinary culture of engagement that makes the Clemson experience applied, engaging and extraordinary.

Acknowledgements

Creative Inquiry program director:

Dr. Barbara J. Speziale, Associate Dean, Undergraduate Studies

Creative Inquiry committee:

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Creative Inquiry is supported by:

Provost Doris Helms
Vice-Provost Dr. Janice W. Murdoch
Clemson Alumni Association
Phil and Mary Bradley
Lori Anne and Chalmers Carr
The Harris Corporation
Bob and Brenda Muldrow
Libby Rauch
Wayne Roper
Goz and Pat Segars
Doug and Lynn Smith
Dr. and Mrs. Charles (and Linda) Watt

Cover Photo by Dr. John DesJardins
Creative Inquiry team: Caleb Eljach and Alison Lamb
Photo Title: Reflecting on Engineers of the Future

Schedule of Events

8:00 am - 9:30 am	Students install posters	Hendrix Ballrooms, Meeting Rooms & Multipurpose Room
10:00 am - 12:00 pm	Morning Poster Session	Hendrix Ballrooms, Meeting Rooms & Multipurpose Room
1:00 pm - 3:00 pm	Afternoon Poster Session	Hendrix Ballrooms, Meeting Rooms & Multipurpose Room
3:00 pm - 4:00 pm	Plenary Session	McKissick Theater

Welcome - Dr. Barbara Speziale

Introduction - Dr. Janice Murdoch

Featured Speaker - Dr. John DesJardins

Creative Opportunities: Innovate, Educate, and Engage

Awards Announcements - Dr. Barbara Speziale

4:00 pm - 5:00 pm	Students remove posters

Speakers

Barbara J. Speziale
Associate Dean, Undergraduate Studies

Dr. Barbara J. Speziale earned her Ph.D. in Zoology from Clemson University, a master's in Botany at the University of Minnesota and a bachelor's degree in Biology and in English Literature at the State University of New York at Binghamton. She has served Clemson University in public service, teaching, and administrative roles. She holds the rank of full professor in the Department of Biological Sciences, and directs Clemson's Creative Inquiry program in Undergraduate Studies. Dr. Speziale's research, funded by more than $13,000,000 in external grants, includes limnological studies of algae in freshwater lakes, water quality educational materials, and science education activities that encourage students, K-12 through college, to pursue science studies and careers. She currently directs two major grants. A National Science Foundation grant created the FIRST program to recruit and retain first-generation college students in science careers. The SC Life project, funded since 1998 by the Howard Hughes Medical Institute Precollege and Undergraduate Science Education Program, provides life sciences education for K-12 students, their teachers, and undergraduate students. She has received numerous awards for her work, including the Elliott Award for Outstanding Service to Off-Campus, Distance and Continuing Education, the South Carolina Governor's Award for Scientific Awareness, Clemson's Martin Luther King Jr. Award for Excellence in Service, the Society for Environmental Toxicology / Menzie-Cura Environmental Education Award, and two awards for the $4H_20$-Pontoon Classroom curriculum -- the Natural Resources Conservation Service Youth Environmental Award and the 4-H Centennial Program of Excellence.

Janice Murdoch
Vice Provost and Dean of Undergraduate Studies

Jan Murdoch, who has taught at Clemson since 1986, received her bachelor's with honors in Psychology from Wake Forest University in 1980, followed by a master's in General Experimental Psychology in 1982. She was elected to Phi Beta Kappa in 1980. A native of Wilmington, NC, she completed her Ph.D, in clinical psychology at Vanderbilt University in 1985, with a clinical internship at Brown University. She is licensed to practice clinical psychology and holds the rank of full professor in the Department of Psychology. Murdoch's primary interest has been in undergraduate teaching. She also works with students on directed research projects and honors research. Courses she teaches include abnormal psychology, substance abuse treatment, and health psychology. Murdoch's research interests are in learning outcomes in General Education social science courses. Murdoch's other interests include public policy, including a sabbatical leave during the 1994-95 academic year to serve as an American Psychological Association Congressional Fellow working for Senator Jay Rockefeller's Senate Committee on Veterans' Affairs staff. She also plays bluegrass mandolin with "Any Old Time."

As Dean of Undergraduate Studies, Murdoch is responsible for maintaining and enhancing the quality of undergraduate academic programs and services, including curriculum, academic advising, the Calhoun Honors College, Cooperative Education, the Academic Success Center, Creative Inquiry, and ePortfolio.

Plenary Speaker

John DesJardins
Assistant Professor of Bioengineering

Dr. DesJardins is an assistant professor in Bioengineering at Clemson University and leads the Laboratory of Orthopaedic Design and Engineering at Clemson and the Frank H. Stelling and C. Dayton Riddle Orthopaedic Education and Research Laboratory at CUBEInC. He received his BS in Mechanical Engineering from Carnegie Mellon University in 1992 and his MS in Mechanical Engineering from the University of Pittsburgh in 1994. Following a series of exciting positions as a biomechanics researcher with the University of Pennsylvania, Johns Hopkins University and University College London, he joined the staff of the Clemson Bioengineering Department in 1998. He earned his Ph.D. in Bioengineering from Clemson University in December 2006, and the joined the Faculty of Bioengineering in 2008. His research interests include the areas of orthopaedic biomechanics, biomaterials tribology, medical device design and engineering education, and his current compliment of 10 undergraduate, 6 MS and 4 PhD students are actively engaged in orthopaedic translational research.

He is the recipient of the 2012 Phil and Mary Bradley Award for Mentoring in Creative Inquiry for his work in mentoring undergraduates at Clemson. Dr. DesJardins currently helps to mentor six undergraduate creative inquiry research and design teams. These student teams work on a variety of projects including developing an implant retrieval program in orthopaedics for the state of South Carolina, using bioengineering applications as a method to enhance calculus instruction at Clemson, partnering with the Roper Mountain Science Center to develop a bioengineering innovation room for their new educational facilities, engaging and mentoring freshman/senior teams in bioengineering design, using tribology (the study of friction, lubrication and wear) as a platform for educate undergraduates in experimental techniques and develop K-12 outreach materials, and developing medical technology for the developing world. Over the last 6 years, these CI groups have produced amazing outcomes and he is very proud of the amazing work by these students.

Plenary Lecture:
Creative Opportunities: Innovate, Educate and Engage

I believe that the creative inquiry program is a powerful engine of opportunity for our students and faculty. I see it every day in the CI groups that I participate in, and I am inspired by what our students are capable of accomplishing if we are willing to engage in the process of Inquiry. In CI, students meet with professors, dream up new ideas, and then act upon them. It is pure opportunity through inquiry. In our CI groups, students are transforming opportunity into innovation by engaging with local and global clinicians, and translating their medical needs into the design of novel biomedical devices for the US and developing countries. Students are engaging clinicians in South Carolina and taking retrieved biomedical devices that were previously disposed of as biomedical waste and transforming then into a nation-wide repository and database for experimental and clinician research into the causes of implant failure. They are engaging with our K-12 partners in the Upstate to design exciting educational materials that will excite the next generation of scientists and engineers in biotechnology, and they are using novel hands-on bioengineering activities as tools to engage and motivate their own peers in their calculus courses. They can even make tribology fun for 2nd graders!!!! All of these projects start with an idea, transformed into an opportunity by CI, and from there exciting things happen. My talk will showcase some of these exciting CI projects and the students that have helped to make them opportunities of a lifetime.

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.

Bradley Award Recipients

2012 Dr. John DesJardins, Assistant Professor of Bioengineering
2011 Dr. Delphine Dean, Assistant Professor of Bioengineering
2010 Dr. June Pilcher, Alumni Distinguished Professor of Psychology
2009 Dr. Karen Kemper, Associate Professor of Public Health Sciences
2008 Dr. Susanna Ashton, Professor of English
2007 Dr. Mark Charney, Professor of Performing Arts

The Bradleys are a "One Clemson" family, supporting both athletics and academics, including providing the first major gift for the Creative Inquiry initiative. They did so because they like the idea of relevance and results. "The projects we've seen so far are about real problems," says Phil, "and they're designed to find solutions."

Phil's father, William F., had attended Clemson in the late 1930s, gone into service before he graduated, gotten married and started a family. In the late 1940s, he came back to Clemson with his young family to finish his degree. Years later, Phil Bradley enrolled in Clemson. After his sophomore year, he married his high school sweetheart, Mary, and before he graduated in 1965, they too had begun their own family with daughter, Renee.

After military service, the Bradleys settled in Charleston where they had their second child, Philip, and where Phil established a successful career in the insurance industry. Their children grew up coming to Clemson ball games. One of Philip's first Death Valley memories is that of being picked up by the Tiger.

Both children attended Clemson. Renee later transferred to the College of Charleston, while Philip earned a political science degree at Clemson in 1992. He now has his own Allstate agency in Mount Pleasant. Seeing Philip graduate was coming full circle for Phil and Mary. In fact, Philip had his father's and grandfather's graduation years engraved inside his own Clemson ring.

The Bradley family has always believed in a life of involvement - whether it's working for their church, hosting Clemson Lowcountry events or giving financial assistance to worthy causes.

"Clemson has played a large role in my family's development," says Philip. "As our own history has evolved, so has the University's. Giving back is part of our shared tradition."

Excerpted from: Clemson World, Summer 2006Volume 59 Number 3: 'One Clemson' Family

Creative Inquiry gratefully acknowledges our Provost, Dr. Doris Helms. It is her vision and support that have made all of this possible.

Dr. Doris Helms
Vice President for Academic Affairs and Provost

During her career as a biologist, Helms has been honored by receiving the South Carolina Science Council and South Carolina Hall of Science and Technology awards and the Charles H. Townes Award for her contributions to science and mathematics education in South Carolina. She has served the Educational Testing Service as Chief Reader for Advanced Placement Biology and is currently serving as the Southern Regional Representative to the College Board Academic Assembly. She has served on the Board of Directors for the Association of Public and Land Grant Universities (APLU). Helms is the author of Clemson University's Roadmap and Academic Plan which have focused research on eight emphasis areas and have resulted in revision of the departmental curricula, general education core, faculty workload policies and the faculty performance evaluation system. She is currently responsible for implementing the University's 2020 plan and for directing the expansion of the University's undergraduate student research initiative and Creative Inquiry.

Doris R. Helms received her B.S. in Biology from Bucknell University and Ph.D. in Zoology from the University of Georgia. Since 2001, she has served as Provost and Vice President for Academic Affairs at Clemson University.

"We want all of our graduates to be thinkers, leaders, and entrepreneurs. We want them to be able to approach a task or problem and figure out how to solve it."

Abstracts

Poster # 1
Culturing *Elysia crispate*, the organism that steals chloroplast from algae
Mentor: Lance Beecher, School of Agricultural, Forest, Environmental Sciences
Students: Reenu Leonard, Biting Li, Ray Adcock

This creative inquiry project deals with an aquaponics system where sea slugs and algae interact in order to make a small self-sustainable ecosystem. This process allows for conservation of time and energy. Sea slugs were chosen for this project because they are important to the pharmaceutical as well as the medical industry. The species of sea slugs chosen for this project was *Elysia crispate*, because of their small size, ease of culture and its unique ability to photosynthesize. Algae, which are the major food source for the sea slug, can be propagated within the system utilizing nutrients and artificial lighting. The sea slugs consume the algae, produce nutrients which in turn produce more algae for consumption and the cycle continues, making the system self-sustaining. The results show the algae and sea slugs flourishing within the system. This project was partially supported by the Creative Inquiry program.

Poster # 2
Clemson Tour for Android
Mentor: Dr. Roy Pargas, School of Computing
Students: Jessie Smith, Gregory Edison, Ally Bertz, Matthew Davis, Kyle Mcguigan

This Creative Inquiry group focuses on creating different Android applications. We use the Eclipse IDE and the Android SDK to create Android applications that will benefit Clemson students. Currently we are developing an Android version of Clemson University Tour, which is already an existing app on the iPhone. It allows prospective Clemson students to tour the University's campus using the Android app as a guide. The app contains a database of important buildings on campus which the user can access in a variety of ways. From the simple, a list of available buildings, to the more complex, an interactive map that the user can search using touch controls. Once a user has selected a part of campus the app provides information on the area as well as helpful multimedia, such as video tours and pictures.

Poster # 3
Culinary Nutrition: Investigating Ingredients for Health Benefits and Innovative Preparation Method
Mentor: Marie Hegler, Food, Nutrition, and Packaging Sciences
Students: Andrea Musselwhite, Meagan Miller, Adair Kerrison, Dylan Hopkins, Elizabeth Gerndt, Catherine Kirby, Juliana Mills, Jennifer O'Brian, Joanna Smyers, Sara Webb

The goal of the Culinary Nutrition Creative Inquiry team is to investigate various healthy ingredients, focusing on their nutritious properties and unique, innovative preparation methods to best represent these healthful attributes. This research is an ongoing effort with the intent of devising recipes and learning the health benefits of a wide-range of ingredients. Some of the ingredients selected for exploration during the current semester are miso, grapefruit, pecans, wasabi, forbidden rice, bison, carrots, and coconut. Each of these ingredients undergoes the following investigative procedure:

- Research of history, physical and nutritional attributes, varieties, uses, and availability
- Development, testing, and re-testing of healthy recipes
- Nutritional analysis on recipes
- Sensory evaluation and roundtable discussion of tested recipes

The developed recipes as well as information garnered are then used as culinary nutrition resources by the American Culinary Federation (ACF) and are easily accessible through their public website.

Poster # 4

The Scoop on Reading Logs: Boring Chore or Ticket to Reading Success?

Mentors: Deanna Ramey, Anastasia Homer, Teacher Education

Students: Jemel Pooser, Amy Anderson, Ashley Duquette, Destin Jennings, Emily Dodgins, Joseph Maxwell, Mary Catherine Causey

The use of reading logs is a popular practice in elementary school classrooms across the country. Though the format and implementation of the log may vary, typically this common homework assignment tracks required out of class reading. Despite the frequent use of reading logs in schools by teachers and education researchers alike, there is little if any research on reading logs themselves. Research shows struggling readers are often reluctant readers and do not choose to read outside school. Our exploratory case study, partially supported by the Creative Inquiry program, examines classroom reading logs and reading log habits of struggling readers in kindergarten through third grade. Knowing more about reading logs, how and why they are used, and how students perceive them may help inform teachers regarding the kinds of reading logs and reading log practices that stimulate or inhibit reading motivation. This is especially relevant for young struggling readers.

Poster # 5

Pilot Sediment Control Facility

Mentors: Dr. Charles Privette, Dr. Cal Sawyer, School of Agricultural, Forest, and Environmental Sciences

Students: Pressley Best, Laurence Stoney, Kelly Williamson, Tripp Williamson

This semester we were presented with a project to design and construct a channel from the main pond on the back side of the dairy farm that feeds into a small sediment trap. We are installing 8 inch pipe through the dam that will serve as a spillway into a small channel on the other side of the dam that feeds into the sediment trap. After the pond reaches the proper level water will flow out of the sediment trap into a secondary channel at the end of which we will construct a weir to help prevent erosion and to take flow rate measurements. We intend to design and construct the channel, pond, weir, and secondary channel along with constructing a concrete anti-seep collar and concrete valve box to protect the valves from the elements. All of the concrete costs and dimensions for the structures have been calculated and then over estimated to leave room for error.

Poster # 6
Future Recreation Opportunities
Mentor: Dr. Robert S. Brookover, IV, Parks, Recreation & Tourism Management
Students: Corey Champion, Giff Timothy

A recreation needs assessment has not been conducted on Clemson University's campus in almost 18 years. The purpose of this project is to conduct a large scale public input session for students, faculty, staff, and other interested individuals (up to 200 participants) to determine future facility and programmatic needs for the Department of Campus Recreation. The input session is scheduled for April 2nd and will include a needs assessment instrument administered using the iClicker system and 4-5 focus group input activities (what-iffing, wipe the slate clean, future headlines, and a willingness to pay exercise). A report with a summary of data collected and recommendations on future facility and programs will be the deliverable.

Poster # 7
People-Place-Sustainability: Place-Based Scholarship and Action in the Commonwealth of Dominica
Mentor: Dr. Brenda Vander Mey, Sociology
Students: Hashim Mefleh, John Maxwell Thomas, Hayden Taylor, Katelyn Bruggeling, Samantha Webber, Olivia Stewart

People-Place-Sustainability is an ongoing project that has as its ultimate goal the full implementation of Landscapes for Learning-Dominica at three schools on the island of Dominica. This poster provides the background on the project and academic and scholarly considerations that are entailed. It also presents an overview of what has been accomplished to date, and gives examples of People-Place-Sustainability in action. Examples of "Off the books" learning experienced because of this project are included.

Poster # 8

Exciting Vibrations: Vibration Testing of Clemson Memorial Stadium

Mentor: Dr. Huriye S. Atamturktur, Civil Engineering

Students: Will Alexander, John Crochet, Chris Mattison, Brannon Blanke, Troy Brandt, James Attenhofer

The primary goal of this project is to understand the changes in the vibration characteristics of Clemson Memorial Stadium due to the presence of football game crowd. Our team will first construct a 3D model of the structure in a frame analysis software, where we will be able to estimate the vibration properties of the stadium. Next, we will excite the structure in predefined sections under controlled excitation forces and measure the corresponding low-amplitude vibration responses using highly sensitive acceleration sensors. The vibration responses dependent on the structure's physical properties, such as damping ratios, natural frequencies and corresponding mode shapes will be identified. During a football game, due to the presence of crowd, damping of the stadium is expected to increase while the natural frequencies are expected to reduce. Repeating the experiments during a football game will allow us determine the changes in the vibration characteristics due to crowd loading.

Poster # 9

Simply Sustainable: Making It Easy To Go Green

Mentors: Jennifer Goree, Student Health Center, Dr. Beth Kunkel, Food, Nutrition & Package Science, Dr. David Ladner, Environmental Engineering & Earth Science, Dr. Catherine Mobley, Sociology and Anthropology, Dr. Brenden Kendall, Communications Studies

Students: Victor Yongkun Liao, Tess Phinney, Rachel Brant, Priya Jacob, Jesse McGee, Ellen Chassareau, Devon Cornelius, Kelsey Bailey, Kristen Brown, Jessica Bush

How can the student body of Clemson University be more environmentally proactive in their daily routine without many sacrifices? We were determined to figure this out because we felt that there were many simple things that students could do to limit waste and curb consumption, but that students were not very aware and motivated to do them. Thus, we ventured to find ways for students to easily be more sustainable through methods like: having aesthetic printed reminders to turn off unnecessary lighting, to recycle, to reduce food waste; having clearly labeled and specified containers for recycling and composting; integrating sustainability into social media (Facebook, Twitter, etc.); exchanging or passing on unneeded items instead of throwing them away; pushing for pro-environment legal change; promoting sustainability at large events; surveying students' thoughts on sustainability; and increasing reusable water bottle usage. This project was partially supported by the Creative Inquiry program.

Poster # 10

Evaluation of Mood State and Sleep Quality in College Students

Mentor: Dr. June Pilcher, Psychology

Students: Emily Howard, Stewart Bryant, Victoria Baker, Elizabeth Rummel

Sleep quality and mood have been related in previous studies, although testing has not been extensive. The purpose of this study is to analyze the correlations between changes in Profile of Mood States (POMS) and the Pittsburgh

Sleep Quality Index (PSQI) global score. A total of 305 participants in an undergraduate psychology course were asked to complete surveys regarding their mood (POMS) and sleep quality (PSQI). Two weeks later the same participants completed the surveys a second time after attending a lecture on sleep habits. We expect to find a negative correlation between POMS scores and PSQI global scores because positive mood is linked to higher sleep quality. This relationship would suggest that improving sleep quality could have a positive impact on waking emotional functioning.

Poster # 11
Accuracy of the Bite Counter Device in a Cafeteria Setting
Mentors: Dr. Eric Muth, James Salley, Psychology
Students: Deanna Burns, Kevin Kohm, Elizabeth Timmons, Taylor Elsey, Kelly Jeanes, Lauren Rampey, Leah Williams, Rebekah Dison, Regan Schroer

Background: Self-monitoring of caloric intake is critical to weight loss. Currently, there are no automated tools for monitoring caloric intake designed for everyday use. Feedback from a device designed to monitor bite count could potentially be such a tool. The purposes of this study were to: 1) assess the ability of the Bite Counter device to detect bites in a realistic setting; and 2) examine the relationship between bite count and caloric intake. Methods: 280 participants ate a meal while wearing a sensor on their wrist and being videotaped. To determine "true" bite count, bites were manually counted. Caloric intake for each participant was determined by estimating portion consumption from the video recordings. Expected Results: We expect true bite count to be highly correlated with measured bite count as well as caloric intake. Conclusions: The Bite Counter Device presents a possible objective measure of caloric intake that could combat obesity.

Poster # 12
Fike Recreation Center Use Analysis
Mentor: Dr. Robert S. Brookover, Parks, Recreation & Tourism Management
Students: Chris Zeigler, Trevor West

The Department of Campus Recreation has the ability to analyze the total number of students, faculty, staff, and other members of Fike Recreation Center utilize the facility each day using data available from the Tiger One Card office. However, once those patrons enter the facility, the department does not have a finer level of detail about the spaces and equipment that patrons are using. In order to assist the department with determining equipment and space utilization rates, the research team will conduct counts of patrons using areas and equipment every half hour during normal operating hours for 3 weeks (1 in fall 2012 and 2 in spring 2013). Data will be collected using the iSurveySoft application and iPads. Data will be analyzed and recommendations will be made on maximizing space and equipment efficiency and future space needs.

Poster # 13
Popular Science Journalism
Mentor: Matthew Johnson, Biological Sciences
Students: Sam Pollard, Brian Elmore, Chris King, Eric Luther, Marjorie Lutz, Quinn Nix, Laura Raciborski, Henry West

With every new scientific discovery comes the challenge of conveying the results and conclusions to the general public in an unbiased, informative, and easily understood manner. Because of the complexities of these studies, few peer reviewed papers are written in terms that a non-scientist can truly understand. Science journalism is an important field that works to disseminate scientific knowledge to non-scientists in a way the accurately reflects the benefits and drawbacks of new findings. The Popular Science Creative Inquiry here at Clemson works to broaden every student's general understanding of scientific advances regardless of their major.

Poster # 14
Headspace Solid Phase Microextraction of Volatiles from *Oplopanax horridus*
Mentors: Gregory Jones, Dr. Feng Chen, Food, Nutrition, and Packaging Science
Students: Lauren Wiseman, Shanna Pearce, Chelsea Partain

Static headspace solid-phase microextraction (SHSPME) is a solventless sample preparation technique that has found wide use in volatile sampling analyses. The coupling of SHSPME with gas chromatography mass spectrometry (GCMS) is common practice and has lead to the separation and identification of volatile compounds from many sources with commercial interests including flavorants, perfumes, essential oils, chemical adulterants, plant signaling compounds and standards of identity. The chemical composition of the volatile fraction of *Oplopanax horridus* root bark was investigated using 100μm polydimethylsiloxane (PDMS) SHSPME GCMS. Satisfactory extraction, separation, and identification of more than 50 compounds were observed.

Poster # 15
Applications of Geographic and Soil Information Systems
Mentors: Dr. Elena Mikhailova and Dr. Christopher Post, Agricultural, Forest and Environmental Sciences, Dr. Julia Sharp, Mathematical Sciences
Students: Judson Bedling, Kathryn Floyd, Kenneth Rush, Patrick Blakely,Alexander McElwee, Grayson Sarif, Thomas Dunlap, Forrest Lathrop, Joshua Caughman

Students work on soil inventories of private lands to create soil management plans using Web Soil Survey, GIS, Clemson Agricultural Service Laboratory analysis, and statistical software. Individual soil inventory projects will be displayed. Abstracts for these projects are at the end of the list of abstracts.

Poster # 16
High Resolution Thermal Infrared Spectra Data Reduction Process Software Optimization
Mentor: Dr. Sean Brittain, Physics And Astronomy
Students: Charles Tupper, John Farmer

Analysis of high resolution thermal infrared spectra from astrophysical sources is a complex process, and takes time to learn. Code used to analyze spectra was developed as it was needed without standardization, resulting in clunky, difficult to use software. Data reduction requires knowledge of which tools to use, and when to use them. When mistakes are made, work cannot be saved or can only be recovered via manual transformation of data. Furthermore, these programs are platform dependent, as essential portions of the code can only run on certain computers and operating systems, and are structurally dependent on the file systems Kinard labs. The project addresses these issues by making it possible to run the software on computers and operating systems that are free and simple to install. The code and processes will optimized to remove training overhead, allowing researchers to get to data analysis and results more quickly.

Poster # 17
Healthy Campus Peer Delivered Initiatives
Mentors: Katelin Domanski, Jennifer Goree, Student Health Center, Dr. Martha Thompson, Public Health Sciences
Students: Chloe Greene, Laura Lamantia

Students in this Creative Inquiry will study the Clemson culture of health and wellness, specifically as it relates to alcohol abuse prevention. CI participants will help promote a healthy and safe campus community through peer delivered initiatives and the utilization of the socio ecological model. Students will focus on the areas of alcohol abuse prevention, sexual assault prevention, stress reduction, nutrition, bystander intervention, physical fitness, and overall wellness. All research and projects will focus on peer delivered programs for Clemson University undergraduate students.

Poster # 18
Bibliotherapy- Healing through Communication
Mentor: Dr. Windsor Sherrill, Public Health Sciences
Students: Anne Pribonic, Meghan Weisen, Joseph Painter , Tiana Branham, Brett Andresini, Elizabeth Middleton, Grace Hanson, Leigh Yarborough, HopeEllen Philpot, Sarah Barnes, Christin Evangelist

The Balm Reader was founded by a group of students interested in careers in medicine and allied health fields. The purpose of the Balm Reader is to investigate the impact of bibliotherapy on health outcomes. Bibliotherapy has been utilized for centuries as an effective way to help patients heal and improve holistic health. The collection of short stories, poems, novel excerpts, religious scriptures, and other literature was carefully selected and compiled on the website BalmReader.com with the intentions of one day publishing it for use in healthcare facilities. The students currently read to patients in six different hospices, hospitals, and nursing homes in the Upstate, with hopes to improve health outcomes in these patients. A data collection form of patient-reported data is used to measure the

impact of the readings, and while the gratitude of the patients is clear, scientific results are pending upon an adequate number of patient interactions.

Poster # 19
The Social Edge in Foreign Exchange Markets
Mentor: Dr. Jason Thatcher, Management
Students: Kyle LePrevost, Paul Smith

Forex, the foreign currency exchange market, is very similar to Wall Street's stock market, except instead of measuring the health of corporations, Forex gauges the welfare of countries and their respective units of currency. Through the broker, Forex.com, an American adult (i.e. an 18-year-old college freshman) can run some day-trading experiments with real money on a 50:1 leverage. By observing the graphs of the currency value fluctuations, one can conjecture as to which currency in a pair will dominate in the near future and attempt to profit on it. After some intense research and crude experiments in 2011, a practice account was opened with TD Ameritrade in order to dissect the trend between the Forex market and Twitter posts. In particular, the fluctuations of the EUR/USD pair were scrutinized, and models were fabricated in order to turn the Twitter feed into a consistent profit.

Poster # 20
Development of a Force Sensing Probe Sleeve for Ultrasound Injury Diagnosis
Mentors: Dr. Delphine Dean, Dr. David Kwartowitz, Bioengineering
Students: Kayla Perry, Hannah Cash, Brian Sudduth, Haley Scruggs, Kate Showers, Megan Hanschke, Cheryl Corbett

Rotator cuff injuries impact over 90 percent of the population. Ultrasound is the second most common device used to look at rotator cuff injuries; however, it lacks the contextual information necessary to help clinicians determine the optimal course of treatment. We aim to create an ultrasound imaging system that measures the amount of pressure being applied to the patient, giving the operator more information and helping analyze the images. Our design is a tri-layer fabric composition with a piece of insulating fabric sandwiched between two pieces of conductive fabric. The change in resistance between the fabrics corresponds to the amount of force and can be used in combination with the ultrasound image data to calculate the Young's Modulus of the tissue. Our device outputs accurate and repeatable force measurements as shown in bench-top testing with an accuracy of 0.034 N. This project was partially supported by the Creative Inquiry program.

Poster # 21
Engineers Without Borders: Nicaragua
Mentors: Dr. Mark Schlautman, Catherine Ruprecht, Hilary Emerson, Environmental Engineering & Earth Sciences
Students: Elizabeth O'Sell, Kate Gasparro, Meg O'Sell, Julia Harper, Shannon Kay, Mathieu Maggio, Ali Cooke, Austin Herbst, Austin Watson, Andrew Carlin, Preston Berkeley, Max Franks

Engineers Without Borders recently visited Nicaragua to work on a variety of engineering challenges. Among those were the implementation of an irrigation system for crops at a home for mentally challenged boys, surveying about water usage, waste management, and interest in rainwater catchment systems, and testing of water quality in La Pintada. The current focus in Nicaragua is the planning, design, and development of a system to treat and distribute water from an existing well throughout La Pintada. Additional projects include waste management, composting systems, rainwater catchment, solar powered ovens for baking, and design of improved latrines.
This project was supported by the Creative Inquiry Program, Undergraduate Student Government, and the Calhoun Honors College. With this support, members were able to improve the lives of the people of Calishuate and La Pintada. This trip expanded both the cultural understanding and engineering skills of students, and thoroughly enhanced their educational experience.

Poster # 22
Math Track Placement
Mentor: Dr. Stephanie Southworth, Sociology and Anthropology
Students: Rebecca Hupp, April Richardson,

This study examines the effects of school-level parental education on the rate of students participating in AP and honors mathematics courses. Students who take AP/honors math are more likely to attend institutions of higher education after graduation, and more likely to be successful in those institutions. Because of this, the methods of tracking can deeply impact the elimination of generational poverty, or the propagation of it. This study focuses on high school students and uses data collected from the *North Carolina Educational Research Data Center at Duke University*. The results indicate that parental education at the school level has a significant and positive effect on all students. Initially the percent of students on free lunch had a strong negative effect on AP/honors course taking; however this negative effect was no longer seen once school-wide parental education was accounted for.

Poster # 23
Neither Here Nor There: Virtual versus Face-to-Face Teams
Mentors: Dr. Fred Switzer, Allison Wallace, Lauren Ellis, Psychology
Students: Evin Roper, Deanna Burns, Savannah Sox, Abbie Carpenter, Magnus Charters, Joe White, Chris Austin, Madeline Rehm, Taylor Murphy

As organizations are modernizing to meet the demands of a fast-paced and ever-changing business sector, it is imperative for management to understand the possible benefits – or limitations – associated with virtual work. Virtual work is related to lower work-family conflict and increased perceived autonomy, yet often creates difficulties for supervisors attempting to foster synergy, interpersonal relatedness, and high performance among employees. The current study was developed to examine virtual versus face-to-face work groups in relation to team processes, such as information sharing, team engagement, respect, and other positive performance outcomes. Sixty undergraduates will be randomly assigned to either a face-to-face group or virtual group (communicating via Skype). Groups will be instructed to solve a murder case similar to the popular board game, Clue™, based on a provided case description and information about suspects. Implications for team-based virtual work will be discussed. This project was partially supported by the Creative Inquiry program.

Poster # 24a

Set-Up Reduction for the Tooling Process - Fabri-Kal

Mentors: Yuan-Han Huang, Dr. Anand Gramopadhye, Industrial Engineering

Students: Brad Behrends, Chris Connelly, Ashley Watson, Alex Wood

In partnership with Fabri-Kal's Piedmont Facility, this capstone design project focused on set-up reduction for the tooling related manufacturing processes. During set-up, machine downtime is incurred while molds and machinery equipment are converted to meet production requirements. The objective was to decrease unscheduled machine downtime by implementing improvements to the tooling process. Through the use of root cause analysis and other industrial engineering tools, it was determined that tooling wear was the largest contributor to unscheduled machine downtime. Specifically, this tooling wear occurs because of the lack of a standard work order, improper storage, and the inefficiencies related to the die plate and punch sharpening procedures. After determining customer needs and process specifications, the team suggested process improvements for the sharpening and handling of the punch and die plates resulting in a decrease of unscheduled downtime and more control of tooling wear.

Poster # 24b

Set Up Reductions for the Tooling Part

Mentors: Yuan-Han Huang, Dr. Anand Gramopadhye, Industrial Engineering

Students: Joseph Charlow, Tucker Allendorf, Tyler Young, Laura Huxtable

The objective of this study was to review the current set up process and reduce the amount of time necessary for completion, focusing on the tooling portion of the set up. The tooling department is an integral part of the overall set up process as this is where the key components of the molds are removed, repaired, exchanged, and installed. After initially determining the customer needs and process specifications, the team performed a comprehensive analysis of the tool room operations to determine where system losses were occurring, followed by an in depth analysis of these losses to determine their respective root causes. Once these root causes were realized, the team went through an iterative concept generation phase developing and refining an array of solutions that would reduce the amount of non-value added activities being performed by the tooling personnel, thus increasing the overall efficiency during set ups.

Poster # 25

An Examination of Enjoyment and Motivation in Youth Sport

Mentor: Dr. Denise Anderson, Parks, Recreation and Tourism Management

Students: Hannah Adkison, Caleb Ayscue, Bashuad Breeland, Nealy Fortner, Margaret Goodale, Kristina Kendrick, Andrew King, Kaitlyn Odom, Mary Patterson, Lauren Sorrels, Sally Southwell, Katherine Suntum, Mark Talbert

Research has suggested that lack of enjoyment, or fun, in youth sport is a primary reason for youth to drop out of youth sport. The purpose of the study is to examine the relationship between enjoyment and motivational climate in youth sport. Data will be collected from participants ages 8-17 enrolled in youth basketball through the City of Clemson's Parks and Recreation Department. A short survey measuring level of enjoyment in youth sport as well as

motivational climate will be utilized to collect data on site during the spring 2013 basketball season. It is anticipated that approximately 100 surveys will be completed. Data analysis will examine the degree of correlation between enjoyment and the motivational climate that the coach facilitates during the basketball season. Implications from this research will focus on volunteer coach selection and training as well as program development.

Poster # 26
Testing the Subway Subs Footlong Claim
Mentors: Dr. Paul Dawson, Food, Nutrition, and Packaging Sciences Dr. Rose Martinez-Dawson, Mathematical Sciences
Students: Mac Marsh, Jordan Bolger, Allie Corvese, Katie Davis, Gabrielle Gunter, James Kaplanges, Carolyn Musselwhite, Arliss Nicholson

Subway Subs has been sued in the past year based on the claim that a customer purchased a Footlong Sub that was not a foot long. This CI team decided to test this claim by sampling Subway Subs in the Clemson Area. The four Subway restaurants in the Clemson Area were sampled 6 different days in February and March of 2013 with 2 subs made from 3 different types of bread purchased each time. Subs were taken to the laboratory ad weighed then measured for the longest length and the length at the midline by 3 different people. These data will be analyzed to determine if Subway subs are a foot long and determine if any differences exist in length (and weight) due to bread type, store and date purchased.

Poster # 27
The Hispanic World: Service Learning Projects
Mentor: Dr. Graciela Tissera, Languages
Students: Nicole Cooper, Grace Winchell, Hannah Miller, Maghan Knight, Jay Patel, Daniel Grant

This project will analyze social, political, and economic issues in the Hispanic world and will include service learning activities at national and international levels. Through their service to Hispanic communities, students will explore the impact of culture, immigration, education, language, health, and jobs on family members and their future expectations in multicultural environments.

Poster # 28
Correlations between Sleep Factors and Body Mass Index in Undergraduate College Students
Mentor: Dr. June Pilcher, Psychology
Students: Katherine Sullivan, Elizabeth Henderson, Megan Hohenberger, Phillip Smith, James Williams

The purpose of the study is to investigate the correlation between several sleep and health factors, including average time asleep at night and average bedtime on Body Mass Index (BMI) in undergraduate Clemson University Students. Three hundred and twenty nine participants from an introductory Psychology course in fall of 2010 who were classified as “normal” sleepers filled out various questionnaires related to their sleep schedules and routines as well as demographic information. A correlational analysis will be used to look for a significant relationship between

sleep and health factors and BMI. We expect the results to show a significant negative correlation between average time asleep and Body Mass Index score. Results gathered from this study as well as supplementary research highlight the importance of sleep time and positive sleep habits on physical health of college students.

Poster # 29
Fibroblasts Solving Mazes in Response to Growth Factor Concentration
Mentors: Dr. Delphine Dean, Bioengineering
Students: Amanda Nguyen, Katie Miller, Tyler Harvey, Brian Peterson, Mary OKelly, Sharon Olang, Nora Hlavac, Tri Vo

During wound healing, fibroblasts migrate to the site of injury and serve an integral role in repairing the wound. Characterizing the mechanism of fibroblast migration has applications in aiding development of wound healing therapies. To conduct migration studies, wound healing interrupted by a physical barrier was modeled as two leading edges of fibroblasts separated by a maze. The maze system was constructed by laser cutting a maze pattern from acrylic which was then adhered to a cell culture dish. 3T3 fibroblasts were plated and then migration into the maze was observed. Results have shown that the developed protocol is suitable for migration studies and continued work is being done to characterize migration in response to chemoattractants. The results of these migration studies will be used to build a computer model to predict cell growth and migration in 3D.

Poster # 30
Perceptions of Surfers and Motivations of Surf Volunteers
Mentors: Jennifer Thomsen, Lorraine Lobascio, Parks, Recreation & Tourism Management
Students: Lauren Bobo, Rhett Cummings, Megan Davis, Madeline Fitts, Nicole Ham, Morgan Hert, Joshua Klingenberg, Matthew Mckenzie, Cornelius Peeler, Kelli White, Taylor Wilks

Surfing has become a major economic industry the world over worth nearly $8 billion dollars and having over an estimated 20 million participants. While this is the case there is still limited research on better understanding surfers and the relationships they have in the communities they visit. Two studies are being compiled together to focus on this improved understanding. These studies will focus on perceptions of surfers by tourists and local community members within a surf community. Another portion will focus on the motivation for surfers to volunteer on projects related to surfing. The implications of these studies include how to understand and improve relations between surfers and tourists/local community members as well as improving the understanding why surfers volunteer and how this information can guide more surf oriented volunteer projects. Both studies can benefit the local surfing community through improved relations and community development.

Poster # 31
From STEM to SWAG: Evolution of MentorClemson
Mentor: Laura Shick, Mathematical Sciences
Students: Hannah Swoap, Brooks Pfeifer, Kelsey Starr, Casey Chazotte, Hilary Pitts, Bailey Warren, Shannon Edmunds, Milton Jennings, Marcus Maxey, Kenneth McDonald, Elizabeth Rummel

This poster documents the work of students in the development of a program originally designed to address the challenge of summer unlearning among at-risk youth. *Mentor Clemson* evolved from the initial summer camp concept, emphasizing STEM curriculum, to an after-school SWAG Club (Students With a Goal) to *Mentor Clemson*. *Mentor Clemson* matches youth with an adult or college student who will provide unconditional support and help with education, goal setting, broad experiences, and the knowledge that they, too, can be mentors and leaders to others. Students in this CI will share experiences, including the transformation of one student to the leadership role as Intern. The program is sustainable through becoming another spoke in the wheel of Clemson community resources.

Poster # 32a
Product Lifecycle Management – Tools for Manufacturing Efficiency
Mentors: Yuan-Han Huang, Dr. Anand Gramopadhye, Industrial Engineering
Students: Paul Sparks, Allison Verde, Leonard Jackson, Taylor Wells, Dennis Duerden

In partnership with GE, this project focused on Enovia VI Product Lifecycle Management software that is used throughout the company. GE has utilized this software for engineering tasks but has not fully utilized its capability on the manufacturing side. The team is specifically focused on the use of this software system in the manufacturing environment. Interviews were conducted to gather need statements and determine specifications for a solution. The system losses were then analyzed to determine their root causes, which will lead to an adjustment of the previously identified specifications. The identified system losses included wasted time in the generation and validation of Bill of Materials' by both engineering and manufacturing along with the underutilization of the Model Based Manufacturing package. The team will continue the design process by generating solution concepts and testing them to identify the best options to recommend to GE for implementation.

Poster # 32b
Product Lifecycle Management - GE Energy
Mentors: Yuan-Han Huang, Dr. Anand Gramopadhye, Industrial Engineering
Students: Caroline Kimmich, James Schill, Desiree Walters, Richard Wilhite, Kevin Sutton

Manufacturing technology leaders at General Electric have expressed discontent with the Product Lifecycle Management tool Enovia V6 in regards to its capabilities and use to reduce manufacturing time to market and increase first pass yields. A research team, consisting of five industrial engineering seniors conducted a survey of current General Electric employees to discover the underlying themes and causes of these issues. The team used an iterative process of evaluation to unveil the key users and recurrent causes of loss. Key users of the system were identified as

daily users within manufacturing and quality functions. Areas of focus for improvement were identified as steps and time taken to access needed information in the system. Information includes, but is not limited to; print drawings, drawing revisions and bill of materials. The team will follow up with observing key users and implementing new capabilities of the system to increase key user productivity.

Poster # 33
Peanut Harvester Sampling System Re-modification
Mentor: Dr. Kendall Kirk, School of Agricultural, Forest, and Environmental Sciences
Students: Robby Drayne, Daniel Compton, Chance Rayfield

The purpose of this report is to describe modifications that will be made to the peanut harvester used by Clemson University's Research and Education Center located in Blackville, SC. Previous modifications enabled the peanut harvester to take accurate weighted samples of harvested plots. The goal of this project is to improve the overall user-friendliness of the sample system and the control circuit. It is made clear that the current sample system is not sufficient and tends to threaten operator's safety. A new sample system must be designed, that is more dependable and eliminates risk to operator's safety. Simplifying the control circuit, will decrease possibility for malfunction and will increase user-friendliness. After modifications have been made to the sample system and control circuit, the peanut harvesting operation will be a safer and simpler task.

Poster # 34
MarcoAFM
Mentors: Dr. Vladimir Reukov, Aleksey Shaporev, Bioengineering
Students: Jarrett Lucero, Mitchell Fullerton, Victor Depiero, Margarita Portilla

An Atomic Force Microscope is an important tool in modern nanoscience, capable of producing visual maps at resolutions on the order of fractions of a nanometer, which is not possible for optical microscopes. During imaging,

a sample is scanned by a cantilever probe; laser beam reflected from the back side of the cantilever is captured by a photo diode array and transformed into computer image. The goal of this project is to create a macroscale model which will serve as an educational tool for introduction of the principles behind atomic force microscopy for the undergraduate and high school students. By creating a scanner that rebuilds an image using the Macro-AFM, we hope to empower instructors to demonstrate the concepts, and to spark interest of potential students in Bioengineering.

Poster # 35

Biomedical Device Innovation in Freshmen/Senior Design

Mentor: Elizabeth Burghardt, Bioengineering

Students: Sarah Stafford, Harley Dennis, Curtis Harper, Megan Sech, Paul Fang, Harrison Smallwood, Jaylin Carter, Kristen Meyers, Lucas Staccioli, Erik Schatzer, Clayton Compton, Brice Blum, James Rex

The Freshmen-Senior Design and Mentoring Experiences in Bioengineering Creative Inquiry encompasses undergraduate research with peers as well as shadowing senior design teams. The undergraduate groups are working on several different design projects that include: an ankle flexor device, modified shower chair, and detachable power safety cord for AEDs. Our projects intend to reach the community by involving a C-3/C-4 quadriplegic in the design of an ankle flexor device to prevent muscle atrophy and drop-foot as well as improving functional independence in limited mobility patients through the modified shower chair. The project involving the AED power safety cord aims to save lives and hospital expenses by decreasing the amount of AED accidental crashes. The senior design groups collaborate with clinical partners to design, create, and modify their final biomedical devices. The first year undergraduate students attend design meetings with the seniors and help in the development of the final product.

Poster # 36

Promoting Physical Activity in Afterschool Settings

Mentor: Dr. Karen Kemper, Public Health

Students: Ashley Aikens, Kristi Antunes, Kylie Cribb, Callie Heyne, Alexa Neiling, Anna Parr, Lauren Rosati, Rachel Smith, Chesley Trewhella, Krissy Wike

Millions of children in the US attend afterschool programs. Afterschool settings are important places to promote healthy eating and physical activity behaviors that prevent youth obesity. This project, funded by Creative Inquiry, emphasizes program planning, implementation, and evaluation research. During 2012-2013 students have 1) established a partnership with Liberty Elementary School and implemented an afterschool program (Girls on the Run) promoting physical activity, positive self-esteem and healthy body image among girls; 2) conducted an evaluation of the GOTR program using pre-post surveys assessing attitudes and behaviors; 3) examined evaluation tools assessing physical activity and nutrition environments and policies; and 4) planned and implemented a second afterschool curriculum (Coordinated Approach to Child Health) for boys and girls. This project resulted in the initiation of a health promotion program at a local school, increased body image satisfaction and physical activity levels among elementary school girls, and a program evaluation report for GOTR.

Poster # 37
Clemson Dirt to Food Project
Mentors: Dr. Beth Kunkel, Food, Nutrition and Packaging Science, Kate Cummings, Forest Resources
Student: Candace Schroer

The *Dirt to Food* Project strives to answer the question, how can we create a vibrant local food system that provides the structure needed for members of our community to make healthier and more sustainable food choices. The motivation of the project is the desire of members to advance a culture of health and sustainability by connecting community members and creating opportunities to experience fresh, locally grown foods. The methods used to achieve this include nutrition education for middle and high school students, the care and maintenance of the Blue Ridge Field community garden in Seneca, and the exploration of other local community garden sites. This is an ongoing project, but we have seen a rise in community support and usage of the garden as well as in community partnerships. This community outreach program has provided an increased awareness of local, sustainable food systems and health.

Poster #38
Quantifying Radial Borehole Deformation During Well Tests
Mentor: Dr. Larry Murdoch, Environmental Engineering & Earth Science
Student: Jonathan Baldwin

The objective of this project is to quantify the radial deformation of a well bore at shallow depths when the well is pumped at a constant rate. This test could be used as a diagnostic for a leak along the outside of a well casing. A device called a RAD-X (Radial Extensometer) was designed to monitor the radial deformation of a casing using fiber optic technology. As the well was pumped, the device expanded or contracted with the walls of the casing, and measured the change in diameter. This device extends against the opposing sides of the well, and compresses or expands according to the deformation of the casing. Initial test results showed that the casing expanded, rather than compressing as was expected. Ongoing and future testing includes measuring the deformation in different orientations and depths within the casing, and in the underlying fractured rock.

Poster # 39
Evaluating Educational Electronic Health Records (EHRs)
Mentors: Dr. Nancy Meehan, School of Nursing, Dr. Roy Pargas, School of Computing
Students: Taj Heyward, Megan Cromer, Melissa Garwood, Casey Gooden, Lauren Rhodes, Nancy Parra, Shelby Stephens

The goal of our creative inquiry team is to teach nursing students electronic documentation skills in an educational setting. Our team has created an educational electronic health records (EHR), TeachEHR, designed to introduce

EHR competencies to students. This year our team is focusing on the evaluation of three different educational EHRs: Neehr Perfect , SimChart & RealEHRPrep. Since all healthcare facilities are supposed to make the switch from paper records to electronic records by 2014, it is crucial that students become familiar with electronic documentation before they enter into the health care setting. The purpose of the proposed evaluation of EHRs is to reassess the needs of our Clemson School of Nursing to decide which EHR best meets our needs. Options are to improve TeachEHR to make it more practical and develop real-world simulations with electronic documentation or purchase a new EHR system.

Poster # 40
An EKG Simulation System for Educational Outreach
Mentor: Dr. David Kwartowitz, Bioengineering
Students: Amanda Nguyen, Anna Merryman, Nadine Luedicke, Laura Tumblin

Heart disease is the leading cause of death in the United States. Increased education about heart health and function can help prevent heart disease. Thus, we have developed an electrocardiography (EKG) simulation unit for use in scientific and healthcare outreach. An EKG is a waveform produced from electrodes placed on the skin that measure electrical changes associated with depolarization of the heart muscle. The waveform can characterize the health of the heart and diagnose life threatening pathologies. For our simulation model, an electrical signal representing cardiac activity is pushed through a polymer model of a child to which a user can connect electrodes and generate an EKG display. By changing the electrical signal supplied to the model, users can visualize healthy and diseased hearts. Visualization of various heart conditions will enable users to become more informed about the effects of disease on the function of the heart.

Poster # 41
Wear and Scratch Testing of Nanolaminate Films
Mentors: Dr. Marian Kennedy, Dr. John DesJardins, Bioengineering
Students: Jaclyn Kovach, Timothy Provin, Brandon Traver, Ross Economy

The objectives of this study were to conduct soil inventory of a residential plot in Central, SC using Web Soil Survey, to collect soil samples (side yard and front yard), and to analyze collected soil samples for major soil chemical properties. The dominant soil type was eroded Cecil sandy loam, 6 to 10 percent slopes (fine, kaolinitic, thermic, Typic Kanhapludults). These results were used to determine plant suitability for the given soil. Perennial flowers, annual flowers, and carpet grass are compatible for growth within the residential plot. Nutrients were examined also to help determine plant suitability and lime suggestions. These results will be used in landscaping plans for the residential plot. This study was supported by the Clemson University Creative Inquiry Program.

Poster # 42

The Effects of Helmets and Concussions in Athletics

Mentors: Dr. John DesJardins, Dr. Delphine Dean, Dr. David Kwartowitz, Bioengineering
Students: Natalie Patzin, Ryan Freed, Devon Bowser, Drew Holman, Will Sumner

Roper Mountain Science Center (RMSC) is a center in Greenville, SC, devoted to science enrichment through interactive and informative displays. Founded in 1984, the center has been a place of learning for elementary and middle schools throughout the Upstate. However, the exhibits are in desperate need of updating. Through funding by the South Carolina government, a grant has been secured for renovations. Seven hundred square feet of the museum will be devoted to biomedical engineering and nanotechnology. This creative inquiry focuses on developing technologically advanced displays targeted to seventh grade students that engage and excite them in the field of biomedical engineering. One interactive display we are working on involves relating high impact collisions in sports and concussions. It will show the students the importance wearing protective helmets in sports, and allow them to design their own helmets for testing. This project was partially supported by the Creative Inquiry program.

Poster # 43

Diamagnetic Particle and Microbe Concentration Using Ferromicrofluidics

Mentor: Dr. Xiangchun Xuan, Mechanical Engineering
Students: Justin Wilbanks, Garrett Kiessling

The focus of this project is to investigate the efficacy of trapping particles and microbes using an applied magnetic field. Concentrating diamagnetic particles and cells to a discernible level is often a necessary and critical feature in biological processes, such as water quality control, environmental monitoring, and food safety. The principle of negative magnetophoresis is utilized to achieve the goal of this project. Two magnets are embedded on either side of a microchannel fabricated from polydimethylsiloxane (PDMS). When particles suspended in ferrofluid pass through the magnets, the magnetic field repels them, which results in a trapping circulation at the leading edge of the magnets. The effects of the ferrofluid flow rate, particle/microbe size, and embedded magnet asymmetry on the concentration effectiveness are also explored using experimental observations. Utilizing asymmetric magnets to concentrate particles provides a simpler, yet effective, solution than alternative methods, such as the application of electric fields. This project is supported by the NSF Career program under grant CBET-1150670 (Xuan), by Clemson University through a Departmental Honors Research Grant (Wilbanks) sponsored by the Calhoun Honors College, and by the Creative Inquiry program.

Poster #44
Atelier InSite Life Science Collaboration
Mentors: David Detrich, Denise Detrich, Joey Manson, Art
Students: Debbie Jacobs, Brittany Lamont, Stephen Farrow, Amy Justice, Emily Sorgenfrei, Gracie Lanthrop, Kayla Smith, Kep Pate, Mariana Hay, Joshua McCall, Ashley Davis, Sabra Buckaloo, John Garofalo, Jena Heaton, Victoria Tanenbaum, Jonathan Windham

Students enrolled in cross-disciplinary programs engaged in a new paradigm for implementing public art on university campuses by collaboratively participating in a direct, hands on process to determine artwork placed in the new Life Science facility. Students investigated the design build process, conducted site analysis, and identified site locations for the implementation and stewardship of site specific artwork for the Life Science facility. Three locations were selected for artwork sites. Location one was a potential site for a diptych wall art located on the top and middle floor of the building. Location two was a potential site for a 3D sculpture in front of the conference room on the middle floor. Location three is the Atrium area on the ground floor where a sculpture could be placed. A possible 4th site is being considered outdoors of the life science facility. This project was partially supported by the Creative Inquiry program

Poster # 45
Improving Heart Rate Variability of Older Adults with Nature Experiences
Mentors: Dr. Ellen Vincent, School of Agricultural, Forest, and Environmental Sciences, Dr. Cheryl Dye, Public Health Services
Students: Ashlee Wilson, Amy Moon, Julia DeVita, Georgina Dukes, Sally Oates, Monica Mccrary

This is the fourth semester of a CI project focused on increasing nature experiences of older adults. Students have reviewed ecotherapy literature and learned about the effect of nature on mental and physical health. Students have also learned about Heart Rate Variability (HRV), its impact on health, how to measure it, and how to improve it. In this fourth semester of work, students are measuring HRV before and after the introduction of nature experiences to older adults. Community partners are the Osher Lifelong Learning Institute and Senior Solutions Centers at Seneca and Clemson/Central.

Poster # 46
Club Sports Analysis
Mentor: Dr. Robert S. Brookover, Parks, Recreation & Tourism Management
Students: Timothy Britton, Justin Hughes

The purpose of this project is to conduct focus group sessions to determine the needs and concerns of clubs that make up the club sports system at Clemson University. Clubs have been divided into eight groups based on the type of activity, location and type of facilities, and how equipment intensive the sport is. A semi-structured interview format will be used with the eight groups. Questions have been designed to determine funding, facility, practice, and support needs. A report summarizing findings and recommendations for each area covered will be the deliverable.

Poster # 47
Community Mapping of Pixabaj, Guatemala
Mentor: Dr. Roxanne Amerson, School of Nursing
Students: Joellen Spicer, Grace Wielicki

The initial goal of this project is to teach local women about the dangers of diarrheal diseases and the implementation of oral rehydration solution (ORS) and zinc supplementation in hopes of decreasing the number of deaths attributed to dehydration. The project will utilize a *promotora* (lay health educator) concept to distribution information into the community. The *promotoras* will share their knowledge within their community and communicate the results of their teaching with the research team using text messaging via cell phones. The long-term goals of the project are (1) to educate community members to prepare and use ORS and zinc and (2) to evaluate the effect on the community. In our student role, we traveled to Pixabaj to assist in the initial phases of community data mapping. We used an iPhone to mark the coordinates of *caserios* (villages) that will be included in the research study.

Poster # 48
Upstate Local Food: Connecting the Dots
Mentor: Holly Garret, School of Agricultural, Forest, and Environmental Sciences
Students: Robb David, Carly Basinger

The tri-county region of Upstate, SC (Pickens, Oconee and Anderson counties) has a vibrant and growing local food network with abundant producers, markets and suppliers. Our Creative Inquiry is tasked with highlighting some of the major nodes in our local food network by creating a map to show the variety of diversified farms and markets in the tri-county region. Our team is utilizing resources from Carolina Farm Stewardship Association, Local Harvest and individual farm visits by our team to create a comprehensive and accurate local food map. This resource can be a valuable and helpful asset to enhance the public's knowledge about access to alternative markets in the Upstate. We will continue to think and research system-wide to have a holistic understanding of the local food landscape in Upstate, SC and be better equipped to enter our careers able to make smart decisions to further sustainable and organic agriculture in our region.

Poster # 49
Sexual Violence Awareness and Prevention
Mentors: Dr. Sarah Winslow, Sociology and Anthropology, Dr. Heidi Zinzow, Psychology
Students: Lauren Hinkel, Mary Catherine Walker, John Christopher, Leonka Garvin, Courtney Mohan

The purpose of the Sexual Violence Creative Inquiry team is to investigate sexual violence on Clemson's campus and to improve Clemson's sexual violence awareness and prevention campaign. This project is partially supported by the Creative Inquiry program. We are using data from research conducted nation-wide and on Clemson's campus to develop and implement a Sexual Violence Awareness campaign that will take place in April 2013 during National Sexual Assault Awareness and Prevention Month. We plan to conduct pre- and post-test measures to determine if our intervention is effective on campus. Our presentation will present data on campus sexual violence,

describe our empirically-informed prevention and intervention efforts, and elaborate on our research design. Our ultimate goal is to increase awareness and decrease prevalence of sexual violence at Clemson University.

Poster # 50

Design and Installation of Greenfield Mini-Pivot System

Mentor: Dr. Charles Privette, School of Agricultural, Forest, and Environmental Sciences

Students: Baker Myers, Thomas Chaplin, Daniel Rummel, Joe Oswald Our group will be designing the power and water requirements for a Lindsay Zimmatic Mini-Pivot, as well as installing it in the Clemson Bottoms. Our main goal is to be able to have a fully functional center pivot to use as a teaching tool for the Ag Mechanization Program. This pivot will provide hands on applications for classes like Irrigation Principles, Precision Agriculture, Soil and Water Conservation, Crop Production and Machinery Management. The design process includes selection a specific site within the Clemson Bottoms based on topography, soil type, and resource availability. Calculations must be done to determine the electrical power and irrigation pipe requirements, as well as pump size. Installation will include erecting the pivot, running electrical and water lines from their respective sources and ensuring that the correct settings are in places for proper output of water.

Poster # 51

Laser guidance in a microfluidic biochip

Mentor: Dr. Wan Qin, Bioengineering

Student: Devin Gibson

It can be very difficult to distinguish between different cell types that have virtually no difference in morphology when viewed under a high-magnification microscope. Laser-guidance technique has been demonstrated to be able to distinguish sub-cell types with very high sensitivity by simply measuring the guidance speed. Consequently, it has high potential to be applied in the field of cell sorting, which plays an important role in life science and clinical applications. Compared with conventional cell sorting methods, laser-guidance-based sorting technique is noninvasive and easy to control. It relies on the intrinsic optical properties of cells (e.g., refractive index, shape, and size). In this study, two cell types, chick embryonic forebrain neurons and chick embryonic spinal cord neurons, were used to demonstrate the distinguishing ability in a microfluidic chip. The chip was developed through microfabrication (soft lithography) with Polydimethylsiloxane (PDMS). Hydrodynamic focusing was used to focus cells into a single-cell pipeline. As the cells flowed they reached a part of the channel where they were laser guided. The laser guidance process was recorded using a 20X objective lens and a high speed CMOS camera. An inferred filter was used to block out the scattering light of the laser so that a clear picture can be achieved. Custom developed tracking software recorded the speed of the cell over a specific region/distance. By subtracting the cell's normal flow speed in the channel from the flow speed in the guidance region, the guidance velocity was obtained. When the two cell types flowed in the microfluidic channel and were simultaneously laser-guided, they showed two different guidance velocities. Therefore, the conclusion was reached that by measuring the difference in two cells¢ guidance velocities, the cells can be effectively distinguished. This technique is expected to provide a new approach to high-throughput cell sorting with a high resolution.

Poster # 52
Allelic Variation in the Melanocortin 4 Receptor Gene in Poeciliid Fishes
Mentor: Dr. Margaret Ptacek, Biological Sciences
Students: A. Tyler Collins, Courtney Ward

Many fish species, including swordtails (genus *Xiphophorus*) and mollies (genus *Poecilia*) demonstrate predictable mating strategies based on body size; large males court females, while small males sneak copulations. Recently, mutant duplicated alleles of a gene (mc4r) encoding melanocortin 4 receptor protein have been implicated in regulating time to maturation and male size at maturity in swordtails, thus affecting male mating strategy. We suspect this same genetic phenomenon occurs in other poecillid fishes, as males of a number of species exhibit a wide range of size at maturity and similar size-associated alternative mating strategies as swordtails. For our study, eight species of genus *Poecilia* were screened for mutant mc4r alleles. Vector cloning and DNA fragment analysis revealed the presence of mutant mc4r alleles in both males and females. Further studies will investigate the effect of mc4r copy number and cell function to determine if regulation of male body size is conserved.

Poster # 53
CEDC Water for the Waterless
Mentor: Dr. Jennifer Ogle, Civil Engineering
Student: Kristen Doolittle

In 2009, Clemson Engineers for Developing Countries (CEDC) began working on the replacement of a water ystem in Cange, Haiti. Water is pumped up a 1,000 foot elevation change through a treatment facility and into four cisterns. From these cisterns, water is gravity fed to a hospital complex and eight public fountains throughout the village. It is the first chloriniated municipal water system in Haiti's Central Plateau and provides potable water to a population of around 10,000. CEDC sent five student interns, over the course of two years, to manage the project and oversee all phases of construction. The intern program was partially supported by the Creative Inquiry program.

Poster # 54
Community Driven Biomedical Design in Rural Tanzania
Mentor: Dr. Delphine Dean, Bioengineering
Students: Matthew Kofoed, Adam Metzger, Danielle Martin, Tyler Youngman

Problems with medical equipment and devices in Tanzania range from hospital equipment failures to lack of access to standard clinically important devices. We conducted a comprehensive multi-hospital study in Tanzania during summer 2012; this allowed team members to compare equipment failure rates to those in the United States. Ultimately this research will lead to action plans which may help slow or even prevent the failure of lifesaving equipment in an area of the world which needs it most. To address some of the needs arising from lack of standard orthopedic stabilization devices, we have worked on designs utilizing local sustainable natural resources. For instance, we have partnered with Tanzanian craftspeople to reproduce western neck brace designs using local

sustainable natural resources. We have also designed a crutch system made from bamboo and other local Tanzanian resources. These devices will help to reduce the cost and healing time for Tanzanian patients. This project was partially supported by the Creative Inquiry program.

Poster # 55a
Substrate Cage Process Improvements and Waste Elimination
Mentor: Dr. Anand Gramopadhye, Industrial Engineering
Students: Seth Kulasekra, Caitlin McCrory, David Parker, Daniel Puetter,

In partnership with Bosch Anderson facility, this capstone design project focused on improvement of the substrate cage that serves as the storage location for many of the components required for production on four manufacturing lines. Components are then issued and delivered by an operator called a "tugger". The project objective was to reduce the opportunity for errors by organizing the cage to help users maintain a first in first out inventory policy and maximize space usage. After determining the state of the system and the project scope, the team interviewed users to determine customer needs. Product metrics and specifications were derived from stated needs. The team then developed concepts that improved the organization of the substrate cage. Concepts were tested and refined. The new arrangement of the substrate cage, improved the transactional accuracy, and reduced the time taken to issue and deliver materials to the manufacturing lines.

Poster # 55b
Substrate Cage Process Improvement and Waste Elimination
Mentor: Dr. Anand Gramopadhye, Industrial Engineering
Students: James Lemmon, Hillary Moore, LaRon Sanders, Patrick Ward,

In a partnership with Robert Bosch Anderson facility, this capstone design project focused on an area of the manufacturing setting called the Substrate Cage. The Substrate Cage is a small, segregated warehouse that houses varying part numbers of substrate reels used for daily production. Due to the large variety of part numbers and space constraints it is difficult to obtain substrate reel orders for production in a timely and efficient manner. The objective was to design an enhanced process for picking and distributing reels from the Substrate Cage. The team first identified customer needs and product specifications, followed by a process concept generation phase. Concepts were then tested for improvements on the current system including, space utilization, order filling errors, and time to complete and order. As a result, a new enhanced process was determined that met both initial and projected demands for increased efficiency in the Substrate Cage.

Poster # 56
Epidemiology and Calculus
Mentors: Dr. Marilyn Reba, Dr. Ellen Breazel, Mathematical Sciences, Dr. Roy Pargas, Computing
Students: Douglas Edmondson, Greg Edison

Our Epidemiology and Calculus Creative Inquiry Course is one of four different Creative Inquiry modules

implemented in the Department of Mathematical Sciences under a 2011 NSF TUES grant: Module 1OrthopedicsModule; 2Disease Epidemiology ; Module 3Health Hazards from Arc-flash; Module 4Mammography and Radiology. Our focus is to motivate interest in and to deepen understanding of calculus by immersing students in bioengineering and biomedical applications. To disseminate the materials and ideas developed in the Epidemiology module, Computer Science students are helping to develop a "mobile app" to be downloadable on ITunes. Our poster will highlight both student presentations within the course that explore modeling diseases using Calculus, as well as student involvement outside the course in developing this interactive instructional program.

Poster # 57
Walk and Roll in My Shoes
Mentors: Arlene Stewart, Deanna Norungolo, Student Disability Services
Students: Regan Schroer, Danna Herring, Laura Jameson, Mauri Leonard, Daniel Mack, Patrick Noe, Maceo Scott, Kathryn Thomason, Eric Trofatter,

The research for this project was gathered through student and faculty participation in the annual Walk & Roll in My Shoes: A Blended Immersion Experience for Disability Awareness event. Participants for the event consisted of 8 individuals from a university located in the southeastern United States. The participants are all over the age of 18 and are either employees or student undergraduates of the university. Each participant was paired with a shadow for the day, and was presented with the disability he/she will be immersed with. The participant carried on his/her daily activities with this disability and underwent the everyday challenges the disability presents them. Information was gathered on the participants subjective experience, and students participating in the event recorded his/her experience through a reflection journal.

Poster # 58
Bio-Integrated Season Extension
Mentor: Dr. Geoff Zehnder, School of Agricultural, Forest, and Environmental Sciences
Students: Benjamin Leppar, Helen Holstein, Mellisa Mcintyre, Steven Meadows

Heating is one of the greatest expenses in the operation of greenhouses in cold winter climates. Solar energy is considered an inexpensive renewable energy source for greenhouse heating. Hot compost piles have also been used to heat greenhouses in an effort to reduce heating costs. In this experiment, the thermal performance of four new solar heating systems and a compost heating system are compared. The north-south oriented greenhouses use a combination of slope, reflected light from rainwater harvesting ponds, water filled barrels and shallow solar ponds to capture and store solar energy. Sloped greenhouses facilitate convective cooling and allow harvesting of rainwater for use as thermal mass and reflection.

Poster #59
21st Century Microbiology
Mentor: Dr. Tamara McNealy, Biological Sciences
Students: Rajan Amin, Kristin McMillin, Jennifer Weast, Stephen Wessel

The microbiology degree at CU offers laboratories with nine upper level microbiology courses. Issues with this arrangement include redundancy, lack of flow and restricting number of enrolled students based on available laboratory space. To resolve these issues, the microbiology curriculum was revised to have a three-part advanced laboratory series. Each course is divided into modules that emphasize and expand on concepts covered in lecture. The revisions also adhere to guidelines set forth by the American Society for Microbiology that recommend education in bioethics, bioinformatics, and careers in microbiology. Four undergraduate students have participated in the Microbiology in the 21st century Creative Inquiry project to develop, test, and evaluate proposed protocols for the new laboratory series, as well as help collaborate and design an innovative online lab manual. Through collaboration among the microbiology faculty and students, novel laboratory courses will be produced that ensure microbiology majors will obtain practical experience and techniques often required for immediate employment after graduation.

Poster # 60
Analysis of microbial communities in an effort to control *Legionella pneumophila*
Mentor: Dr. Tamara McNealy, Biological Sciences
Student: Sarah Dusenbury

Legionella pneumophila is a pathogenic bacterium that causes Legionnaires' disease. *L. pneumophila* occurs naturally in the environment but persists in biofilms in indoor water-based environments such as cooling towers. We hypothesize that the composition of the microbial community present in the towers affects the ability of *Legionella* to colonize and/or persist within tower environments since some are positive for *L. pneumophila* and others are not. Cooling towers that are *L. pneumophila* positive or negative will be sampled and the associated biofilm communities analyzed using PCR, DGGE, sequencing, and RT-PCR. In preliminary analyses of three towers, *Legionella*, fungi, bacteria, and archaea were found to be present in samples from all three. Shifts in the Archaea population were seen between towers and over time. From continued community analysis, we will attempt to identify cooling tower

Poster # 61
Descriptions from Memory of Faces With and Without Distinctive Features
Mentor: Dr. Thomas Alley, Psychology
Students: Kathryn Payne, Rachel Gillespie,

Distinctive features are commonly thought to assist in later face recognition, but the effects may not be entirely beneficial. Distinctive features are likely to attract attention and be easy to verbally encode and remember, so we expect such features to be found in later verbal descriptions given from memory. But the associated attention and

encoding of distinctive features may also reduce recall of other facial information. To address this question, volunteers viewed two computer-generated faces for 20 sec each: one male and one female face, only one of which had a highly distinctive feature (a scar). Ten minutes later they were asked to guess the age and to give descriptions of both "such that someone else might be able to identify them." The results confirm that highly distinctive features are usually reported in verbal descriptions collected shortly after observation, and reveal a possible impact on recall of other facial information.

Poster # 62
Adaptation and interpretation of Soil Judging to Cameroon
Mentor: Dr. Elena Mikhailova, School of Agricultural, Forest, and Environmental Sciences
Student: Scott Sherard

Adaptation and interpretation of Soil Judging to Cameroon can significantly enhance soil science education in the country. This may not only impact schools but also several government sectors such as public health, agriculture, housing and town planning and the transportation sector. The study was conducted to adapt and interpret soil judging for Cameroon by graduate student from Cameroon and undergraduate students from Creative Inquiry project (FNR 470: Soil Judging at Clemson University) and 2012 Southeast Regional Competition in Lexington, KY. During this time, student from Cameroon received training on 4 of the 8 soil orders present in Cameroon encountered in the Southeastern United States. Southeastern Region Soil Judging Handbook was used to develop teaching materials for Cameroon. Soil judging teaching materials were prepared for Cameroon including tables of soil physical and chemical properties, topographic maps, and scorecard. Newly developed teaching materials can significantly enhance soil science education in Cameroon which may be part of an important long term solution to ineffective land use management.

Poster # 63
Economic Development in Haiti
Mentor: Rebecca Clark, Civil Engineering
Student: Peter Butler

On top of public health projects *Clemson Engineers for Developing Countries* is seeking out economically sustainable solutions for the Central Plateau of Haiti. The group is currently looking to spark industries in the production of both CMU (concrete masonry units) and ceramic tile. Developing industry in these two trades will bring more money and work into the area as well as provide quality building materials for local builders.

Poster # 64
Creative Inquiry in Inexpensive Tire Softners
Mentor: Dr. Rachel Getman, Chemical Engineering
Student: Sean Dix

Developing inexpensive tire softners can prolong the life of tires and save people money that would be spent on

new replacement tires. We have set out to putting the treated and untreated tires through several tests: Hardness Test: Tire hardness was measured with a durometer on a tire that was treated the hot lap and a tire that was not. The tire that was treated with hot lap was slightly softer than the untreated tire substantiating the tire softener's claim. Grip Test: We will be cutting pieces out of the tire (also called omegas) and running them through an instron machine. What this machine does is stretch the omegas at a certain frequency and reports back the hysteresis. The higher the hysteresis the better the grip. Conclusion: Testing is ongoing, but initial results show that the tire softners did make the tires softer.

Poster # 65
Ruminant Anatomy: A Photo Atlas
Mentor: Dr. Heather Dunn, Animal and Veterinary Science
Students: Megan Kelley, Anne Harmon, Erika Pisik, Jayne Major, Jack Teasdall, Krystina Rowland, Danielle Williams, Reta Miller, Shelly Kennerly, Callie Crowder, Chelsea Albowicz, Jessica Forbes, Catherine Tenenbaum

The United States has the largest cattle industry in the world and produces economically significant food products and livestock species for the global market. According to the USDA there has been a drastic reduction in food animal veterinarians, technicians and food producers. This project, supported by the Creative Inquiry (CI) program, is currently developing a user-friendly textbook titled "Ruminant Anatomy: A Photo Atlas." The primary focus of this CI created textbook is to educate undergraduate Animal & Veterinary Science students nationwide in an effort to: offset the emerging critical shortage of food animal producers; increase the safety of public food supply; and reduce emerging diseases from inadequate animal production operations. No animals were sacrificed during this CI project for the sole purpose of obtaining photographs. Post-mortem animals used for imaging were euthanized for other studies or they died of natural causes.

Poster # 66
Do Substrate Cleaning Methods Affect Cellular Response?
Mentors: Dr. Delphine Dean, Bioengineering, Dr. Marian Kennedy, Materials Science & Engineering
Students: Theresa Hafner, Katherine Hafner, Brian Kirkland

We are currently characterizing dental pulp stem cells (DPSCs) response to surfaces so that they can be used in tissue regeneration. Our previous studies have measured the response of these cells to amine-coated gold surfaces. This study is being conducted to determine the effect of two proposed cleaning methods on gold wafers. The first method was a control protocol consisting of two rinses of acetone/isopropyl/deionized water, 10min of plasma cleaning, and 30min of UV sterilization. The second method used piranha solution (sulfuric acid and peroxide), followed with the control cleaning process. DPSCs were allowed to proliferate on wafers for five days. After this, the wafers were imaged to observe cell morphology and proliferation, and then the cells were removed using the described cleaning methods. Surfaces were imaged again and roughness was assessed using a topometer. After consecutive cleaning, the long term effects of cellular residue on DPSCs will be assessed.

Poster # 67
Degeneracies in Stellar Disk Parameters
Mentor: Dr. Sean Brittain, Physics and Astronomy
Students: Alex Kerr, Marc Schaeuble

We present a computer code that models ro-vibrational fluorescence of OH and CO molecules in circumstellar disks. The fluorescence of these two molecules allows for the determination of physical parameters of the disk, such as temperature distribution, and size. This code, however, is dependent on numerous parameters, which might exhibit multiple levels of degeneracy. Our primary goal of this project is to find these degeneracies by writing a Monte Carlo code that incorporates the fluorescence code to estimate these degeneracies. To complete this task in a reasonable time frame, the fluorescence code has been written in MATLAB, enabling us to use multiple processor cores. Initially, we will limit ourselves to selected parameters in selected ranges, but if these iterations should fail to give adequate results, we will expand our ranges. Once these initial parameter degeneracies have been determined, we will proceed to determine the degeneracies of other disk parameters.

Poster # 68
Poverty Ends with a Girl
Mentor: Dr. Elizabeth Adams, Women's Studies
Students: Melissa Moore, Ashley Hernandez, Ellison Taylor, Elizabeth Gerndt, Wynne Morris, Whitney Garland, Jenna Weed, Savannah Mozingo

Gender inequality is one of the greatest human rights challenges of this century and a major cause of generational poverty in developing countries. This project focuses on the unique challenges that girls and women face around the world and the potential that girls have to end poverty for themselves and their community when they are given equal opportunity to boys. The project aims to raise awareness about worldwide gender inequality and encourage Clemson students to promote gender equality when volunteering abroad. In addition, students in this Creative Inquiry are conducting case study research on perceptions of education at Jane Adeny Memorial School, a girls' high school in Kenya. This project was partially supported by the Creative Inquiry Program.

Poster # 69
Electronic Health Records: The Benefits and Consequences experienced by Healthcare Providers at a University Health Clinic
Mentor: Dr. Joy Rodriguez, Industrial Engineering
Students: Michelle Jahn, Jacey Gombert, Jenna Lay, Desiree Walters

The research team's goal was to identify and understand the interactions HCPs had with the EHR system. Using a sociotechnical framework, the team conducted over 52 hours of semi-structured observations in the healthcare clinic. The majority of the time was spent observing physicians (~18 hours) and lab technicians (~16 hours), followed by nurse practitioners (~13 hours) and registered nurses (~ 4 hours). although the EHR system contains positive attributes which support some patient care tasks, there are many problematic issues that exist. These issues

may be due to: 1) a poorly designed EHR system, 2) an inadequate EHR training program, 3) a poorly designed EHR implementation process, and/or 4) deficient communication between designers and end users. Some of these issues, especially those related to usability, should be considered "low hanging fruit" by the designers and fixed immediately. Others need more research to better understand the contributing factors.

Poster # 70
Site Assessment of Seed Orchard Road Primitive Campsite in the Clemson Experimental Forest
Mentors: Knight Cox, Carla Mora, Parks, Recreation & Tourism Management
Students: Brandon Driscoll, Annie Marino, Bralyn Canaday, Christopher Anderson

In 2011 the first primitive campsite was added to the 17,000-acre Clemson Experimental Forest allowing users to camp at the end of Seed Orchard Road in the south forest. This is a multiple-use area frequented by hikers, bikers, and horse riders. This project uses interviews and observations to answer questions about interest in and type of use at the site from users of the seed orchard road trail complex. The aim of the project is to determine best management strategy for the site, as well as research potential strategies to mitigate unwanted activities like litter, graffiti and site destruction currently a problem. Research suggests additions may aid in this mitigation, such as a horse tie-up area and a primitive toilet. Findings also indicate user conflicts and high interest in the site. The goal of this project is to create a site management plan, and promote ongoing research at the site.

Poster # 71
Long-term Supplementation of Cranberry Extract Improves the Healthspan in *C. elegans* Aged Population
Mentors: Sujay Guha, Dr. Yuqing Dong, Dr. Min Cao, Microbiology
Students: Ryan Kane, Luke Lampe, Elisabeth Peevy, Cole Murbach

Due to their beneficial properties to alleviate the symptoms of aging and stress, natural compounds/nutraceuticals have been studied extensively. In our lab we employ the aging model *Caenorhabditis elegans* to study the effects of numerous nutraceuticals. Findings from our lab have suggested that supplementation of cranberry extract (CBE) at an optimum concentration not only increases the lifespan but also helps the worms survive under various stresses. Currently, we are testing how CBE supplementation may affect different worm populations at varying ages. Our findings suggest that CBE supplementation leads to profound lifespan extension in aged populations. We also observed improved cognitive skills in aged worms. Moreover, Our preliminary data suggests that CBE helps combat the progression of certain age-related pathologies (i.e. Alzheimer's disease). In the future, we would like to investigate the mechanisms involved in this protective effect. This project was partially supported by the Clemson University Creative Inquiry program.

Poster # 72

Serious Games to Enable Research and Education

Mentors: Dr. Catherine Mobley, Sociology and Anthropology, Dr. Stephen Moysey, Annick Anctil, Alex Hannah, Environmental Engineering & Earth Sciences

Students: Corey Buchanan, Jessica Bush, Joel Farrar, Jeanni Haas, Matthew Monteith, Paul Lecroy, Edward Parham

This CI team explored the factors necessary to develop, test, and evaluate serious (i.e., educational) web-based games as a tool to enhance environmental and STEM education and to influence environmental decision making. To accomplish our goals, we developed a framework and rubric to evaluate the effectiveness of games for the purpose of environmental education. We identified three overarching elements (entertainment, learning and game play), and several sub-elements (immersiveness, customization, social aspects, motivation, teaching effectiveness, clear guidance, concept complexity, and interface) that should be considered when assessing web-based games. The team then used this rubric to test and evaluate existing serious (e.g., River City) and non-serious (e.g., Farmville) games to establish which game features promote learning and engagement. Our poster presents a graphic display of our rubric and assessments of serious and non-serious games. An interactive element will allow FOCI participants to contribute to our growing database on serious games assessment.

Poster # 73

Effects of Ocean Acidification on Aggression and Den Sharing Behavior of Juvenile Caribbean Spiny Lobsters, *Panulirus argus*

Mentor: Dr. Michael Childress, Biological Sciences

Students: Scott Miller, Katherine Heldt

Acidification of seawater has been shown to impair chemoreception ability in marine crustaceans, yet no work has been done on how this may affect social behavior. We examined the effects of lowered pH on aggression, cleaning, and den sharing behavior in social, juvenile Caribbean spiny lobsters, *Panulirus argus*. Lobsters were observed to determine the number of aggressive acts, antennule wipes (cleaning behavior), and antennule flicks ("sniffing" behavior) in normal and acidified conditions. Y-maze trials were conducted in normal and acidified environments to determine if acidification impacts lobster activity levels and attraction to conspecific odors. We found that lobsters performed fewer aggressive acts and shared dens less frequently in the acidified environment. Decreased antennule flicks and increased antennule wipes were also observed in lower pH. Our study suggests that ocean acidification impairs lobster aggression, den sharing, and cleaning behaviors, which could have wide-ranging impacts on this ecologically and commercially important species. This project was partially supported by the Creative Inquiry program.

Poster # 74

Creating Value Added Coproducts from Biofuels Wastes

Mentors: David Thornton, Karthik Gopalakrishnan, Biosystems Engineering, Dr. Terry Walker, Environmental Engineering & Earth Sciences

Students: Brittany Sandy, Gabrielle Michel, Charles Griffin, Bradley Hatch, Chris Henderson, Levi Mills, Jimmy Oconnor, Cahner Jennice

Through collaboration with the Clemson University Facilities and Maintenance Organization this team has committed to design a scaled up facility for biodiesel and ethanol production to meet the demands of CUFMO for displacement of fossil derived transportation fuels. Goals for this project have been established to help CUFMO meet the Presidential Net Zero goal by 2030. This semester we displaced 18% of diesel fuel on campus with clean burning renewable biodiesel. With the implementation of this proposed system, capacity will expand to potentially displace 100% of diesel fuel, and a percentage of gasoline on main campus. This interdisciplinary team has designed and acquired the equipment necessary for the scale-up and will be implementing the system over the next several months as the BioEnergy Lab in Mcadams Hall is permanently located to a larger facility to house the Clemson University Biosystems Energy Complex.

Poster # 75a

Team-11-Optimize Packaging/Kitting Flow –Bosch

Mentor: Kapil Chalil Madathil, Industrial Engineering

Students: Nicholas Bierie, Robert Ivanov, Brian Sutphin, Haley Vaigneur

In partnership with Bosch Anderson, this capstone design project focused on the Welcome Road Warehouse, a storage location dedicated to returnable containers that cycle through the supply chain from Bosch manufacturing to customers (i.e., Nissan and GMC). Approximately 50% of containers are washed at an industrial washing station due to contact with transmission fluid. The other 50% must be cleaned of trash and "re-kitted". The scope of this project was to maximize the number of containers that flow through washing and kitting per shift, while improving safety. Constrained by a limited budget, the team focused on primary customer needs and prototyped many ideas to test. These tests compared the completion time of a container cycling through the system before/after the changes. After choosing the best ideas, the team found that these recommendations help Bosch increase the number of containers washed/kitted per day and create a safer work environment for employees.

Poster # 75b

Improving Efficiency at the Bosch Warehouse Rd Plant

Mentor: Dr. Anand Gramopadhye, Industrial Engineering

Students: Evan Cottingham, Kurt Freemyer, Richard Hanson, Talha Khan

The project that was given to the team was to improve flow, 5s, ergonomics, efficiency and safety at the Welcome Road warehouse that serves the Bosch Anderson plant. Specifically, the focus was on the areas of the warehouse where plastic totes are washed and kitted for shipment. After determining customer needs through interviews

and from watching the employees on a day-to-day basis the team decided to focus on the downtime caused by the automatic transmission fluid removal process at the washer and the lack of documentation and efficient flow in the kitting area. Data collection and root cause analysis tools such as Fish Bone diagrams and flow charts helped determine the magnitude of these system losses. The team generated concepts and plans on extensive prototyping and using tools learned as Industrial Engineers to create feasible solutions for Bosch.

Poster# 76
Economic, Ethical, and, Practical Aspects of Trapping
Mentor: Dr. Webb Smathers, School of Agricultural, Forest, and Environmental Sciences
Students: Hannah Newton, Kaitlyn Childress, Cameron Gill, Madison West, Caleb Patrick , Grayson Burdine, Chris Short,

Through research on traditional and modern techniques, laws and regulations, as well as technical application, students have gained an understanding of wildlife control and the effectiveness of applied management techniques. Due to the extensive amount of damage nuisance species cause, trapping is sometimes the most logical solution to manage detrimental wildlife. Trapping helps maintain a balance between wildlife and people by reducing or preventing expensive damage to agricultural crops, buildings, and homes. Regulated hunting and trapping reduces the threats to human and pet health, by decreasing wildlife populations and exposure to diseases and parasites. Controlling these animals through trapping also ensures viable and healthy populations. With property access granted by private landowners, students were able to experiment with various trapping methods, and had a great amount of success. A selection of species captured included Beaver, Raccoon, Opossum, Skunk, and Squirrels.

Poster # 77
Bamboo Reinforce Concrete
Mentor: Dr. WeiChiang Pang, Kent Nilsson, Civil Engineering
Student: Nathan Schneider

This Creative Inquiry (CI) project aims to address the sub-standard and dangerous construction of buildings with unreinforced concrete due to the high cost of rebar. In many developing countries, such as Haiti, single-story buildings are constructed with severely under-reinforced concrete beams and columns which contributed to the extreme devastation during the 2010 earthquake. In past studies, bamboo has been used to replace steel to provide tensile reinforcement for concrete; however, no reliable standardized methods are available. This CI project is developing standardized methods for bamboo reinforcement, covering all steps of the process, from cutting and preparing the bamboo to integrating the bamboo into concrete as reinforcement. The research, begun in January 2013, is in its beginning stages, and consequently no results are yet available. However, this innovative method could positively impact construction around the world. The project is partially supported by the Creative Inquiry program at Clemson University.

Poster # 78
Stochastic Screening and its Application to Expanded Gamut Printing
Mentor: Dr. Liam O'Hara, Graphic Communications
Students: Joshua Boland, Trey Reidmayer

The Clemson TAGA student chapter is tasked annually with the production of a technical research journal for the international student publication competition. The finished journal represents a body of student research, design, and production work, and each article within the journal stands as its own research project. While not detracting from the research of other authors, this year we are highlighting the research of Trey Reidmayer on Stochastic Screening and its Application to Expanded Gamut. Reidmayer's study included creating color targets comparing three different stochastic screen patterns, then a specific screening was chosen for implementation into a 7-color characterization. This process created an ICC Profile with an expanded gamut. The profile was then implemented in the reproduction of continuous tone classical paintings. Reidmayer found the stochastic screening used with expanded gamut Flexographic reproduction prevented morie patterns, had an average print contrast of 51%, and a minimum dot size of 38 microns.

Poster # 79
CI: Renovation and Restoration of the CU Foucault Pendulum
Mentor: Dr. Chad Sosolik, Physics and Astronomy
Students: Jared Williams, Edward Bell, Ryan Caracciolo, Maximillan Hughes

The Foucault pendulum is a classic experiment that served as the first unambiguous scientific evidence that the earth rotated. These pendulums have been built all across the world and Clemson University is home to the only publicly displayed Foucault pendulum in South Carolina. Within the last 10 years, the electronics designed to drive our pendulum have ceased to function and our Creative Inquiry team has redesigned them into a digital driving mechanism. Results from this project have been presented to the Clemson University student senate and formed the basis for a team-led capital improvement proposal. As a result of these efforts, the Foucault pendulum restoration project was chosen for funding ($68,001) earlier this year. The resulting renovation plans include upgrading the electronics, installing a new lighting system, designing and installing a museum describing the pendulum, and opening up the ground floor view of the pendulum to a full 360 degrees.

Poster # 80
Semi-mobile Aquaponics Systems
Mentors: Lance Beecher, School of Agricultural, Forest, and Environmental Sciences
Students: Sarah Carson, Aaron Murphy, Brandon Newton, and William Redd

This project allows for the design and construction of a true aquaponics system that requires little space and maintenance once built. This system uses Nile Perch, *Lates niloticus*, in a 150-gallon Rubbermaid tank. Plants are used to filter nitrogenous waste to create an environment for maximum growth of the fish and plants. The plants filter the nitrogenous waste from the water and use solid waste as natural fertilizer. Plants used include cucumbers

(*Cucurnis sativus*), basil (*Ocimum basilicum*), bell peppers (*Capsicum annuum*), and Sweet aroma hybrid (*Solanum lycopersicum*) and 100 hybrid (*Solanum lycopersicum var. cerasiforme*) tomatoes. Research was conducted to determine which species perform best in filtering and utilization of nutrients. Further investigation was required to obtain media in which to grow the plants. The aquaponics system was designed and built with the intent of simplicity and remaining builder friendly. Application of the system is intended to provide homeowners with resources.

Poster # 81
Collaborative Creative Inquiry for Commercialization of a Novel Central Venous Catheterization Simulator
Mentors: Dr. Jiro Nagatomi, Dr. Delphine Dean, Bioengineering
Students: Nadine Luedicke, Elizabeth Burghardt, Johnie Hodge, Alex Barrett, Rebecca Thomas

Our Creative Inquiry, through collaboration with clinicians, local hospital simulation centers, and MBA students, has involved the development, testing, and commercialization of a central venous catheterization training simulator. Central venous catheterization is a procedure involving insertion of a large catheter into the jugular or subclavian vein to deliver drugs to the heart. Accuracy is vital due to the proximity of the veins to major arteries and the lungs. The dilemma with this procedure is that one in six of the 800,000 cases result in complication, often due to ineffective and expensive training. To address the shortcomings of previous simulators, our affordable model includes features such as ultrasoundability, fully rotatable head, and accurate anatomical landmarks. We have filed a patent and are currently working with business professionals to start the manufacturing and marketing of our product in hopes of increasing the success rate and safety of CVC procedures.

Poster # 82
Greener, Safer Methods toward Nitrogen Macrocycles
Mentors: Dr. Modi Wetzler, Chemistry
Students: Matthew Wasilewski

Nitrogen containing macrocycles have rich coordination chemistry and see use in diverse applications, ranging from industrial catalytic complexes to MRI contrast agents, but their broad adoption is hindered by the difficulty of their 40 year old synthesis (Inorg. Chem. 1974, 96, 2268-2270). This synthesis requires heating in concentrated sulfuric acid at ~160 °C for 24-48 hours—a serious safety hazard—and sodium hydride, a dangerous chemical that can ignite in air and therefore requires an air-free glove box. Therefore, we wanted to discover whether milder protecting groups can enable safer and more efficient synthesis of nitrogen macrocycles. We have utilized Boc protecting groups instead of Tos protecting group to redo the macrocycle synthesis using much safer chemistry, and this approach also enables synthesis of more complex differentially functionalized ligands. This project is partially supported by Clemson University's Creative Inquiry program.

Poster # 83
CyberTiger
Mentors: Alex Kelly, Dr. James Martin, Computer Science
Students: Joe Maley, Daniel Dara, Garret Stroud, Chris Fairchok

Networking companies routinely advertise the quality of their wireless networks, but the advertised speeds are rarely met. Our research focuses directly on wireless network performance analysis. The first step was to design tests that could be run across multiple phones on multiple networks. These diagnostic tools were developed in the form of an app on both the Android and iOS operating systems. The results from these tests are automatically stored on our database, but may be hard to interpret. Visualization was made on our website, in the form of a map to display signal strengths around campus. We have found that our tools can accurately represent network quality, and are ready to be used on a much larger scale. This project was partially supported by the Creative Inquiry program.

Poster # 84a
"To Make or Not to Make"
Mentor: Dr. Anand Gramopadhye, Industrial Engineering
Students: Michelle Jahn, Leo Roque, Kristie Jordan, Eric Michels, Brian Hays

In partnership with Nutra Manufacturing, this capstone design project focused on re-designing a costing model for new products. Nutra current costing model is an excel-based model and it inputs user-supplied data (e.g., raw materials, packaging) to calculate a final cost for a new product. The main objective of this project was to improve the accuracy of the costing model and consequently increase Nutras overall profit. The team also hoped to address other issues with the model such as decreasing the time to create a price quote while improving the usability, accessibility, and security of the costing model. After determining customer needs and product specifications, the team developed an initial Excel based VBA prototype that improved the information flow within the costing model. The team conducted multiple rounds of usability testing and the new costing model was more accurate and easier for the end-users to use, edit, and maintain.

Poster # 84b
Nutra Manufacturing Costing Model
Mentor: Dr. Anand Gramopadhye, Industrial Engineering
Students: Casey Hobbs, James Butler, Tuangsi Sittisuntor, Daniel Lapihuska

This project is a costing model for Nutra Manufacturing. Nutra is a GNC subsidiary that produces vitamins for them as well as third party customers. Nutra uses a costing model to create quotes for manufacturing new products. The costing model is Excel based, and consists of fourteen tabs, including two input tabs. Formulators at Nutra input the raw materials and other manufacturing information in order to generate a quote. Our focus will be to improve the costing model by making it easier to use and more accurate by reducing the number of exceptions that have to be manually calculated. The team will use root cause analysis and other industrial engineering tools to analyze the current system. The analysis will used to create a list of requirements for the final solutions that will be developed by the group over the course of the semester.

Poster # 85

Personality in Lobsters: Do Juvenile Spiny Lobsters Show Repeatability in Their Social and Anti-social Behaviors?

Mentor: Dr. Michael Childress, Biological Sciences

Students: Larissa Clarke, Katie Cunningham, Katherine Heldt

Caribbean spiny lobsters are attracted to conspecific odor cues which lead to den cohabitation. However, recent studies have found that den sharing is also influenced by aggression toward conspecifics. Since aggression differences among individuals are often a result of distinct behavioral phenotypes, we wanted to test if such phenotypes occur in juvenile lobsters. Our study investigates whether gregarious and/or aggressive behaviors are repeatable for juvenile lobsters. We measured aggression by observing the number of aggressive acts (antennae flicks/pushes and body pushes) exhibited for 7 nights. We measured gregariousness by observing conspecific odor preferences in y-maze choice tests. These behaviors were measured one week after capture (time 1) and again after three months in captivity (time 2). Repeatability was determined by comparing the change in behaviors from time 1 to time 2. A significant correlation between the expression of these behaviors is evidence for repeatability and potentially fixed behavioral phenotypes. This project was partially supported by the Creative Inquiry Program.

Poster # 86

Effect of Demonstration in Bioengineering Concentration Selection

Mentors: Dr. Delphine Dean, Dr. David Kwartowitz, Bioengineering

Students: Andrew Cobb, Miller Byrd, Donald Benza, Hannah Haire, Fletcher Williams, Jackson Turbeville, Thomas Veith

The Bioelectrical concentration of the Bioengineering major at Clemson University has much fewer students than the Biomaterials concentration. This Creative Inquiry team wishes to explore the reasons behind this disparity. We have created several hands-on demonstrations that are featured for freshmen students during their General Engineering Tours. These demonstrations employ bioelectrical phenomenon to control robotic devices. Students are asked to complete a pre-demonstration survey and a post-demonstration survey. The survey is designed to gauge the students' perception of Bioelectrical engineering, and to evaluate the effectiveness of our demonstrations. Adhering to Institutional Review Board standards, we have gathered data from 320 freshmen students. We have found that our demonstrations effectively portray the many aspects of the Bioelectrical concentration, allowing students to make a more informed decision in their sub-major concentration selection.

Poster # 87

Nano Brewery Engineering and Zymology in the Musser Fruit Farm

Mentors: David Thornton, Biosystems Engineering, Dr. Terry Walker, Environmental Engineering & Earth Sciences

Students: Yancey Appling, Melissa DeSantiago, Even Skjervold, Megan Smith, Kirby Tate, Mike Dozier, Mark Kalata, Jordan Fox

Yeast are ubiquitous organisms found in almost every region of the world. In particular, *Saccharomyces cervevisiae*,

the yeast commonly used for the production of ales, wines, spirits and fuel ethanol, is commonly present on the skins of mature fruit. Our team has been bioprospecting regional strains of *Saccharomyces* and *Brettanomyces* and characterizing their attributes to be utilized in the production of regionally unique fermented beverages. Through the course of this project 9 unique strains have been identified and preserved for their favorable traits. While continuing our characterizations, members of the team were simultaneously engineering a food grade, certifiable nano-brewery. These members have developed a microcosm of a commercial brewery, equipped with controls, capable of producing a single keg of beer per run. The culmination of these experiments has resulted in the design and production of a certifiable nano-brewery where local strains of yeast may be tested to demonstrate their potential for use in the commercial brewing industry.

Poster # 88
Humanitarian Aid to Support Ethnic Reconciliation
Mentors: Dr. Vladimir Matic, Political Science
Students: Drayton Wade, Lauren Popovich, Rebecca Watson, Joshua Masterson, Katherine Hunter, William Hunter, Alexander Knowles

While studying abroad in the Western Balkans a group of students bore witness to the lingering effects of a civil war that ravaged the area in the 1990s. The civil war in Bosnia and Herzegovina led to over 100,000 causalities and the horrific event that took place near the Bosnian town of Srebrenica in July of 1995, where within two weeks over 8,000 Bosniak males were massacred by a Serbian army. The town was completely cleansed of Bosniaks. In order to combat prejudice and the chance of future violence, organizations are working to provide better education for the children. Our Creative Inquiry aims to help the children attend and participate in school, by providing much-needed necessities such as clothes and school supplies. In order to accomplish this, we are raising money and collecting supplies in Clemson, SC to send overseas to an NGO working closely with the children of Srebrenica.

Poster # 89
Vacuum Forming Consumer Products and Entrepreneurial Business Development
Mentors: Dr. R. Andrew Hurley, Food, Nutrition, and Packaging Sciences
Students: Matthew Barber, David Cottrel, Nathan Bailey, Ehrick Haight

For this project, Packaging Science students researched the Vacuum Forming process. Vacuum forming is a process where a plastic sheet is heated and then formed to a mold using a vacuum and compressed air. After much consideration, the team settled on developing Clemson University themed plastic-ware such as cups, plates, and ice-cube trays. All the products contain the Clemson paw logo. The designs were created using a computer aided design program while keeping correct draw down ratio and draft angles in consideration. Draw down ratio is needed because vacuum formed products don't maintain uniform thickness after being formed. The team will proceed to create the machined molds and operate a 4x4 foot vacuum former. The team hopes to create a sustainable business model for the Clemson-themed products.

Poster # 90
How Many Mates Can a Latin Square Have?
Mentors: Dr. Neil Calkin, Carl Mummert, Mathematical Science
Student: Megan Bryant

We study the number of mates that a latin square may possess as a function of the size of the square. We performed an exhaustive computer search of all squares of sizes 7 and 8, giving the exact value for the maximum number of mates for squares of these sizes. The squares of size 8 with the maximum number of mates are exactly the Cayley tables of $_2Z^3 = Z_2 \times Z_2 \times Z_2$, and each such square has 70,272· 8! mates. We obtain a combinatorial proof that, for every $k \geq 2$, the square obtained from a Cayley table of $_2Z^k$ has a mate. This research was partially supported by NSF grants OCI-1005117 and EPS-0918949.

Poster # 91
Responsive Origami Structures
Mentor: Dave Lee, School of Architecture
Students: Emily Schulte, Dylan Perkinson, David Stone

This research investigates the potential for lightweight, transformable kinetic origami structures that incorporate heat energy to activate their movement using shape-memory alloys. We propose the use of shape-memory alloys to replace the motors in the transformation of structural origami patterns from one shape to another. Shape-memory alloys (SMA) are metals that can be made to transform from one programmed shape to another within a certain range of temperature change. Using SMA's in origami structures would both simplify the mechanics of the system by eliminating otherwise bulky components as well as introduce the possibility activation via passive heat transfer, both at potentially great energy and cost savings. In the United States, buildings account for 39% of all energy consumption and 72% of electricity consumption. A great potential for using SMA at an architectural scale is the ability of it to operate with zero energy consumption, thus affording the possibility of vastly reduced energy costs for operating buildings. McLaren, Warren. "US Buildings Account for 40% of Energy and Materials Use.' Treehugger, 10 August 2009. 27 October 2012.

Poster # 92
A Portable, Low Cost, Near-infrared Camera for Self-Monitoring of Diabetic Patients to Manage Inflammation of Tissue at Risk of Ulceration
Mentors: Dr. David Kwartowitz, Dr. Vladimir Reukov, Aleksey Shaporev, Bioengineering
Students: Jarrett Lucero, Mitchell Fullerton, Victor Depiero, Margarita Portilla

Clinical applications for infrared (IR) cameras and thermometers have emerged in health care to detect and manage inflammation of tissue at risk of ulceration. Recent study findings in wound care suggest that IR technology is beneficial in targeting lower extremity skin temperature, including diabetic, pressure, neuropathic foot and venous leg ulcers, to predict, prevent, and treat these ulcers. It is demonstrated in the literature that strong differences in the absorbance of oxygenated vs deoxygenated blood is observed around 760nm. Using this information, we de

signed a circuit with LEDs of three separate wavelengths: 640nm, 740nm, and 880nm, with adjustable intensities to allow individual or combined light. The purpose of this Creative Inquiry is to manufacture a cheap, portable near-IR camera for self-detection and self-monitoring of diabetic patients to test whether the device can detect areas of skin at risk for ulceration.

Poster #93

Building Effective Peer Mentoring Programs for Special Populations

Mentor: Amanda Bonilla, Gantt Center, Dr. Sherry Dorris, Undergraduate Studies, Mary Kaenel, Transfer Academic Programs, Dena Kniess, Educational Leadership

Students: Shirkerah Abney, Morgan Clardy, Naima Clark, Amber Cooper, Amanda Drower, Alexandra Drye, Timothy Erb, Kierra Fulmore, Larissa Knight, Alexander Knowles, Marley Larue, Erin Mayor, London Means, Alexa Neiling, Raven Nesmith, Quinn Nix, Rachel Pope, Kaitlin Rivera, Briana Ryans, Regan Schroer, Whitney Smith

A student research project was initiated to address an overarching research question: Do new students of special populations report they have experienced a better transition to the university as a result of their participation in a mentoring program? These special populations included students from the *FIRST* Program who are first-generation students, students in *Connections* who are students of color, students in the Transfer to Tigers students who are transfer students, out of state students, and students in *Tiger Success* who are on academic probation. The mentor training portion of the course has been conducted for three semesters. As part of the academic course, mentors study the impacts and effectiveness of peer mentors on special populations. Currently, mentors are proceeding with the research project by conducting focus groups and collecting data for the project. They will be showcasing their research efforts at the end of the semester as final data is collected. This project was supported by the Creative Inquiry program.

Poster # 94

Pilot Study Determining Delirium in the Intensive Care Unit: Utilizing a Wireless Sleep Monitor for Assessment

Mentor: Dr. Nancy Meehan, School of Nursing

Students: Kathleen Spencer, Lauren Boynton, Sarah Truman, Chris Rhodes

Introduction/Background: Delirium continues to be a major issue in intensive care units (ICU). Sedation and lack of REM sleep could be an important factor in the development of delirium. Methods: A pilot study of 7 new patients who were intubated and sedated, age 65 and older. Data on patient sleep cycles were collected using a wireless sleep monitor. Results: Preliminary results demonstrated that on average between the hours of 2100-0600 48% remained awake (range 8-88%), 30% were in light sleep (range 2-50%), 18.5% were in REM (range 2-60%) and 3.4% were in a deep sleep (range 0-9%). One patient remained awake 52-88% during entire admission of 7 days, had an ICDSC score of 5 and had a self extubation, sedation ordered was Versed prn. Implications: Preliminary results show that there is a relationship between sedation, lack of REM sleep, and delirium and thus led to further investigation and larger studies.

Poster # 95
Herbig Ae/Be Accretion
Mentor: Dr. Sean Brittain, Physics and Astronomy
Students: Tyler Frazier, Joe Laroche

While a great deal is known about the universe, the origins remain unclear. The formation of stars is an example. Star formation is broken down into three categories: low mass stars (<2 solar mass), intermediate mass stars (2-10 solar mass), and high mass stars (>10 solar mass). The objective of this project is to measure CO and Brackett-Gamma, two tracers in the accretion disk of forming intermediate mass stars, compare them, and analyze the trends that form. To do this, data was compiled from archives, directories, and taken with SARA (a 1-meter telescope Clemson has a share in). Correlations between the two tracers offer insight into the timescales of both planet formation around intermediate mass stars and the dissipation of dust around these stars. This project was supported by the Creative Inquiry program.

Poster # 96
Is cardiovascular emotional dampening associated with poor sleep quality?
Mentor: Dr. James McCubbin, Psychology
Students: Ronald Schram, Melissa Hibdon, Meredith Caldwell, Eric Wilson, Kathleen Backman, Elizabeth Dukes

Our previous studies have shown that persons with high blood pressure have emotional dampening, a reduced response to emotionally meaningful stimuli. This phenomenon could have an effect on one's social interactions, possibly influencing risk-related decision-making. Higher blood pressure has also been associated with poor sleep quality. The current study focuses on whether or not overall sleep quality has a significant impact on cardiovascular emotional dampening. We hope to determine the overall effect of sleep quality on the relationship between blood pressure and affect. Sleep quality was analyzed using the Pittsburgh Sleep Quality Index (PSQI), a questionnaire that's assesses an individual's quality of sleep over a period of one month. The questionnaire contains 24 questions that relate to one's usual sleep habits. Blood pressure and perception of affect (PAT) were also measured. We expect that poor sleep quality will be associated with elevated blood pressure and lower perception of affect (PAT) test scores. Emotional dampening and poor sleep quality may increase the risk for hypertension.

Poster # 98
Altered Mechanical and Wear Properties of Enamel Due to Whitening Treatment
Mentor: Dr. Marian Kennedy, Material Science and Engineering
Students: Jeffrey Willis, Leah Sweet, Scott Stanley, Diane Zybko

While the use of tooth-whitening products is on the rise, their wear effects on regular and mottled enamel are unknown. Whitening treatments use reactive oxygen species, including hydrogen peroxide, which diffuse through enamel and eliminate accumulated stains found deeper in the tooth's dentin layer. Initial studies have shown that enamel mechanical properties (modulus and hardness) decrease when exposed to hydrogen peroxide due to its demineralizing nature. Both regular and mottled enamel samples were treated with Crest Whitestrip™ and pre

pared following standard protocols. We hypothesize that mottled enamel will experience a greater wear rate when compared to homogenous enamel. Wear rates were accessed using profilometry and a CETR linear-reciprocating scratch tester with a zirconia counterface. During wear testing, the roughness decreases for whitened, mottled enamel from 207 to 128 nm. Initial results show that the coefficient-of-friction was 0.2 for a whitened, mottled enamel and 0.3 for the regular enamel without whitening.

Poster # 99
Valuing Heritage Language Through Interpretation
Mentor: Margaret Warner, Teacher Education
Students: Brittany Flores, Lauren Fasbender, Jessie Phillips, Margot Cilker, Robert Weston Taylor, Emily Saxon

Are Latino children's perceptions of themselves as language brokers mirrored in daily routines of school, home and community? The poster will serve as a springboard for portraying the impact of an interpretation program at a local elementary school in which the use of Latino's children's literature opened conversations leading to insights, understandings and appreciation of the value of bilingualism. Results of data collected on two separate occasions will depict students' perceptions and beliefs about their bilingualism as related to the roles they are asked to take on in school, home and community.
This project was partially supported by the Creative Inquiry program

Poster # 100a
Electrolock: Plant Optimization Post Plant Expansion
Mentors: Yuan-Han Huang, Dr. Anand Gramopadhye, Industrial Engineering
Students: MaryAnn Lander, Alana Powers, Joe Tanner, Will Turner

In partnership with Electrolock Inc., the purpose of this project was to design a new plant layout which would increase the efficiency of the process flow throughout the plant. Electrolock is currently undergoing an expansion that will roughly double the plant size. The scope of the project includes the location of the shipping and receiving area, machinery locations, and locations of the lab and inventory storage areas. After meeting with Electrolock's Quality and Process Engineer the team determined customer needs using employee input from interviews, questionnaires and surveys. The team's three key business goals are to: reduce distance traveled by products by 40%, reduce inventory time by 20% and reduce clutter by 80%. During the Root Cause Analysis section of the project, the team used Why-Why Analysis, Pareto Charts, and Fishbone Diagram methodologies to attain in-depth data pinpointing the root causes of the problems within the current system.

Poster # 100b
Plant Optimization Post Plant Expansion - Electrolock
Mentors: Yuan-Han Huang, Dr. Anand Gramopadhye, Industrial Engineering
Students: Samantha Lawley, Jeff Correa Correa, Bruce Scott, Courtney Anderson

In partnership with Electrolock Inc. of Duncan, South Carolina, this capstone senior design project focused on re

designing the facility layout to include a 240,000 square foot expansion. The current layout supports the four major departments, slitting, lamination, fabrication, and coating, of this electrical and thermal insulation manufacturing facility. The major objectives with regards to the new layout are to measure improvements in plant organization, reduce material handling time, and increase finished product throughput. Excessive time required to retrieve raw materials from storage racks was identified as the critical system phenomenon. The team then used the Why-Why analysis tool and determined multiple root causes of the phenomenon. Root causes discovered were, number of storage racks in the facility, computer locations within departments, and location of the forklift storage area. Moving forward, the team plans to eliminate as many root causes as possible while developing a new layout for the facility.

Poster # 101

Happiness and Passion: What Type of Passion Defines Happy People?

Mentor: Dr. Robin Kowalski, Psychology

Students: Brooke Baker, Julia Turner, Elizabeth Whittaker, Justin Stephens, Virginia McMillan, Laura Frazee, Taylor Elsey, Alissa Fortune, Megan Morgan, Cara Murphy, Charles MacLennan

Not all passions are created equal for activity enjoyment. Harmonious passion is associated with positive affect, whereas obsessive passion is associated with addiction. This study hypothesized differential relationships of the two passion types in regards to happiness. One hundred forty undergraduates completed measures of harmonious and obsessive passion, self-esteem, satisfaction with life, positive/negative affect, and the Oxford Happiness Questionnaire. A significant relationship was observed between happiness and harmonious passion ($r = .45$, $p < .001$). However, no significant correlation emerged with obsessive passion ($r = .07$, $p > .05$). In spite of significant relationships between self-esteem and both happiness ($r = .72$, $p < .001$) and harmonious passion ($r = .29$, $p < .001$), the relationship between happiness and harmonious passion remained even after partialling out self-esteem ($r = .39$, $p < .001$). Implications of these relationships for persistence in and enjoyment of academics, sports, etc. will be discussed. This project was partially supported by the Creative Inquiry program.

Poster # 102

Impact of Wireless Devices in the Improvement of Diagnosis, Treatment and Therapeutic Outcomes in Various Healthcare Fields

Mentor: Dr. Vincent Gallicchio, Biological Sciences

Students: Kelsey Derrick, Katherine Bartz, Amanda Macaluso, Anissa Anglin, Mohammed Siddiqui, Charlene Lyon, Jordan1 Elder, Chris Chaudhary

Recent advancements in mobile wireless devices (smart phones and tablets) have given these products the potential to drastically alter the practice of healthcare. The project will determine how these devices will assist in improving diagnosis, treatment and therapeutic outcomes. Also, it seeks to determine if the healthcare community feels these devices will make healthcare more cost effective and affordable. To cover multiple aspects of healthcare, several groups are being targeted: clinical laboratory, veterinary medicine, dental medicine, public health, rehabilitation medicine, imaging technology, and hospital administration. A questionnaire has been distributed to representatives

in each field. Questionnaire data is and will be analyzed. In the future, the project will investigate other areas of interest, including the education of future healthcare professionals as well as forensic medicine. Overall, the project will define the potential for mobile wireless devices to improve healthcare.

Poster # 103

Determining the Effects of Family Camp on Children Living With Type I Diabetes

Mentors: Dr. Teresa Tucker, Dr. Francis McGuire, Parks, Recreation & Tourism Management

Students: Claire Peyton Bowman, Carlye Byrd, Alex Driscoll, Anna Kate Eskew, Kinsey Hammond-Beyer, Jessica Hayes, Katie Horne, Rebekah Horton, Jasmine Huttobarksdale, Jessica Jones, Maggie Pautler, Rita Penniman, Hope Rosenlund, Amanda Sparkman, Liz Stephens, Sarah Thackston, Paige Wright

Type I Diabetes, although it only affects 5% of the population, is dramatically on the rise in the United States. There is no cure for Type I diabetes. If a person with Type I does not manage diabetes well, it can lead to negative effects. This can include loss of vision neuropathy, dialysis, and kidney disease. The purpose of this study is to determine the impact of Camp Kudzu on the self-efficacy for diabetes management among family members participating in the camp. The camp setting in general can enhance the confidence, stability, and self-worth of children, teens, and adults alike. We will conduct our research through surveys immediately before, immediately after, and several weeks after camp so see if self-efficacy improved after attending Camp Kudzu.

Poster # 104

$60 Scholarships: Providing Educational Opportunity for Belizean Children

Mentor: Dr. Sean Williams, English

Students: Sara Bailey, Brooke Baker, Kayla Cobb, Anne Coker, Molly Collins, Olivia Elswick, Kellie Hawkins, Rebecca Williams

Taking an applied approach, our Creative Inquiry team transformed the theory of entrepreneurial narrative into entrepreneurial reality. Specifically, eight students under the supervision of Dr. Williams created a social enterprise called $60 Scholarships in order to provide educational opportunity to children in impoverished countries—creating their own entrepreneurial narratives in the process. In four months, the team fundraised at several locations, raised $11,000 to begin the enterprise, and enabled 33 Belizean children to receive a $60 scholarship, which covers the cost of academic tuition, classroom textbooks and supplies, a uniform, and daily lunch for an entire year. In March, the team will travel to Belize City to film a documentary about Unity Primary and its students, as well as award the individual scholarships accumulated through donations. This project was partially supported by the Creative Inquiry program and sponsored by Sturgis Web Design, Mel and Patricia Ziegler, Sponsorcraft, and many more.

Poster # 105
Engineers without Borders in Liberia
Mentors: Dr. Mark Schlautman, Catherine Ruprecht, Hilary Emerson, Environmental Engineering & Earth Sciences
Students: Garrison Stevens, Allison DeNunzio, Patrick Scheele

Engineers Without Borders is working on projects in Liberia, West Africa including a biodigestor, free energy water pump, energy-generating playground and education and health awareness. This project was partially supported by the Creative Inquiry program. The biodigestor will produce methane gas for cooking to replace expensive natural gas. The free energy water pump will be implemented for irrigation of a pineapple farm. Two potential solutions are being evaluated including a ram jack pump and a vertical axis windmill. The energy-generating playground is being designed for a school and will use a merry-go round to generating electricity. The energy harvested will power lights at night so adults that have to work all day may educate themselves in the evening. The final project is an education and health awareness program, which will promote vaccination and sanitation awareness. A team of students will be traveling to Liberia in May to implement projects.

Poster # 106
Twin Row Peanut Digging and Combining Losses
Mentor: Dr. Kendall Kirk, School of Agricultural, Forest, and Environmental Sciences
Student: Basil Jordan

There has been growing interest in twin row planting of field crops and recent studies have indicated increased yields from twin row peanuts, compared to yields of those planted in conventional (single) rows. Because the peanut harvest is a two stage process where the plants are first dug and then combined several days later, there are two opportunities for yield losses. Digging losses were categorized as “above ground” or “below ground” losses. The general trends across the treatments were the same for both varieties. Below ground digging losses for twin row peanuts were 36% higher than those for single row peanuts and above ground digging losses for twin row peanuts were 52% higher than those for single row peanuts. While single row total peanut production was 8.5% higher than that for twin row, twin row harvested yield was 3.9% higher than that for single row.

Poster # 107
Effects of multiple plain water rinses on bacterial count of produce and poultry
Mentors: Dr. Paul Dawson, Chinmay Naphade, Food, Nutrition, and Packaging Science
Students: Bonnie Alexander, Katelyn Bond, Eric Ewald, Joanna Hamrick, Emily Marsinko, Megan Martin, Mark Maurer, Jonathan Mitchell, Taylor Shook, Paul Smith, Cassandra Watford

Many consumers rinse produce items in plain water to lower the amount of bacteria on the food and make their food safer. This experiment focuses on the effect of numerous plain water rinses to determine the effectiveness of single and multiple rinsing on reducing the total amount of bacteria on produce and poultry. Food samples were weighed and placed in a sterile bag with peptone water and rinsed for one minute. Rinses were repeated multiple

times, and serial dilutions were plated on Petrifilm for each rinse number. After 48 hours, colonies were counted and recorded to determine the efficacy of each rinse of the food product. From the data collected, it is clear that even after five one-minute rinses, bacteria is still present on food products.

Poster # 108
Best Practices for Food from Shopping, Storing and Cooking
Mentor: Katherine Ancona, Dr. Margaret Condrasky, Food, Nutrition, and Packaging Science
Students: Ashee Conrad, Grace Couch

College students secure food from multiple locations on a given day. Decisions on food handling and storage for food ingredients used to prepare snacks and meals as well as handling away from home foods are made many times each day. Tips and techniques for the college student to adopt in order to consume and serve wholesome foods are provided. Topics investigated for illustration include: where to store foods in the refrigerator to ensure maximum freshness; shelf life of common foods; examination of foods that respond favorably to freezer temperatures; as well as the use and misuse of leftovers. This practical approach to a complex and important health topic is simplified by an interactive food product storage decision action station that aims to build confidence in food handling for the participant.

Poster # 109
Health and Business Topics in Film
Mentor: Dr. Graciela Tissera, Languages
Students: Spenser Staub, Patrick Wagner, Michael Harris, Aubrey Lawson, Alexa Parker, Ben Vukov, Kelsey Wright, Calie Berry, Margaret Boyd, Kaela Gardner, Jessie Phillips, Kayla Wardlaw, Cameodiamond Joseph, Victor Montilla

This project will analyze different perspectives on health, business and related topics to explore their impact on Hispanic countries and/or other areas of the world. Students will research historical and cultural aspects of several nations through videos, mass media, and pertinent materials (such as actual footage, film adaptations of novels, documentaries, movies based on real events and business and medical literature) by world renowned authors and film directors. This project was partially supported by the Creative Inquiry program.

Poster # 110
Design proposal for Clemson University Biosystems Engergy Complex
Mentors: David Thornton, Biosystems Engineering, Dr. Terry Walker, Environmental Engineering & Earth Sciences
Students: Blake Ellisor, David Adamson, Jon Ulsaker, Victor Liao, Garrett Clark

“Waste is but a resource misused”. In an integrated biorefinery, there is no such thing as waste. This is the premise of our engineering foundations in biosystems engineering. The word *waste* is stricken from our vocabulary. In its place we find *value added co-products*. Utilizing co-products from biodiesel production and ethanol production in addition to utilization of cafeteria food wastes, our team created a diverse product line including biolipids, protein

pellets, soaps, detergents, soil amendments, and livestock feed. Using processes such as heterotrophic algae production, black soldier fly digestion, and bioseparations, we create new feedstock from what was once a waste; Thus, improving economics of the systems while also decreasing carbon footprint and increasing renewable sustainable energy production.

Poster # 111
Compounds from fermented noni exudates (fNE) selectively kill human cancer cells
Mentor: Dr. Yanzhang Wei, Biological Sciences
Students: Alexandra Blumer, Robert Borucki, Shaina Arambula, Ashlee Tietje

Our recent studies involving fermented noni exudates (fNE) made from noni (*Morinda citrifolia*) have shown promising anti-cancer activities. Using an *in vitro* cell culture system, this study examines dozens of compounds isolated from fNE in order to identify specific compounds preferentially toxic to tumor cells. The compounds at concentrations of 20, 5, or 2 μg/ml were added to NL-20 non-tumor lung cells or A549 lung carcinoma cells and incubated for 48 hours. The cytotoxicity of the compounds on the cells was measured using the MTS cell proliferation assay. At least two compounds (P1H and NCEERM15) at the concentration of 20μg/ml were found selectively effective in killing more A549 tumor cells than NL-20 cells ($p<0.5$ and $p<0.1$). These preliminary results suggest that compounds from fNE have the ability to selectively kill cancer cells. Further testing is necessary to determine the mechanism of action and its possible role in immune activation.

Poster # 112
Clemson Veterans Project
Mentor: Col. Lance Young, Management
Students: Daniel Mack, Will Hines, Derek Devera, Max Thomas

This presentation highlights the achievements and milestones of the creative inquiry team's efforts in collecting the oral history of combat veterans. Since the creative inquiry team's work is primarily video recording, a flat screen will be used to feature interviews and a montage. The poster will list the various accomplishments of the team such as the number of veterans from each era and other statistics. The poster will also feature the file nomenclature and organization system that was designed from scratch for the program. QR codes will be placed on the poster so mobile devices can go straight to the website. There will also be detailed information about the Library of Congress and how their project sparked the idea for the creative inquiry.

Poster # 113
TigerTern
Mentor: Dr. Kenneth Weaver, Computing
Student: Carrie Eisengrein

The focus of computer science students on Dr. Kenneth Weaver's Creative Inquiry team is to enhance the ADA Compliant TecTern by Egan Visual. Code-named "TigerTern," lectern enhancements begin with a proof of concept

design to automate the height adjustment feature of the TecTern. We are using a USB card reader, Raspberry Pi, Arduino microcontroller, relays and a server. When an instructor enters a classroom, he or she will swipe an I.D. card and the lectern will adjust to the preset desired height. Once the initial concept is fully realized, we will then explore other classroom options that can be customized such as activating the projector, adjusting classroom lighting, or activating speakers. The TigerTern team is dedicated to providing a classroom that is tailored to the instructor and conducive to a better learning experience.

Poster # 115
Sediment Transport After Dam Removal on Twelve-Mile Creek, Norris, SC
Mentor: Dr. Larry Murdoch, Environmental Engineering & Earth Sciences
Student: Tyler Waterhouse, William Chamlee, Jonathan Baldwin, Emily Thompson, Thomas Vaughn

The Woodside dams were removed from Twelve-Mile Creek in order to remediate PCB contamination in Lake Hartwell. The concept behind the plan is that removing the dams will increase sediment flux, which will isolate PCB-laden sediments. Considerable sediment existed in the region behind the dams, so a field study of the transport of that sediment was initiated to survey streambed topography at six locations to evaluate erosion and deposition of sediment as a function of time. Results indicate that approximately 3x105 cubic meters of sediment have been eroded from the impoundment while deposition averaging 0.25m/month occurred at the uppermost site below the dam for the first four months. Slight increases in bed elevation occurred further downstream, but the changes on average are less than 0.45m over the entirety of the study. Because the factors affecting sediment transport are unclear, a secondary study has been initiated in order to understand the processes occurring in the field.

Poster # 116
Sustianable Biodigestor Solutions for Sanitation Control in Cange, Haiti
Mentor: Rebecca Clark, Civil Engineering
Students: Brianna Noblin

The purpose of the anaerobic biodigester bags is to provide a sustainable system to treat wastewater and an alternative energy source to charcoal in order to help offset the amount of deforestation in Haiti. Cange's ground water sources are contaminated by fecal coliforms and other bacteria. Currently, most residents of Cange use the bathroom outside and their waste and the harmful organisms within it easily enter the ground water. Our project provides a treatment the waste that biologically removes these harmful organisms and prevents outbreaks of deadly diseases like cholera. The benefits of the biodigesters exceed pathogen removal, they also produce biogas. Through natural processes, the organic matter is converted into methane, and other gases. This mixture of gas can be piped to any gas burning stove and used as sustainable cooking fuel. The biodigester accommodates financial and logistical limitations of the Central Plateau of Haiti. Our team developed a modular plan that can be adapted to different villages as well as be integrated into a latrine and communal kitchen system.

Poster # 117
Exploring Vegan Diets
Mentor: Alexa Weeks, Food, Nutrition, and Packaging Science
Students: Erin Fitzgerald, Kathryn Grigg, Julie Luxemberg, Elizabeth Terry, Brooke Butterworth

Balancing nutrition and taste is a worthy goal for everyone, but some would think a bigger challenge for a vegan. This growing lifestyle requires a closer look at protein as well as other nutrient needs that are commonly associated with animal sources. A review of literature and introspection of the vegan diet provides a continued conversation about the health, economic, environmental and ethical implications of this approach. Illustration on the differences in cost of an average grocery trip; examples of typical vegan fare; and accessibility of vegan foods in restaurants are provided. Due to the increase popularity of vegan lifestyle recipes, and tips for following this regimen has been investigated. Sampling of a vegan appetizer will be provided!

Poster # 118
Evolutionary Novelty versus Exaptation: Oral Kinematics in Feeding versus Climbing in the Waterfall-Climbing Hawaiian Goby *Sicyopterus stimpsoni*
Mentor: Dr. Richard Blob, Biological Sciences
Student: Joshua Cullen

Species inhabiting extreme environments often exhibit distinctive traits that help meet environmental demands. Such traits might evolve via exaptation, a process where structures are coopted for new behaviors. We assessed whether exaptation operated in the fish *Sicyopterus stimpsoni*, which use an "inching" behavior to climb waterfalls that resembles oral mechanics during feeding. We filmed climbing and feeding for *S. stimpsoni* individuals from Hawai'i allowing us to: (1) compare feeding kinematics to those for two suction feeders (*Awaous guamensis, Lentipes concolor)*, and (2) quantitatively compare climbing and feeding in *S. stimpsoni*. Premaxillary movements differed most between scraping and suction feeding, whereas kinematic profiles of climbing and feeding matched closely, despite differences in maximum values. Although current data cannot resolve whether oral movements for climbing were coopted from feeding, or vice versa, similarities between feeding and climbing in *S. stimpsoni* are consistent with exaptation between these behaviors.

Poster # 119
Increasing 3D Printing Accessibility Through a Low-Cost, Automated Workstation
Mentors: Dr. Todd Schweisinger, Dr. James Gibert, Mechanical Engineering
Students: Matt Sheen, Curtis Beck, Devin Tiernan

3D printers, one of the many methods of rapid prototyping, have become increasingly versatile, available, and cost effective. The 3D Printing Creative Inquiry group is developing a low-cost rapid prototyping system easily accessible to students on campus for personal and academic projects. The objective of the project is a "vending machine" to automatically print and distribute uploaded designs from users. Two contrasting designs were chosen and developed, both of which create parts by heating and extruding polymer filaments in layers. Multiple programs

were developed to integrate the two printers and vending machine system while considering Vending machine infrastructure and functionality. Printer hardware assembly was completed in Fall 2012. Just as conventional paper printing has become universal in homes and offices, 3D printing is poised to become similarly universal with the development of systems like the rapid prototyping "vending machine."

Poster # 120
Using Modified Golf Cart for Teaching and Research Precision Agriculture
Mentors: Dr. Kendall Kirk, Hunter Massey, School of Agricultural, Forest & Environmental Sciences
Students: Brett Schmidt, Basil Jordan III, Zachary Taylor, Kamron Kerr, Ryan Richardson

Agricultural Mechanization and Business (AGM 473) students are making improvements to an already modified golf cart. This golf cart has incorporates many skills that are learned by AGM students. These improvements are being made for the purposes of becoming a teaching tool for AGM instructors. GPS technology will be added for the purposes of teaching Precision Agriculture (AGM 410) and variable rate technology. Also, this technology will be used in Machinery Management (AGM 206) to determine field efficiencies and cost savings generated from such technology. This modified golf cart platform will be used as hands on training for future AGM students who may not come from an agricultural background and are not familiar with current technologies used in modern agricultural applications. This concept will be totally unique to Clemson University and is globally one of a kind.

Poster # 121
Optimize Production Test Equipment in Final Assembly
Mentor: Dr. Anand Gramopadhye, Industrial Engineering
Students: Joshua Lechleiter, Russell Lortz, Theresa Mcmahon, Caitlyn Timko

This capstone design team is working with Boeing in Charleston, SC, focusing on the Final Assembly area for the Boeing 787 Dreamliner plane. Final Assembly has eight positions that each hold one plane for a six days to do assembly or quality/safety testing. There are over 350 tests performed on each plane and each test requires several tools. Currently, tools are stored randomly throughout the facility because they have no specified storage location. The objective was to both specify a specific tool storage location that optimized the distance between storage and usage locations and to establish a system of tool accountability. After analysis of the current state and determining customer needs, the team has generated concept solutions and used Excel to develop an optimized layout model. This new layout design, combined with the new system for tool accountability, will minimize the distance traveled and the time required to obtain tools.

Poster # 122
Protein expression and purification of the gene 2107 from *Legionella pneumophila*
Mentor: Dr. Tamara McNealy, Biological Sciences
Student: David Limbaugh

Legionella pneumophila is a disease causing bacterium with two main illnesses, the mild form, Pontiac fever, and

the more severe illness, Legionnaires' disease. *L. pneumophila* can be found easily in the environment existing in biofilms; and is found ubiquitously in natural waters. Sensing and response to metal is a required trait in bacteria but not well understood. We identified a novel operon in L. pneumophila that responds to gold and is involved in biofilm formation. Lpg2107 is one of four genes in this operon and predicted to be a secreted protein with metal binding capability. The project will clone, express and purify this protein for use in antibody development and further exploration of operon activity. The gene is amplified and cloned into the expression vector pET28a, and transformed into *E. coli* BL21 for expression. The protein will be purified using standard his-tag purification methods.

Poster # 123
Measurement of C^{16}O, C^{17}O, and C^{18}O in RYTau, HLTau, and GVTau
Mentor: Dr. Sean Brittain, Physics and Astronomy
Students: Thomas Teasley, Scott Davis

There is an overabundance of C17O and C18O in the inner accretion disks of young stellar objects (YSO), and in Chondritic meteorites. We will present CO absorption spectra from the M band (4.7 μm) and K band (2.3 μm) that will help distinguish the difference between potential self-shielding and properties of the parent cloud by mass fractionation. Self-shielding is a process in which certain oxygen isotopologues are protected from photodissociation by far ultraviolet (FUV) radiation. The photodestruction of these isotopologues outside of the disk leads to an overabundance of 17O and 18O deeper inside the disk which may explain their overpopulation in meteorites. The data we have collected are from three young stars. By measuring the column densities, equivalent widths, and Full Width at Half Maximum for each absorption spike from each star, this will allow for comparisons in the mass fractionation between the stars and interstellar medium.

Poster # 125
Students Making Connections With the Packaging Industry
Mentor: Bob Moore, Food, Nutrition, and Packaging Science
Student: Hannah Adams

Students interact with the packaging industry to make professional connections well in advance of graduation. In addition to benefits for the students (co-ops, scholarships, careers, etc.), Clemson's Packaging Science program, one of only five in the U.S., also benefits by making the packaging industry aware of our Bachelor of Science program, and by facilitating industry collaboration with, and support for, the program. The packaging industry likewise benefits by learning about our future packaging professionals, our faculty, and our many research and testing capabilities. The primary artifact is a relational data base, which allows for two-way cross reference by categorizing both companies and students, using a wide range of search criteria. Student interactions with industry occur in a variety of ways, including industry trade shows, conferences and seminars, visits to companies, and visits to the Clemson campus by companies. This project is generously supported by Dr. Barbara Speziale and Clemson Creative Inquiry.

Poster # 126
Engineering Sustainable Chemical Production in Microorganisms
Mentor: Dr. Mark Blenner, Chemical Engineering
Students: Yancey Appling, David Carey, Taylor Cook, James Foster, Parker Hume

Our mantra is Inspired, but not limited by biology. Microbial biosynthesis of chemicals and fuels offers a renewable way to create the molecules our society needs in a sustainable manner. The major barriers to more broad adoption of biochemicals in the chemical process industry are starting to be overcome by advances in biotechnology and engineering. Taking advantage of natural biodiversity, and engineering new biological components will enable an expanded set of biochemical reactions to be better controlled and therefore more efficiently produced.

Poster # 127
Childhood Obesity Prevention in the Latin American Community
Mentors: Janice Lanham, Nursing
Students: Amy Moon, Katelyn Beardsley, Samuel Baxter

This creative inquiry focused on childhood obesity, which has received national attention in recent years- largely affecting minority children. Childhood obesity is the condition of children being well above the normal weight for their age and height cohort. Through massive reviews of literature and journals, major factors that increased the risk of a child being at risk of obesity were determined to be minority status, socioeconomic position, parent(s)' degree of education, and knowledge of healthy food options. The group resolved to design an activity book that educated, motivated, and improved upon the knowledge and implementation of a healthy lifestyle among minority children. The Latin American youth population is currently the fastest growing in America and the most affected by childhood obesity. The aim of this work is to aid in the elimination of childhood obesity as a health disparity, through education and illustration, in a culturally competent way.

Poster # 128
Management and Attitudes Towards Predators in Quail Plantations in the Southeastern United States
Mentors: Cady Etheredge, Dr. Greg Yarrow, School of Agricultural, Forest, and Environmental Sciences
Students: Olivia Souther

Loss of habitat and predation are two of the primary reasons given for recent bobwhite quail (*Colinus virginianus*) population declines in the southeastern United States. However, the bobwhite quail remains a favored game species of many hunters throughout the southeastern states. A survey of private and commercial landowners in the southeast was conducted to determine the significance of predator control programs in the respondents' management plans. Survey questions aimed to assess the respondents' attitudes towards predators of bobwhite quail, the extent to which predators were controlled, and the perceived return of the implemented predator control programs. Results will be examined for which mammalian predator species are more commonly removed, which predator control practices are most common, and the cost and perceived return of such practices between private and commercial quail plantation owners and among the various states.

Poster # 129
Wear and *in vitro* Testing of a Novel PTFE Coating on 316 Stainless Steel
Mentor: Dr. John DesJardins, Bioengineering
Student: Taylor Pate, Jisele Green

PTFE coatings have been shown to reduce biofilm formation on medical implants, which is especially important for battlefield wounds that can be large and prone to infection. The CoBlast technique is a technique for surface coating developed by EnBio. It is used to apply PTFE to enhance mechanical stability and surface modification. Using 316 stainless steel treated with PTFE from the CoBlast technique, our goal is to determine if the biofilm layer and local infection is reduced. In addition, the physical properties will be tested to determine how deposition affects the material. Currently, the team has been gathering base line optical profilometry data and is calibrating the wear bench with six new 100 N load cells in order to gather wear data to determine the properties of the steel when CoBlast coated. This project was partially supported by the Creative Inquiry program at Clemson University.

Poster # 130
Does Cardiovascular Emotional Dampening Diminish Social Support Utilization?
Mentor: Dr. James McCubbin, Psychology
Students: Jack Graham, Aaron Nathan, Anastasia Morrison, Michelle Steele, Alexandria Wooten, Justin Stephens

Cardiovascular emotional dampening states that people with elevated resting blood pressure tend to exhibit a lessened response to emotionally significant stimuli which may impact psychosocial functioning. Our study analyzed how social support networks and close personal relationships were undermined by this phenomenon. We tested this by assessment of resting blood pressure, perception of affect, and perception of social support in 72 young women and men. Participants were also given the Perception of Affect Task (PAT), the Social Provisions Scale (SPS) and the Toronto Alexithymia Scale (TAS-20). Results confirm dampening in the sample, and suggest that the relationship between systolic blood pressure and SPS scores is mediated, at least in part, by alexithymia. We have added a more objective measure of social support utilization (Krause's Social Support Assessment) to the current protocol, believing this scale will provide more accurate social support utilization data.

Poster # 131
Mapping of the Clemson Forest using Digital Field Mapping Techniques
Mentor: Scott Brame, Environmental Engineering & Earth Sciences
Student: Alexandra Lefitz

To expedite the tedious conversion of geologic field data into a geologic map, a ruggedized PDA is being used to digitally map the Clemson Experimental Forest while in the field. This unit combines GIS and GPS capabilities in a compact, handheld device. The software program installed on the unit, ArcPad 10, allows data collected in the field to be immediately inputted into the map. This approach is being used to investigate the basis for a geologic feature called the Clemson Window. In this feature, the Clemson area is the result of erosion of the overlying Six Mile thrust sheet exposing the underlying Walhalla nappe. The supposed evidence for the window is indicated by the transition from a biotite gneiss/mica schist to a hornblende gneiss.

Poster # 132

An Examination of Finding Your Voice: Can We Empower Girls to be Physically Active?

Mentors: Kate Evans, Dr. Denise Anderson, Parks, Recreation and Tourism Management

Students: Chancie Dunn, Dorinda Barnes, Abby Calhoun, Emily Loudermilk, Hannah Brenner, Paige Dockins, Rocky Raybon, Staci Quinn, Courtney Garrett, Katherine Gaulin

Preadolescent females are more overweight today than ever before. A necessary component for preventing this problem is regular physical activity, but many pre-adolescent females participate at rates much below the recommended level. Clemson University's *Finding Your Voice* program is a residential weekend camp aimed at introducing preadolescent females to nontraditional physical activity and career pursuits. The main goal of the camp is to equip females with both the abilities and the self-confidence needed to make healthy choices related to physical activity. This purpose of this study is to examine the impact of the *Finding Your Voice* program on the perceived physical activity self-efficacy and physical activity perceptions of its participants. Participants will complete a self-efficacy measure and participate in focus groups. The quantitative data will be examined to determine any statistically significant changes while the qualitative data will be analyzed to determine significant themes that emerge among the participants.

Poster # 133

A Precedence Relationship Learning Tool for Assembly Line Balancing

Mentor: Dr. Mary Beth Kurz, Industrial Engineering

Students: Joseph Tanner, Kyle Wagner

The team has been working on solving a line balance problem for an automobile manufacturing plant in Upstate, South Carolina. It is difficult to determine the optimum line balance for an assembly structure because precedence relationships are best known by the people who work on the line and those relationships are not documented. The main objective is to develop a program, which utilizes the data supplied by the plant to gather precedence information that will be useful in determining a more efficient line balance. Essentially, the program documents the precedence relationships between individual tasks performed on the line. The program updates the precedence relationship status of each task by looking at the tasks that are moved between different stations.

Poster # 134

Clemson Students create the International Division of Nutrition Education Newsletter for SNEB

Mentors: Dr. Katherine Cason, Andrea Aguilar, Kattia Blanco, Elizabeth Ramirez , Food, Nutrition, and Packaging Science

Students: Bonnie Alexander, Sarah Brady, Heather Britt, Jessie Buckley, Meghan Carney, Abigail Davis, Alyssa Grigg, Devin Hicks, Karli Hogsed, Erin Jones, Paul Landeene, Carolyn Musselwhite, Cassandra Watford, Brianna Williams, Anna Whitworth,

Objective: To involve the Creative Inquiry students in the process of creating the spring and fall 2012 edition of the International Division (DINE) newsletter from SNEB. Design and Participants: SNEB promotes healthier lives

through nutritional education provided by international professionals. Its newsletter shares strategies in nutrition outcomes through different views on key issues and disseminates research findings. Students developed and cooked healthy recipes from around the world. SNEB members shared information about programs in Nutrition Education from different countries and shared their findings. The students edited the issues and collected their information. Participating countries were Argentina, India, Sudan and United States. This summer's issue will include a new section on techniques about easy-to-do physical activities. Results: The Spring and Fall edition of the DINE newsletter. Conclusions: By participating in the newsletter and the recipes, the students developed an awareness of the work done by SNEB. Students acquired better nutritional habits.

Poster # 135

Geologic Mapping by Soil Analysis: Determining the Contact Between Amphibolite and Biotite Gneiss Using Soil Chemistry and pH

Mentor: Scott Brame, Environmental Engineering & Earth Science

Student: Erin Black

Soil chemistry was used to determine the spatial distribution of bedrock at a site in the northern portion of the Clemson Experimental Forest. The goal was to differentiate the contact between an amphibolite (99% hornblende) and the predominant biotite gneiss that surrounds it on three sides. Chemical analysis of the soil samples were conducted by Clemson's Agricultural Services Laboratory (CASL). The concentration of major cations was determined by soil extraction (Mehlich 1), and analysis by Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-AES). Using CASL's results, the soil chemistry was associated with the respective sample locations using GIS. The pH and cation concentrations were interpolated using the Inverse Distance Weighted and Kriging techniques. Magnesium and Calcium concentration positively correlated with the location of the amphibolite outcrops and allowed for the determination of the contact with a good measure of certainty. The laboratory pH results showed a stronger association to the amphibolite outcrops than the field pH test results.

Poster # 136

The Role of Diet in the Expression of Alternative Male Mating Strategies in the Sailfin Molly, *Poecilia latipinna*

Mentor: Dr. Margaret Ptacek, Biological Sciences

Students: Eric Rice, Rachel Hite, Grant Davidson

The insulin-like growth factor (IGF) influences growth rate and development of male secondary sexual characteristics. Diet is known to alter IGF pathway activity in several fish species. The goal of this study is to understand how the IGF pathway affects growth in poeciliid fishes by examining changes in life history traits and allometry of morphological traits in the sailfin molly (*Poecilia latipinna*) in response to different diets. Offspring of known genotypes for male size at maturity were produced, and fed either a control (high protein, low carbohydrate) diet or the experimental (low protein, high carbohydrate) diet. At maturity, morphological traits of offspring were measured. Diet influenced size at maturity and mass growth with experimental-fed males having decreased length and mass growth rate. Experimental-fed males also had weaker allometries for dorsal fin area. Sire genotype was important in length growth rate with males from small sires growing most quickly.

Poster # 137

Mobile Hydraulic Power Pack

Mentors: Dr. Kendall Kirk, School of Agricultural, Forest, and Environmental Sciences

Students: Jackson Rogers, Lawrence Edmunds, Brandon Padgett

The goal of the mobile hydraulic power pack group is to provide hydraulic power in a mobile environment. The mobile hydraulic power pack group consists of Jack Rogers, Brandon Padgett, Bo Edmunds who are all Senior Agriculture Mechanization and Business Majors. The advisor for this project will be Dr. Kendall Kirk and will provide resources, motivation, and support for the group during the project. The hydraulic power pack will be used later to aid in teaching power transfer in the agriculture mechanization hydraulics lab. We will calculate all of the requirements for the project using equations learned in various agriculture mechanization classes. We are hoping that this project will help teach future Clemson students more about hydraulics and power transfer.

Poster # 138

Self-Compassion as a Buffer Against the Stigma Associated with Psychological Problems

Mentors: Dr. Thomas Britt, Psychology

Students: Christine Muchoe, Abigail Lee, Caroline Hill, Melicia Bosnjak, Janelle Cheung, Kristin Jennings

The present study investigated the role of self-compassion in how students (N = 246) would respond to developing symptoms of anxiety and depression. Participants completed an online questionnaire assessing their self-compassion and then came to the lab to read scenarios where they imagined experiencing symptoms of anxiety and depression under low or high levels of stress. The participants then responded to questions assessing how much they would blame themselves for the symptoms, whether they would cope effectively with the symptoms, and whether they would talk with others about their symptoms. The results indicated that participants higher in self-compassion were less likely to blame their symptoms on their bad character, were more confident in their ability to handle the symptoms, and were more likely to indicate they would talk to a family member or romantic partner about their symptoms. Participants higher in self-compassion also reported lower self-stigma at the prospect of seeking mental health treatment.

Poster # 139

Pet Peeves and Happiness: How Do Happy People Complain?

Mentor: Dr. Robin Kowalski, Psychology

Students: Brooke Baker, Julia Turner, Elizabeth Whittaker, Laura Frazee, Justin Stephens, Cara Murphy, Taylor Elsey, Virginia McMillan, Megan Morgan, Alissa Fortune, Charles MacLennan

No studies have examined the relationship between pet peeves and happiness, the purpose of this study. One hundred and thirty undergraduates listed their pet peeves with a relationship partner. Participants rated characteristics of these pet peeves and completed personality measures. Individuals higher in happiness perceived their pet peeves had less of a negative effect on their relationship than individuals lower in happiness, $p < .05$. Happiness was positively correlated with mindfulness ($r = .52$, $p < .001$), complaining propensity ($r = .18$, $p < .05$), and affect

intensity ($r = .24$, $p < .001$), and negative correlated with depression ($r = -.63$, $p < .001$). Happy people may engage in a different type of complaining than nonhappy people. The relationship between happiness and mindfulness suggests that happiness may trigger more instrumental complaining than nonhappiness. In partial support of this, depression and mindfulness were negatively correlated ($r = -.46$, $p < .001$). This project was partially supported by the Creative Inquiry program.

Poster # 140a
Efficiency Analysis and Improvement at Milliken's Pendleton Dye House
Mentors: Dr. Anand Gramopadhye, Reshmi Koikkara, Industrial Engineering
Students: Erin Horgan, Kyle Lassiter, Emily McGrath, Clay Toddy

Working with the Milliken fabric dyeing facility in Pendleton, this capstone design project was charged with creating a system that calculated efficiency for the fabric dyeing process. The fabric dyeing process did not have an accurate measure to calculate efficiency, and thus Milliken was unsure of their dyeing process performance. The objective was to design a tool that is able to take process data already being collected in the dyeing department, and create a variety of efficiency reports for analysis by Milliken's management. After determining customer needs and product specifications, the team developed an Excel based VBA tool that calculated process efficiency across multiple parameters, utilizing a preexisting electronic process data source called QDOCS. Several rounds of usability testing were conducted to improve and refine the tool. The efficiency calculation tool is expected to quantify the dyeing department's performance, and identify causes of efficiency losses.

Poster # 140b
Efficiency Analysis and Improvement at Pendleton Finishing Plant Dye House
Mentors: Dr. Anand Gramopadhye, Reshmi Koikkara, Industrial Engineering
Students: Anne Kayla, Michael Chickene, Chase Rummans, Remy Grossi

In partnership with Milliken & Company, the objective of this capstone design project is to create a system of measure for the efficiency of the dyeing process at Milliken's Finishing Plant in Pendleton, SC. The dye process is currently lacking any measure of efficiency but does record a number of time based machine and operator parameters. The data is then stored in a database making further reference difficult to understand or utilize. In order to create a safe, user friendly and cost-effective measure of efficiency, the team consulted with various Milliken operators and management to determine needs of the system and to identify valuable variables to shape the system around. Following the implementation of an effective system, the team's goal is to use the formulated efficiency measure to discover causes of current delays and make recommendations to improve overall efficiency of the dyeing process and subsequent systems.

Poster # 141

Development of Evaluation Tools for the EFNEP South Carolina Farm-to-Table Cookbook

Mentors: Elizabeth M. Ramirez, Maciel Ugalde, Dr. Katherine L. Cason, Food Nutrition and Packaging Science
Students: Devin A. Hicks, Kathleen R. Sanders, Katherine L. Watcher, Edward C. Jones, Katelyn E. Parker, Katherine P. Worley

The South Carolina Farm-to-Table cookbook aims to provide healthy recipes and nutritional information incorporating locally grown produce while providing opportunities for family engagement. The cookbook contains four sections: agricultural facts, nutrition and food safety, kid-friendly recipes, and educational activities, which provide families with knowledge on how food grown regionally arrives at their plates. The creative inquiry team is currently involved in numerous aspects of the development of the cookbook. One aspect includes sensory and preparation evaluations of recipes. Another aspect is the creation of a sensory evaluation tool for children and a cookbook content evaluation for the parents. The evaluation tools and the cookbook will be pilot tested in Summer 2013. The objective is that through involvement in the cooking process, children will be more apt to making healthier dietary choices.

Poster # 142

Targeting, Solubilizing, and Degrading Biphenyls Using Synthetic Biology

Mentors: Aaron Brown, Dr. Jeremy Tzeng, Dr. Min Cao, Maryam Saffarian, Biological Sciences
Students: Ryan Kane, Matthew Bickford, Whitney Crain, Andreea Nicolaina, Aaron Scanlan, Rachel Louie, Tyler Smith, Jessica Tzeng, Ariel Whatley, Jenny Wilson,

Polychlorinated biphenyls (PCBs) are a major pollutant linked to the causation of cancer, skin problems, and immunological interference. PCBs were previously used mainly as liquid insulators in the manufacture of electrical equipment. The pollutant is a major problem in Twelve-Mile Creek and Lake Hartwell as well as globally. We are using synthetic biology to engineer a small consortium of bacteria with the ability to degrade biphenyls. Our three-pronged approach includes (1) a guider magnetotactic bacterium which gravitates towards the PCB contaminated sediments and sends out a chemoattractant when in contact with biphenyls, (2) a biosurfactant-producing *E. coli* that will reduce surface tension and increase the bioavailability of the PCBs, and (3) *E. coli* overexpressing the catabolic enzymes required for biphenyl degradation. We are attempting to demonstrate a significant increase in the rate of PCB degradation using this combined approach.

Poster # 143

Characterizing Water Content Trends Observed in Local Saprolite Soils

Mentor: Dr. Lawrence Murdoch, Environmental Engineering and Earth Sciences
Student: MollyJane Lyles

The redistribution of rainfall as recharge, interflow or evapotranspiration is a fundamental aspect of the water budget, with important applications to aquifer management and agriculture practices. This study serves to evaluate the feasibility of assessing changes in soil moisture with space and time to estimate rainfall redistribution. We in

stalled four access tubes into saprolite soils at the Bull Test Site in Pendleton, SC. A *PR2 Profile Probe* was inserted into the tubes several times a week at depths down to a thousand millimeters. This data was compared with data from a nearby weather station indicating, regardless of rainfall, water content increases with depth to average 50% at 600mm then decreases at greater depths. The least amount of water is found in the upper 100mm of soil, and showed more dependency on the air temperature and precipitation. Surface soils are more susceptible to conditions encouraging evapotranspiration, while the water infiltrating deeper accumulates 600mm down, experiencing longer resonance time.

Poster # 144
Qualitative Analyses of Why Soldiers Do Not Seek Treatment and Why They Drop Out of Treatment
Mentor: Dr. Thomas Britt, Psychology
Student: Melicia Bosnjak

The present study examined why soldiers do not seek mental health treatment and why they drop out of treatment once sought. Surveys were administered to 1,725 soldiers. Soldiers who reported a problem but had not sought treatment provided open-ended responses to why they had not sought treatment (N=269), and soldiers who had sought treatment but dropped out provided responses to why they stopped going to treatment (N=110). Four coders categorized the open-ended responses, and a fifth individual was asked to resolve the disagreements. Preliminary results showed the primary reasons for not seeking treatment were soldiers thinking they could handle the problem themselves and a high workload, and the primary reasons for dropping out of treatments were that treatment was not working and was interfering with work duties. These results suggest interventions are needed to make sure soldiers seek needed treatment and that they remain in treatment until problems are resolved.

Poster # 145
Using soil pH and Ca/Mg Hardness to Map Bedrock in the Clemson Experimental Forest
Mentor: Scott Brame, Environmental Engineering & Earth Science
Student: Peter Wylie

Developing a geologic framework of the Clemson Forest has been hampered by inconsistency in outcrop density and by a lack of readily identifiable patterns in the geologic formations. An investigation was undertaken to investigate the practicality of relating the bedrock geology to their weathering products. Soils were collected from different parts of the Forest immediately adjacent to outcrops that represent the common rock types found in the Forest and analyzed for their major chemical components in order to distinguish between soils derived from the dominant rock types: biotite gneiss and amphibolite (hornblende gneiss). The soil samples were initially analyzed in the field using field pH and hardness test kits. These samples were analyzed for their chemical composition using two different methods: the first method utilized the soil testing service provided by the Clemson Agricultural Services Lab as a check on the second method which utilizes an off-the-shelf soil hardness test.
biofilm community members that have prevented colonization.

Poster # 146
Clemson Racing: Driven Tigers Finish First
Mentor: Dr. Mary Anne Raymond, Amanda Fine, Marketing
Students: Katie Steed, Tom Delaney, Matt Fetty

Nine marketing students at Clemson University have partnered with a NASCAR Nationwide racing team to handle sponsorship for a Clemson-branded racecar. The Creative Inquiry team is developing marketing plans for the team's No. 01 Chevrolet driven by Mike Wallace. The goal is to cultivate potential sponsorship donors, develop proposals, meet potential customers, close deals, and activate the brand of Clemson University and the Nationwide team by using strategic methods taught by the Clemson Marketing Department. The students are currently working to co-brand a racecar with the United Service Organization and Clemson University for Mike to drive in his 2013 season. Since NASCAR is the nation's largest outlet for promoting brand awareness, this is a unique and valuable opportunity for organizations to pursue.

Poster # 147
The Effect of Mineral on Dental Cell Differentiation
Mentors: Dr. Delphine Dean, Bioengineering, Dr. Marian Kennedy, Materials Science & Engineering
Students: Amanda Farley, Kevin Shores

With the progression of regenerative medicine, bio-fillers are becoming a very viable option in the treatment of dental caries and the repair of cranio-facial injuries. Many previous studies have focused on the use of bone marrow stem cells (BMSCs) with micro-Hydroxyapatite (HA) particles. However, there have been mixed reports on these particles having positive or negative effects on cells. This work delves into the effects of micro-HA on BMSCs, 7F2 osteoblasts, and dental pulp stem cells (DPSCs) as well as the effects of micro-Fluorapatite (FA) on these cells. ALP and BCA assays were run for 14 days on to determine ALP specific activity and protein content. Antibody stains and confocal imaging were done for collagen I and osteocalcin. Control cells produced more protein, osteocalcin, and collagen I, and had higher levels of ALP specific activity with the exception of a few spikes in each for cells cultured with microparticles.

Poster # 148
Who says Intermediacy is a Bad Thing? Influences of Community Factors on Coral Diversity in the Florida Keys
Mentor: Dr. Michael Childress, Biological Sciences
Students: Kelsey McClellan, Brandt Quirk-Royal

The patch reefs of the Florida Keys contain a diversity of coral species, which provide a foundation for a community of organisms. The intermediate disturbance hypothesis is an ecological model that suggests intermediate levels of disturbance allow for high species diversity. Based on this hypothesis, we examined if coral species diversity was related to various community factors on 14 patch reefs throughout the Florida Keys National Marine Sanctuary. Survey data of the reef was used to evaluate the complexity and species composition. We found coral species diver

sity was unrelated to depth or topographic complexity. Coral species diversity was negatively related to macroalgal cover. Additionally, coral species diversity was highest for intermediate levels of parrotfish abundance and parrotfish species diversity. These results suggest that parrotfish may play an important role in coral ecosystems. This project was partially supported by the Creative Inquiry program.

Poster # 149
Clemson Engineers for Developing Countries
Mentor: Dr. Jennifer Ogle, Civil Engineering
Student: Michael George

Clemson Engineers for Developing Countries (CEDC) is a Creative Inquiry group that has been working for the past 3 years to design and install water systems for the Central Plateau of Haiti. Our largest project thus far was a water treatment and distribution system in Cange, Haiti, that was dedicated in June. We currently staff multiple student interns in Haiti full-time to oversee construction, assess new villages, and coordinate with locals. Our organization functions very similarly to a traditional business with our engineers working with industry and faculty advisors to complete designs and oversee construction in Haiti. The organization also works to improve the economy of Haiti to aid in business development and allow the country to produce its own building materials. CEDC's ultimate goal is improvement of public health in the Central Plateau of Haiti.

Poster # 150
Biohydrogen Production From Waste Peaches on a Pilot Plant Scale
Mentor: Dr. Caye Drapcho, Environmental Engineering & Earth Sciences
Students: Kyle R. Mihaljevic, Taylor W. Wade, and Cynthia L. Westmoreland

Currently, there is a large demand for alternative fuel sources to replace dependency on fossil fuels. While fossil fuels are more efficient, they are limited in their supply and produce harmful emissions. Alternatives such as biohydrogen are being taken into consideration as a cleaner, renewable substitute. The overall purpose of our design is to produce biohydrogen on a pilot plant scale by using waste fruits as the food source for bacteria in its hydrogen production. For this particular project, waste peaches are to be used. Every year, tons of peaches are thrown away, either from over production or because there is no use for the flesh of the fruit. With the implementation of a biohydrogen pilot plant, these waste peaches could be put to use in the production of biohydrogen instead of being left to rot in the orchards.

Poster # 151
The Use of Marijuana and Abuse of Prescription Drugs at Clemson University
Mentors: Dr. Elaine Richardson, Academic Success Center, Dr. Hugh Spitler, Public Health Sciences
Students: Jacqueline Fontana, John Garstka , Alec Wasner, Lauren Chapman, Sarah McCown, Jordan Hyrne

Use of marijuana and abuse of prescription drugs have significantly increased over the past few years on college campuses. This project is investigating use and perceptions of marijuana and other drugs among college students.

Preliminary observations from focus groups revealed that while acceptable, marijuana is a problem on our campus. According to drug arrest reports (CUPD), total arrests have increased and the majority has been marijuana-related; students arrested for possession with intent to distribute increased. Data related to prescription drug use for ADHD treatment (Student Disability Services) indicate that total percentage of students with ADHD registered at Clemson is 1.5%. However, national data and preliminary university data indicate that prevalence and accessibility of prescription drugs is significant. Qualitative and quantitative data will be collected from Clemson students and compare to other sources. Results will be used to increase awareness of laws and policies pertaining to marijuana and prescription medicines.

Poster # 152a
Optimization of the Cable Prep Station
Mentors: Melissa Dorlette Paul, Dr. Anand Gramopadhye, Industrial Engineering
Students: David Alrutz, Scott Chaney, Wade Holder, Leah Tuten

Schneider Electric, a world leader in energy management, operates a Motor Control Center (MCC) manufacturing facility in Seneca, SC. In partnership with Schneider Electric, this capstone design project focused on the area of the manufacturing setting known as the cable prep station. The cable prep station supplies properly sized, bent, and prepped cables for use in the Seneca plant as well as in other Schneider facilities. The objective of this project was to increase the productivity of this process by 25% and to reduce the ergonomic strain on the operator in 5 identified areas (RULA score of no more than 4). After determining customer needs and product specifications, along with the identification of system losses and subsequent root cause analysis, the team developed and tested solutions to increase productivity and reduce ergonomic strain within the cable prep station.

Poster # 152b
Optimizing Processes for Schneider Electric Cable Preparation Station
Mentors: Melissa Dorlette Paul, Dr. Anand Gramopadhye, Industrial Engineering
Students: Stephanie Brown, William Hewston, Kyle Mish, Austin Nettles

In partnership with Schneider Electric's Seneca facility, this capstone project focused on two main objectives: reducing the ergonomic strains within the cable preparation process and improving process productivity by 25%. The initial project investigation used Rapid Upper Limb Assessment (RULA) to analyze areas of ergonomic concern for the operator and the results from this assessment indicated a need to address these ergonomic issues. The initial investigation also found opportunities for process improvement in terms of productivity. The design team generated numerous solution concepts, combined and refined these concepts, and used a rating system to determine the best concept solution. As a result, this final solution achieved the project objectives.

Poster # 153

Optimizing the Energy Consumption of South Carolina's Houses

Mentors: Dr. Don Beasley, Mechanical Engineering, Dr. Vincent Blouin, Ulrike Heine, David Nocella, School of Architecture, Nigel Kaye, Civil Engineering, Rajendra Singh, Electrical & Computer Engineering

Students: Emily Burns, Amlan Pattnayak, Kevin Santos, Cody Whitelock, Vaughn Hayduk, Freddy DeAngelis

Optimizing the energy consumption of houses is a constant endeavor for owners, designers, builders, and society at large. This Creative Inquiry project involves multidisciplinary teams of undergraduate and graduate students from Architecture, Civil, Electrical and Mechanical Engineering and focuses on developing and testing design solutions for improving energy consumption of South Carolina's residential buildings. Research is conducted on three fronts: (1) Cost considerations of solar PV for every home in South Carolina: Researchers analyzed solar power and five other energy sources and evaluated their impacts on water, climate change, air pollution, cost, subsidies and tax incentives. PV shows to be the best alternative; (2) Retrofitting solutions for existing low cost mobile homes in order to reduce the utility bills of most mobile homes, which are up to three times that of other homes; and (3) Preliminary designs of a solar house for Clemson's participation in the 2015 Solar Decathlon competition. This project was partially supported by the South Carolina Clean Energy Business Alliance (SCCEBA).

Poster # 154

***Artfields* Economic Impact Analysis**

Mentors: Dr. Stephanie Southworth, Sociology and Anthropology

Students: Lauren Dilleshaw

Artfields is a unique art competition and festival occurring in Lake City, SC in April of 2013. Its intent is to draw in artists and tourists from all over the Southeastern states, boosting revenue for the historic Lake City. The ten-day festival will include an art competition judged by a panel, as well as other activities such as dancing, music, and foods. Our project's purpose is to determine the economic impact of *Artfields* on the Lake City community. Our Creative Inquiry team has taken the necessary steps to being conducting an economic analysis of the festival. After research and the creation of surveys, our team will travel to Lake City, SC in April to interview attendees and administer the survey in order to attain the necessary information to generate our analysis report. After the collection of data, our team will analyze and produce a report of our findings.

Poster # 155

An Alternative Method to Measuring Water Loss in Cotton Plants

Mentor: Dr. Young Han, School of Agricultural, Forest, and Environmental Sciences

Students: Sam Adkinson, Heyward Bonner, Tom DuRant, Matt Shultz

The objective of this Capstone project is to develop, design and construct a counterweight method for measuring water loss in potted cotton plants. This will be done by using the fulcrum and lever principle applied through a counterweight point to offset the weight of the potted cotton plant. A load cell will record the weight change of the plant using the change of voltage applied to it. The design of this project is a novel idea and the entire design

process has been iterative. The system will consist of the pot sitting on a steel frame with a counterweight on the other end. This frame will be welded to two bearings connected by a steel rod. The load cell will be placed underneath the cotton plant. The goal of this project is to achieve an extremely high level of accuracy along with designing the system as economically as possible.

Poster # 156

The Fecundity, Behavior, and Dispersal of *Bellamya japonica*, a New Invasive Species in the Savannah River Basin

Mentor: Dr. John J. Hains, Biological Sciences

Students: Joseph R. Catoe, Mark A. Chestnut, Joseph A. Farmer, Amy A. Justice, Hristos Stamatopoulos, Colleen M. Milsted, Evan R. Meadows

Since the discovery of *Bellamya japonica* as a new invasive species to the Savannah River Basin in 2006, the dispersal and ecological characteristics of this exotic species have largely been unknown. Aside from impacts to the HVAC systems for Clemson University, the effects of this new invasive species are still under investigation. Our studies have shown negative phototaxis, indifference with respect to geotaxis, and now include experiments regarding fecundity, dispersal in a controlled environment, and potential substrate preferences. Using individual tags and an experimental pond segmented into observation regions, we will follow hundreds of individual snails, their locations, their individual growth, and individual reproduction over their entire lives. This is the first comprehensive study of its kind for a new invasive species in a newly invaded habitat.

Poster # 157

Conjugated Nanoparticles for Treatment of Resistant Bacteria

Mentor: Dr. Tamara McNealy, Biological Sciences

Student: Olivia Keane

Through horizontal gene transfer, nonspecific resistance mechanisms, and erroneous practices in the use of antibiotics, antibiotic resistance has spread and become a constant problem for researchers who must develop new antibiotics against resistant bacteria. Gold nanoparticles (AuNPs) are particles <100nm in size that can be stabilized by adding small amounts of sodium citrate. Nanoparticles of various types are used in multiple biomedical arenas. Our goal is to determine whether antibiotics such as neomycin can be conjugated with AuNPs to overcome bacterial resistance mechanisms. We hypothesize that membrane permeabilization due to AuNP interaction will allow uptake and increased efficiency of antimicrobials. The fluorescent dye, N-phenyl-1-naphtylamine (NPN), will be used to analyze membrane permeability after nanoparticles exposure. NPN fluoresces upon integration with hydrophobic membranes therefore, indicating permeabilization and uptake into the bacteria. Development of this assay and analysis of AuNP potential to permeabilize membranes will lead to novel technologies in antibiotic use and development.

Poster # 158

Barriers and Facilitators as Predictors of Soldier Attitudes towards Mental Health Treatment

Mentor: Dr. Thomas Britt, Psychology

Students: Caroline Hill, Melicia Bosnjak, Christine Muchoe, Janelle Cheung, Kristen Jennings

Military personnel frequently have negative attitudes toward seeking mental health treatment when they are having psychological problems. The present study examined how perceived barriers and facilitators of treatment seeking were related to attitudes toward seeking mental health treatment among 1,725 Infantry soldiers. Barriers to treatment seeking (e.g. stigma of being seen as weak, lack of time off for treatment) were associated with more negative attitudes, whereas facilitators (e.g. supportive leadership, seeing treatment as a sign of courage) were associated with more positive attitudes. Furthermore, although barriers and facilitators both accounted for unique variance in the prediction of overall attitudes, barriers were more strongly predictive. These results are consistent with the Theory of Planned Behavior (Azjen, 1991), suggesting that both positive and negative beliefs about a behavior are related to the overall attitude towards that behavior. The results support both removing barriers and increasing facilitators towards soldiers receiving mental health treatment.

Poster # 159

Sensors for Resource-Poor Settings

Mentors: Dr. Delphine Dean, Dr. John DesJardins, Bioengineering

Students: Kayla Gainey, Tyler Ovington, Alex Devon, Hilliary Adams, Jordan Hall, Rebekah Adams, Matthew Kofoed, Tyler Youngman, Colin Burns-Hefner

Our goal is to develop healthcare solutions that can be implemented in developing countries to reduce their dependence on donations. We have focused on several devices: a monitor for premature babies, a glucometer for treatment of diabetes, a bacterial sensor for infection diagnoses, and a blood loss monitor for mothers in labor. Our designs minimize the use of consumables and provide better detection and/or treatment than currently available in-country. The baby monitor detects skin temperature and controls an electric warming blanket. The glucometer uses test strips that can be printed with a standard inkjet printer to allow clinics to print the strips themselves rather than depend on donations. The bacterial sensor quickly detects the bacteria in a sample without the need for lengthy culture times. The blood loss monitor helps predict hemorrhaging earlier to give the physician adequate time to administer a blood transfusion during labor.

Poster # 160

Design and Construction of Erosion Prevention and Sediment Control Onsite Research Lab

Mentors: Dr. Charles Privette, Dr. Calvin Sawyer, Agricultural, Forest and Environmental Science

Students: Christian Spinosa, Jim Williams, Taylor Culler, Corey Boyter

The design and construction of the erosion prevention and sediment control onsite research lab will be an essential part of the research being conducted on the Lamaster Dairy Farm. As researchers are using the siphon spillway an onsite lab will provide an environment to conduct research in an efficient and economical way, while also

providing a secure storage location for equipment and instrumentation that is being used on the siphon spillway. The total estimated cost of this project is $2787.69.

Poster # 161
Throughput Optimization of Non-woven Product
Mentors: Dr. Anand Gramopadhye, Reshmi Koikkara, Industrial Engineering
Students: Corey Walker, Katherine Wallace, Austin Riggs, Foster Davis

This capstone design project focused on optimizing the throughput of non-woven fabric at the Milliken Enterprise Finishing plant. Through the use of many on-site visits, customer interviews and root cause analysis; the team was able to identify the areas of the process in need of improvement. Several possible concepts were developed and implemented in an ARENA model. The concepts were compared through the use of a process analyzer. The team was then able to determine the optimal solution for the system that also stayed within the given budget. By implementing the new system model, the Milliken Enterprise plant will be able to handle an increase in customer demand, which it expects to occur within the next year.

Poster # 161
Throughput Optimization of Non-woven Product
Mentors: Dr. Anand Gramopadhye, Reshmi Koikkara, Industrial Engineering
Students: William Duncan, Christopher Jones, Tamara Smith, Kyle Wagner

The goal for this project with Milliken & Company is to optimize the throughput, storage, flow, and distribution of non-woven products from Milliken to all customers. One of the problems faced with the non-woven product is that it is much thicker than other fabrics processed in the plant. The project will account for current volume and routings of material in addition to future volume growth and complexity to account for maximum volume. All processing steps at Enterprise are being evaluated, including goods to be received and goods shipped. The group is using a variety of Industrial Engineering tools to optimize the layout and storage needs of the Enterprise Milliken Plant with a focus on maximizing cost avoidance and minimizing the time of non-woven product in the system. The team determined system losses using why-why analysis, pareto analysis, and time studies. Concept generation will lead to marginally acceptable, feasible, and optimal solutions.

Poster # 162
The Effect of Coyote Scent on Foraging Behavior of Mammalian Species Native to the Southeastern U.S.
Mentors: Cady Etheredge, Dr. Greg Yarrow, School of Agricultural, Forest, and Environmental Sciences
Student: Jenna Kohles

Coyotes have assumed the role of novel predator in the southeastern United States and their impact on native fauna is unknown. As a large-bodied predator in an ecosystem presently lacking an apex predator, coyotes have the potential to alter the behavior of a diverse number of mammalian prey species. If targeted species feel threatened by coyote presence, they may adjust foraging behavior to reduce risk of predation. This study was conducted to

determine the effects of coyotes on antipredator behavior of herbivorous and mesopredacious mammalian species native to South Carolina's piedmont. Nocturnal attendance of mammals at established supplemental food sites was recorded using camera traps at locations treated with scent extracted from coyote feces. Foraging behavior was analyzed via assessment of photo data and food consumption was visually estimated. In presence of coyote scent, foraging behavior should favor increasing levels of vigilance while duration of stay at food sites and amount of food

Poster # 163
International Health and Hispanic Culture
Mentors: Dr. Graciela Tissera, Arelis Moore, Languages
Students: Madison Bailey, Erika Burton, Mahvash Husain, Grace Stonecypher, Emily Winburn

This research project focuses on the interrelations between health and culture in the Hispanic countries and their impact on individuals and communities. The research will explore medical diseases and conditions, people's traditions and concerns related to health issues, home remedies, behavior change, family and community, doctor-patient relationship, and social aspects of public health (ethnicity, gender, poverty). Students will travel to the Dominican Republic with the researchers and participate in health-related service learning activities to help Hispanic communities and collect data for their research project. This project was partially supported by the Creative Inquiry program.

Poster # 164 Outside Ballroom
Clemson University Retrieval of Explants Program and Registry in Orthopaedics (CU-REPRO)
Mentors: Dr. John DesJardins, Dr. Melinda Harman, Bioengineering
Students: Ryan Quinn, Kathy Parker, Alison Lamb, Chrissie Stamer, Liz Russo, Rachel Binnicker, Mishka Wisniewska, Anjali Bergren, Garrett Hall, AJ Zandecki

Total joint replacement devices have been successfully used for over 50 years to relieve pain, correct deformity, and improve the quality of life for millions of patients. Unfortunately, a small percentage of these devices fail each year due to materials fracture, infection, loosening, or osteolysis. Causes of implant failure can be assessed using implant retrieval collections to examine trends in the failure of these devices. The Retrieval of Explants Program and Registry in Orthopaedics (CU-REPRO) was started in 2008 to create our own collection and to educate students on current Orthopaedic problems. This program works with 10+ hospitals in the state of South Carolina to collect, process, and store explanted implants for educational and scientific studies. To date, over 300 implants have been collected and documented. The success of the program is predicated ultimately by developing relationships within the South Carolina medical research community and the continual education of students. This project was partially supported by the Creative Inquiry program.

Poster # 165 Outside Ballroom
Creative Inquiry in Marketing
Mentor: James Gaubert, Marketing
Students: CI Project #406

Clemson University marketing and graphic communication students have worked since September on a competitive national case competition. Students undertake a specific campaign by forming and operating as an advertising agency. This year's case was sponsored by Glidden Paint and the American Advertising Federation with focus on marketing to Walmart consumers. The CI team began with secondary research on Glidden, Walmart, the paint industry, and three specific segments the sponsor wanted to target. This evolved into primary research collection, providing insights and a foundation for the creative strategy and supportive elements. Over 2000 primary research sources were consulted, utilizing interviews, focus groups, and surveys. After much brainstorming, data analysis and discussion, the campaign, with the tagline: "Glidden Quality. Walmart Value. Your Perfect Match." was created. The campaign centered on implementing a variety of solutions. The three primary areas developed were events, shopper pathways, and an enhanced service experience. Each element within these solution areas was developed, refined, and detailed in teh plan book of the campaign. A media plan and campaign schedule with budget were also assembled. District competition where the campaign will be presented is to be held in mid-April in Raleigh, North Carolina.

Supplemental Abstracts for Poster #15

Soil Inventory of a Forest Land in Georgetown, SC
Mentors: Dr. Elena Mikhailova, Dr. Christopher Post, School of Agricultural, Forest, and Environmental Sciences, Dr. Julia Sharp, Mathematical Sciences
Student: Patrick Blakely

The objective of this project was to conduct a soil analysis of a residential property in Georgetown, SC using Web Soil Survey to determine the suitability of the property for growing Loblolly pine (Pinus taeda). Soil samples were collected and analyzed for soil chemical properties and major nutrients in the Clemson University Agricultural Services Laboratory. The samples were taken from areas of the property that have not been farmed in the past. Three soil series dominate the land: Yauhannah, Johnston, and Wakulla. From the study of these soil samples I determined that a majority of the land would be suitable for the planting of Loblolly pine. This project was partially supported by the Creative Inquiry program.

Soil Inventory of Burnt Oak Plantation, GA
Mentor: Dr. Elena Mikhailova, School of Agricultural, Forest, and Environmental Sciences
Students: Judson Belding

The objectives of this project were to conduct soil inventory of a recreational property in Warrenton, GA using Web Soil Survey. Soil samples were collected and analyzed for soil chemical properties and major nutrients in the Clemson University Agricultural Services Laboratory for front and backyard of the property. Three soil series dominate the land: Appling, Grover, and Madison. All soils belong to the soil order of Ultisols. The majority of land is prime farmland or farmland of statewide importance. Soil nutrient analyses indicated necessary fertilizer and lime additions to food plots. This study was supported by the Clemson University Creative Inquiry Program.

Soil Inventory of a Farm in Bishopville, SC
Mentor: Dr. Elena Mikhailova, School of Agricultural, Forest, and Environmental Sciences
Student: Joshua Caughman

The objectives of this project were to conduct soil inventory of a farm in Bishopville, SC using Web Soil Survey. Soil samples were collected and analyzed for soil chemical properties and major nutrients in the Clemson University Agricultural Services Laboratory for pasture. Five soil series dominate the land: Norfolk, Ailey-Barnwell complex, Barnwell, Goldsboro, and Johnston muck, all of which belong to the order of Ultisols except for Johnston muck (Inceptisols). Most of the land is prime farmland or farmland of statewide importance. Soil nutrient analyses indicated that both of the soil's nutrients contained the essential elements needed for plant life, but levels may need to be adjusted based on the crops planted. This study was supported by the Clemson University Creative Inquiry Program.

Suitability of Pear Trees and Blackberries on a Residential Property in York, SC
Mentor: Dr. Elena Mikhailova, School of Agricultural, Forest, and Environmental Sciences
Student: Thomas Dunlap

The objectives of this project were to conduct soil inventory of a residential property in York, SC using Web Soil Survey. Soil samples were collected and analyzed for soil chemical properties and major nutrients in the in the Clemson University Agricultural Services Laboratory for front and backyard of the property. The land was dominated by the Cecil soil series, which belongs to the order of Ultisols. All land is prime farmland or farmland of statewide importance. All soils on the property have a site index of 84 feet for loblolly pine (Pinus taeda). Soil nutrient analyses indicated that all of the soil nutrients were in medium to sufficient quantities, except for phosphorus (P), which appears in low concentrations in the both yards and calcium (Ca), which appears in low concentrations in the front yard. This study was supported by the Clemson University Creative Inquiry Program.

Soil Inventory of Sarif Plantation, NC
Mentor: Dr. Elena Mikhailova, School of Agricultural, Forest, and Environmental Sciences
Students: Grayson Sarif

The objectives of this project were to conduct soil inventory of a residential property in Albemarle, NC using Web

Soil Survey. Soil samples were collected and analyzed for soil chemical properties and major nutrients in the in the Clemson University Agricultural Services Laboratory from multiple areas of the property. Three soil series dominate the land: Goldston, Oakboro, and Badin, all of which belong to the order of Ultisols. All land is not prime farmland, but some portions of the land show moderate yield with non-irrigated crops. Also, some areas of the land are better suited to sustain seedlings that were other areas. Soil nutrient analyses indicated that all of the soil nutrients were in medium to sufficient quantities, except for Phosphorus (P) and Potassium (K), which appears in low concentrations in pasture 1 and field 3. This study was supported by the Clemson University Creative Inquiry Program.

Soil Inventory of Ekom Beach Farm, SC
Mentor: Dr. Elena Mikhailova, School of Agricultural, Forest, and Environmental Sciences
Students: Forest Lathrop

The objectives of this project were to conduct soil inventory of a residential property in Ware Shoals, SC using Web Soil Survey. Soil samples were collected and analyzed for soil chemical properties and major nutrients in the in the Clemson University Agricultural Services Laboratory for three different locations of the property. Two soil series dominate the land: Madison and Pacolet, and Cataula both of which belong to the order of Kanhapludults. Most of the land is not considered to be prime farm land and very little parts of the land are considered to be prime farm land or of statewide importance. All soils on the property have a site index of 90 feet for loblolly pine. (Pinus taeda). Soil nutrient analyses indicated that all of the soil nutrients were in medium to sufficient quantities, except for manganese (Mn), which appears in low concentrations in the back yard. This study was supported by the Clemson University Creative Inquiry Program.

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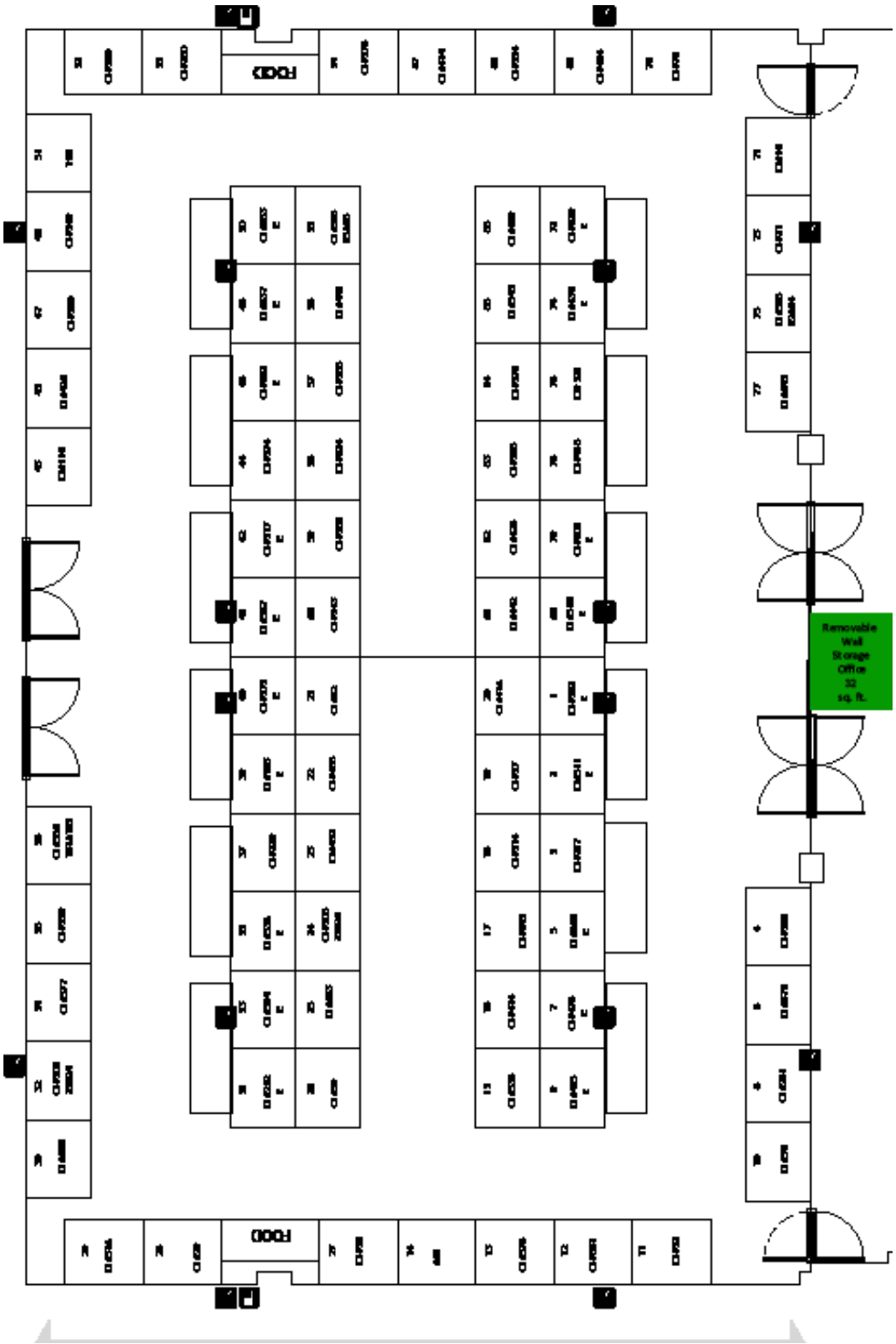

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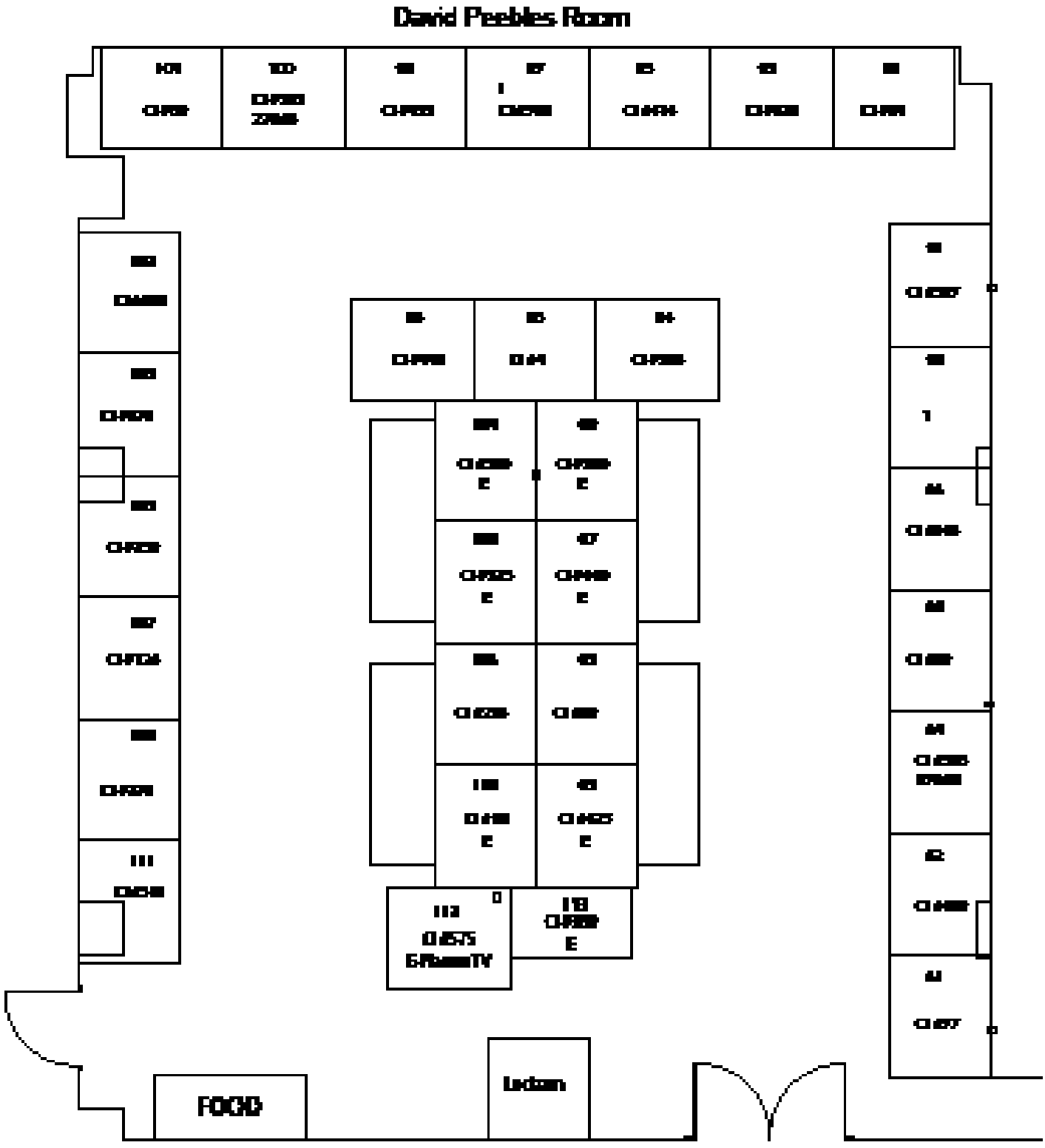
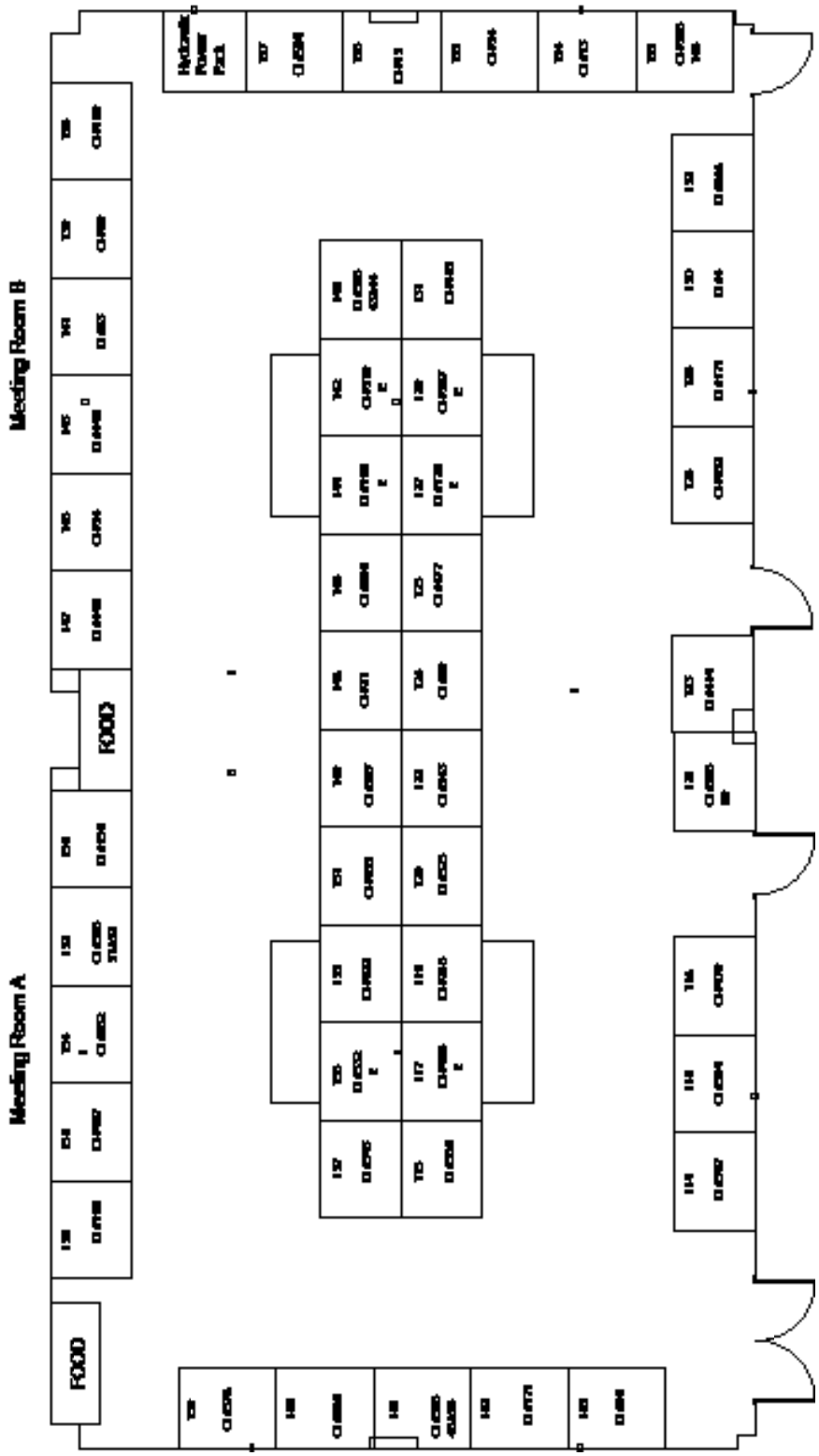


Map - Meeting Room



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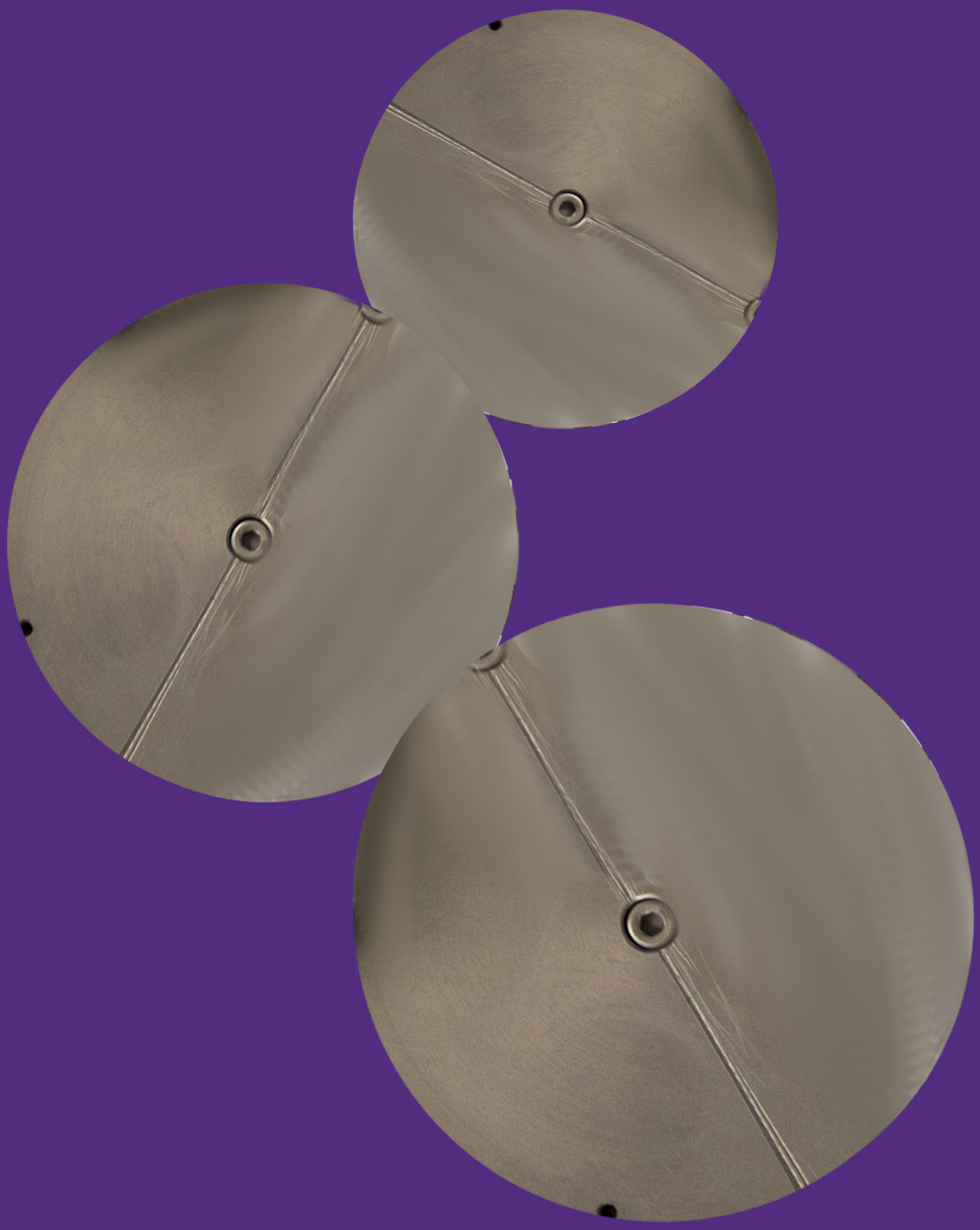

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