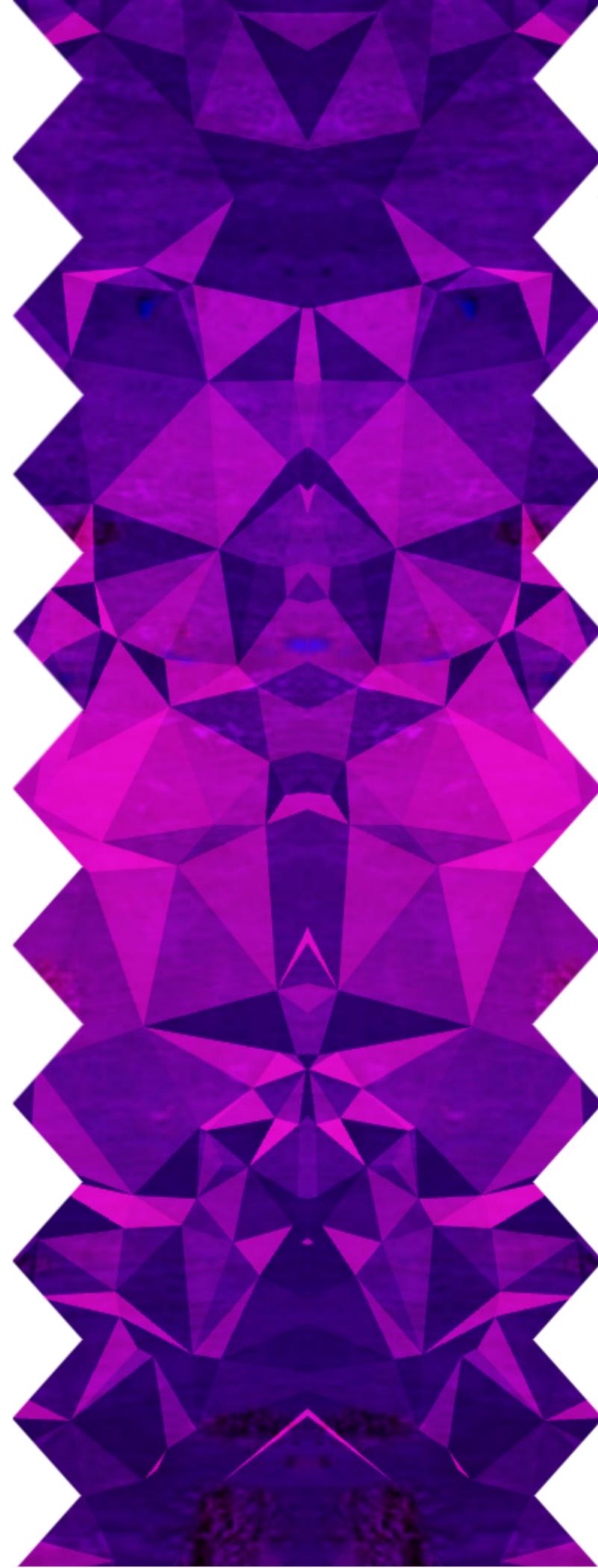


**research &
discovery
for
a
better
tomorrow**



CLEMSON GRADS

Graduate Research And Discovery Symposium

**Tuesday April, 7th 2015
Hendrix Student Center
Clemson University**

**Poster Session
1:00 - 4:00 PM**

**Awards Ceremony &
Reception
4:30 PM - 6:00 PM**

"Alone we can do so little,
together we can do so much."

-Helen Keller

Our Deepest Gratitude to the Following:

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*"If I have seen further than others,
it is by standing upon the shoulders of giants"*

- Sir Isaac Newton

Welcome to the 3rd annual Graduate Research and Discovery Symposium (GRADS)! This year's event will showcase the research of over 100 graduate students from each of the colleges in Clemson's Graduate School. GRADS serves as an opportunity for Clemson's graduate students to exhibit their work, but also provides an opportunity for our graduate community to learn about what their peers are researching, creating, and producing! The GRADS Event Committee would like to thank all of the sponsors for this year's event, as well as those who have generously donated their time, effort, and resources toward funding and publicity. We would also like to express our sincerest gratitude for our judges and, most importantly, we would like to thank our graduate presenters for their hard work and dedication toward sharing their research and studies! We hope you enjoy the presentations! Please feel free to stick around for the GRADS/Three Minute Thesis (3MT) awards ceremony and social immediately following the poster forum!

#GRADSforabettertommorrow

- The GRADS Team

First Half Presenters (1:00 pm to 2:30 pm)

Posters 1 through 40 (in Ballrooms A & B)

(Poster numbers have been mentioned beside presenters' names)

College of Agriculture, Forestry and Life Sciences

Food Technology

Evaluating the Nutritional Risk of Older Adults Participating in the South Carolina Older Americans Act

Maciel Ugalde, M.S; Katherine L. Cason, PhD, RD, LD; Cheryl Dye, PhD; Vivian Haley-Zitlin, PhD, RD
Presented by Maciel Ugalde (#17)

Older Americans Act (OAA) services are designed to help older adults maintain maximum independence in their homes and communities and to promote a continuum of care for the vulnerable elderly. Monitoring nutrition status of Area Agencies on Aging clients will help identify those at high nutritional risk for poor health outcomes and the factors contributing to that risk. This assessment will inform the development of strategies to enhance delivery of food and nutrition services to those with the greatest need. The purpose of this study is to determine population "hot spots" of high nutritional risk and their association with demographic indicators by analyzing data collected at senior centers using the South Carolina Lieutenant Governor's Office on Aging Assessment/reassessment instrument. Preliminary results show that older adults receiving services from Area Agencies on Aging in the South Carolina's I-95 Corridor Region have the higher nutrition risk scores. This research could be used to engage and solicit active participation of various key players in the state to improve nutritional status of older adults. Results could also be helpful in seeking to ensure adequacy of economic resources and minimize the risk of financial setbacks.

Microbiology

Characterizing the Novel GIG Operon in Legionella pneumophila

Katie Jwanowski, Christina Wells, Tamara McNealy
Presented by Katie Jwanowski (#6)

Legionella pneumophila, the number one cause of waterborne outbreaks in the US, contaminates man-made water systems increasing exposure risk for Legionnaire's Disease. Copper/silver ionization is one common method for managing L.pneumophila in water systems, but bacterial response mechanisms to neither metal is well described in Legionella. We identified an operon, lpg2105-2108, demonstrating homology to known gold/copper response genes in Cupriavidus metallidurans. Using a GFP reporter gene system, we measured transcriptional activity of the lpg2105-2108 operon in L.pneumophila strain Lp02 in response to 20µM or 50µM of HAuCl₄ or CuSO₄ in planktonic and biofilm cultures. Bioinformatic tools were used to assess the prevalence of the operon in sequenced bacteria and to known as well as uncharacterized Legionella species. A basal level expression was evident in all cultures, but a significant increase in expression was

observed in response to gold and copper addition. Bioinformatic analysis revealed the presence of homologs to the GIG operon in 100+ different species of bacteria. We hypothesize that the *Legionella pneumophila* gold induced genes(GIG) could play a role in bacterial persistence in man-made aquatic systems. Understanding the mechanism of bacterial response to gold/copper could lead to new targets for disinfection and prevention of *Legionella* in water systems.

Reversal Effects of Probiotic Supplementation on a High Glucose Diet in *Caenorhabditis elegans* Model

Miranda Klees, Yuqing Dong, Min Cao
Presented by Miranda Klees (#31)

The “Western Diet” refers to a diet rich in refined sugars. With an increasing glycemic index observed in Western society, it comes to no surprise that obesity, diabetes, and heart disease are on the rise. Shortened lifespan and increased susceptibility to pathogens are associated with these diseases and linked to increased consumption of foods high in sugar. Therefore, the benefits probiotics have on restoration of shortened lifespan induced by a high glucose diet, and the benefits of probiotics supplementation in combination of cranberry extracts in the model system *Caenorhabditis elegans* were investigated. By targeting the homologous pathways with humans, *C. elegans* provides an economical model system with application in humans. Here, we investigated the effects probiotics have on high glucose diet in *C. elegans*. Consistent with previous studies, when *C. elegans* was supplemented with each probiotic strain, lifespan was extended. Interestingly, the reversal of glucose induced shortened lifespan and the extension of lifespan in combination with cranberry extracts was strain dependent. The impact that probiotics have on the reversal of detrimental effects associated with a high glucose diet, including protection against known pathogens and pathway targets, is under investigation.

Plant and Environmental Sciences

Fitness and Competitive Ability of *Alternaria alternata* Field Isolates with Resistance to SDHI Fungicides and resistance to QoI and MBC fungicides

Zhen Fan, Guido Schnabel
Presented by Zhen Fan (#2)

Alternaria rot, caused by *Alternaria alternata*, was observed in well managed, commercial peach orchards in South Carolina. In total, 64 isolates were collected in 2012 and 2013 from symptomatic fruit of problem orchards. Most isolates were resistant to boscalid, pyraclostrobin, and thiophanate-methyl. Resistance to SDHIs was due to point mutations in the SDH subunits, resistance to pyraclostrobin was due to the G143A mutation in the *cytb* gene, and resistance to thiophanate-methyl was due to 167Y in the β -tubulin gene. The four most commonly found genotypes based on mutations in the SDH subunits (H277Y in SDHB, H134R in SDHC, D123E in SDHD) were selected for fitness evaluations. Genotypes H277Y and H134R didn't suffer fitness penalties based on mycelia growth on PDA, spore production in vitro, osmotic sensitivity, oxidative sensitivity, germination ability, and ability to cause disease. Hypersensitivity to oxidative stress and weak sporulation capacity was only observed in genotype D123E. No competitive advantage was detected for sensitive isolates over the course of five generations when mixed with genotypes H277Y or H134R. The results suggest that in the absence of fungicide pressure, isolates of the H277Y and H134R genotypes may effectively compete with the wildtype population.

College of Architecture, Arts and Humanities

Communication, Technology and Society

Binge Watching: Exploring the Relationship of Binge Watched Television Genres and Colleges at Clemson University

Amanda E. Moore

Presented by Amanda E. Moore (#38)

This study explores the relationship between students' area of study at Clemson University and their choice in binge watched programming. This article focuses on the uses and gratifications theory to explain that individuals have different motivations for viewing particular media, such as television genres. This article examines how area of study and gender can influence individuals' preferences of binge watched television content. In addition, this article discusses how the combination of online-streaming options and viewers personal television consumption preferences have resulted in an increase in overall binge watching habits. The study was conducted through an online survey using convenience sampling. A one-way ANOVA was conducted to test the significance of differences. The ANOVA reported the difference in gender for preference of binge watching fantasy genres was ($F(1,38) = 4.431, p = .042$), therefore the results were statistically significant at the $p < .05$ level. In regards to the College of Engineering and Sciences the correlation resulted with Drama ($F(4,35) = 2.228, p = .086$) and Fantasy ($F(4,35) = 1.821, p = .147$) both approaching significance. Specifically, the results suggest that the correlation between genre and biological sex is more significant than the correlation between genre and college.

History

Letters in War: Analyzing Word Trends from the Battlefield

Constance Walker, Dr. Pam Mack, Dr. Paul Anderson

Presented by Constance Walker (#3)

What could we learn by merging digital tools with traditional research in History? How could data mining large amounts of letter texts give a deeper depth of understanding to what the letters of soldiers during war contained? This project delves into merging traditional research methods with the digital world to analyze word trends in the letters of the everyday soldier from the First World War. What can be assessed by comparing the unpublished letters of soldiers to those published during the war? Using Voyant-tools.org, can add value to traditional methodology by assisting in discovering the emergence of trends or repetition in word uses of the authors. The goal of this project is to support my thesis work, by establishing that published letters during the war maintained a strong connection to the battlefields, thus perpetuating propaganda to keep fighting. This was not the pulse of reality on the front lines. There was a vital link to the home front, and the letters that soldiers wrote home did not talk of valor or sacrifice for their country, but instead, spoke of home. Using digital tools support these arguments and by displaying the word trends and word clouds generated, add visual evidence.

Planning, Design and the Built Environment

Spatial assessment of subsidized housing occupants based on proximity to environmental hazards and availability of conserved lands

Jorge Mata Otero, Mickey Lauria

Presented by Jorge Mata (#16)

Empirical evidence in support of claims that communities of color and low-income groups experience the disproportionate effects of environmental health risks has accumulated throughout the past three decades developing into a massive body of research under the Environmental Justice (EJ) field (Brulle and Pellow, 2006). In more recent studies researchers have started to expand that traditional focus on environmental risks to include environmental goods or “desirables” as part their analyses (Jennings et al., 2012). With this new research direction centered on one of the fundamental EJ premises that all people have the right to healthy environments, new questions have emerged that need to be addressed. The main objective of this research is to examine the spatial relationship between the location of those historically disadvantaged communities and the location of both environmental risks and environmental amenities. To do so, the research project relies on a number of statistical and GIS-based analyses. The area of study comprises four counties, two in California (Sonoma and Sacramento) and two in Colorado (Boulder and Mesa). Datasets previously assembled for a NSF-funded project have been expanded using data from: assessor’s offices and several GIS files on open space and environmental and natural hazards from governmental offices.

Visual Arts

The Reciprocity of Objects and the Psyche

Mary Cooke, Dave Detrich, Greg Shellnut

Presented by Mary Cooke (#19)

I seek to undermine the belief that broad distinctions can be made between the pathology of the consumer and that of the hoarder. I establish binary relationships between hoarding and consumerism through images and objects relating to consumer culture as well as intervening on combinations of objects that connote frenetic energy. I utilize installation and assemblage as the formal vehicle to posit this equation.

Contemporary Romantic Landscapes

Haley Floyd, Anderson Wrangle

Presented by Haley Floyd (#14)

The concept of the natural landscape has evolved in conjunction with the intervention of humans in the environment. The Industrial Revolution acted as a catalyst for such physical changes. Many photographers have worked to document this change. New Topographics, a photography exhibition from 1975, presented viewers with a series of man-altered landscapes. The photographers who worked on this project and others like it introduced the actual landscape as we have shaped it, challenging the age-old idea of the Romantic Landscape. My work expands on the concept of the changing landscape and the duality of man and nature by romanticizing these scenes. I investigate the relationship between the Romantic Landscape and the man-altered landscape to redefine the Sublime in contemporary art.

The Absence of Presence

MJ King, Greg Shelnut
Presented by MJ King (#10)

Portrait paintings have been a source of imagery, immortalization, and example of class status for centuries. As a painter in present day, I am investigating how one can challenge the term portrait. My research considers the absence of a portrait or a version of portraiture in a non-literal sense. Themes that are being explored and researched are the things one leaves behind, the remnants of an individual, an evidence of presence or absence of presence, an existence outside of our personal being, or extenders of ourselves. Painting these transitional moments provides an immortalizing acknowledgement of this extension of oneself, but not providing the literal information of "who." My hope is to encourage the viewers to consider what they leave behind, how they are evolving or transcending daily, and question how one can be perceived from an extension of self.

Semi-Permanent Forms

Deighton Abrams, Valerie Zimany
Presented by Deighton Abrams (#28)

As a ceramic artist, I am using high fired porcelain forms to create miniature memorials for our ever shrinking polar ice caps. Through the use of public installation, I am seeking to arrange the ceramic forms in ways that potentially confront the viewer in hopes to generate discourse and/or reflection. The use of ceramic materials will help me as an artists gain insight in to the material and push the concept of slipcast porcelain kitsch souvenirs in to different avenues of utilization: as a means of ecological statement rather than solely nostalgia.

College of Business and Behavioral Science

Applied Psychology

Exploring the relationship between stigma and climate related to employee safety and health

A Munc, K Jennings, RR Sinclair
Presented by Alec Munc (#18)

This study sought to investigate the relationship between stigma and climate for the strategic priorities of health and safety. Using a two-wave longitudinal design (N = 650), confirmatory factor analysis indicated that stigma is distinct from psychological climate. Additionally, we fit safety and health stigma within the broader conceptual linking mechanisms of their respective climates. The results were somewhat supportive of the hypothesized linking mechanisms of safety stigma but not for health stigma. Lastly, both types of stigma were found to be associated with poorer psychological health.

Economics

The Distribution of Earnings Losses: Evidence from Displaced Worker Surveys 1994-2010

Mallika Garg, Dr. Curtis Simon

Presented by Mallika Garg (#21)

Workers that lose their jobs because their employer closed a plant or division, moved or abolished their position, or simply had insufficient work for them are reported to experience huge losses in earnings, post-displacement. Empirical studies using ordinary regression techniques have estimated these losses to average between 10% - 40%. However, around this mean loss is a distribution with considerable variation, variation that for the most part has been unremarked on. Using Displaced Workers Survey data from 1994-2010, I find that the mean loss in weekly earnings of displaced workers stands at 18%, while the median loss is only 6.5%. At the 25th percentile of the earnings-change distribution, the loss amounts to 35% and at the 75th percentile there's a gain of around 9.5%. In light of such variation in losses, I argue that classical regression models with their estimates of conditional-mean loss fail to provide a complete picture of the post-displacement earnings experience of workers. I apply quantile regression technique to this problem and use regression curves corresponding to various points on the earnings-change distribution to provide more insight into these losses.

Directed Technical Change and the Age-Earnings Profile

Randy Cragun, Robert Tamura, Machael Jerzmanowski
Presented by Randy Cragun (#40)

Workers' wages increase rapidly early in their careers and then level off and decline late in their careers. The dominant theories explain these wage "hills" by concluding that workers accumulate skills more slowly later in their careers. We propose an alternative mechanism for this effect: businesses are constantly looking for cheaper ways to produce their services. Older and younger workers perform different kinds of jobs, so some efforts to improve productivity will use younger workers more than older workers, and businesses will develop these new "technologies" to best use the workers most available to them. Because each generation tends to start out larger than the previous one, attains higher education levels than previous generations, and then shrinks as it ages and its members die, aging workers move out of the most dynamic sectors of the economy as businesses move on to figuring out how to best use the larger, better educated younger generations. We use data on 146 countries over an average of a century to show that this theory will often produce wage hills like those we see in the actual wage data.

Human Factors Psychology

The Perceived Preferred Critical Boundary As an Example of Gibson's Margin of Safety

Brian Day, Leah S. Hartman, Christopher C. Pagano
Presented by Brian Day (#36)

The purpose of this experiment was to investigate whether people were able to accurately judge their ability to traverse a gap. Additionally, we also observed if participants exhibited a 'margin of safety' in their judgments when more than one action was possible. Affordances are features of the environment and characteristics of an organism that make a particular action possible, and in terms of locomotion, it is vitally important to be able to accurately perceive affordances. In this experiment, participants were asked to judge whether a gap afforded traverse-ability. Participants were split into three groups (focal, timed, and embedded) to investigate how varying constraints on the task affected perception of affordances. Participants gave a judgment for 36 randomized distances about whether or not they could cross the gap, whether they would step or leap over the gap, and how safe it would be to perform that action on a 7-point scale. We found that participants exhibited a "margin of safety" in their judgments when the perception-action task was preserved. We also found that participants were able to recognize when gap length surpassed

their actual maximum stepping ability and exhibited a concurrent increase in safety ratings as a result.

The Effect of a Target Bite Count and Plate Size on Food Intake

Phillip W. Jasper, M.S., James N. Salley, M.S., Adam Hoover, Ph.D, Eric R. Muth, Ph.D
Presented by Phillip Jasper (#25)

The purpose of this study was to determine if an instruction to take fewer bites than typically taken, would reduce intake and overcome the known environmental cue of plate size. In a previous study, fifty-five participants (34F) ate ad libitum macaroni and cheese in groups of four, either from a small plate or a large plate. They ate $111\pm35\text{g}$ with 12 ± 4 bites from the small plate, and $195\pm111\text{g}$ with 20 ± 6 bites from the large plate. The current study employed the same paradigm. Sixty participants (33F) were given bite count feedback and were instructed to take only 12 bites, while eating from either a small plate or a large plate. Participants ate $135\pm52\text{g}$ with 12 ± 3 bites from the small plate and $177\pm63\text{g}$ with 12 ± 2 bites from the large plate. Results of a 2x2 ANOVA indicate a main effect of plate size ($p<.001$) and instruction ($p<.001$) on bites taken and an interaction ($p<.001$). Plate size also affected grams consumed ($p<.001$). Notably, instruction also affected bite size ($p<.001$). These results suggest that people will reduce the number of bites when instructed to, but will increase their bite size to compensate for the reduced bite allowance.

Are you Committed Cathy, Reluctant Rita or Negative Nancy? Defining User Personas for a Technology-Based Wrist-Worn Eating Monitor

Michael L. Wilson, MS; James N. Salley, MS, Eric R. Muth, PhD
Presented by Michael L. Wilson (#33)

Self-monitoring of energy intake is a critical element of a successful weight loss plan. However, current methods to monitor energy intake are cumbersome and prone to under reporting. The present study examined how individuals used a new energy intake monitoring tool, the Bite Counter to adjust their eating behavior to a targeted bite limit. Data were collected from 30 female participants examining their compliance with using the device as well as their adherence to eating limits based on bite count. Three distinct compliance personas were developed based on the shared behaviors and traits of device users: Committed Cathy (the rapid adopter, seldom misses tracking eating activities), Reluctant Rita (often forgets device, always has an excuse) and Negative Nancy (will not wear or use the device). These personas will inform future experimenters on how to improve usage instructions in order to increase participant compliance with using technology-based eating behavior monitoring tools.

Industrial/Organizational Psychology

Non-hypothermic cold stress methodology for psychological research

Drew M. Morris & June J. Pilcher
Presented by Drew M. Morris (#1)

Cold environments are a natural stressor and impact human performance through homeostatic response. Common methods of studying cold stress use expensive climate chambers and are out of reach of traditional labs. To safely study the effects of cold in a traditional lab setting, affordable methods of producing non-hypothermic cold stress should be explored. The current study developed and tested an affordable cold stress method using ice packs by measuring human psychological and physiological response. Forty-four participants were in a thermal neutral or cooled condition. Cold condition participants wore a cooling vest and sat on a cooling pack with

a mild breeze for forty-five minutes. Results showed the stressor significantly lowered subjective feelings of comfort and raised perceptions of cold ($p < .001$). Mean skin temperature taken continuously from three locations was also significant lower in the cold condition ($p < .001$). Importantly, core temperature taken from the mouth and ear was not significantly impacted ($p > .05$). These findings support the effectiveness of the method in producing a psychological cold stress response without resulting in hypothermia.

College of Engineering and Science

Automotive Engineering

Combustion Modeling of Dual-fuel Engines

Shuonan Xu, Zoran Filipi

Presented by Shuonan Xu (#20)

Energy security concerns and abundant supply of Natural Gas in US provide impetus for engine designers to consider alternative gaseous fuels in existing engines. Dual-fuel Natural Gas (NG) engine concept is attractive due to minimal design changes, ability to preserve high Compression ratio (CR) of the baseline diesel, and reduce fuel cost without imposing consumer range anxiety. However, increased complexity of the dual-fuel engine poses challenges, including auto-ignition of end NG-air mixture (knock) at high loads, flame propagation limit at low load and transient response of an engine with directly injected diesel fuel and injection of Compressed NG upstream of the intake manifold. Predictive simulation of the complete engine system is an invaluable tool for investigations of such conditions and development of dual-fuel control strategies. Simulation work gives a better understanding of dual-fuel combustion nature, enables investigation of a broader operating space and complement results by providing values of parameters that cannot be easily measured from experiment. Additionally, with increased complexity of modern engines, map-based control becomes abundant and costly. A combustion model with sufficient level of predictiveness and reasonable requirement on calculation effort enables opportunities for model based control development

Chemical Engineering

Conducting Polymer Microstructures and Composites for Supercapacitors

Kryssia P. Díaz-Orellana, Mark E. Roberts

Presented Kryssia Pamela Diaz Orellana (#32)

Increasing power demands associated with electronic devices, transportation and renewable energy systems require new energy storage technologies with higher specific capacitance, faster charge-discharge rates and long-term cycle stability. Supercapacitors offer an alternative to conventional batteries and capacitors, with the potential to deliver high energy and power density. Of the different materials used as electrodes, electrochemically conducting polymers (ECPs) have emerged as a low cost alternative with tremendous synthetic and structural versatility. The focus of our research is to utilize various processing and synthesis methods to increase the performance of ECP electrodes by controlling ion-transport and electron transfer processes. First, we show how to synthesize ECP microtubes with tunable dimensions using stainless steel mesh

substrates with varying wire diameters and spacing. Second, we investigated the use of polymer dopants to directly affect key performance metrics. For example, we integrated poly(4-styrene sulfonic acid), a known proton conductor, to increase the ion transport within the polymer structures. We also investigated the use of lignin, a non-conductive polymer with moderate redox activity, to improve the redox capacitance of the ECP film. Through this work, we demonstrate how electrode composition and morphology influence key metrics of polymer electrodes to design new materials for high-energy supercapacitors.

Cellulose Nanofiber Composite Membranes for Water Purification

Nithinart Chitpong and Scott M. Husson

Presented by Nithinart Chitpong (#9)

Global water demand continues to increase because of population growth, urbanization, and climate change. Since there are limited natural water resources, water purification systems play a critical societal role. Membrane technologies are used widely to improve water quality for beneficial use. Therefore, high-performance, nanofiber-based ion-exchange membranes were prepared for removal of heavy metals from impaired waters. Our hypothesis was that such membranes would have high metal ion capacities resulting from large surface area-to-volume ratios and high water permeability relative to barrier-type membranes such as reverse osmosis and nanofiltration. The nanofiber membranes were produced by electrospinning cellulose acetate nanofiber mats, which were strengthened by thermal-mechanical annealing and then converted to regenerated cellulose nanofiber mats. Subsequent surface modification transformed the membranes into ion-exchange membranes for removal of trace metal ions in water. The regenerated cellulose nanofiber mats were modified by grafting poly(itaconic acid) (dicarboxylic acid side groups) and poly(acrylic acid) (monocarboxylic acid side groups) to the surfaces of individual nanofibers. Direct-flow filtration measurements showed that the nanofiber membranes have water permeabilities much higher than reverse osmosis or nanofiltration membranes. Results of metal ion static and dynamic ion-exchange capacities will be presented and compared to more traditional ion-exchange media.

Chemistry

Luminescent spectral rulers for non-invasive strain measurement through tissue

Melissa M. Rogalski, Nakul Ravikumar, Hunter Pelham, Joshua Lake, John D. DesJardins, Jeffrey Anker

Presented by Melissa M. Rogalski (#26)

Dynamic compression plates and orthopedic screws maintain proper bone alignment and share load with bone as a fracture heals. We are developing luminescent spectral rulers to evaluate strain on the surface of these devices to mechanically monitor fracture healing and aid in detection of hardware fatigue (e.g. load sharing, implant loosening, and non-union). The strain sensors contain two patterned surfaces: (1) an "encoder" patterned with alternating luminescent lines, and (2) a transparent "analyzer mask" patterned with opaque lines that overlay and mask a portion of the encoder below. Moving the encoder with respect to the analyzer generates a color change that is detected by spectrometer and analyzed in MATLAB. We have fabricated a bromocresol purple patterned encoder that overlays an X-ray scintillator film (Gd₂O₂S:Eu). The dye absorbs a portion of the Gd₂O₂S:Eu luminescence spectrum in a position-dependent manner. With our x-ray scintillator sensors reproducible small displacements (~13 microns) through 6 mm thick chicken breast tissue have been detected. Additionally, we have fabricated sensors that do not require ionizing radiation; a 633 nm laser is used for excitation. The sensors contain an encoder patterned with alternating spectrally distinct fluorescent materials. Both sensors provide a non-invasive method for strain analysis through tissue.

Analysis of Cellulose Nano Crystal Hydrothermal Treatment Product

Yimei Wen, George Chumanov
Presented by Yimei Wen (#8)

Cellulose is the most abundant and inexpensive material available for chemical synthesis. Hydrothermal treatment of cellulose nanocrystal can assemble the nature carbonization process of carbon species. Recently, carbon nanotubes are reported to be successfully synthesized from hydrothermal treatment of carbon species. We then carefully carry the hydrothermal treatment of cellulose nano crystalline and analysis the product. Fibers resemble single wall carbon nanotube structure were observed under Atomic Force Microscopy. Raman Spectroscopy and Transmission Electron Microscopy results show more information about the fibers, which may further prove our assumption to use cellulose nano crystalline to synthesis single wall nanotube in mild hydrothermal treatment conditions.

One-Pot Synthesis and Application of Highly Concentrated, Monodisperse AgNPs with an Ultra-Thin Silica Shell

Daniel Willett, Dr. George Chumanov
Presented by Daniel Willett (#35)

Ultra-thin silica shells (UTSS) are an effective way to improve the stability and compatibility of metallic nanoparticles without significantly attenuating their intrinsic optical properties. This is of particular importance to plasmonic particles used in sensing or surface related studies such as localized surface plasmon resonance (LSPR) or surface enhanced Raman spectroscopy (SERS). For silver nanoparticles an UTSS can both hinder oxidation of the Ag in both air and water as well as establish a scaffold for functionalization through well-established silane chemistry. UTSS on metallic nanoparticles such as gold or silver generally involve first using a silane coupling agent to render the surface vitreophilic followed by precipitation of silica by the Stober method or addition of sodium silicate species. Here we present a method to obtain silver nanoparticles with a silica shell of a thickness between 1-20 nm on silver nanoparticles ranging in size from 20-300 nm. This silica shell greatly improves the particle stability allowing for further concentration of the particles in water up to solutions containing 50% Ag by weight. In addition we demonstrated the ability of these particles to be easily integrated into substrates for both SERS and LSPR applications.

An investigation into the effect of metal ion in PA and TEM8 binding

Zhe Jia, Christine Ackroyd, Kenneth Christensen, Brian Dominy
Presented by Zhe Jia (#39)

Anthrax toxin is transported into human cells after its protective antigen (PA) binds to its receptor. The receptor, tumor endothelial marker 8 (TEM8), has been identified as a potential anticancer target for its involvement in angiogenesis. This project investigates the role of the metal ion in the TEM8/PA binding mechanism to provide information relevant to anticancer therapy development. Structures of the TEM8/PA complex were produced through homology modeling, and canonical conformational ensembles of the TEM8/PA complexes involving different metal ions in TEM8 were generated through molecular dynamics simulations. Binding thermodynamics were also assessed using a Molecular Mechanics/Generalized Born Surface Area (MM/GBSA) method. In addition, the dissociation constant between TEM8 and PA in the presence of different divalent metal ions was determined experimentally via fluorescence resonance energy transfer (FRET). Both computational and experimental results indicate the metal ion in TEM8 contributes significantly to the binding affinity. Simulation shows the existence of Mg²⁺, Zn²⁺ or Ca²⁺ in

TEM8 corresponds to a sequentially reduced affinity between TEM8 and PA. Further, computational analyses suggest the differences in TEM8/PA affinity are consistent with the behavior of closely related integrin proteins known to adopt two conformations (open and closed) correlated with different levels of activity.

Civil Engineering

Using Spatial Analysis to Identify High-Risk Driver Residential Areas in South Carolina

Kweku Brown, Wayne Sarasua

Presented by Kweku Brown (#37)

Addressing safety issues at high crash incidence locations through crash countermeasures or better geometric design helps to make roadways safer, however, the most influential and ever-present factor in most crashes, the driver, is still not addressed. This paper investigated the socio-economic and demographic characteristics of residential locations (found using 9-digit zip code data) of drivers involved in crashes in South Carolina aggregated to census block groups. The spatial (block group and cluster analysis) and statistical (negative binomial) analyses results showed significant relationships and correlations between drivers involved in fatal and injury crashes within the state and demographic and socio-economic variables of the residential locations of these drivers. To mention a few, the results suggest that drivers with high median household income and within the 35 to 44 age group are less likely to be involved in fatal and injury crashes than other groups. This research has spatially and statistically shown the relationship between risky-driver clusters and some socio-economic and demographic characteristics of these drivers. Thus, providing justification for state decision makers and officials to support safety programs and research that target drivers while providing a method for prioritizing areas of the state with greatest need from a high-risk driver standpoint.

Computer Science

Formal Verification of Software Architecture

Ethan McGee, John McGregor

Presented by Ethan McGee (#24)

The majority of errors within a software project are introduced during the requirements and design phases of the project, yet, usually, these errors remain undetected until the implementation and test phases of the Software Development Life Cycle, when the errors are most costly and difficult to correct. The use of Formal Methods during implementation has made possible the earlier detection of errors. Using Formal Methods during the design phase when the software architecture is produced has significant impact by ensuring properties of the requirements are properly represented in the architecture enabling even earlier detection. Tools supporting formal verification of architecture are now mature enough to allow for verification at multiple levels of the architecture. The Architecture Analysis and Design (AADL) language and its verification tools, AGREE, BLESS and Resolute, provide an excellent platform for representing an architecture and its verification requirements. However, determining what is necessary to declare a requirement as sufficiently verified is not well understood.

Human Centered Computing

Investigating the Impact of Perturbed Visual and Proprioceptive information in Near-Field Immersive Virtual Environment

Elham Ebrahimi; Bliss Altenhoff; Christopher C. Pagano; Sabarish V. Babu; J. Adam Jones
Presented by Elham Ebrahimi (#30)

We report the results of an empirical evaluation to examine the carryover effects of calibrations to one of three perturbations of visual and proprioceptive feedback: i) Minus condition (-20% gain) in which a visual stylus appeared at 80% of the distance of a physical stylus, ii) Neutral condition (0% gain) in which a visual stylus was co-located with a physical stylus, and iii) Plus condition (+20% gain) in which the visual stylus appeared at 120% of the distance of the physical stylus. Feedback was shown to calibrate distance judgments quickly within an IVE, with estimates being farthest after calibrating to visual information appearing nearer (Minus condition), and nearest after calibrating to visual information appearing further (Plus condition).

Industrial Engineering

Human Performance Engineering

Dotan I. Shvorin, Kevin M. Taaffe
Presented by Dotan Shvorin (#15)

Ph.D. students are challenged to discover new ideas, invent new products or break through barriers on existing problems. As a Ph.D. student I am leading a new area of research in the STEM discipline. As an industrial engineer, I am attempting to extend the reach of engineering methods and tools traditionally applied in manufacturing and service-related settings to the area of human performance. Human Performance Engineering, IE 402 008, is a new creative inquiry class that Dr. Kevin Taaffe and I have created. The research includes many focus areas such as quality, decision making, perception, game theory, biology, simulation, and disciplines from engineering to psychology to management and the sciences can all potentially play a role. For the last two semesters I have guided undergraduate students in investigating the cause and effect relationships in human performance in individual or team sports. As a research group, we are challenged to learn materials that are beyond our current knowledge base and to examine psychological and biological factors that affect decisions people make in a competitive environment. Moreover, we aim to quantify the extent to which changes to our mental and physical abilities translate into an increased performance during the sporting event.

The Impact of Training Method on Skill Acquisition and Transfer

Myrte Alfred, David Neyens
Presented by Myrte Alfred (#4)

Technology based learning tools are gaining traction in both educational and organizational settings. One of the primary advantages of these tools are that they offers a means for students and employees to practice a skill without safety risks and continue to practice until they obtain the necessary level of proficiency. However, there may be differences in the effectiveness of these tools based on the characteristics of the learner. The purpose of this study is to evaluate how an individual's performance in a task differs depending on the physical fidelity of the learning tool. Additionally, this research examines the effects of cognitive ability, goal orientation, and motivation on performance. Specifically, this study investigates different methods for practicing

building electric circuits using a virtual breadboard environment, a 2D breadboard simulation, and a physical breadboard. The study will also assess how the participants' level of engagement impact performance outcomes using an electrodermal activity (EDA) device. It is expected that the learning tool will have an impact on task performance that is moderated by learner characteristics. The results of this study will have implications on the design and implementation of technology in both student and employee education.

Material Science and Engineering

From tiny butterflies to distant planets: Recent advances in Magnetic Rotational Spectroscopy

Pavel Aprelev, Konstantin Korneev

Presented by Pavel Aprelev (#11)

Recent advances in the fields of soft and composite materials have led to the development of Magnetic Rotational Spectroscopy (MRS) – a technique for analysis of viscous and elastic properties of complex fluids such as gels and polymer solutions, characterization of magnetic properties of nanoparticles, and as recently discovered in our lab, detection of weak magnetic fields. MRS takes advantage of characteristic features of rotation of magnetic nanorods in liquids, when subjected to a uniformly rotating magnetic field. These features of rotation are very sensitive to the viscosity of the liquid, the magnetization of the nanorod, and constant external magnetic field. The small size of the probes (nanorods) and sensitivity of the method allows for extremely accurate measurements at micrometer scale. We demonstrate exciting applications of this technology in biology, where MRS is being used to study butterfly saliva, in materials science, where MRS is being used to study magnetic properties of magnetic nanorods, and in space exploration, where MRS can be used for weak magnetic field mapping of planets.

Mathematical Sciences

Johnson-Lindenstrauss projection of high dimensional data

Shuhong Gao, Fiona Knoll, Yue Mao

Presented by Fiona Knoll (#13)

Johnson and Lindenstrauss (1984) proved that any finite set of data in a high dimensional space can be projected into a low dimensional space with the Euclidean metric information of the set being preserved within any desired accuracy. Such dimension reduction plays a critical role in many applications with massive data. There have been extensive effort in the literature on how to find explicit constructions of Johnson-Lindenstrauss projections. In this poster, we show how algebraic codes over finite fields can be used for fast Johnson-Lindenstrauss projections of data in high dimensional Euclidean spaces. This is joint work with Shuhong Gao and Yue Mao.

Application of the Reduced Basis Method to Hyperspectral Diffuse Optical Tomography

Rachel Grotheer, Taufiqar Khan

Presented by Rachel Grotheer (#22)

Diffuse optical tomography (DOT), which uses low-energy laser light in the visible to near infrared range, has become a popular alternative to traditional medical imaging techniques such as x-ray, because it is non-ionizing and cost effective. Since DOT is especially effective in reconstructing images of soft tissue, where light penetrates more easily, one of its main applications is in breast cancer detection. Hyperspectral DOT (hyDOT) uses hundreds of optical wavelengths in the imaging process in order to improve the resolution of the image by adding new information. We

develop a reduced basis method approach to solve the forward problem in hyDOT, which is to determine the measurements on the boundary of the tissue given information about the light source on the boundary, the location of any tumors, and the values of the absorption and diffusion coefficients. Our work on the forward problem is motivated by the image reconstruction problem in hyDOT which is computationally expensive because any algorithm requires solving the forward problem hundreds, if not thousands, of times. We show how the reduced basis method greatly improves the computational burden of the forward problem and thus, improves the efficiency of the reconstruction problem.

Mechanical Engineering

Carbon cone electrodes for Selection, Manipulation and Lysis of Single cells

Rucha Natu, Monsur Islam and Rodrigo Martinez-Duarte

Presented by Rucha Natu (#29)

Here we present initial experiments towards an integrated platform for single cell selection, manipulation and lysis. An array of polarized conical carbon electrodes can be dipped in a cell culture, trap cells of interest using dielectrophoresis and transport them to specific locations where they can be lysed electrically to extract intracellular components from targeted particles over specific locations. What we contribute in this work is modeling of the electric field and its gradient around carbon cones, as well as initial cone fabrication results. Ongoing work is on demonstrating cell trapping and lysis using these conical electrodes by only varying the magnitude and frequency of their polarizing AC signal. Here we use conical carbon electrode to trap volumes to keep a single particle in place and yields strong enough electric fields for lysing once the cell is on top of a specific location. Electric Gradient of the range of $10^{15} \text{ m}^2/\text{s}^2 \cdot \text{A}^2$ can be used to trap single cell. COMSOL Modeling dictate the use of structures (height 30 μm) with tip of 45 degrees to obtain a $10 \mu\text{m}^3$ -volume to allow for manipulation and lysis of a single yeast cell.

Physics

Determining the shape of a supernova explosion

Amber L. Porter, Mark D. Leising, G. Grant Williams, Peter Milne, Paul Smith, Nathan Smith

Presented by Amber L Porter (#23)

Spectropolarimetry, a technique that determines the fraction of light from a polarized source as a function of wavelength can help astronomers determine the geometry of a supernova explosion. The spectrum of these objects are a combination of an underlying continuum and superposed absorption and/or emission features. Low degrees of polarization ($\sim 0.2\text{-}0.3\%$) across the continuum with higher detections across some spectral features ($\sim 1\text{-}2\%$) indicate that a particular explosion is relatively spherical in nature, but some of the ejecta has been expelled in a clumpy manner. It is possible to determine how the star exploded by comparing the evolution of this polarization over time to theoretical explosion models. We present the multi-epoch observations of 2014J, a supernova with very little overall asymmetry as revealed by low continuum polarization measurements. However, a polarization detection of $\sim 0.5\%$ across the singly-ionized silicon spectral feature indicates that this particular ion has a more complex geometry.

College of Health, Education and Human Development

Counselor Education (Clinical Mental Health Counseling)

Advocacy in Childhood Obesity: Examining Adolescent Girls' Perspectives of Childhood Obesity through Photovoice

Corrine R. Sackett, Ellen M. Granberg, Alyssa M. Jenkins

Presented by Alyssa Jenkins (#7)

This poster contains the findings of a study where researchers explored adolescent girls' perspectives of environmental influences on childhood obesity using Photovoice and implications for counselor advocacy. Photovoice is a participatory action research method developed by Wang and Burris (1997) to capture an issue from the lens of those affected, and to influence social policy in that area, which in this case is childhood obesity. As counselors are called by ethical code to "advocate at individual, group, institutional, and societal levels to address potential barriers and obstacles that inhibit access and/or the growth and development of clients" (ACA, 2014, p.5), the presenters will address how counselors can use the findings from this study to advocate on this issue as it affects many clients.

International Family and Community Studies

Child Labor in Colombia: Physical and Psychological Discomfort at Work in Children Who Work and Attend School

Andrea Morales Reyes, Mark Small, Bonnie Holaday

Presented by Andrea Morales Reyes (#27)

This study examined the health consequences of child labor in Colombia through the use of a dataset on the economic and non-economic activities engaged in by children and adolescents during 2011. The data collection was a collective effort between the Colombian government and the International Labor Organization (ILO). The data was collected on 48,876 children between the ages of 4 and 17 (mean=11.13, SD=3.7). This particular study focused on a subset of the population of children that either worked and attended school (n=3989) or only worked (n=2,118). Univariate Analysis of Variance (ANOVA) was used to determine whether there was a statistically significant difference between these two groups on the basis of physical and psychological discomfort at work. The group of children who worked and attended school was associated with statistically significant lower mean physical (M=.043) and psychological discomfort (M=.023) than the group of children who only worked (M=.044; M=.066, respectively). The higher mean discomfort in children who only worked showed that attending school mitigates children's discomfort at work. By promoting protective factors to deter child labor, the Colombian government could safeguard children's health and development. Education should be at the forefront of these. Keywords: Child labor, Colombia, Health, Mental Health

Middle Level Education (MAT)

What is a Scientist? Applications of the Scientific Method for Young Adolescents

Kendall Gallagher, Katherine Allen King Cassie Quigley, PhD

Presented by Katherine Allen King (#34)

Do students view themselves as scientists? Do they believe they can change the world? This interactive presentation examines middle school students' answers to these questions and how their views have developed throughout the school year. We have examined the applications of the scientific method to the lives of young adolescents, including their future civic lives.

Parks, Recreation and Tourism Management

The Role of Attitude on Local Seafood Purchase Intention of Tourist Couples Visiting South Carolina: A Multi-Level Approach

Guliz Coskun, William C. Norman, DeWayne Moore

Presented by Guliz Coskun (#12)

Despite the collective nature of tourism activity, the research focusing on group behavior in tourism literature is very rare. People usually travel with groups, mostly with their families who have influence on each other's travel decisions. Food as one of the unique aspects of a destination, has become a marketing tool for tourism planners. The preference of local food among tourist will create positive impact on the region and exploring the underlying factors of this preference will be beneficial for future marketing plans. The purpose of this study was to understand the factors influencing local food purchase intention of tourist couples visiting coastal areas of South Carolina through the use of modified Theory of Reasoned action and provide a better understanding of their decision making process by using Hierarchical Linear Modelling as data analyzing technique. Data was collected in Charleston and Beaufort from 180 tourist couples in October 2014. Results show that even if women have negative attitude towards oysters, their intention to purchase local seafood is not different than men. Positive variables have stronger influence on intention to purchase seafood at individual and couple level. The implications of this study will be discussed in three ways; theoretical, methodological and practical.

Impact of a novel after school program: Smart Fit Girls

Kellie Walters, Dr. Denise Anderson

Presented by Kellie Walters (#5)

Individuals who are highly physically active are more likely to have a greater self-esteem, better body image, and increased physical activity self-efficacy. Currently, the average PE program provides less than 12% of the recommended daily amount of physical activity, with adolescent girls being the least active. The primary purpose of this research is to explore the efficacy of an after-school program, Smart Fit Girls (SFG), which aims to improve adolescent girls physical activity habits, self-esteem and body image. A secondary purpose is to examine how physical activity and mother/daughter relationships affect adolescent girls physical and emotional health. Girls attending Riverside Middle School in Pendleton, SC and their mother or female guardian were recruited for this study. The girls were 10-14 years old, in good academic standing, and were not involved in school athletics. To explore the impact of SFG all participants and their mothers will complete two rounds (pre/post) of questionnaires and focus groups. A control group of daughters and mothers at R.C. Edwards in Clemson, SC will participate in quantitative and qualitative data collection as well. Using the data collected, we aim to improve the wellbeing of adolescent girls and contribute to the youth development and exercise science literature.

Second Half Presenters (2:30 pm to 4:00 pm)

Posters 41 through 54 (in Ballrooms A & B)

Posters 55 through 75 (in David Peebles Room)

(Poster numbers have been mentioned beside presenters' names)

College of Agriculture, Forestry and Life Sciences

Biological Sciences

Walking with Giants: Mitigating human-elephant conflict in Myanmar

Christie Sampson, Peter Leimgruber, Melissa Songer, David Tonkyn

Presented by Christie Sampson (#45)

Myanmar has experienced dramatic declines in its wild elephant populations over the last seven decades, dropping from as many as 10,000 wild elephants to as few as 2,000 today. The main reasons for this loss is the live capture of wild elephants for use in logging operations, and significant habitat loss and the ensuing human-elephant conflict. We are investigating the causes for human-elephant conflict (HEC) and possible mitigation methods in rural areas outside of the former capital city Yangon. We have conducted over 300 interview surveys with village residents to determine the levels and types of HEC experienced and conservation attitudes towards the wild elephant population. We have also captured and attached satellite-GPS collars to four wild male elephants to monitor their movements and behavior before, during, and after HEC. The results from our initial interview surveys demonstrate that most households experience HEC, with 38% of farmers losing over half their crops annually to elephant crop raiding. However, a majority of the interviewees favored elephant conservation (88%). We will use these results to work with the Myanmar government to focus HEC management strategies and provide recommendations to combat HEC as the development of Myanmar continues to progress.

Can lizard embryos survive climate warming? Thermal constraints on the physiology of developing Eastern fence lizards

Michael A. Carlo, Eric A. Riddell, and Michael W. Sears

Presented by Michael Carlo (#41)

Sublethal stressors will likely mediate an organism's response to climate change. Mobile animals can change their behavior to maintain temperatures within preferred ranges. However, animals in immobile life stages are particularly vulnerable to warming. For example, lizard embryos experience recurrent thermal stress as they develop in shallow nests with daily temperature fluctuations. Nesting temperatures above 41.5°C can be lethal to Eastern fence lizard (*Sceloporus undulatus*) embryos. Although that is beyond the range experienced at current nest sites, rapid warming will push nest conditions toward critical limits. Therefore, it is important to examine the effects of sublethal high nest temperatures on developing lizards. We reared *S. undulatus* embryos under three thermal regimes—one to simulate contemporary nest conditions with Frea maximum daily temperature (T_{max}) of 32.1°C, and two regimes to simulate warming scenarios in which the T_{max} was raised to 35.6°C and 39.1°C. We tracked changes in physiology and survival through embryonic development, and we measured growth and metabolic rates of

surviving hatchlings. Results showed reduced embryo survival and decreased hatchling growth for lizards reared under sublethal warming, suggesting that thermal constraints on the physiology of developing Eastern fence lizards may limit the persistence of the species under climate warming.

Environmental Toxicology

The effect of microplastic fibers on the freshwater amphipod, *Hyaella Azteca*

K.J. Talley, S.Y. Au, and S.J. Klaine

Presented by Sarah Au (#62)

Microplastics are a growing and persistent contaminant in aquatic ecosystems. There is a wide variety of shapes that MPs can take, with fibers being the most prominently found in marine systems. Few studies have investigated the toxicological implications of MP exposure to freshwater organisms, and none so far has quantified the effect that fibers, as compared to spherical particles, may have on aquatic organisms. A 42-day chronic exposure to polypropylene MP fibers (0 – 22.5 MPs/mL) was conducted in order to investigate potential effects on mortality, growth, reproduction, and egestion times. Significant mortality was only observed at the highest concentration (22.5 MPs/mL). Growth and reproduction is also significantly less than the control at all exposures to MP fibers, with no mating pairs forming at all in concentrations greater than 5.63 MPs/mL. Interestingly, gut clearance times after exposure to MP fibers is also greater at concentrations greater than 5.63 MPs/mL. Delays in reproduction and growth may result from deficiencies in nutrient uptake. This study provides further insight on how the shape of MPs may hold significant implications on their toxicity to aquatic organisms.

Food Technology

Development and Implementation of the G.E.T.T. Cooking Curriculum: A Pilot Study

Elizabeth Ramirez, Katherine Cason

Presented by Elizabeth Ramirez (#56)

Contributing factors to the obesity epidemic in the US are great and complex but a leading factor is dietary behavior. Hectic schedules and increasing availability of highly processed foods, even in food desert areas, provide an appealing opportunity to feed a family quickly and at a cost-efficient manner. In an effort to combat the appealing nature of fast food consumption, it is essential to arm adults and adolescents with the tools, skills, and knowledge necessary to provide themselves and their families with healthy home-prepared meals. The purpose of this pilot study was to test the 8-lesson curriculum, Generations Eating Together Through Cooking (G.E.T.T. Cooking), and determine its efficacy in a low-income audience. Pre, post, and follow up evaluations and interviews were conducted. The 2 participating families demonstrated an increase in food budgeting, food security, food safety practices, consumption of fresh fruits and vegetables, child involvement in cooking, and in-home meal consumption. A decrease in consumption of sugar-sweetened beverages, distractions during meals, food pickiness, food waste, and fast food consumption were also observed. Participation by children and adolescents was enthusiastic and “exciting” and provided numerous learning opportunities for both the adult and children participants.

Effectiveness of Different Instructional Methods in Imparting Knowledge about Nutrition Concepts among Culinary Arts Students

Nisreen M. Abdulsalam, Margaret Condrasky, Pamela Havice, William Bridges, Ronald Thomas
Presented by Nisreen M. Abdulsalam (#65)

The problem: Many nutrition courses for culinary arts students are theoretical in nature. Students are not taught how to translate knowledge about nutrition into practice. Combining educational theories and nutrition research with cooking applications through nutrition education programs for culinarians are key for long-term successful menu changes. Intervention: Culinary arts students were randomized to receive either traditional lecture (C), demonstration (DP), online lecture capture (OP), and the combination of (OP+DP) intervention. Design: this randomized controlled trial comparing the relative effectiveness of the four instructional methods Sample: A convenience sample of n= 139 culinary arts students was randomized to receive either the C, DP, OP or OP+DP intervention in imparting knowledge about nutrition concepts. Analysis: A survey was administered at pre-test, post-test and at an 8-week follow-up. ANOVA was used to detect if there were statistically significant differences on any of the four survey subscales. Results: There was no statistically significant difference in performance between DP, OP and OP+DP groups on each subscale. However, each of these methods performed significantly better than the traditional lecture. ($\alpha \leq 0.05$) was considered significant when conducting hypotheses tests. Conclusion: All methods were superior to traditional lecture. Resultant outcomes were higher as compared to pre-intervention status.

The NECAP Program -The Nutrition Education for Children Attending Preschool Program

Ibtehal Alsallaiy, Katherine Cason
Presented by Ibtehal Alsallaiy (#51)

Nutrition education should be introduced early in life to promote healthy eating and physical activity throughout life. The understanding these important lifestyle actions is important for young children, and this is as early as 3 years old when the child forms food preferences. They begin to recognize food flavors, colors, textures and smells. It is estimated that 42-51% of children that attend day-care in the USA spend almost 35 hours/week there, indicating the role of this facility on the lives of young children. The aims of this research study is to: 1) Explore the perceptions, preferences, and dietary intake of the main food groups of preschool children at a daycare. 2) Explore the availability, choices, and preparation of the main food groups by the care providers. 3) Design and present a nutrition education program to the children and their care providers teaching healthy eating habits, food choices and long-term health benefits. 4) Evaluate the results of the presentations and their impact on the children and care providers and adjust the program accordingly. 5) Observe the first aim again to see if there is any change in perceptions, preferences, and intake of the main food groups by the children and their caregivers.

Genetics

Identification of Autism Spectrum Disorders associated Long Non-Coding RNAs shows connections to the synaptic transmission pathway

Brian Gudenas, Liangjiang Wang
Presented by Brian Gudenas (#68)

Autism spectrum disorder's (ASD) are a pervasive neurodevelopmental disorder with thousands of implicated genes that converge on specific brain tissues, developmental times and molecular

pathways. Although, the exact causes of these dysfunctional pathways in neurodevelopment are still unknown, it is likely due to aberrant expression of crucial regulatory genes. Recently, there has been a surge of evidence for the emerging regulatory mechanisms of long non-coding RNA's (lncRNAs). To explore the underlying connections between ASD neurodevelopment and aberrantly expressed lncRNAs we analyzed RNA-seq data from the temporal cortex of ASD brains with matched controls to identify differentially expressed lncRNA's, the majority of which are functionally uncharacterized. Next, we extracted expression profiles of our candidate ASD associated lncRNAs and known autism risk genes from a comprehensive neurodevelopmental transcriptome dataset. We constructed a weighted gene co-expression network to functionally characterize the candidate lncRNAs in normal tissue, utilizing a guilt by association approach. We found a biologically significant module enriched for processes related to synaptic functioning such as ion channel activity, which also contained the majority of our candidate lncRNAs. In addition, the lncRNAs present in this module show peak neurodevelopmental expression at 10-12 months, a developmentally convergent period in ASD.

Wildlife and Fisheries Biology

Prevalence of six viral and bacterial diseases in wild hogs in South Carolina (2007-2013)

Susan Sullivan, Dr. Patrick Jodice, Dr. Greg Yarrow

Presented by Susan Sullivan (#53)

The wild hog (*Sus scrofa*) is an invasive species that can pose a serious threat to native ecosystems, the domestic livestock industry, and human health. It is estimated that wild hog damage in the United States amounts to roughly \$1.5 billion each year; however, this estimate could substantially increase if wild hogs transmitted a viral or bacterial disease to the country's domestic livestock industry. From 2007-2013, blood and nasal secretion samples were collected from 629 wild hogs in South Carolina to test for 6 selected diseases including classical swine fever, swine brucellosis, pseudorabies virus, porcine circovirus, porcine reproductive and respiratory syndrome, and swine influenza virus all of which can be transmitted to domestic livestock. The sex, age class, and geographic location of each wild hog sampled were also recorded. Results indicate that age class was significantly associated with swine brucellosis, pseudorabies virus, and porcine circovirus prevalence. Over all years sampled, 62.5%, 50.0%, and 92.3% of counties sampled had swine brucellosis, pseudorabies virus, and porcine circovirus prevalences of greater than 10.0%, respectively. Because wild hogs are present in every county of South Carolina, this information is crucial to prevent disease transmission from wild swine populations to domestic livestock or humans.

College of Architecture, Arts and Humanities

Architecture

A Chapel in Clemson University

Shirui Lin, Junichi Satoh, Peter Laurence

Presented by Shirui Lin (#61)

This project discussed the chapel, a spiritual space in Clemson University. It aimed to provide a new experience of relaxation, reflection and meditation for Clemson students. It was designed

based on the concept of inner interstellar, the space transfer in mind. Combining site relationship, light, material and structure, the architecture language was unified a simple pattern. Waving with light and shadow, various feelings happened through the whole visiting process, the tree pool space, the corridor, the entrance, the core space and the roof.

Clemson University Solar Decathlon House: Indigo Pine

Clemson University Solar Decathlon Team

Presented by Alex Latham (Indigo Pine team) (#55)

Every two years the U.S. Department of Energy sponsors the Solar Decathlon competition in Irvine, California. Clemson was selected from universities around the world to design and build a solar home that is cost-effective, energy-efficient, and visually appealing. The competition winner best blends affordability, consumer appeal, and design excellence with optimal energy production and maximum efficiency of their design. Comprised of architecture, engineering, and social science majors, along with dedicated faculty members, Clemson's team will be one of sixteen competitors this fall. Clemson will build and operate their home, Indigo Pine, all within a three-bedroom, 1,000 square feet, net-zero energy, solar house that is cost-efficient in today's market and comfortable in South Carolina and comparable climate zones. Clemson University is altering the competition standards by choosing to "email" the house across the country using only digital files to cut out the structural system using a CNC routing machine. This system, referred to as Sim[PLY], allows Indigo Pine to be built virtually anywhere a CNC is available using off-the-shelf materials while also eliminating the need for large, unsafe machinery in construction. Indigo Pine is challenging the construction and design world to think differently about light wood framing and construction in general.

CyberPLAYce, a Play Space of Creative Intelligent Tools Promoting Personal and Computational Expression for Early Learners

Arash Soleimani, Keith Evan Green

Presented by Arash Soleimani (#64)

CyberPLAYce is a tangible learning tool for children supporting personal and computational expression, and particularly, playful storytelling. CyberPLAYce finds inspiration in the concept of embodied child-computer interaction, where meaning is constructed through spatially reconfiguring the physical environment. This poster briefly outlines the motivations for CyberPLAYce, and focuses on a participatory design and evaluation activity involving 8-10-year-old "co-designers." The kinds of digital-physical-spatial play afforded by CyberPLAYce promise to cultivate thinking, imagining, creating, and sharing in children.

Communication, Technology and Society

Perception of Analog Synthesizer users in regards to social identity and communication

Christoph S. Kresse, Chenjerai Kumanyika

Presented by Christoph S. Kresse (#42)

This exploratory study, and research based creative project explores the analog synthesizer world with focus on organizational structure and perception of social identity. The study will be based on the question of how analog synthesizer enthusiasts share their common artistic and technological beliefs, patterns of practice, ritual, symbolism and meaning but will also address the ways the members communicate and what channels of communications are preferred. The project will yield two tangible products, a documentary film that will explore the environment of

the scene and take a closer look at member's practices and behavior and a scholarly paper that is based on field observations and interviews as well as the researcher's experience. This research project aims to not only bridge the disciplinary gap between performing arts, technology and communication but also will be a contribution to existing explorations of the synthesizer scene. While there are studies and documentaries that are purely focused on the technology, history and artistry, this study will extend the conversation by exploring the organization of the social group, and their perception of identity and channels of communication.

Planning, Design and the Built Environment

Encouraging Engagement with Therapeutic Landscapes: Using Transparent Spaces to Optimize Stress Reduction in Urban Health Facilities

Shan Jiang, Matthew Powers
Presented by Shan Jiang (#50)

Urban mega-hospitals have been built in the way that separated patients from the natural environments. Empirical research on this subject suggests that patients experience physical environment-related stress in such settings due to lack of control and insufficient connectivity with the exterior world. To encourage person-nature engagement in urban health environments, the design of transparent spaces have been proposed to address the existing disconnection between interiors and the therapeutic landscapes. Taking hospital waiting areas for example, it have been rigorously tested regarding to the stress-reducing and mood-changing effects of transparent spaces, using Evidence-Based Design strategies. People's preferences to three types of hospital waiting areas were also surveyed, including (a) hospital waiting areas with no window views, (b) hospital waiting areas with limited window views of nature, and (c) transparent waiting areas with maximum natural views. 95 Clemson students attended the study. Results have shown that transparent spaces performed stronger potentials regarding to the stress-reduction and mood change. In addition, people significantly favored the transparent waiting areas with maximum natural views compared to the other design patterns. Other factors have also been detected that contributed to higher preference, such as direct views to nature, abundant natural light, and non-institutional furniture arrangement.

Professional Communication

What the Learners Need: Building User-Centered Models of Education

Carlisle Sargent, Dr. Sean Williams
Presented by Carlisle Sargent (#69)

Although distance education is a rapidly growing industry, there is a "likeability" problem among both educators and students. This research argues that it is not simply the current design of online courses that frustrates those teaching and taking them, but the pedagogy behind the design. Pedagogical problems in online education are a result of changing needs of current students of higher education, and the challenge of instructors and university administration to meet and adjust to those needs. Students today want online instruction that is relevant and individualized to specific interests, passions, and professional fields. This research will take on a user experience framework, which will put the learner at the forefront of a remediation of traditional online course design. Theories from a number of figures in usability and user experience design, such as Don

Norman, Jakob Nielsen, and Jesse James Garrett will be applied to current online course designs to show the pedagogical gaps that must be filled for the user.

College of Business and Behavioral Science

Applied Psychology

Implicit and Explicit Attitudes Towards Mental Health Treatment

Kandice Goguen, Thomas Britt, Kristen Jennings, Anton Sytine, Stephanie Jeffirs, Allison Peasley
Presented by Kandice Goguen (#70)

The present study assessed implicit and explicit attitudes toward mental health treatment, and whether the different attitude assessments were related to treatment-seeking. Undergraduate students (N=192) completed three Implicit Association Tests (IAT), which were computer-based reaction time tasks where participants responded to terms for mental health and medical treatments that were paired with the attributes good versus bad, effective versus ineffective, and honoring versus humiliating. Survey items assessed explicit ratings of mental health treatment and medical treatment on these attributes, as well as more general attitudes toward mental health treatment. The IAT results revealed a significant negative implicit bias toward mental health treatment as being less effective, good, and honoring than medical treatment. Explicit survey measures also showed more negative responses toward mental health treatment. Some correspondence was also obtained between the implicit biases reflected by the IAT and the explicit biases shown on the self-report survey. Finally, students who had sought mental health treatment had more positive explicit attitudes toward mental health treatment than those who had not sought treatment, but no differences were obtained on the implicit attitude measures. The current study helps to progress research working to reduce stigma towards mental health treatment and increase treatment-seeking behaviors.

Economics

Estimating the Effects of Extended Unemployment Insurance Benefits during the Great Recession: Evidence from Kentucky

Shan Jiang, Curtis Simon
Presented by Shan Jiang (#59)

An important part of the policy response to the Great Recession was a substantial extension of the Unemployment Insurance benefit, from 26 weeks to 99 weeks. This paper attempts to quantify the effect of this extension on the job-finding rates of insured unemployed workers. Using administrative data from the Kentucky Office of Employment and Training for the period January 2006 through December 2011, I construct hazards of exit to employment according to the schedule of policy changes. I use hazard models with several specifications to estimate the effect of the benefit extension on reemployment and to distinguish this effect from the effect of macroeconomic factors. My estimates confirm that increasing unemployment benefits decreases

job-finding rates and prolongs unemployment durations, consistent with the prediction of the standard job search model. My counterfactual results suggest that the extension of the benefit lowered monthly exit hazards by 5 percent, an estimate which is higher than those from the previous literature that uses the Current Population Survey (CPS) to study the Great Recession.

Industrial/Organizational Psychology

Longitudinal Predictors of Self-Reliance for Coping with Mental Health Problems in the Military

Kristen S. Jennings, Cynthia L. S. Pury, Thomas W. Britt, Janelle H. Cheung, and Heidi M. Zinzow
Presented by Kristen Jennings (#48)

Military personnel encounter occupational hazards that make them vulnerable to developing mental health symptoms; however, many soldiers who experience a problem do not seek treatment. A major barrier to treatment is self-reliance, a preference to manage problems oneself rather than seek help from a professional. In the present study, we sought a more comprehensive understanding of factors that contribute to self-reliance. Active-duty soldiers (N = 485) were surveyed at two time points. The sample was 93% male, 67% Caucasian, and most were aged 20-24 (49%). The survey included: factors that affect treatment-seeking, deployment experiences, and mental health symptoms. Results indicated that stigmatizing beliefs about those who seek treatment and negative beliefs about treatment at Time 1 were related to higher preferences for self-reliance at Time 2, while positive beliefs about treatment at Time 1 were related to lower self-reliance. Combat exposure, mental health symptoms, social support for treatment-seeking, and stigma from others were not significant predictors. These results demonstrate that self-reliance may not be unique to combat soldiers and may not diminish as symptoms become severe. Instead one's views of treatment and others who seek treatment may be more impactful, and should be the target of interventions to encourage treatment-seeking.

Management

Disaster Operations Management: an Empirical Study from Thailand

Niratcha Tungtisanont, Aleda V. Roth, Yann B. Ferrand, Thomas A. Mroz
Presented by Niratcha Tungtisanoni (#63)

Disasters have unpredictable and deleterious impacts on modern societies. While recent operations management research has increasingly focused on disaster operations, only a few studies have examined the recovery phase of post-disaster operations. This research presents an overview of Disaster Operations Management as well as an empirical study using econometrics analysis to examine the recovery phase of post-disaster operations. The results suggest that when resources are scarce, at a strategic level we need to understand where to begin when planning the recovery process. This study is an exploratory analysis of the question of how flooding affects per capita income in areas with different levels of industrialization. We developed multiple regression models using panel data from Thailand to examine this effect, finding that flooding in a previous year has a positive effect on areas with a low level of industrialization, but a negative one on highly industrialized areas, meaning the residents of the latter are affected differently. Our results suggest the level of industrialization impacts the effectiveness of the recovery process. Finally, we discuss the implications of the study as well as suggestions for future research.

College of Engineering and Science

Automotive Engineering

Electrically Assisted Augmentation of the Forming Process

Abram Pleta, Harshal Date, Dr. Durul ulutan, Dr. Laine Mears
Presented by Harshal Date (#71)

Fuel economy standards are getting increasingly stringent over time. Automotive OEMs are required to pay penalties to the government if their vehicles fail to meet the CAFE standards. One of the techniques to improve fuel economy is vehicle lightweighting. Hence, OEMs demand their suppliers to individual materials with increased strength to weight ratios. Advanced high strength steels (AHSS) may serve this purpose, but they have poor formability and high springback characteristics. Advanced high strength steels such as TRIP exhibit good formability but their high alloying content adversely affects their weldability and high cost of production makes it infeasible for these materials to be put to use on a large scale. Electrically assisted forming has been proposed as a means of reducing cold stamping tonnage, improved ductility and eliminating springback. The increasing maturity of research on EAF has developed to a point where it can be introduced onto a manufacturing scale. The objective of this project is to study various parameters related to electrically assisted forming and translate a research level idea into a production level process. This will allow introduction of AHSS like Dual Phase steels into the automobile industry and help contribute to overall lightweighting of a vehicle.

Bioengineering

Biofabrication and Evaluation, in vitro and in vivo, of a Dual Responsive Glucose and Lactate Implantable Biosensor in a Piglet Trauma Model

Olukayode Karunwi, Fouzan Alam, and Anthony Guiseppi-Elie, Sc.D.
Presented by Olukayode Karunwi (#74)

With the current state of progress in trauma management by first responders, there is a need for development of an electrochemical biotransducer that can be used with a wireless implantable biosensor system for continual measurement of interstitial glucose and lactate; beginning from the site of the accident and en-route to a trauma center. Fabrication of oxidoreductase enzyme-rich biorecognition membranes deposited via pyrrole electropolymerization at microfabricated electrodes has been achieved. This construct was then electrochemically overoxidized to create a non-conductive enzyme-hosting polymer film and finally the entire biotransducer was coated with a phosphorylcholine-containing biomimetic hydrogel to mitigate biofouling and reduce the foreign body response. A catalytic layer of Ni-hexacyanoferrate placed at the electrode-enzyme interface for enhanced peroxide response produced a 20-fold increase (14.19 nA vs. 0.7 nA) in buffered H₂O₂ measured at 650 mV vs. Ag/AgCl. In vitro characterization showed a sensitivity of 0.68 mA/cm²/mM and 0.36 mA/cm²/mM and a limit of detection of 0.05 mM and 7.9 mM for glucose and lactate respectively.

Optically-Based Strain Measuring Orthopaedic Screw for Fracture Fixation Implants

Nakul Ravikumar, Melissa M. Rogalski, Hunter Pelham, Joshua Lake, Matthew Urban, John D. DesJardins

Presented by Nakul Ravikumar (#52)

In the USA over 28 million musculoskeletal injuries are treated annually, including 2 million fracture fixation surgeries (about 0.5% of the population). Treatment involves mechanical fixation with rods, plates and/or screws which repair slowly, are susceptible to infection, have failure rates of up to 25%, and complication rates as high as 30-60%. Implant infection and loosening are serious concerns, but can currently only be measured through expensive instrumented implants, biopsy culture, or radiographs. None of these directly quantify implant loading and stability however. There is therefore a need for a simple, cost effective way to quantify implant loading and stability in patients. The purpose of our study is to design and evaluate an optically-based strain measuring orthopaedic screw to quantify the change in strain of the implant in-vivo after surgery and monitor the load sharing between the bone and the implant. The screw system developed will be able to quantify clinically-relevant bone healing strains in the range of 10-3000 μ strains, corresponding to 0.2-60 μ m change in length for a 2cm gauge. Through this work, we will be able to develop a unique portable tool for physicians to quantify bone healing rather than relying on less quantitative assessments based on pain and radiography.

Chemical Engineering

Development of Anti-Fouling, Anti-Microbial Membranes by Chemical Patterning

Steven Weinman, Na Li, Viatcheslav Freger, Moshe Herzberg, Scott Husson

Presented by Steven Weinman (#57)

Membranes are a tool that can help provide clean water to people. However, treatment of impaired waters exposes the membranes to feed waters containing biological and abiotic species, which leads to fouling and loss of membrane productivity over time. Since flux reduction due to fouling is one of the largest costs associated with membrane processes in water treatment, new coatings that limit fouling would have significant economic and societal impacts. Prior studies in this area largely have focused on chemical modifications to the membrane surface, which can be effective but not sufficient for controlling biofouling. A more recent area of research is nano-patterning the membrane surface, inspired by nature (i.e., shark skin). Our hypothesis is combining these two methods (chemical coating and patterning) will yield membrane surfaces that are more effective at biofouling control than either method alone. We will introduce the methodology used to coat membrane surfaces with polymer nanolayers designed to combat biofouling and the methodology used to pattern membrane surfaces. We will explain the chemical switching mechanism and use FTIR to support the reversible switching of the polymer nanolayer between its antifouling and antimicrobial states. We will demonstrate the feasibility of the patterning methodology through AFM.

Polymer Sensors for the Quantification of Waterborne Uranium

Christine E. Duval, Ayman F. Seliman, Timothy A. DeVol, Scott M. Husson

Presented by Christine Duval (#47)

Clandestine activities involving the separation, concentration or manipulation of special nuclear material for the express purpose of developing a weapon of mass destruction is likely to result in the contamination of environmental water sources. The capability to conduct isotopic analyses for waterborne special nuclear material, like uranium, would be a powerful nuclear forensics tool.

Despite widespread interest, there currently is no on-line or field-able measurement system available for low-level quantification of uranium in aqueous solutions. A recent development in environmental sensing is a portable, flow cell detector that utilizes extractive scintillating (ES) resin. The ES resin serves the dual purpose of (1) concentrating the radionuclide of interest and (2) serving as a radiation transducer. Currently, such resins are produced by physically absorbing organic extractants and fluors into a polymer matrix. Unfortunately, this approach yields resins with poor stability as the active components leach from the resin over time. This contribution describes our work to increase resin stability by synthesizing ES resin in which the active components are bound covalently within the polymer matrix. The extraction and fluorescence properties of the resin were studied separately before the resin was applied in flow cell detector where detection efficiencies of 40% were achieved.

Alternative Sample Loading Preparation for Thermal Ionization Mass Spectrometry

Scott M. Husson, Brian Powell, David Locklair, and Joe Mannion

Presented by Joe Mannion (#66)

This contribution describes a new sample loading method for Thermal Ionization Mass Spectrometry (TIMS), which is used in nuclear safeguards and non-proliferation efforts worldwide and is known as the “gold standard” in isotopic ratio measurements of plutonium. TIMS analysis is used to determine grades of nuclear material and the extent of enrichment at production sites. The current sample loading method for TIMS analysis is known as “bead-loading”. While it provides the lowest detection limit of any known method for plutonium analysis, bead-loading is a difficult, time consuming, and expensive method that results in up to 20% sample loss. The major encumbrance of the method is the need to manually place a small polymer bead (~40 μm diameter) containing the plutonium sample onto a narrow and fragile ionization filament. We have developed an alternative sample loading method that eliminates the difficult and time-consuming steps by pre-coating the ionization filaments with a thin polymer film. Sample loading times have been reduced from hours to minutes. The films remain stably anchored to the filament, thus preventing sample loss. Ongoing TIMS measurements are testing our hypothesis that the method will increase overall measurement efficiency/sensitivity by isolating the sample in close proximity to the filament.

Chemistry

Modification of polyethylene terephthalate capillary-channeled polymer (C-CP) fiber stationary phase for HPLC separations

Liuwei Jiang and R. Kenneth Marcus

Presented by Liuwei Jiang (#72)

Capillary-channeled polymer (C-CP) fibers have been under investigation and development as stationary phase for high performance liquid chromatography (HPLC) separations for over ten years. They have eight capillary channels extending the whole length of the fibers. This unique shape offers them ~3x greater surface area than that of circular cross-section fibers with the same nominal diameter. When packed into a column, C-CP fibers self-align, yielding a monolith like structure of 1-5 μm open, parallel channels. As a result, C-CP fiber stationary phases exhibit excellent fluid transport properties. In this study, a polyethylene terephthalate (PET) C-CP fiber packed microbore HPLC column was sequentially functionalized. The common biotin-streptavidin affinity pair was used as a demonstration of the basic methodology, wherein biotin was the immobilized ligand. The biotin functionalized PET C-CP fiber column was shown to be able to affinity capture streptavidin from an enhanced green fluorescence protein (EGFP)-spiked E. coli

cell lysate with high selectivity and efficiency. The coupling method used here yields PET C-CP fiber stationary phases with great potential for further functionalization by a variety of ligands and used for different applications.

Civil Engineering

Current Practice of Design, Delivery and Maintenance of Online Training for Transportation Professionals at Public Agencies

Sababa Islam, Mashrur Chowdhury
Presented by Sababa Islam (#75)

Transportation officials need to address the day-to-day challenges of both traffic demands and infrastructure needs to maintain the sustainability of the existing transportation system. While participating in the decision making process, professionals from any public agency (i.e. State Department of Transportation or DOT) need diverse knowledge and dynamic skills to identify any specific points of concern. In order to make the transportation professionals efficient in their job, different public agencies offer online trainings along with the traditional instructor-led courses. These online capacity building courses augment contemporary knowledge and technical skills, which empower professionals to perform their tasks proficiently. Apart from an extensive literature review, this study compiles the outcome of the survey among 10 different state DOTs online training. In addition, this study also summarizes the results from interviewing 6 different state DOTs, of which more than 80 percent, design and develop online trainings for their employees. While outcome of the online survey has provided a general overview regarding online training practiced by state DOTs, the telephone interviews has helped to obtain detailed insight about the design considerations, delivery methods and adopted strategies for developing effective online trainings.

Computer Science

Longitudinal Analysis of Technical Debt for Strategic Platform Adoption

J. Yates Monteith, John D. McGregor, Mike Finney
Presented by J. Yates Monteith (#46)

Increasingly, software producing organizations utilize a common software platform, joining an ecosystem; however, little expertise exists on selecting which platform to use when presented a number of different platforms. While technical debt can be used to examine the quality of a software platform by the organization that produces the software, a single discrete data point does not provide sufficient context for analysis. In this paper, we seek to resolve this difficulty by applying linear regression analysis to technical debt data collected by the SonarQube static analyzer. We apply this method to a case study on Cytoscape network analysis platform to perform a pedagogical investigation on the longitudinal technical debt found in that platform. We present our case study on the longitudinal technical debt in the form of arguments for and against the adoption of the Cytoscape network analysis platform, utilizing the data and analysis generated from our method.

Engineering and Science Education

Multidisciplinary Research Projects as a Pathway for Undergraduate Skill Development: A Pilot Study

Rachel Anderson, Todd Schweisinger, Barbara Speziale, and Julie Martin
Presented by Rachel Anderson (#58)

This poster presents research in progress that is looking to explore the value of multidisciplinary, hands-on research projects within undergraduate mechanical engineering education programs. Developing programs to expand the skills of engineering graduates in order to better meet the needs of industry has become a recent topic of attention for many national organizations as well as education researchers. The overall goal of this research study is to identify outcomes associated with participation in multidisciplinary projects. This study has collected pilot data from students involved in a two year Creative Inquiry project at Clemson University. The multidisciplinary team of mechanical engineering, bioengineering, nursing, and marketing students aspired to develop a stabilization process for pediatric patient's arms during venipuncture procedures, such as drawing blood. Pilot interviews were conducted with past team members who had since graduated and were either employed or pursuing further education. Pilot participants articulated direct links between the skills they developed from the project and their roles in their current careers. The findings of this pilot study have motivated future investigation into the implications of multidisciplinary research as a supplement to traditional mechanical engineering education.

Chemistry Ph.D. Student Experiences

Aubrie L. Pfirman and Julie P. Martin
Presented by Aubrie L Pifman (#43)

This study aims to explore the experiences of graduate students who are in the process of obtaining a Ph.D. in chemistry, as well as to better understand the culture of graduate chemistry programs. This study is important in the field because attrition rates in graduate school have been holding steady around 50% for at least 40 years, despite rising numbers in enrollment. The negative impacts this has on individuals and universities alike are rationale for investigating students' experiences and the interplay with the culture. While socialization and relationship with advisor in graduate school has been shown to be important for graduate student retention, satisfaction, and success, more work needs to be done to expand our understanding with a cultural perspective. My purposes in interviewing chemistry Ph.D. students are to uncover nuances in their experiences with possible connections to frameworks such as Community Cultural Wealth and Funds of Knowledge. My guiding questions throughout my pilot study are: What are the experiences of chemistry graduate students as they obtain their Ph.D.? and what are the various ways that the culture/climate of graduate school and the chemistry department affect the student and have an impact on their experience?

Industrial Engineering

Multiple-Objective Analysis of Integrated Relief Distribution and Network Restoration in Post-Disaster Humanitarian Logistics – Hazus based South Carolina (SC) Case Study

Kasin Ransikarbum and Scott J. Mason
Presented by Kasin Ransikarbum (#60)

In this research, motivated by the 2004 Asian Tsunami, we focus on a large-scale supply network problem during a disaster, known as humanitarian logistics or supply disruption. This is an

emerging research domain gaining recent attention from several research communities. While several works exist in the pre-disaster operations, there is a clear need for research in post-disaster operations. Thus, several issues arise during a post-disaster, such as relief supply distribution and network restoration, are integrated and studied through Operations Research techniques, inclusive of multiple-criteria programming, goal programming, metaheuristics, etc. The poster shows the Multiple-Objective Integrated Response and Recovery (MOIRR) model, which provides an equity- or fairness-based solution for constrained capacity, budget, and resource problems in post-disaster logistics management. Further, a designed experiment for this NP-hard problem is conducted to analyze important aspects of the integrated problem for both small- and large-sized networks: full vs. partial restoration and pooled vs. separate budgeting approaches. Finally, the model is applied to a Hazus-generated regional case study in South Carolina (SC) based on an earthquake scenario and efficient Pareto frontiers are generated to understand the trade-off between the objectives of interest.

Material Science and Engineering

Magnetically Responsive Silicon Carbide Whiskers for Enhanced Nanocomposite Materials

James Townsend, Dr. Ruslan Burtovyy, Dr. Konstantin Kornev, Dr. Igor Luzinov

Presented by James Townsend (#49)

Boeing's 787 Dream Liner, GE's wind turbine blades, and Ferrari's F1 chassis demonstrate the accomplishments of designed directionality in carbon fiber/epoxy composites. The aerospace, energy and transportation industries demand composite material with enhanced multifunctional properties including ultimate strength and toughness. Despite sizeable improvements, composite utilization is limited by the fiber's low surface-area-to-volume ratio (specific surface). Orientation in man-made composites has been the key to effective strengthening of materials under mechanical load and compensating for intrinsic limitations of the current technology. Nanocomposites can drive performance to new heights by increasing the fiber to matrix interaction. Thus far, the embedding of nanomaterials into composites has been achieved, but directional arrangement has proved to be a challenging task. Even with advances in insitu, shear, and stress orientation, these methods are both difficult to control and unreliable, hampering nanocomposite improvements. Therefore, the implementation of nanomaterials with a natural ability to orient along a magnetic field will create a controlled system with precisely designed morphology. To this end, the proposed project has develop an effective approach for the design of magnetically active nanowhiskers to form 2D aligned structures in a polymer matrix, creating novel nanocomposites with enhanced mechanical properties.

Mechanical Engineering

Additive Manufacturing of Carbides using Renewable resources

Monsur Islam, Rodrigo Martinez-Duarte

Presented by Monsur Islam (#67)

We present preliminary experiments leading to novel additive manufacturing of carbides using a biopolymer-metal oxide composite as the precursor material. Renewable biopolymers replace petroleum-based ones as carbon source; and the temperature needed for carbide formation is drastically reduced due the colloidal proximity of the reactants. Additive manufacturing of a precursor gel composite could enable complex shapes, especially those currently challenging for powder pressing or machining of bulk carbides. To this end, we characterized water-based gels

featuring iota-carrageenan (IC) as matrix; cellulose or chitin as fillers; and silica nanoparticles. Composite synthesis featured addition of a mixture of iota-carrageenan and chitin or cellulose to a silica nanoparticle dispersion. . Different 3D shapes were made with the composites by manual extrusion using a syringe. After heat treatment at 1300 °C in a nitrogen environment, carbonaceous 3D shapes were obtained. SEM-EDX, BET and XRD analysis were performed on the carbonaceous samples towards characterizing their composition and geometry. These results reveal a highly porous and amorphous material. Ongoing work is optimizing the heat treatment protocol and implementing a linear motion stage to enable additive manufacturing.

College of Health, Education and Human Development

Applied Health Research and Evaluation

Chronic Condition Predictors of Emergency Room Expenditures Among Uninsured People Aged 45-64

Julie Summey, Lu Shi

Presented by Julie Summey (#73)

Background: Chronic health conditions among the uninsured aged 45-64 are likely to cause high costs for Medicare when these individuals turn 65. The purpose of this study was to explore which chronic conditions are associated with emergency room expenditures among uninsured people aged 45-64 living in the U.S. Methods: We used the MEPS 2012 household component data to estimate the association between specific chronic conditions and ER expenditure (N=1102). To deal with the left-censored distribution of the dependent variable “total ER expenditure,” we used a Tobit regression model to determine which chronic conditions predict ER expenditures among uninsured people aged 45-64. Results: Cardiovascular disease ($\beta=1453.237$, $p=.017$), diabetes ($\beta=2072.317$, $p=.007$), and back problems ($\beta=3215.644$, $p=.000$) were found to be significant contributors to ER expenditure. Kidney disease was marginally significant ($\beta=2805.303$, $p=.060$). Conclusions: ER expenditure signals an inefficient use of health care resources, and ER expenditure beyond age 45 among the uninsured could predict high cost for Medicare. Public health stakeholders should focus on controlling cardiovascular disease, diabetes, and back problems among the uninsured as these conditions are most significant predictors of ER use among the uninsured aged 45-64.

Parks, Recreation and Tourism Management

Bringing Romanticism into urban landscapes: how investment in parks and open green spaces helped revitalize the City of Chattanooga, TN

Bernard M. Kitheka, Dr. Betty D. Baldwin

Presented by Bernard M. Kitheka (#44)

The romantic preservation movement is credited with helping preserve many parks and wilderness areas in the U.S.A. The philosophy behind romanticism espoused respect for nature

and enhancement of its integrity as opposed to fear for nature and the attempts to conquer it. What if those same principles of reverence for nature and ecological integrity were integrated into urban landscapes? There is increasing recognition of the role of proximity to nature in enhancing the wellbeing and quality of life and thus an effort to enhance and bring back green infrastructures urbanized areas. Residents and visitors use such spaces for recreation, connection with nature and also for educational purposes. This research looks at the role of urban parks and other green infrastructures in the rebirth of the City of Chattanooga, TN, once the “dirtiest city in America.” Findings suggest that investment in environmentally-sensitive recreation amenities were pivotal in re-imagining the city.

Interdisciplinary Programs

Policy Studies

Tri-Force Technology Policy Model

Laura Freeman, Bruce Ransom

Presented by Laura Freeman (#54)

I am presenting a new theoretical model that builds upon established policy theory in order to improve understanding of policy development as it relates to new technologies. The Tri-Force Technology Policy Model has been designed to help guide innovators in their quest for policy that reflects an understanding of current technological progress and encourages technological development. The model improves upon previous models by recognizing the inherent conflict present when the dominance of old technologies is challenged by innovation, and recognizes the tendency of people and organizations to act out of self-interest.

