11th Annual
Capitol Graduate Research Summit

February 13, 2014

Featuring Graduate Student Research from:

Kansas State University
The University of Kansas
The University of Kansas Medical Center
Wichita State University

The Graduate Deans and Graduate Students of KU, KUMC, KSU and WSU wish to gratefully acknowledge the support and co-sponsorship of the Capitol Graduate Research Summit from the Kansas Bioscience Organization and its President and CEO, Angela Kreps.

Presenters and Poster Titles

Kansas State University

Megan Brown	GREENHOUSE GAS FOOTPRINTS OF TWO NON-LEGUME COVER CROPS FOLLOWING WINTER WHEAT
Bryan Cafferky	A META-ANALYSIS OF RELATIONSHIP FACTORS IMPACTING COUPLES WITH IPV
Joseph Chapes	ENCOURAGING THE ADOPTION OF E.COLI CONTROL AND PREVENTION STRATEGIES: ANALYSIS OF AN ONLINE TRAINING INTERVENTION
Fariba Fateh	A NONLINEAR CONTROL SCHEME FOR EXTREMUM POWER SEEKING IN WIND TURBINE ENERGY CONVERSION SYSTEMS
Tim Hoffman	GROWTH OF HBN USING METALLIC BORON: ISOTOPICALLY ENRICHED 10BN FOR NEUTRON DETECTION
Joseph Holste	TRANSFER-LENGTH MEASUREMENTS ON CONCRETE RAILROAD TIES FABRICATED WITH 15 DIFFERENT PRESTRESSING REINFORCEMENTS
Keyla Lopez	VALIDATION OF WASHING TREATMENTS TO REDUCE PATHOGENS IN FRESH PRODUCE
Andrew McGowan	IMPACT OF NITROGEN RATE ON NITROUS OXIDE EMISSIONS AND LIFE CYCLE GREENHOUSE GAS EMISSIONS IN SWITCHGRASS-BASED CELLULOSIC ETHANOL
Mohammadreza Mirzahosseini	STUDY OF THE FEASIBILITY OF USING COMBINED GLASS PARTICLE SIZES AND TYPES IN CONCRETE AS PARTIAL CEMENT REPLACEMENT
Lance Noll	A FOUR PLEX REAL-TIME PCR ASSAY FOR DETECTION AND QUANTIFICATION OF ESCHERICHIA COLI 0157 IN CATTLE FECES

University of Kansas

Emily Beck	DECELLULARIZED CARTILAGE HYDROGELS FOR CARTILAGE TISSUE ENGINEERING
Yufei Cheng	ANALYZING GEODIVERSITY AND IDENTIFYING VULNERABILITIES IN OPTICAL NETWORKS
Brittany Hartwell	CELLULAR RESPONSE TO A NOVEL MULTIVALENT POLYMERIC IMMUNOTHERAPY FOR MULTIPLE SCLEROSIS
Sharmin Kader	DEVELOPMENT OF HOSPICE ENVIRONMENTAL ASSESSMENT PROTOCOL (HEAP): A POST OCCUPANCY EVALUATION TOOL FOR HOSPICE BUILDING FACILITIES
Margaret Lloyd	THE DISPARATE IMPACT OF ALCOHOL, METHAMPHETAMINE AND OTHER DRUGS ON FAMILY REUNIFICATION AFTER FOSTER CARE IN KANSAS
Lindsey Ott	BIOMATERIAL DEVICE FOR REPAIRING THE PEDIATRIC AIRWAY
Cynthia L. Taylor & Benjamin Rutt	EVALUATION OF TEXT4BABY PROMOTIONAL EFFORTS IN FINNEY COUNTY AND STATE LEVEL REPLICATION
Yan Xia	DESIGNING INHIBITORS TARGETING RNA-BINDING PROTEIN MUSASHI-1

Cara Busenhart	THE OPPORTUNITY TO ACT LIKE A NURSE: A QUALITATIVE ANALYSIS OF PERCEIVED IMPACT OF SIMULATION ON PROFESSIONAL ROLE TRANSITION
Charles Jehle	ALCOHOL USE DISORDER IN BURN PATIENTS
Bliss O'Bryhim	TYROSINASE ACTIVITY IS ASSOCIATED WITH INCREASED SEVERITY OF OXYGEN-INDUCED RETINOPATHY VIA MODULATION OF DOPAMINERGIC SIGNALING
Greta C. Stamper	AUDITORY RESPONSES IN NORMAL-HEARING, NOISE-EXPOSED HUMAN EARS
Kristin Watt	INVESTIGATION OF THE ROLES OF RNA POLYMERASE SUBUNITS POLR1C AND POLR1D CRANIOFACIAL DEVELOPMENT AND THE PATHOGENESIS OF TREACHER COLLINS SYNDROME

William Choi	DOES MORE ATTENTION IMPROVE LANE-KEEPING PERFORMANCE?
Halil Cobuloglu	AN OPTIMIZATION APPROACH AND ANALYSES TO BIOMASS PRODUCTION WITH AN APPLICATION IN KANSAS
Jake Ellis	MUTUAL INTERFERENCE OF DRIVING AND TEXTING PERFORMANCE
Sarah Fouquet	BEYOND THE CONTENT: THE ROLE OF TEAMWORK AND COMMUNICATION IN PATIENT HANDOFFS
Samantha Jansen	UNDERSTANDING SPEECH IN NOISY CONDITIONS
Eyyub Kibis	A BIO-ECONOMIC OPTIMIZATION MODEL FOR SUSTAINABLE AND LONG-TERM CONTROL OF SERICEA LESPEDEZA (*LESPEDEZA CUNEATA*) INVASION IN THE GREAT PLAINS
Foo Kok	NUMERICAL ANALYSIS OF BLOOD FLOW IN THE HUMAN AORTA AND BYPASS GRAFTS
Ali McKeown	EFFECTS OF ETHNICITY ON HEARING SCREENING FAILURE RATES IN A NEWBORN, WELL BABY CLINIC.
Wilfred Nobleheart	ACTIVE WING SHAPING CONTROL OF A MORPHING AIRCRAFT
Madhulika Srikanth	EVALUATING NANOSAFETY OF NANOMATERIALS BY IN-VITRO CYTOTOXICITY TESTS ON FIBROBLAST CELLS

GREENHOUSE GAS FOOTPRINTS OF TWO NON-LEGUME COVER CROPS FOLLOWING WINTER WHEAT

***Megan Brown**, Peter J. Tomlinson, and Kraig Roozeboom*
Department of Agronomy, Kansas State University

Agriculture practices can affect the production of greenhouse gas emissions. Conflicting studies on the ability of cover crops to alter carbon and nitrogen (N) storage, reduce nitrogen losses and improve crop yields necessitate further study. One understudied loss mechanism is gasses losses of carbon and nitrogen. The objective of this study was to measure CO_2, N_2O, and CH_4 gas emissions from summer and winter non-legume cover crop and chemical fallow treatments planted after wheat. Field plots where established in 2007 at the Kansas State University Experiment Station in Riley County, Kansas to examine the use of different cover crops in a Soybean -Wheat/Cover Crop-Sorghum rotation, with a range of nitrogen fertilizer application rates applied at sorghum planting. Gas flux measurements were measured weekly from polyvinyl chloride (PVC) chambers constructed according to USDA-ARS GRACEnet Project Protocols. Two PVC rings 30-cm diameter 15 tall were installed in each plot to a depth of 10-cm, and used to support soil chambers during measurements. Flux measurements were taken by placing vented chambers on rings and collecting samples at 0, 15, 30, 45 min. Linear regression techniques were used to determine flux rates for each chamber and average flux rates for each treatment were used to calculate total season fluxes.

A META-ANALYSIS OF RELATIONSHIP FACTORS IMPACTING COUPLES WITH IPV

*Nicole Bird, **Bryan Cafferky**, Prerana Dharnidharka, María Dominguez, Nicole Lawson, and Sandra Stith*
Department of Family Studies and Human Services, Kansas State University

Intimate Partner Violence (IPV) is a major public health concern affecting millions of families in the United States each year. Research has focused on gaining a greater understanding of risk factors associated with IPV. A meta-analysis was conducted to identify the relationship factors that counselors should target in working with couples experiencing IPV. This presentation will focus on attachment characteristics, jealousy, and communication skills. Computer database searches were the primary method utilized for identifying articles for inclusion in the study. Over 460 articles were included in a larger meta-analysis, of which this poster proposal is a part. Effect sizes were entered and analyzed using Comprehensive Meta-Analysis Version 2 (Borenstein et al., 2008). Preliminary analyses indicated that jealousy (r = .36) is the strongest risk factor and dismissive – avoidant attachment style (r = .002) is the weakest risk factor for IPV. However, other factors examined varied in their strength, negative relationship communication (r = .28), and anxious-pre-occupied attachment style (r = .16). The poster will also address gender differences, for example, anxious-preoccupied attachment is a significant predictor of female perpetration (r = .34), but not of male perpetration (r = .09). Preliminary findings suggest that attending to issues of attachment, helping clients build trusting relationships, improving communication skills, and increasing overall relationship satisfaction can be important factors in preventing and/or reducing IPV in relationships.

ENCOURAGING THE ADOPTION OF *E. COLI* CONTROL AND PREVENTION STRATEGIES: ANALYSIS OF AN ONLINE TRAINING INTERVENTION

Joseph Chapes[1], *Mylissia Smith Tukey*[2], *and Heidi Yonkey*[2]
[1]*A.Q. Miller School of Journalism, Kansas State University;* [2]*Public Health Program, Kansas State University*

This study explores the effectiveness of health communication strategies in the control and prevention of foodborne diseases. The theory of planned behavior is utilized to analyze an online video training intervention by identifying individual attitudes, norms, perceived behavioral control and intentions of adopting management strategies for *E. coli* among beef cattle producers (n=60). An online questionnaire was used to measure pre-video attitudes, norms, perceived behavior control and intentions regarding *E. coli* in the beef industry before allowing participants to watch an *E. coli* management training video. Next, the questionnaire measured perspectives on the video's content, favored sources for receiving educational information, as well as post-video attitudes, norms, perceived behavior control and intentions. The results showed significant positive changes in respondents' perceptions on *E. coli* and the advocated prevention strategies after viewing the video. Although most of them had not used previously used online training, they found the information disseminated easy to understand. Also, results demonstrated that while beef cattle producers primarily rely on periodicals or veterinarians for management information, many of them identified online sources as the preferred method to receive prevention-related training. Based on the findings of this study online training is an appropriate tool for encouraging the adoption of *E. coli* control strategies among beef cattle producers. The findings also suggest that there is an unmet demand for online training. Further research is, however, is needed to identify the barriers to using online training including accessibility as well as individual characteristics such as level of knowledge and self-efficacy.

A NONLINEAR CONTROL SCHEME FOR EXTREMUM POWER SEEKING IN WIND TURBINE ENERGY CONVERSION SYSTEMS

Fariba Fateh[1], *Warren N. White*[2], *and Don Gruenbacher*[1]
[1]*Department of Electrical and Computer Engineering, Kansas State University;*
[2]*Department of Mechanical and Nuclear Engineering, Kansas State University*

An adaptive control scheme for wind turbine systems has been developed. The role of the controller is to adaptively reach the maximum estimated power coefficient when the wind speed changes. The contribution of this work is that instead of using the dither signal used in previous works, the extremum seeking controller uses fluctuations in wind speed to adaptively maximize the output power. In the proposed control scheme, the wind turbine power coefficient is estimated using a Lyapanov-based adaptive control technique. The estimated power coefficient is used to determine a desired turbine rotor speed based on an estimate of the power coefficient gradient with respect to rotor speed. This control system was developed in a Matlab/Simulink environment, which simulates dynamics of the system from the turbine rotor (using NREL 5MW FAST model), where the kinetic wind energy is converted to mechanical energy, to the generator, which transforms mechanical power to electrical power. The two main control schemes, i.e. power coefficient estimation with rotor speed regulation and desired rotor speed calculation based on maximizing the estimated power coefficient, have shown robust dynamic behaviors. The NREL FAST numerical results demonstrated the validity and robustness of the developed control scheme.

GROWTH OF HBN USING METALLIC BORON: ISOTOPICALLY ENRICHED ^{10}BN FOR NEUTRON DETECTION

Tim B. Hoffman[1], *Ben Clubine*[1], *Kyle Snow*[1], *Yichao Zhang*[1], *M.D. Tashfin Hossain*[1], *J.H. Edgar*[1], *Jeffrey Geuther*[2], *and Tyrel George*[2]

[1]*Department of Chemical Engineering, Kansas State University;* [2]*Department of Mechanical & Nuclear Engineering, Kansas State University*

Due to the increasing scarcity of ^{3}He for gas detectors there is a growing need for a highly sensitive neutron detector with high gamma radiation discrimination. Hexagonal boron nitride (hBN) has recently shown promise as a solid-state neutron detector due to the development of a growth technique for bulk hBN single crystals using a Ni-Cr solvent. Our research modified this technique to allow for the growth hBN single crystals from metallic boron sources. Crystals were precipitated through cooling of a molten metal solution composed of Ni, Cr and B under nitrogen flow at high temperatures and atmospheric pressures. This process facilitates the growth of hBN from enriched ^{10}B and ^{11}B sources. ^{10}B enrichment of hBN detectors should improve neutron capture efficiency up to a factor of five thereby decreasing the hBN single crystal thickness needed to produce a full neutron interaction spectrum. Crystals grown using this process were extracted from the metal surface using a thermal release tape exfoliation technique. This technique produced free crystal layers, which could then be employed as freestanding crystals or transferred onto an arbitrary substrate. Confirmation of isotopically pure hBN was tested by shifts in the Raman spectra peak. Metal contacts were deposited onto the surface of crystals to allow for electrical characterization and neutron response measurements. Finally, enriched h(^{10}B)N and h(^{11}B)N crystals were tested under neutron flux and compared to previously measured spectra produced by natural hBN to confirm the benefits of isotopic enrichment.

TRANSFER-LENGTH MEASUREMENTS ON CONCRETE RAILROAD TIES FABRICATED WITH 15 DIFFERENT PRESTRESSING REINFORCEMENTS

Joseph R. Holste[1], *Robert J. Peterman*[1], *Naga Narendra B. Bodapati*[1], *B. Terry Beck*[2], *and Chih-Hang John Wu*[3]

[1]*Department of Civil Engineering, Kansas State University;* [2]*Department of Mechanical and Nuclear Engineering, Kansas State University;* [3]*Department of Industrial and Manufacturing Systems Engineering, Kansas State University*

A study was conducted at Kansas State University to determine the correlation between tensioned-wire pullout tests and the corresponding transfer lengths in prestressed concrete railroad ties. Five different 5.32-mm-diameter pre-stressing wires were selected to be used on this project based on previous testing conducted at Kansas State University (KSU). The wires were tested to simulate the transfer-length bond. The transfer-length bond test involved tensioning each of the wires to 75% of their ultimate capacity, casting concrete around each wire and then de-tensioning the wire when the concrete had reached 4,500 psi. End-slip and force measurements were recorded on both sides of the specimen as the wire was de-tensioned. Transfer bond data was used to investigate the transfer length that each wire type would expect to see in a concrete railroad tie. Prisms with each wire type were cast and the transfer length was measured for each type of wire. Prism end-slip measurements were used along with the transfer bond data to correlate a relation between the transfer bond test and the transfer lengths of the prisms.

VALIDATION OF WASHING TREATMENTS TO REDUCE PATHOGENS IN FRESH PRODUCE

Keyla Lopez[1], *Kelly J.K. Getty*[1], *and Christopher I. Vahl*[2]
[1]*Food Science Institute, Kansas State University;* [2]*Department of Statistics, Kansas State University*

Many fresh produce outbreaks are the result of *Salmonella* and *Escherichia coli* O157:H7 contamination due to growing conditions or human handling. The purpose of this study was to determine the efficacy of a commercial wash solution for reducing pathogens in green leaf lettuce and tomatoes. Lettuce (25 ± 0.3g) and tomato samples were inoculated with *E. coli* O157:H7 (~7.8 log CFU/ml) and *Salmonella* spp. (~9.39 log CFU/ml), respectively. Inoculated samples were washed separately with commercial wash solution (contains citric acid and grapefruit oil) or tap water (control) for three contact times (30, 60, and 120 s). Lettuce (25 ± 0.3g) and tomato (core of 11.34 cm^2) samples were diluted and stomached for 1 min and then 0.1 ml was plated onto CT-SMAC and XLD agar plates for *E. coli* O157:H7 and *Salmonella* recovery. Experiment consisted of three replications and two samples per treatment (n=6). Recovery of *E. coli* O157:H7 populations on leaf lettuce were different ($P<0.05$) between commercial wash solution and cold tap water. There were no differences ($P>0.05$) between commercial wash and tap water in *Salmonella* populations recovered from tomatoes samples. Commercial wash solution reduced *E. coli* O157:H7 populations by 3.0 logs on leaf lettuce and *Salmonella* populations by >2.0 logs on tomatoes for all contact times. The commercial wash solution is applicable for food service and home-use and would reduce risk of pathogens on produce.

IMPACT OF NITROGEN RATE ON NITROUS OXIDE EMISSIONS AND LIFE CYCLE GREENHOUSE GAS EMISSIONS IN SWITCHGRASS-BASED CELLULOSIC ETHANOL

Andrew McGowan *and Charles Rice*
Department of Agronomy, Kansas State University

The 2007 Energy Independence Security Act mandates the production of 16 billion gallons per year of cellulosic biofuel by 2022. These biofuels will be required to have life cycle assessment (LCA) greenhouse gas (GHG) emissions 60% below gasoline. Switchgrass is one potential feedstock for the production of cellulosic ethanol. Emissions of the GHG nitrous oxide (N_2O) from soils treated with nitrogen fertilizer could negatively impact the GHG balance of biofuels. The objectives of this study were to 1) measure the yield and N_2O emissions from switchgrass receiving different rates of N fertilizer and 2) determine the impact of these emissions on the LCA GHG emissions of switchgrass-based ethanol. Annual N_2O emissions were measured from switchgrass receiving different N rates. Measured yields and N_2O emissions were used as inputs in the GREET LCA model to simulate the life cycle GHG emissions of switchgrass-based ethanol. Nitrogen rate increased switchgrass biomass by an average of 20 kg / ha per kg N applied. Increasing nitrogen rate caused substantial increases in the LCA GHG emissions of switchgrass-based cellulosic ethanol. Much of the increase was due to increased N_2O emissions, which accounted for 58% of total LCA GHG emissions in switchgrass receiving 150 kg N / ha. LCA GHG emissions of ethanol were lower than emissions from gasoline at all N rates. Increased N rates increased yield but also substantially increased the GHG balance of switchgrass-based ethanol. Optimal N management will be key in maximizing GHG savings from the use of switchgrass for cellulosic ethanol production.

STUDY OF THE FEASIBILITY OF USING COMBINED GLASS PARTICLE SIZES AND TYPES IN CONCRETE AS PARTIAL CEMENT REPLACEMENT

Mohammadreza Mirzahosseini *and Kyle A. Riding*
Department of Civil Engineering, Kansas State University

Finely ground glass has the potential of pozzolanic reactivity, and can serve as a supplementary cementitious material (SCM). The uniform composition, amorphous nature, and high silica content of glass make it ideal for studying effects of glass type and particle size on reactivity at different temperatures. This study focuses on determining how combining glass types and particle sizes affects the microstructure and performance properties of cementitious systems containing glass cullet as a SCM. In this study, the reaction rate, pozzolanicity, and hydration degree quantification of four sets of combined glass types and sizes have been investigated using isothermal calorimetry, thermogravimetric analysis (TGA), and analysis of scanning electron microscope (SEM) images. Moreover, compressive strength tests were performed to correlate reactivity of cementitious materials containing glass to its performance. The results show that combined glass can increase reaction rate and have pozzolanic properties, especially when particles below 25µm of clear and green glass were used at curing teperature of 50°C. Additionally, at elevated curing temperatures the combined glass was able to increase the compressive strength of the mortar samples. Glass cullet is a very temperature-sensitive supplementary cementitious material. Additionally, glass pozzolanic reactivity is a linear function of surface area, reflecting that the surface area would be a significant factor affecting glass cullet reactivity. Combined glass cullet, especially glass below 25µm in diameter, can be used as an effective SCM.

A FOUR PLEX REAL-TIME PCR ASSAY FOR THE DETECTION AND QUANTIFICATION OF *Escherichia coli* O157 IN CATTLE FECES

Lance W. Noll*, Pragathi B. Shridhar, Xiaorong Shi, Baoyan An, T.G. Nagaraja, and Jianfa Bai*
Department of Diagnostic Medicine/Pathobiology, Kansas State University

Cattle are asymptomatic reservoirs for Shiga toxin-producing *Escherichia coli* O157:H7, a major food borne pathogen. Typically, the organism colonizes the hindgut and is shed in the feces, which serves as a source of contamination of food products. Culture-based detection and quantification methods have been low-throughput and time-consuming. The objective was to develop a multiplex, real-time quantitative PCR (mqPCR) assay for the detection and quantification of *E. coli* O157 in cattle feces based on genes that code for the serogroup specific O157 antigen (*rfbE* O157) and three major virulence factors, Shiga toxins 1 and 2 (*stx*1 *and stx*2) and intimin (*eae*). Primer and probe concentrations were optimized with extracted DNA from a strain of O157 (ATCC 43894) containing all four genes. Sensitivity of the assay was determined with extracted DNA from serial ten-fold dilutions of *E. coli* O157 ATCC 43894 cultured. In pure culture, the minimum detection limit of the assay was $3.1X10^3$ CFU/mL. Serial dilutions of pure cultures of *E. coli* O157 strains (ATCC43889 and ATCC 43894) spiked in cattle feces were prepared to determine applicability of the assay to quantify the organism. Sensitivity of the mqPCR assay from spiked fecal samples was determined. The detection limit of the mqPCR assay for *E. coli* O157 (ATCC 43894) with DNA extracted directly from cattle feces was $7.8x10^4$ CFU/g. However, after six-hour enrichment, sensitivity increased to $3.3x10^0$ CFU/g. The assay targeting the four genes has the potential to be a high-throughput method for detecting and quantifying *E. coli* O157 in cattle feces.

DECELLULARIZED CARTILAGE HYDROGELS FOR CARTILAGE TISSUE ENGINEERING

Emily Beck[1], *Sarah Kieweg*[1,2], *Stevin Gehrke*[1,3], *Cory Berkland*[1,3], *and Michael Detamore* [1,3]

[1]*Bioengineering Program, The University of Kansas;* [2]*Department of Mechanical Engineering, The University of Kansas;* [3]*Department of Chemical and Petroleum Engineering, The University of Kansas*

Arthritis is the leading cause of disability among U.S. adults, and yet surprisingly, current therapies fail to effectively treat cartilage damage. Instead, treatment primarily involves reducing symptoms or a complete joint replacement. Thus, tissue engineering is aspiring to regenerate cartilage by providing a biocompatible and biodegradable construct that provides the structural integrity of the native cartilage and facilitates cartilage cell growth. Promising materials for these constructs are hydrogels, which are water-swollen, crosslinked polymer networks. However, one of the drawbacks of hydrogels is they are prone to leaking from the defect site after implantation. Additionally, the hydrogel composition leads to drawbacks. Hydrogels can be made of natural or synthetic materials. Synthetic materials allow for fine-tuning mechanical performance, which is crucial since articular cartilage is a load-bearing tissue. However, synthetic materials can be toxic and lack cell recognition cues that facilitate cartilage regeneration. Natural materials are more biocompatible and more likely to contain these cell cues, but in general they have poor mechanical strength. To address these drawbacks, my research involves designing gel pastes composed of decellularized cartilage (DCC). The pastes are ideal because they allow the gel to set in place once implanted. Furthermore, by utilizing DCC, I am actually engineering tissues with the building blocks of native cartilage, which not only results in a crosslinked hydrogel mechanically similar to native cartilage, but also a material that promotes cell attachment and differentiation. Ultimately, this technology may lead to improving the clinical translation of hydrogels for arthritis treatments.

ANALYZING GEODIVERSITY AND IDENTIFYING VULNERABILITIES IN OPTICAL NETWORKS

Yufei Cheng, *Junyan Li, and James P.G. Sterbenz*

Department of Electrical Engineering & Computer Science, The University of Kansas

With the increasing frequency of natural disasters and intentional attacks that challenge the telecommunication network, network vulnerability to cascading and regional-correlated challenges is escalating. Given the high complexity and large traffic load of the optical networks, the correlated challenges have devastating effects on the capacity and connectivity of the network topology. In this work, we propose two network vulnerability identification mechanisms and determine the different vulnerability scale in real-world optical networks. We propose geographical diversity and incorporate geographical diversity into a new graph resilience metric cTGGD (compensated geographical graph diversity), which is capable of characterizing the resiliency of the network topologies. This way we can effectively compare the resilience level of different topologies under regional-based network failures and have shown to be an effective physical resilience level indicator for different optical networks. We present the GeoDivRP routing protocol that takes geographical diversity of physical network topology into consideration when making routing decisions and increases the responsiveness of routing to different regional-correlated challenges. It increases the resiliency level of physical networks against area-based challenges by exploiting nodes' multiple ingress and egress ports. It shows better performance compared to OSPF when the network is subject to area-based challenges since the end nodes have access to multiple geographically diverse paths for their communication.

CELLULAR RESPONSE TO A NOVEL MULTIVALENT POLYMERIC IMMUNOTHERAPY FOR MULTIPLE SCLEROSIS

Brittany Hartwell[1], *Joshua Sestak[2], Bradley Sullivan[2], Jun Chen, David Moore[3], Heather Shinogle[3], Teruna Siahaan[2], Cory Berkland[2,4]*

[1]Bioengineering Program, The University of Kansas; [2]Department of Pharmaceutical Chemistry, The University of Kansas; [3]Microscopy and Analytical Imaging Lab, The University of Kansas; [4]Department of Chemical and Petroleum Engineering, The University of Kansas

Multiple sclerosis is the leading neurological disease and cause of disability in young adults worldwide. The disease manifests when the myelin sheath surrounding axons undergoes an autoimmune attack, causing chronic inflammation, demyelination, and subsequent axonal and neuronal injury. Many current therapies for multiple sclerosis (MS) are not effective in specifically targeting the disease, but instead act systemically on the general immune response and can cause many harmful side effects. There is a pressing need for therapies that are safer and more effective at targeting the source of the disease. The Berkland lab at the University of Kansas has developed therapeutic molecules called Soluble Antigen Arrays (SAgAs) that we believe satisfy this need by acting only on the auto-reactive immune cells involved in the self-attack response. SAgAs are designed to interrupt signaling between T cells and antigen presenting cells in the peripheral lymph, thereby blocking the cascade of autoreactive T cell activation, differentiation, and proliferation that ultimately leads to myelin degradation. The polymer array design consists of two peptides, specific for cell receptors involved in the signaling reaction, conjugated onto a hyaluronic acid polymer backbone chain. This therapy has proved effective in animal studies at treating and preventing disease. We are pursuing in vitro cell studies to determine the molecule's therapeutic mode of action – to investigate our hypothesis that T cells and antigen presenting cells are involved and that the SAgA-cell interaction is specific. Our results indicate that we have the potential to develop an improved treatment for multiple sclerosis that is safer and more effective than current therapy options.

DEVELOPMENT OF HOSPICE ENVIRONMENTAL ASSESSMENT PROTOCOL (HEAP): A POST OCCUPANCY EVALUATION TOOL FOR HOSPICE BUILDING FACILITIES

Sharmin Kader

Department of Architecture, The University of Kansas

The Post Occupancy Evaluation (POE) of any building facilities is essential for providing information to the architects about the performance of their designs, and to the building owners to achieve the best out of what they already have. Since the beginning of hospice movement in America, the mid-1970s, the hospice design has been considered similar to a nursing home. Also, hospice facilities have been using the same post occupancy evaluation instruments that are developed for use in nursing home. But in recent years, several studies have found that the environmental need of hospice is quite different than the nursing homes because of the following reasons: a) hospice patients are terminally ill and mostly bed-bound who are not able to walk around in the entire facility; b) their physical, social and spiritual demands are different; c) overnight accommodations for patients' family plays a significant role in patients' satisfaction; and d) the environment needs to be supportive to accommodate the event of death. All these reasons have created a significant gap in the usefulness of nursing home's POE tool in a hospice. So, the need for developing a POE tool for hospice facilities is evident, and this study has focused on fulfilling that goal with two objectives; a) to identify the 'Therapeutic Goals' of hospice environments; and, b) to develop a Hospice Environmental Assessment Protocol (HEAP). Research design has considered multi-method qualitative research: a) a systematic literature review to identify the therapeutic goals and developing the tool; b) the Delphi method to obtain experts opinion to modify the tool; and c) the case study survey to verify the tool in the physical settings.

THE DISPARATE IMPACT OF ALCOHOL, METHAMPHETAMINE AND OTHER DRUGS ON FAMILY REUNIFICATION AFTER FOSTER CARE IN KANSAS

Margaret Lloyd

School of Social Welfare, The University of Kansas

In the child welfare system, knowledge of risk factors is vital to improving service delivery, and in turn reunifying children with their families of origin quickly and safely. Parental substance abuse is the single most prominent reason that children enter foster care in Kansas. The relative role of substance type in delaying reunification has remained elusive. This study sought to understand the impact of parental use of alcohol, methamphetamine, other drugs, and poly-substances on reunification rates for children in Kansas foster care placement. This study used administrative foster care data from Kansas between years 2007 and 2012 to evaluate the unique contribution of each substance use domain. Results suggest that parental methamphetamine use has the most significant impact on time to reunification [Wald(1)=9.72, p=.002, O.R. =.781], followed by other drugs [Wald(1)=13.94, p<.001, O.R.=.879], and poly-substances [Wald(1) =5.20, p=.023, O.R.=.881]. These findings further indicate that children removed due to any parental drug use stay in foster care an average of 49-156 days longer than their peers. Nationally, family dependency drug courts are a best practice for handling these complicated cases, however Kansas has not yet adopted this collaborative model. Implementing family dependency drug courts to provide appropriate treatment to child welfare involved parents will be important to keeping Kansas families together.

BIOMATERIAL DEVICE FOR REPAIRING THE PEDIATRIC AIRWAY

Lindsey Ott[1], *Natalie Walker*[2], *Ashley Farris*[2], *Katrina Fox*[4], *Mark Weis*[5], *Robert Weatherly*[6], *and Michael Detamore*[1,3]

[1]*Bioengineering Program, The University of Kansas;* [2]*Biomaterials & Tissue Engineering Lab, The University of Kansas;* [3]*Department of Chemical and Petroleum Engineering, The University of Kansas;* [4]*Animal Health Center, Hays, KS;* [5]*Department of Anatomy and Physiology, Kansas State University;* [6]*Children's Mercy Hospital, Kansas City, MO*

Sometimes infants and toddlers develop a narrow windpipe (or trachea). This can be acquired, through injury from a breathing tube or external factors, or can be congenital. Currently, surgeons treat this condition with balloon dilation, augmenting the airway with the child's own rib cartilage, or a specialized surgical procedure called slide tracheoplasty. These treatment methods do not always guarantee successful recovery, especially in cases where a large portion of the trachea is affected. Through collaboration with a pediatric ENT surgeon, we developed a biomaterial implant that can augment the trachea and alleviate the child's symptoms. Our approach uses biodegradable medical polymers spun into ultrafine fibers, creating a mesh-like material, which is ideal for cells to populate and grow into. Polymeric rings are inserted into the fiber mesh to reinforce the tube structure. Variations of the device include adding stem cells or specialized chemicals (or growth factors) to enhance tissue growth in the material. This device has been tested in vitro (with cells) and in vivo (with living organisms) and we have observed cell growth into the material and open airways in our animal models. We are in the process of improving and modifying the device, with plans to advance to patients in the future. Our end goal is to provide surgeons with tools and materials to improve patient outcomes and to ensure that children affected by airway stenosis have a long and quality life.

EVALUATION OF TEXT4BABY PROMOTIONAL EFFORTS IN FINNEY COUNTY AND STATE LEVEL REPLICATION

Cynthia L. Taylor and Benjamin Rutt

The Center for Public Partnerships and Research, and Department of Psychology and Research in Education, The University of Kansas

New parents must learn a wide variety of information to raise a healthy child. Delivering this information to parents living in poverty is an ongoing challenge. Text4baby addresses this need by promoting maternal and child health through text messaging. Research has demonstrated that participating in text4baby is associated with many beneficial outcomes, including increased awareness of medical warning signs, increased attendance of medical appointments, and increased communication with healthcare providers. The purpose of this study was to evaluate the effectiveness of promotional efforts such as movie theater ads, billboards, and brochures in increasing text4baby enrollment in one Kansas community (Finney County). We found that these promotional efforts significantly increased text4baby enrollment at the local level. We then disseminated these promotional efforts across the state and evaluated their effectiveness at the state level. Through a competitive grant funded by Kansas Project LAUNCH and the Kansas Early Childhood Advisory Council, we awarded $40,036.00 to 54 Kansas counties in increments of $500 to $1000. 50 Kansas counties who did not receive the grants served as the control group. We analyzed monthly text4baby enrollment statewide using a two-level hierarchical multilevel model (Level 1 = monthly enrollment; Level 2 = counties). After the grants were awarded, monthly text4Baby enrollment significantly increased in the 54 counties that received the grants, $t\ (106.460)$, $p < .001$.There was no significant difference in monthly text4Baby enrollment between the grantee and non-grantee counties before the grants were awarded, $t\ (105.696) = 0.685$, $p = .495$.

DESIGNING INHIBITORS TARGETING RNA-BINDING PROTEIN MUSASHI-1

Yan Xia, *Ragul Gowthaman, Lan Lan, Jia Yu, Bryan Tsao, Liang Xu, John Karanicolas*

Department of Molecular Biosciences and the Center for Bioinformatics, The University of Kansas

RNA-binding proteins (RBPs) are proteins that bind to the single or double stranded RNAs. RBPs play important roles in various cellular processes, such as mRNA stabilization, translation and localization. Virus, such as HIV and HBV, also rely on RBPs in the course of their life cycles. Due to the versatile roles of RBPs, they are involved in numerous human diseases and accordingly inhibiting them represents an intriguing new therapeutical strategy. The main challenge of using RBPs as targets for therapeutic intervention, however, is to design small molecules that interact specifically with only the desired target. Current methods mostly focus on using nucleoside analogues that resemble naturally occurring nucleosides, but these are typically not specific and frequently lead to side effects. We propose to solve this specificity problem by mimicking the *interactions* between RNA and RBPs, rather than just the chemical structure of a single nucleoside. To accomplish this mimicry, we developed a computational framework that extracts from the structure of RNA-RBP complexes a pharmacophore that corresponds to the interaction “hotspot.” We can then computationally screen for small molecules that mimic this pharmacophore, which we expect will specifically inhibit the target RNA-protein interactions. This methodology aims to recapitulate the protein-RNA interactions by using the RNA molecule as a template, and therefore avoids the challenging task of computationally designing new interactions from scratch. Using this methodology, we have identified new small molecule inhibitors of Musashi-1, an RNA-binding protein that contributes to tumorigenesis in humans. Through biochemical and cell-based assays, we have demonstrated that these small molecules can bind to and block the *in vivo* function of Musashi-1. We are now optimizing these compounds through medicinal chemistry efforts, and also applying our computational tools to identify inhibitors of several other RNA-binding proteins of therapeutic relevance.

THE OPPORTUNITY TO ACT LIKE A NURSE: A QUALITATIVE ANALYSIS OF PERCEIVED IMPACT OF SIMULATION ON PROFESSIONAL ROLE TRANSITION

Cara Busenhart, MSN, APRN, CNM[1], *Shirley Waugh, MSN, RN*[1], *Mary Meyer, MS, RN, APRN*[1], *Karen Groller, MSN, RN-BC, CMSRN*[1,2], *Sarah Meyers, MS, APRN, CCRN*[1], *and Kristin Stegenga, PhD, RN*[1,3]

[1]*School of Nursing, University of Kansas;* [2]*Department of Nursing, Moravian College;* [3]*Children's Mercy Hospital*

Simulation based training provides healthcare students opportunities to practice and learn in an environment where patients are not at risk. Additionally simulation allows exposure to high-risk, low-frequency care situations. Simulation is used to augment traditional pedagogies despite gaps in what is known about learning transfer. This study aimed to describe new registered nurses' perceptions of the experience of simulation and its' impact on learning and skill development. This descriptive qualitative study used content analysis and semi-structured interviews with 19 new nurses from two geographical locations in the United States including Kansas. We explored the impact of simulation on skill development for clinical practice and defined the challenges and benefits of simulation from the learner perspective. A metaphor of simulation as a theatrical play with three underpinning themes emerged. In Theme 1: *Setting the Stage*, participants described the components of simulation to include how the stage was set, their acting roles, and efforts made to achieve realism. Theme 2: *The Performance*, described how the RNs viewed simulation participation within four sub-themes: *The Performance, Some Actors Have Stage Fright, Acting Like a Nurse,* and *The Audience (Observer Role).* In Theme 3: *Faculty as Directors*, the participants described the faculty role to include pre-simulation preparation, directing the simulation experience, and debriefing. In conclusion, nurses identified simulation encounters as effective learning experiences that augmented classroom and clinical experiences. *Acting Like a Nurse* during simulation prepares students to better care for patients in both student and professional nurse roles, thus providing safer care for Kansans.

ALCOHOL USE DISORDER IN BURN PATIENTS

Charles Jehle, BS[1], *Niaman Nazir, MBBS*[2], *and Dhaval Bhavsar, MD*[3]

[1]*Medical Student, University of Kansas Medical Center (KUMC);* [2]*Preventative Medicine and Public Health, KUMC,* [3]*Department of Plastic Surgery and Burns, KUMC*

Alcohol use disorders (AUD), including alcohol abuse and alcohol dependence, may lead to increased medical and financial burdens in the hospital. We investigated 716 adult patients admitted to our burn center from 2009 to 2012. Incidence of AUD in our burn patients was compared against national general population rates using chi-square tests. Additionally, the burn patient population was analyzed using bivariate analysis and t-tests to find differences in complications and outcomes associated with AUD. The incidence of AUD was 18.7% for our study sample versus 8.5% for general population. This increase in incidence for AUD was seen in both genders and across every age category in burn patients compared to general population (P=0.9709, P=0.0632). Increased incidence was found across all races except Asian (P=0.03). Analysis of the burn patient population shows patients with AUD were comparable to controls demographically, except for gender, where males were a greater portion of AUD patients (P<0.0001). Both groups had comparable burn sizes and rates of inhalation injury (P=0.74, P=0.0630). The average number of comorbidities was actually greater in the control population (P=0.0216) with higher rates of cardiac problems, diabetes and hypertension (P=0.0214, P=0.0135, P=0.0086). Despite this, the AUD population had more complications and stayed longer in the hospital (P=0.0005, p=0.0053). People with AUD are overrepresented in burn units compared to the general American population. These patients stay longer in the hospital, often require detox and tend to have more complications, which result in higher cost.

TYROSINASE ACTIVITY IS ASSOCIATED WITH INCREASED SEVERITY OF OXYGEN-INDUCED RETINOPATHY VIA MODULATION OF DOPAMINERGIC SIGNALING

***Bliss O'Bryhim*[1,2]*, Jeff Radel*[3]*, R.C., and Andrew Symons*[1,2,4,5]
[1]*Department of Ophthalmology,* [2]*Department of Molecular and Integrated Physiology,* [3]*Department of Occupational Therapy Education, University of Kansas Medical Center,* [4]*Department of Surgery (RMH), The University of Melbourne, VIC, Australia,* [5]*Department of Ophthalmology, Royal Melbourne Hospital, Parkville, VIC, Australia*

Retinopathy of prematurity (ROP) is a leading cause of blindness in children. Prior work identified tyrosinase (*Tyr*) as a candidate gene associated with severity of oxygen-induced retinopathy (OIR), the murine model of ROP. We hypothesize that *Tyr* increases disease severity via dopamine production. To test this hypothesis, *Tyr*-null c-2J and wild-type (WT) mice were exposed to 75% oxygen for 120 hours, beginning on post-natal day 7 (P7). Mice were returned to normoxia on P12 and euthanized on P12, P13 or P16. Serum samples were collected to quantify dopamine by HPLC. Additional mice were exposed to OIR and injected with dopamine (50 mg/kg), dopamine antagonist SCH39166 (3 mg/kg), or saline on P11. Mice were euthanized 24 hours later and perfused with fluorescein-labeled dextran to allow measurement of retinal avascular area. *Tyr*-null c-2J mice had improved revascularization from P12 to P16 compared to WT mice (2.80 versus 3.12 mm^2, $p = 0.05$, on P12; 0.94 vs. 1.81 mm^2, $p = 2.5 \times 10^{-10}$ on P16, respectively). c-2J mice had reduced dopamine concentrations compared to WT (0.75 vs. 2.92 ng/mL serum, $p = 0.05$). Dopamine administration reduced retinal revascularization in both WT (3.71 vs. 3.43 mm^2, $p = 0.01$) and c-2J strains (3.28 vs. 2.96 mm^2, $p = 0.006$). Administration of a dopamine antagonist improved revascularization in WT mice (3.69 vs. 4.04 mm^2, $p = 0.029$). These data identify a mechanism by which *Tyr* exacerbates OIR outcome. Furthermore, our study supports clinical data that children requiring dopamine treatment are at increased risk of ROP. Future studies will investigate the mechanism by which dopamine modifies angiogenesis as these findings likely apply to other diseases such as diabetic retinopathy and neoplastic disease.

AUDITORY RESPONSES IN NORMAL-HEARING, NOISE-EXPOSED HUMAN EARS

Greta C. Stamper*, and Tiffany A. Johnson*
Department of Hearing and Speech, University of Kansas Medical Center

Noise-induced hearing loss is a prevalent condition affecting approximately 15% of Americans 20-69 years old and is characterized by changes in hearing following exposure to loud sound. A common perception is that if hearing recovers over time, no residual auditory damage exists and the temporary hearing loss has been essentially harmless. Recent investigations involving animal models have challenged this viewpoint and provide evidence that suggest exposure to loud sound is considerably more dangerous than previously believed. Furthermore, these investigations argue that clinical testing protocols are insensitive to detecting early evidence of noise-induced auditory damage. However, more research is necessary prior to generalizing these findings to the human ear. This research project investigated the relationship between noise exposure history and auditory responses in normal-hearing, noise-exposed human ears. Two commonly used clinical tests, the distortion-product otoacoustic emission response and the auditory brainstem response, were used to measure auditory function across a range of stimulation levels. Results indicated that smaller auditory brainstem responses were found in individuals who had greater amounts of noise exposure background, providing evidence that noise exposure may damage high-threshold auditory nerve fibers in humans. This finding is of clinical importance because data from the present study could be used to identify an assessment approach for early detection of noise-induced auditory damage. This would allow for procedures to be initiated that prevent or mitigate further auditory impairment.

INVESTIGATION OF THE ROLES OF RNA POLYMERASE SUBUNITS POLR1C AND POLR1D IN CRANIOFACIAL DEVELOPMENT AND THE PATHOGENESIS OF TREACHER COLLINS SYNDROME

Kristin Watt[1,2], *Annita Achilleos*[1], *and Paul Trainor*[1,2]

[1]Stowers Institute for Medical Research, Kansas City, MO, USA; [2]Department of Anatomy and Cell Biology, University of Kansas Medical Center, Kansas City, KS, USA

Treacher Collins Syndrome (TCS) is a craniofacial disorder affecting approximately 1 in 50000 live births and is characterized by deformities of the facial bones, eyes, and ears. TCS is associated with mutations in *TCOF1, POLR1C,* and *POLR1D.* Mutations in *TCOF1* are known to disrupt the development of neural crest cells, a migratory stem and progenitor cell population which generate most of the cartilage, bone, and connective tissue of the head and face. Disruption of *POLR1C* and *POLR1D,* subunits of RNA polymerases I and III, are also known to cause TCS; however, little is known about the function of these genes during embryogenesis or in the pathogenesis of TCS. We are using two zebrafish models, which carry a mutation in *polr1c* or *polr1d* to investigate their function during embryonic development. We find that *polr1c* and *polr1d* are dynamically expressed during embryogenesis. Using the cartilage stain alcian blue, we show that homozygous mutations in these genes mimic the cranioskeletal abnormalities characteristic of human TCS. Additional analysis shows that *polr1c* and *polr1d* mutants display elevated neuroepithelial cell death and diminished neural crest cell generation. We hypothesize that this is due to disrupted ribosome biogenesis and nucleolar stress activation of p53, as p53 inhibition is able to restore development of craniofacial cartilage. Using these unique zebrafish models, we can further examine the roles *polr1c* and *polr1d* during normal embryonic development and in the pathogenesis of TCS. In addition, these models will be useful for investigating important avenues for the potential therapeutic prevention of TCS.

DOES MORE ATTENTION IMPROVE LANE-KEEPING PERFORMANCE?

William Choi *and Jibo He*
Department of Psychology, Wichita State University

The effect of cognitive load on lane-keeping is inconsistent and unclear. The lateral prioritization hypothesis proposes that drivers prioritize lane-keeping when cognitively distracted; In contrast, the automatic steering hypothesis suggests that cognitively distracted drivers devote less attention to the automatic behaviors of steering control. Drivers were asked to prioritize lane-keeping, car following or the secondary task in a driving simulator. Drivers in lane-keeping prioritization condition produced smaller lane deviation and quicker steering response time to lateral wind gusts compared to drive-only condition. Data suggests that more attention to lane-keeping improves rather than impairs performance.

AN OPTIMIZATION APPROACH AND ANALYSES TO BIOMASS PRODUCTION WITH AN APPLICATION IN KANSAS

Halil Cobuloglu *and Esra Buyuktahtakin*
Department of Industrial and Manufacturing Engineering, Wichita State University

Biofuels are critical in meeting the world's energy demand and have become a priority for the nation. In particular, biofuel production from lignocellulosic biomass feedstock has gained growing importance due to concern about the sustainable energy supply and security of food crops. Among other biomass sources, switchgrass is considered one of the best because of its economic and environmental benefits such as enriching degraded soils through carbon sequestration and prevention of soil erosion. In this study, we develop a mixed-integer optimization model in order to investigate the economic and environmental tradeoffs of switchgrass-based biomass production. This model maximizes the total profit of farmers while considering sustainable food supply and environmental concerns such as protection of bird populations. The model also provides land managers and policy makers with optimal decision strategies regarding allocation of cropland, grassland, and marginal land for biomass cultivation, seeding time, harvesting time, amount, and budget for operations at the farm level. We have applied the model to a case study in Hugoton, a city in southwest Kansas, by considering the production of switchgrass. Results show that given the current market price, switchgrass cultivation on grassland and cropland is highly profitable. The model results also suggest that if utilized by the government, conservation reserve program (CRP) incentives could make marginal land more favorable over cropland. This model can also be extended to biomass production from any other types of energy crops to identify the most efficient management and planning strategies for biomass production.

MUTUAL INTERFERENCE OF DRIVING AND TEXTING PERFORMANCE

Jake Ellis, *Jibo He, Colton Turner, Alex Chaparro, and Kirsten Turner*
Department of Psychology, Wichita State University

Texting while driving is a disturbingly common habit; however, the impact of texting on driving performance and effective approaches to counteract its risks are still not well understood. This study utilizes the Lane Change Task and smartphone technologies to capture driving and texting behaviors in a simulated driving environment. Data show that driving and texting interfere with each other. Texting increases lane deviation; driving increases texting completion time and texting errors. In conclusion, the findings provide evidence that can be used for new social campaign approaches and smartphone technologies to reduce the risks of texting while driving.

BEYOND THE CONTENT: THE ROLE OF TEAMWORK AND COMMUNICATION IN PATIENT HANDOFFS

Sarah Fouquet[1], *Evan Palmer[1], Joseph Keebler[1], Elizabeth Lazzara[1,2], Raymond Chan[3,4], and Robert Riss[3,4]*
[1]Department of Psychology, Wichita State University; [2]Office of Research, University of Kansas Medical Center, [3]Section of Pediatric Hospital Medicine, Children's Mercy Hospital, [4]Pediatrics, University of Missouri-Kansas City School of Medicine

Patient handoffs are the transition of patient care from one provider or group of providers to the next (Joint Commission, 2005). Handoffs are important, information rich communication events that are essential for maintaining patient safety (Institute of Medicine, 2000). We sought to understand the role of handoff communication for providers not using a standardized handoff protocol by conducting interviews using semi-structured and ‘think aloud’ protocols with 13 clinicians at a large Midwestern pediatric hospital. We identified several interesting themes in the interviews beyond factual handoff content, including the role of expertise, experience and individual style on how handoffs are conducted.

UNDERSTANDING SPEECH IN NOISY CONDITIONS

***Samantha Jansen*[1]**, *Alex Chaparro*[1], *David Downs*[2], *and Joseph Keebler*[1]
[1]*Department of Psychology, Wichita State University;* [2]*Department of Communication Sciences and Disorders, Wichita State University*

When an environment is noisy, vision and audition cooperate to improve the ability to understand spoken communication. In fact, researchers have demonstrated that simulated cataracts can worsen the ability to understand speech, by reducing the usefulness of vision in the speechreading process. The purpose of this study was to determine if measures of visual, auditory, and/or cognitive performance could be used to predict how well participants understood spoken sentences in a noisy environment. Thirty participants, age 18-40, with normal vision and hearing, were tested on their visual, auditory, cognitive, and speechreading performance. Speechreading performance (i.e., speech intelligibility) was used to calculate the average benefit that participants gained from seeing (i.e., visual enhancement) and listening to the speaker, in comparison to only listening to the speaker with no visual input. Analyses showed that the best predictors of this visual benefit (i.e., visual enhancement) were two measures of cognitive functioning and one measure of visual functioning. These results suggest that the speechreading process is dependent on visual (i.e., contrast sensitivity) and cognitive (e.g., executive function) processes.

A BIO-ECONOMIC OPTIMIZATION MODEL FOR SUSTAINABLE AND LONG-TERM CONTROL OF SERICEA LESPEDEZA (*LESPEDEZA CUNEATA*) INVASION IN THE GREAT PLAINS

Eyyub Kibis, *Halil Cobuloglu, and Esra Buyuktahtakin*
Department of Industrial and Manufacturing Engineering, Wichita State University

Native grasslands in the Great Plains are threatened by the spread of sericea lespedeza (*Lespedeza cuneata*), a noxious weed brought from Asia, which can damage forage or hay production and result in substantial economic loss to landowners. Sericea has spread over 5,501,400 acres of the mid- to southern Great Plains and has led to $29 million average annual forage loss in the Flint Hills region of Kansas. Therefore, policy makers and farmers need to find effective decision strategies for controlling sericea invasion and reducing the related damages. In this research, we develop a dynamic nonlinear bio-economic optimization model that is structured based on age, density, and frequency of invasive species. This very complex nonlinear optimization model integrates biological models into a decision theory framework while accounting for seed production and loss rates for different age classes, seed dispersal, longevity and germination, seed bank dynamics, survival rate of seedlings, carrying capacity, treatment costs, budget, and relevant economic loss. The model minimizes the sum of damages to hay and forage caused by the invasion of sericea over time subject to two main constraints: (1) growth and spread dynamics of invasive species over space and time, and (2) budget restricting the total cost of labor and herbicides used to control sericea. The numerical results provide effective management strategies to land managers and government officials regarding where, when, and how much resources need to be allocated for controlling sericea, and provide insights into the biological growth and spread behavior of invasive species.

NUMERICAL ANALYSIS OF BLOOD FLOW IN THE HUMAN AORTA AND BYPASS GRAFTS

Foo Kok, *Roy Myose, and Klaus A. Hoffmann*
Department of Aerospace Engineering, Wichita State University

Blood flow is complex due to the presence of curves, multiple branches, non-Newtonian flow, and pulsating effect. Even when an individual receives a bypass, which saves the patient, several years later a new bypass may be required due to graft failure. There are two different approaches for multiple bypass grafts, and clinical observations are inconclusive as to which approach is better. The aim of this study is to provide a systematic numerical approach considering different effects (curves, branches, non-Newtonian behavior, and pulsation) individually, and then integrating them together. The final goal is to better understand the geometrical effects of graft.

EFFECTS OF ETHNICITY ON HEARING SCREENING FAILURE RATES IN A NEWBORN, WELL BABY CLINIC

Ali McKeown, *Stephanie Fowler, and David Downs*
Department of Communication Sciences and Disorders, Wichita State University

Researchers have reported a higher prevalence of hearing loss among Hispanic school-aged children than among children of other ethnicities. The purpose of this study is to measure if a higher risk of hearing loss is already present at birth among Hispanic well babies. Specifically, in this retrospective study, investigators will review hearing screening and demographic records of over 22,000 well babies born at a Wichita hospital from 2009-2012, and: 1) statistically compare the screening failure rates of Hispanic well babies versus well babies of other ethnicities; and 2) analyze if screening failure rates are associated with risk factors at birth.

ACTIVE WING SHAPING CONTROL OF A MORPHING AIRCRAFT

Wilfred Nobleheart *and Animesh Chakravarthy*
Department of Aerospace Engineering, Wichita State University

This project performs the control system design of a passenger aircraft with highly flexible wings, being conceptualized by NASA. The flexible wings enable change of the wing twist and bending in flight so as to achieve a local angle of attack distribution that is optimal for the specific flight condition. This leads to lower fuel consumption, which lowers emissions and benefits the environment. The aircraft has twenty-three control surfaces, distributed along the trailing and leading edges of each wing that are actively controlled. An output feedback controller is designed, and simulation results demonstrate the validity of this controller.

EVALUATING NANOSAFETY OF NANOMATERIALS BY IN-VITRO CYTOTOXICITY TESTS ON FIBROBLAST CELLS

Madhulika Srikanth, *Heath Misak, and Ramazan Asmatulu*
Department of Mechanical Engineering, Wichita State University

In recent years, the use of nanomaterials has increased exponentially. In spite of the extensive research in this field, some areas are not completely understood, one of them being nanosafety. Because of their size and shapes, these nanomaterials have the ability to be easily absorbed in the biological and the ecological systems and interfere with them by hampering smooth functioning. In this study, MTT Assay was used to evaluate the nanosafety of carbon-based nanomaterials (Carbon Nanowire, Graphene and Carbon Nanotubes). All of the nanomaterials exhibited various levels of cytotoxicity. The level of cytotoxicity was dependent on the concentration, the size and shape of the nanomaterial. Smaller particle sizes exhibited higher cytotoxicities, which may be useful for the students, scientists, engineers and other participants who involve in these nanomaterials.

NOTES:

Index of Presenters

For more information, please contact:

Kansas State University

Carol Shanklin, Kansas State University, 103 Fairchild Hall, Manhattan, KS, (785) 532-6191. www.ksu.edu/grad

Wichita State University

Abu Masud, Wichita State University, 107 Jardine Hall, 1845 Fairmount, Wichita, KS 67260-0004, (316) 978-3095. www.wichita.edu/gradschool

University of Kansas

Michael C. Roberts, The University of Kansas, 213 Strong Hall, 1450 Jayhawk Blvd., Lawrence, KS 66045-7535, (785) 864-8440. www.graduate.ku.edu

University of Kansas Medical Center

Robert Klein, The University of Kansas Medical Center, 5015 Wescoe Building mail stop 1040, 3901 Rainbow Blvd, Kansas City, KS 66160
http://www.kumc.edu/academic-affairs/graduate-studies

Or visit: http://webs.wichita.edu/?u=cgrs