

PROGRAM AND ABSTRACTS

Wichita State University

13th Annual

**UNDERGRADUATE RESEARCH AND
CREATIVE ACTIVITY FORUM—URCAF**



APRIL 9, 2013

HUGHES METROPOLITAN COMPLEX

2013 URCA FORUM

Organizing Committee

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Steven Oare, Assistant Professor, Fine Arts
Masud Chand, Assistant Professor, Business
Animesh Chakravarthy, Assistant Professor, Engineering
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Wichita State University
13th Annual Forum
Undergraduate Research and Creative Activity Forum—URCAF

SCHEDULE

9:00 am - 9:30 am: Registration, *Hughes Metropolitan Complex, Rm 132*

9:30 am- 12:15 pm: Oral Presentations

- Natural Sciences and Engineering, *Hughes Metropolitan Complex, Rm 137*
- Social Sciences and Humanities, *Hughes Metropolitan Complex, Rm 130*
- Creative Activity and Performances, *Hughes Metropolitan Complex, Lowe Auditorium*

10:00 am- 12:00 pm: Poster Presentations, *Hughes Metropolitan Complex, Rm 132*

2:00 pm - 2:30 pm: Awards Ceremony, *Hughes Metropolitan Complex, Rm 137*

Natural Sciences and Engineering Oral Presentations

Moderator: Animesh Chakravarthy

Judges: Barbara Morrison, Lyn Goldberg

Hughes Metropolitan Complex Room 137

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9:45	Nguyet Le	Reading/Writing Station for Limited Space in Nursing Home	15
10:00	Evan Ohlman	The Role of GH3 Genes in Disease Response to Charcoal Rot Pathogen	18
10:15	Michael Staab	Analysis and Optimization of Axisymmetric Supersonic Inlets for Rocket-Based Combined Cycle Propulsion Applications	23
10:30	Zachary Pearson	The Design of a Micro-Controller Training System for Use on a Bio-Sand Filter	20
10:45	David Wickell	Molecules, Morphology and <i>Mimeoma</i> Scarab Beetles: Evolutionary Implications for a Palm Associated Group	24
11:00	Jerret Ross	Investigating the Use of Design Patterns in Open Source Software Systems	22
11:15	Laura Elson	Fabrication of Polyelectrolyte Layers on Magnesium Alloys for Cell Growth in Bone Tissue Engineering	11
11:30	Denis Delimarschi	Applying Natural User Interface Interactions in the Software Development Process	10
11:45	Tj Jayarante	Material Properties of Model Aircraft Structural Elements	13
12:00	Pie Pichetsurnthorn	Growth and Differentiation of Neuronal Cells in Injectable Collagen Hydrogel For Neural Regeneration	20

Creative Activity and Performances

Moderator: Steve Oare

Judges: Michael Hanawalt, Rachel Crane, Geoffrey Deibel

Hughes Metropolitan Complex Lowe Auditorium

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Humanities and Social Sciences Oral Presentations
Moderator : Masud Chand
Judges: Francisco Flores-Cuautle, Larry Ramos, Lorraine Madway
Hughes Metropolitan Complex Room 130

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9:45	Monica Williams	From Dropped Out to Checked In: A Snapshot of Alternative Education	25
10:00	Chandler Williams	How University Students Continue to Live in a Bilingual Society in Puerto Rico	22
10:15	Matthew Conklin	Divergent Outcomes of the Arab Spring: A Case Study of The United Arab Emirates and Libya	9
10:30	Kathryn Luu	An Overview on the Effects of Personal Listening Devices on Noise Induced Hearing Loss between 1998-2011	16
10:45	Marcus Crawford	Ecological Impact of Rap Music on Youth	9
11:00	Robert Freeman	Will Depreciation of the Dollar Decrease the U.S. Trade Deficit?	12
11:15	Eric Brown	Seeing the Invisible Through Visible Symbols: Discussing Alfred Gell's Work on Papua New Guinea	7
11:30	Ian Huntley	Looking at Advertisement through Language and Culture: The case of Linguistic Shifts in American and English Language	13
11:45	Sein Lengeju	Student Perceptions of Poverty	16
12:00	Keely Wells and Diana Thompson	Phonological Systems of Spanish Speakers	23

Poster Presentations
Humanities and Social Sciences (USSH)
Judges: Kyoung Lee, Kimberly Engber, Guillermina Pena-Sandoval, Carla Decker
Hughes Metropolitan Complex Room 132

Presentation	Presenter's Name	Presentation Title	Abstract Page
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UPSSH3	An Diep Nguyen	Maternal Perceptions of Skin-to-Skin Contact and Breastfeeding Practices Before and After Healthcare Provider Education and Implementation Initiative	19

Poster Presentations
Natural Sciences and Engineering (UPNSE)
Judges: Gina Brown, Guillermina Pena-Sandoval, Carla Decker
Room 132

Presentation	Presenter's Name	Presentation Title	Abstract Page
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UPNSE4	Anosh Gomes	Bio Corrosion Evaluation of Organic Coatings on Magnesium Alloys for Cardiovascular and Orthopedic Applications	12
UPNSE5	Danny Nguyen	Analysis of Spider-Web Network Topology for Multicore/Manycore Architectures	18
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UPNSE7	Natasha Schlittenhardt	Isolation and Characterization of Halotolerant Bacteria from Oligohaline Soils	21
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UPNSE10	Alan Nguyen	Fabrication of Self Assembled Multilayers on Magnesium Alloy for Drug Delivery From Biodegradable Metallic Stents	17

Jordan Bontrager

Faculty Sponsor: Anil Mahapatro

College of Engineering

Natural Sciences and Engineering Poster Presentation

Design of Dynamic Corrosion Test Bench for Evaluating Potential Cardiovascular Biodegradable Stent Materials

Natural Sciences and Engineering Poster Presentation

Biodegradable materials including biodegradable metals are continuously being investigated for the development of next generation cardiovascular stents. Predictive in vitro tests are needed that could evaluate potential materials while simulating in vivo conditions. In this report we have designed and fabricated a corrosion test bench and carried out static and dynamic corrosion tests with samples of magnesium alloy. The fluid wall shear stress equation and the Churchill's friction factor equation were used to calculate the fluid velocity required to generate the desired shear stress on samples in the test bench. Static and dynamic corrosion tests at 24 and 72 hrs were carried out at 0.88 Pa shear stress mimicking the in vivo shear stress. Post test the samples were characterized by optical, scanning electron microscopy (SEM), and energy dispersive x-ray spectroscopy (EDX) to evaluate the corrosion behavior and surface properties of the test samples. Results indicated that dynamic conditions prevented the buildup of corrosion by products on the sample surface and the corrosion mechanism was uniform as compared to static conditions. The use of a masking element to restrict the exposed area of the sample didn't result in increased corrosion at the boundary. Thus the feasibility of the test bench as a viable method to test dynamic corrosion behavior of potential biodegradable cardiovascular stent materials has been demonstrated.

Eric Brown

Faculty Sponsor: Jens Kreinath

Fairmount College of Liberal Arts and Sciences

Humanities and Social Sciences Oral Presentation

Seeing the Invisible through Visible Symbols: Discussing Alfred Gell's Work on Papua New Guinea

How is the shape or color of an object a reflection of a culture's understandings of the world people live in? What can we learn about another culture by what we can see in their daily life, art, or ritual? When does the movement of a ritual dance or the performance of artful gesture reveal something about a culture's sacred beliefs?

The work of British anthropologist Alfred Gell serves as an example to answer such questions as he sought to make the invisible visible by gathering information available to him. By observing rituals during his fieldwork among the Umeda people in Papua New Guinea, he attempted to understand the meaning of symbols in sacred objects and dances. Analyzing the ethnographic film Gell produced, ideas of visual anthropology will be taken as a key to understand how he approached the notions of the visible and invisible as expressions of sacred beliefs in a culture.

An object can represent an idea or concept at one time and at another time it can serve to represent a different idea or concept. Two examples will be discussed as presented in the work of Gell: How the penis sheath was at one time an overt representation of sexuality, and yet with just minor changes, it demonstrated a restraint of sexual activity. In discussing examples presented as in Gell's Umeda ethnography, it will be shown how a mask can at one time in a ritual represent a bird, and at another time in the same ritual represent a tree.

How can changes in movement of dance steps indicate a shift in meaning? The main question in understanding other cultures is: How can we analyze what is observable and that simultaneously has many layers of meaning in ways of life that are disappearing from the human world?

Jeffrey Millsbaugh and Victoria Burns

Faculty Sponsor: Lyn Goldberg and Douglas Parham

College of Health Professions

Humanities and Social Sciences Poster Presentation

Investigating Students' Readiness for Interprofessional Education

Interprofessional Education (IPE) occurs when students from two or more professions work together to learn with, from, and about each other's work. The World Health Organization, the Institute of Medicine and academic accrediting bodies advocate IPE as essential to equip students in healthcare professions for effective Interprofessional Practice. To optimize students' participation in IPE, it is important to document their readiness for interprofessional learning. Purpose: To analyze the perceived readiness of students according to program (Communication Sciences & Disorders [CSD], Dental Hygiene [DH], Nursing, Physical Therapy [PT], Physician Assistant [PA], Public Health Sciences [PHS]) and level of study (graduate /undergraduate). Method: Students (N = 260) completed the 19-item Readiness for Interprofessional Learning Scale (RIPLS) using 1 (Strongly Disagree) to 5 (Strongly Agree) ratings. The 19 items were categorized into: (1) Teamwork & Collaboration (1-9), (2) Negative Professional Identity (10-12), (3) Positive Professional Identity (13-16), and (4) Roles & Responsibilities (17-19). Results: Two-way ANOVAs documented Main Effects for Program and Level of Study. Post-hoc testing showed significant differences ($p = 0.05$) in Teamwork & Collaboration: CSD students felt significantly more ready than Nursing, DH, and PA students; Positive Professional Identity: CSD students rated themselves significantly higher than Nursing, DH and PA students; PT students also rated themselves higher than DH and PA students; Roles & Responsibilities: PHS students felt less ready than students in all other programs. Overall, undergraduate students felt more ready for IPE than graduate students. Implications: Faculty need to address such differences in readiness as they facilitate interprofessional learning.

Andrew Claycomb

Faculty Sponsor: Li Yao

Fairmount College of Liberal Arts and Sciences

Natural Sciences and Engineering Poster Presentation

Characterization of Extruded Collagen Fiber for Tendon Repair

Fibrous tendon tissue has limited blood supply, and because of this, natural healing after injury can be a long and painful process. Surgical methods that suture the broken tendon can aid the healing process, but the function of most repaired tendons can not be fully restored. Collagen type I, being the primary component of tendon, can be fabricated as biomaterial scaffolds for therapeutic cell delivery to the lesion to repair the injured tendon. The natural orientation of collagen type I in tendon tissue is as a bundle of strong parallel fibers. Healing would more closely resemble that of initial tissue generation using type I collagen fibers carrying stem cells or tenocytes to repair the wounded tendon. To mimic the structure of native tendon, we fabricated collagen fibers using a fiber extruding method. Fibers were formed by ejecting collagen solution using a syringe pump into fiber formation buffer (phosphate buffer and 20% polyethylene glycol), then transferred to an incubation buffer (phosphate buffer and sodium chloride). The formed fibers were finally hung to air-dry. Fibers were then cross-linked with carbodiimide (EDC) and N-hydroxysuccinimide (NHS). The mechanical strength of the fiber bundles were tested by uniaxial stretching. The crosslinking level of the fibers was measured by differential scanning calorimetry. We found treatments of fiber with high concentrations of cross-linking solution (5mMEDC/5mMNHs) showed significant higher fiber durability compared with low concentration crosslinking solution (1mMEDC/1mMNHs). This study confirms the potential for extruded collagen to act as a suitable biomaterial for tendon repair and regeneration.

Matthew Conklin

Faculty Sponsor: Dinorah Azpuru
Fairmount College of Liberal Arts and Sciences
Humanities and Social Sciences Oral Presentation

Divergent Outcomes of The Arab Spring: A Case Study of The United Arab Emirates And Libya

The Arab Spring is unlike any other period of social unrest in history. While some Arab states experienced a regime change due to social pressure or self-abdication, others have felt little ramifications. My research focuses on the study of the government policies that may have facilitated or prevented the rise of social unrest, and consider those findings when analyzing the reorganization of new governments following the Arab Spring. This topic was chosen because it is relevant to the ongoing conflict in the Middle East and can provide insight into possible social consequences of government decisions in the long run. Using case-study methodology, I compare what has happened in one country that underwent major social unrest, Libya, and one that has not had unrest, the United Arab Emirates. I use qualitative and quantitative measures as well as in-depth analysis to determine to what extent certain domestic policies of those Arab states are related to the downfall or continuity of authoritarian regimes.

Marcus Crawford

Faculty Sponsor: Natalie Grant
Fairmount College of Liberal Arts and Sciences
Humanities and Social Sciences Oral Presentation

Ecological Impact of Rap Music on Youth

At-risk young people from diverse backgrounds can be vulnerable as they struggle between acceptance and identity development during the transition between childhood and adulthood. As youth seek to form their own identities and find a place for themselves within their world, many turn to music as a foundation of this community and identity formation. The qualitative study seeks to answer the research question: in what ways does rapping affect the creation and development of social connections in young men? Through ecological analysis, the study demonstrates how rap music is used to form relationships, tell stories about their life, and address issues such as trauma. The participants included eight adolescent males all over the age of 18. Eco-maps were created for each participant and resulted in a graphic that identifies important groups and individuals in their lives and the communication patterns within those groups. This study revealed that participants have small inner circles that they relate to more as family than their biological families and a general mistrust exists for people outside of that core group. Participants conveyed messages about their use of marijuana as related to their music, daily lives, and relationships with peers. Findings present an opportunity to learn about the inner workings of young people who are involved in rap music as an activity with peers and an outlet for processing issues of daily life. By using the ecosystems theory as the foundation of the study, the researcher also applied prevention and risk-focused theories in examining results.

Denis Delimarschi

Faculty Sponsor: Huzefa Kagdi
College of Engineering
Natural Sciences and Engineering Oral Presentation

Applying Natural User Interface Interactions in the Software Development Process

Natural User Interfaces (NUI) experienced a tremendous growth in the past decade, being applied in fields such as security research and healthcare. The ability to control the behavior of machines and detect patterns in physical movement with the help of voice, touch and gestures provides opportunities to optimize processes and minimize the effort required to perform routine tasks. The context of my research at Wichita State University is applying NUI in the software development process, by implementing a shared layer between the Microsoft Visual Studio integrated development environment (IDE) and hardware such as the Microsoft Kinect sensor. The sensor is able to capture physical movement, proximity and voice data. I have successfully developed and tested a client plugin, which is receiving and processing voice and gesture commands from the attached hardware and transferring those as internal commands that can be recognized by the target development environment. The principal objective of this work is to develop and empirically assess NUI support for software engineering environments. To the best of our knowledge, there is no existing work on this topic in the scientific literature. Although the starting point is Microsoft Visual Studio, I am committed to extending it to other platforms and ensuring maximum coverage of the extensibility frontend offered by a variety of environments. The project has a potential to position WSU as a leading player in this line of research investigation.

Joseph Dille

Faculty Sponsor: Moriah Beck
Fairmount College of Liberal Arts and Sciences
Natural Sciences and Engineering Poster Presentation

Palladin's Ig4 Mutation: Exploring the Link with Pancreatic Cancer

Palladin is a recently discovered protein that is expressed in human cells and plays a key role in cytoskeletal dynamics by directly binding and bundling filaments of actin. These processes provide an important function in cell motility and are made possible by the Ig3 and Ig4 domains of Palladin. Since cancer survival is often dependent upon migration of cancerous cells to other parts of the body, Palladin has been implicated as playing a critical role in cancer metastasis. In addition, a mutation from a tryptophan to cysteine in Palladin's Ig4 domain has recently been linked to a form of pancreatic cancer. This mutation is called "PaTu2," and understanding how it affects Palladin is the focus of this research project. We began by isolating the wild type and mutant Ig4 domains, as well as the Ig3 domain of Palladin. Obtaining the PaTu2 mutant protein required a different approach due to the protein remaining insoluble within inclusion bodies in *E. coli* bacteria. This was amended by denaturing the protein to solubilize it, followed by affinity purification and eventually renaturation. Next, we aimed to determine if the mutation affected Palladin's ability to bind and bundle actin filaments by conducting cosedimentation assays. The second goal of the project was to use circular dichroism to see if the mutation affected the structure and stability of Palladin. Initial results indicate a significant change in the secondary structure of this domain, and assessing the effects of this will be the next phase of our research.

Kristina Durham

Faculty Sponsor: Shukura Bakari-Cozart
Fairmount College of Liberal Arts and Sciences
Humanities and Social Sciences Oral Presentation

Outsiders: Effects of Peer Labeling On Juvenile Development

Labeling theory proposes the idea that labeling a person as deviant leads to engagement in unacceptable behavior. Such labeling by parental and authority figures, such as teachers and law enforcement, has long served as a prominent factor in the behavior of juveniles. This research looks to explore and provide a broader view of an overlooked aspect that can also influence juvenile behavior- peer labeling. In order to investigate the influence of peer labeling on juvenile delinquency, as well as the development of the juvenile self-identity, interviews were conducted with a small group of counselors and staff involved with the local Boys & Girls Club of America. Those interviewed included staff members who work with children in grades six through twelve. The interview consisted of questions measuring numerous variables such as the establishment of rules and understanding of social norms, as well as the effect of peer influence on personal opinion. The purpose of this study is to examine if relationship between peer labeling and engagement in juvenile acts, as well as the impact of peer labeling on self-concept and identity.

Laura Elson

Faculty Sponsor: Anil Mahapatro
College of Engineering
Natural Sciences and Engineering Oral Presentation

Fabrication of Polyelectrolyte Layers on Magnesium Alloys for Cell Growth in Bone Tissue Engineering

Biodegradable metals are being studied for their applications as a metallic scaffold for bone tissue engineering. Magnesium-based implants degrade under physiological conditions in vivo and form soluble, nontoxic magnesium chloride that is harmlessly excreted in the urine. However, for magnesium to serve as a viable scaffold material, surface modification strategies are needed to create a matrix on the surface in order to support the growth and differentiation of cells. Layer by Layer (LbL) assembly is a simple and effective way to form a porous coating on a surface. It is inexpensive, and the layers' thickness can be varied from nanometers to small micrometers; this makes this method very customizable. In this study, we have demonstrated the formation of natural polyelectrolyte LbL coatings on magnesium alloy. Chitosan was chosen as the constant polycation, while various polyanions were studied: Carboxymethyl cellulose (CMC), Dextran salt, Xanthan gum, Pectin, and Carrageenan. The effect these polyanions had on the strength of the layers was evaluated using electrochemical methods. The strength of the layers varies depending on the charge affinity between the cation and the anion. LbL coatings on magnesium alloys were prepared by dipping the magnesium substrates alternatively in the polycation and polyanion solutions. A surface characterization test, a contact angle test, and a corrosion test were then performed on each group of samples. When the results were analyzed, the surface images and the contact angles of all the samples proved that the polyelectrolytes bound appropriately to the surface of the magnesium. The corrosion results showed that all of the polyanions portrayed comparable corrosion rates, so they will not greatly affect other layers placed on the magnesium. Future studies on cell compatibility are needed to evaluate the preferred coating among the chosen systems.

Robert Freeman

Faculty Sponsor: Jen-Chi Cheng
Barton School of Business
Humanities and Social Sciences Oral Presentation

Will Depreciation of The Dollar Decrease the U.S. Trade Deficit?

Using data on exchange rates, imports and exports, income, and relative price between the US and its major trade partners, I applied regression analysis to determine whether there is a connection between a weakening of the US dollar and an increase in US exports. I studied the price elasticity and income elasticity for both the short run and long run. The key hypothesis is that the gains in US exports to its top trading partners due to a weaker dollar will be offset by decreased income from exporting to the US. The results indicate that in the long run 3 of the 5 US trade partners examined do not meet the Marshall-Lerner condition, supporting the hypothesis, which will diminish the hope of improving the U.S. trade deficit.

Anosh Gomes

Faculty Sponsor: Anil Mahapatro
College of Engineering
Natural Sciences and Engineering Poster Presentation

Bio Corrsion Evaluation of Organic Coatings on Magnesium Alloys for Cardiovascular and Orthopedic Applications

Biodegradable metals are a novel class of biomaterials which have promising interventions in the current biomedical world. Medical implants such as stents, bone screws and bone plates could be made by biodegradable metals. These implants would serve their purpose within the patient's body and disintegrate harmlessly, eliminating a need for removal surgeries. Magnesium is a prime contender as a biodegradable metal due to its biocompatibility and biodegradability. Surface modification techniques are needed to enable its suitability for specific applications. For example, localized deliveries of drugs are needed from cardiovascular stents to treat restenosis while localized deliveries of antibiotics are needed from bone plates to treat post-operative infections. These surface coating techniques should not significantly change the underlying corrosion behavior of Magnesium while providing localized drug delivery. Organic coating such as self-assembled monolayers is a technique which could be used for localized delivery of drugs and antibiotics from the surface of magnesium. This research aims to evaluate the bio corrosion behavior of these organic coated magnesium alloys. The corrosion behavior of self-assembled monolayer coated magnesium alloy was evaluated using polarized and unpolarized methods in physiological conditions. These organic coated magnesium metals were subjected to electro chemical corrosion testing, mass loss analysis and hydrogen evolution testing. Comparison of the results obtained between the Organic coated magnesium and the control showed no statistical significant changes in the corrosion behavior. In summary, organic coated magnesium was studied for its bio corrosion properties and this study concludes that these organic coatings do not change the corrosion behavior of the underlying magnesium and thus could be used for modification of magnesium alloy for potential cardiovascular and orthopedic applications.

Ian Huntley

Faculty Sponsor: Jens Kreinath
Fairmount College of Liberal Arts and Sciences
Humanities and Social Sciences Oral Presentation

Looking at Advertisement through Language and Culture: The Case of Linguistic Shifts in American and English Language

The settlement of North America by European colonists created an isolation event in the English language which saw the English language splinter into American and British English. Over the course of four centuries, the two tongues developed separately, influenced by different cultural and historical events. By examining the linguistic conventions used in British and American English to approach the same problems, a judgment to the degree of linguistic determinism or relativism can be made. This study seeks to examine American and British approaches to advertising the same products throughout history, documenting the points where American and British English diverged phonetically, morphologically, syntactically, and semantically. Examples of print, audio, and audio-visual advertising will be examined to back up the claim. These media and their language use will be analyzed to determine what socio-cultural events informed them. Times of great social change, including early twentieth-century women's voting rights activism, World War I and II, the Korea and Vietnam conflicts, and the American civil rights movement will be closely examined in relation to the advertisement of specific products or brands of from the 1910s and 1920s, from the 1950s and 1960s and from the 1990s and 2000s to determine if the two languages drew nearer or moved further apart. Specifically, Coca-Cola print advertising from the early twentieth century, Hellman's/Best Foods radio and television advertising from the mid-twentieth century, and from recent history, Starbucks and Cadbury's chocolates will be examined. Examining the parallel development of advertising and language will demonstrate a degree of linguistic determinism or relativism in the field of advertising. This research will give further insights in understanding the working of advertisements in relation to language and culture and how they become effective at a given time in history.

Tj Jayaratne

Faculty Sponsor: Suresh Keshavanarayana
College of Engineering
Natural Sciences and Engineering Oral Presentation

Material Properties of Model Aircraft Structural Elements

Materials such as balsa wood and foam are widely used by engineering students in major Aeronautical Engineering design competitions across the world such as the AIAA Design-Build-Fly, SAE Aero Design and Wichita State Design-Validate-Compete. However neither adequate nor accurate mechanical data exists for these materials resulting in many model airplanes being structurally over or under built. A variety of tests are performed on these materials, such as simple tension, compression, shear, planar tension, and volumetric compression to determine their mechanical properties. An electromechanical test frame is used to apply loads and a laser extensometer, a high precision non-contact strain measurement device, is used to measure the displacements. The variation in mechanical properties due to the differences in density and thickness of the balsa wood is investigated through the testing of a variety of specimen configurations. Balsa composite laminates are also manufactured and tested to examine their mechanical behavior. It was observed that density has a significant effect on the mechanical properties of balsa wood. The use of balsa composite laminates was found to be especially beneficial when strength was required in multiple directions, rather than just the grain direction of the wood. Foam used in model aircraft is well-known for being a non-hookean material and while linear hookean model can be assumed using the basic mechanical properties found during this project, further testing is carried out currently to formulate a non-hookean model for its analysis. In conclusion a complete set of mechanical data for the materials tested was obtained from this research which will be of immense value to the many aerospace engineering students designing aircraft every year.

Benjamin Karnes

Faculty Sponsor: Gerald Scholl

College of Fine Arts

Creative Activity and Performances Oral Presentation

Selections from J.S. Bach's Violin Partita No. 1 In B Minor, Performed On Marimba

This performance will feature three movements of J.S. Bach's Violin Partita No 1 in B minor, that the performer has adapted for marimba, an instrument, which has its origins in traditional African and Latin American music. The selected movements will include: the Sarabande, Double, and Tempo di Bourrè (Gavotte) respectively. Each of Bach's Sonatas and Partitas for Violin are lengthy compositions from the Baroque Period, made up of short dance movements alternating with filler material. Bach bases the rhythm of each dance movement on its original Baroque dance steps. The Sarabande is a stately dance of Spanish origin. The selected Double movement is a filler movement, not necessarily composed to fit a particular baroque dance, but certainly with its own unique musical ideas. The movement titled "Tempo di Bourrè" is a Gavotte, which is based on a lively French folk dance with a very strong duple feel. The listener will notice a definitive change in mood and tempo between the Sarabande and the Gavotte movement. Of critical importance to performing this work on any medium is attaining knowledge of how each of the different dance movements is to be performed. By researching the characteristics of the individual dance genres the performer gains insight into Bach's original intent in composing the work. When learning the piece on a non-traditional instrument such as the modern marimba, the performer should listen to numerous violinists' interpretations as a resource to help adapt Bach's music to the new instrument. The culmination is to use the research and specialized marimba techniques combined with the instrument's unique musical capabilities to create a new and convincing interpretation.

Erik Wong

Faculty Sponsor: Moriah Beck

Fairmount College of Liberal Arts and Sciences

Natural Sciences and Engineering Poster Presentation

Myopalladin: Linking the Structure-Function Relationship to Cardiac Muscle Development

Myopalladin is a 145 kDa sarcomeric protein and is a fundamental cellular component of skeletal and cardiac muscle tissues. A known function of myopalladin is in cardiac muscle it tethers nebulin and alpha actinin together at the Z-lines which gives muscle tissue its integrity. Recent studies have found two heterozygous missense mutations in myopalladin. The first mutation, R955W was located in an individual with reduced ventricle function, while the second mutation P961L shows an even greater compromised ventricle function. Both of these mutations occur in the Ig3 domain of myopalladin, which has high sequence homology with the Ig3 domain of palladin. Based on this similarity, we hypothesize that the Ig3 domain of myopalladin is responsible for the binding and cross-linking of actin as has already been established for palladin. Disruptions or changes such as DNA mutations in the Ig3 domain may lead to the reduction of these proficiencies. The purpose of this project is to first determine whether wild type myopalladin Ig3 binds actin directly, and then to find out how these two mutations affect the binding and bundling capabilities. The first step we took was the formation of the plasmid that contained the above mutations by PCR followed by verification of product through DNA sequencing. The next step was the growth and purification of both mutations as to isolate pure protein samples from E. coli cells. Finally, along with the wild type Ig3, the purified mutant proteins were incubated with actin as to determine their binding and bundling affinities by performing actin cosedimentation assays. Initial results show that the wild type Ig3 domain does indeed bind and bundle actin. Future goals include structural analysis of both mutations and even the use of circular dichroism (CD) and nuclear magnetic resonance (NMR) to reveal the structure and stability of these changes.

J. Tanner Lampe

Faculty Sponsor: Esra Buyuktahtakin

College of Engineering

Natural Sciences and Engineering Poster Presentation

Management of Invasive Species: Sericea Lespedeza Insights from an Optimization Model

Native grasslands in the Great Plains are threatened by the spread of Sericea (*Lespedeza cuneata*). Sericea is a non-native legume originating from Asia. Sericea infestations negatively impact the forage value and hay production from grasslands resulting in substantial economic losses to landowners. Furthermore, this invasion threatens the integrity of native and restored prairies as it chokes out native flora and alters the habitat. Although herbicides are available, effective control can be expensive because of the scale of the problem and the necessity of iterated application to combat the plant's long-lived, extensive seedbank. Herein proposed is an optimization model to find economically efficient strategies to control the invasion of Sericea. Using empirical data, the model accounts for population growth rates, carrying capacity, seed dispersal, treatment costs, and economic loss due to invasion. The model is then utilized to minimize the discounted sum of damages, prevention/restoration, and control costs over time subject to two constraints: the spread of invasive species over space and time and the cost of resources to control and prevent Sericea. Results from model reflecting the outcome of different management scenarios are presented to give insight to economically efficient strategies for controlling Sericea in the Great Plains.

Nguyet Le

Faculty Sponsor: Nils. A. Hakansson

College of Engineering

Natural Sciences and Engineering Oral Presentation

Reading/Writing Station for Limited Space in Nursing Home

Rehabilitation Engineering is the systematic application of engineering sciences to design, develop, modify, and apply the technology solutions to support people with disabilities or impairment to have the better lives. The functional areas which Rehabilitation Engineering addresses are mobility, communication, cognition, and all activities which involve human living. For this project, the goal was to build a Reading/Writing station for a resident who has lived in the limited space of a nursing home. The benefits from this station were to gain her confidence and help her to perform motion easily for reading, writing, holding, and reaching without assistance. This work was a result of the structural environment which did not work out for the resident due to her disease, and it required modification.

Sein Lengeju

Faculty Sponsor: Natalie Grant
Fairmount College of Liberal Arts and Sciences
Humanities and Social Sciences Oral Presentation

Student Perceptions of Poverty

The 2008 recession left many families in poverty. According to the U.S. Department of Health and Human Services 2011 Poverty Guidelines, the average income earned by an individual in 2011 was \$10,890. This reduction of income and the rise of living expenses have created a myriad of problems that have yet to be fully evaluated or solved. Efforts to understand poverty as well as how poverty is perceived have become increasingly important in the fight to eliminate poverty itself. The research investigated college student perceptions of people who are poor and how society and personal choices contribute to poverty in order to answer the following research question: How do student interpretations of issues surrounding poverty affect their attitudes, beliefs, and perceptions of poverty as well as those living in poverty? The study gathered perceptions about whom the students believe the poor to be and what circumstances have occurred and what choices people have made that have contributed to their being poor. Through quantitative methods, using a 64 item questionnaire, students enrolled in courses at Wichita State University provided data regarding their perceptions. Social exchange and social emotion theories were used to frame this research and provide a lens with which to view results. These theories help us to understand better where people gain information and how they filter it when viewing others and making judgments. The discussion identifies that perceptions are dependent on the social class of the student, political affiliations, moral framework, and whether they plan on actively combating poverty after they graduate. Additionally, the results for the questionnaire will be discussed further.

Kathryn Luu

Faculty Sponsor: Raymond Hull
College of Health Professions
Humanities and Social Sciences Oral Presentation

An Overview on the Effects of Personal Listening Devices on Noise Induced Hearing Loss between 1998-2011

Chronic noise exposure can lead to damage of the nerve fibers that reside in the cochlea of the ear. After continuous over-stimulation, these nerve fibers begin to damage as a result are not able to effectively stimulate the auditory nerve leading to sensorineural hearing loss. This type of hearing loss is permanent and accumulative. Noise induced hearing loss stemming from leisure noise has evolved rapidly over this past decade as a result of technological advances, embodied through personal listening devices, video games, televisions, laptops, and the Ipod series, etc. Thus, this new market of technological gadgets has provided billions of people around the world with easy access to streaming music, movies and interactive video games. As the growing number of individuals increase their exposure to personal listening devices, this meta-analysis investigates the relationship between noise induced hearing loss and personal listening devices. As a result over the years, there have been a growing number of published research and guidelines centered on the adaptation of noise induced hearing loss from personal listening devices. The purpose of the meta-analysis is to depict the adaptation of the audiology and medical field correlating with the growing popularity of personal listening devices and noise induced hearing loss that can be represented through articles dating from 1998 to 2011.

Crystal Miller and Cambria A. Goen

Faculty Sponsor: Jodie Hertzog
Fairmount College of Liberal Arts and Sciences
Humanities and Social Sciences Poster Presentation

“Have You Met Ted?” Unrealistic Sex in Media

Social Script Theory provides an explanation for the way people behave in a variety of social situations based on cultural norms, which are behaviors that are learned through various day-to-day activities (Wiederman, 2005). Substantial research investigates the potential function of television as a sexual socializing agent for youth (Bersamin, Bourdeau, Fisher, & Grube 2010). The current study uses script theory to investigate the fit between what is portrayed as “realistic sexual relationships” on the top rated CBS television show, “How I Met Your Mother,” and the actual sexual attitudes and behaviors reported among emerging adults in existing research while exploring: 1) Which tactics do male characters use for the purpose of initiating a heterosexual relationship? 2) How do the tactics vary by character? 3) How do the tactics used on television link to tactics reported being used in real life? Ten episodes of the television show were coded using Greer & Buss’s “Tactics for Promoting Sexual Encounters” (Greer & Buss, 1994) scale of 122 specific acts. This research found that, while almost 20 years have gone by, many of the tactics used to promote sexual encounters in the original study are being portrayed on television. However through this study it is suggested that for some aspects of dating, particularly initiating sexual encounters, tactics may actually be becoming more egalitarian.

Alan Nguyen

Faculty Sponsor: Anil Mahapatro
College of Engineering
Natural Sciences and Engineering Poster Presentation

Fabrication of Self Assembled Multilayers on Magnesium Alloy for Drug Delivery From Biodegradable Metallic Stents

Magnesium alloys are being investigated for applications as a biodegradable metallic stent. Surface coating techniques on magnesium are needed for localized drug delivery to prevent restenosis after stent implantation. Non polymer based drug delivery systems are being explored due to drawbacks such as polymer fracture during stent expansion and an inflammatory reaction to the polymer that could contribute to restenosis. The goal of this research is to fabricate and characterize self-assembled multilayers (SAMs) on magnesium. This will result in having single or multiple layers of SAMs coated on the surface of a substrate, which then could be tailored to enhance biocompatibility and enable drug delivery from magnesium alloy. Self-assembled layers of (12-Phosphonododecyl) phosphonic acid and 1,10-Decyldiphosphonic acid on magnesium alloy AZ31 were formed using solution immersion methods. The layers formed were characterized using FTIR, AFM and contact angle measurements. Surface wettability, surface topography images and chemical structure analysis of the surface were analyzed and compared with uncoated magnesium alloy AZ31. FTIR showed peaks representing the presence of monolayer and thus confirming formation of the SAMs. AFM images showed surface irregularities indicating formation of multilayers, while contact angle measurements showed changes in surface wettability. These results confirm formation of the SAMs layer on magnesium alloy. Future work would include X-ray photoelectron spectroscopy and ellipsometry to quantify the thickness of the layers formed. In summary, we have demonstrated formation of a non-polymer based delivery system for localized drug delivery from biodegradable metallic stent materials.

Danny Nguyen

Faculty Sponsor: Abu Asaduzzaman

College of Engineering

Natural Sciences and Engineering Poster Presentation

Analysis of Spider-Web Network Topology for Multicore/Manycore Architectures

Parallels between my questions appear clearly, but I am always looking for points of intersection.

This research introduces the idea of the self-titled ‘Spider-Web’ topology and conducts a theoretical analysis of its behaviors, and investigates how this may benefit multicore/manycore architecture. The spider-web topology is the idea of a network where the nodes are laid out and connected in a manner that represents a spider’s web, as opposed to a traditional two-dimensional square mesh. In scenarios where the center node must communicate extensively with the rest of the network of nodes, it is expected that a spider-web will offer a benefit over a traditional square/rectangular mesh layout. The spider-web topology aims to take advantage of the high-speed communication ability of a star layout, while introducing a level of fault-tolerance and cost efficiency with interspersed ring topologies. Through theoretical analysis it is shown mathematically/geometrically that in the worst-case scenarios, the amount of hops needed to reach the furthest node from the center for a spider-web topology is less than the amount of hops to a similar node from the center in a square mesh. Results become even more interesting when considering the effects of adding further ‘s-lines’ between different rings to take advantage of special symmetries in the topology, such as connecting the perfectly middle node of each even-level ring to the perfect center node on the following even ring, effectively creating 6 more ‘s-lines’ for messages to take shortcuts through for faster communications that don’t directly have to pass through the center node. The mathematical analyses conducted shows that a spider-web topology connected in this fashion has roughly 50% more capacity for nodes with comparative hop distance versus a purely square-mesh for manycore systems.

Evan Ohlman

Faculty Sponsor: Bin Shuai

Fairmount College of Liberal Arts and Sciences

Natural Sciences and Engineering Oral Presentation

The Role of GH3 Genes in Disease Response to Charcoal Rot Pathogen

Charcoal rot is a plant disease caused by the soil-borne fungus *Macrophomina phaseolina*, which affects many important crops. Currently there is no effective method for controlling the disease. Previous studies in our laboratory have shown that the plant hormone auxin is involved in the early infection process. Our testing hypothesis is that *M. phaseolina* attacks plant hosts by modulating auxin homeostasis, partly through regulating the expression of GH3 genes. Auxin is an important plant hormone that is required for normal developmental process and disease responses to different types of plant pathogens. Some of the GH3 genes encode enzymes that convert active auxin into inactive amino acid conjugates, thus maintaining auxin homeostasis. To help determine the role of GH3 genes in disease resistance against *M. phaseolina*, we utilize a reverse genetics approach. Arabidopsis insertion mutant lines for seven GH3 genes have been obtained. We have genotyped individual plants using PCR technique to identify homozygous mutants for each gene. Currently, the homozygous mutants are being infected with *M. phaseolina* to compare their disease symptoms with that of the wild type. If our hypothesis is correct, then GH3 mutants will show less severe disease symptoms comparing to the wild type. We hope a better understanding of the disease mechanisms can lead to the development of more effective management approaches and disease resistant strains in the future.

An Diep Nguyen

Faculty Sponsor: Barbara Morrison

College of Health Professions

Humanities and Social Sciences Poster Presentation

Maternal Perceptions of Skin-To-Skin Contact and Breastfeeding Practices Before and After Healthcare Provider Education and Implementation Initiative

Background

Skin-to-skin care (SSC) starting immediately after birth is a new practice being implemented to improve mother-newborn care. SSC correlates with greater initiation, exclusivity, and duration of breastfeeding. However, longstanding hospital practices of separating mother and newborn for infant care are barriers to adopting SSC. Studies indicate healthcare providers' (HCPs) perceptions, attitudes and support influence SSC implementation and rates of breastfeeding initiation, exclusivity, and duration.

Purpose

To compare

- 1) Maternal perceptions and practice of Birth SSC and breastfeeding, and
- 2) Maternal reports of SSC support and breastfeeding initiation, exclusivity, and duration before and after HCP SSC and breastfeeding education program.

Process Secondary analysis of surveys eliciting maternal perceptions of HCPs' attitudes, support and practice of Birth SSC and breastfeeding before and after a 4 hour SSC and breastfeeding education session and official implementation of Birth SSC.

Sample

A convenience sample of breastfeeding mothers who birthed normally at a community hospital in northeast Ohio between June 2008 and June 2009.

Results

Significantly more mothers initiated SSC immediately after birth and did any SSC before leaving the birthing unit after HCP education and SSC implementation. Breastfeeding rates and maternal perceptions of HCP support and SSC practice were not significant between groups. Comparison of maternal perceptions of SSC and breastfeeding between groups will be reported.

Conclusions

Even though evaluation was done while HCPs were completing required education, significantly more mothers did some SSC after implementation date. Further evaluation is needed after HCP education is completed and Birth SSC is fully implemented.

Rebecca Keraly

Faculty Sponsor: Pina Mozzani

College of Fine Arts

Creative Activity and Performances Oral Presentation

Oh Quante Volte

I am to perform an Aria from the Romeo and Juliet Opera. This piece of music will then be explained musically and I will spend some time talking about the composer and the translation that went into this piece.

Zachary Pearson

Faculty Sponsor: John Harrison
College of Engineering
Natural Sciences and Engineering Oral Presentation

The Design of a Micro-Controller Training System for Use on a Bio-Sand Filter

Biosand filters are point-of-use filtration systems that remove pathogens and suspended solids from water. They are commonly used in developing countries as they can be constructed from readily-available materials and do not require chemicals or electricity. Compared with other point-of-use filtration systems such as chlorination, however, biosand filters require continual maintenance to be effective. Moreover, when communities are introduced to biosand filtration, it can be challenging to assist these communities in developing habits which support the necessary maintenance. To address these issues, I developed a microcontroller-based, battery-powered training and monitoring system which uses LED's to notify users when to perform maintenance tasks. Two sensors ensure that the tasks are completed. The microcontroller also captures this data for future review. This project is awaiting field trials which will measure its effectiveness. It was motivated through my work with WSU's chapter of Engineers Without Borders USA where I learned the details regarding the challenges many communities face in ensuring continual access to a potable water supply.

Pie Pichetsurnthorn

Faculty Sponsor: Li Yao
College of Engineering
Natural Sciences and Engineering Oral Presentation

Growth and Differentiation of Neuronal Cells in Injectable Collagen Hydrogel for Neural Regeneration

Injury to the central nervous system including brain and spinal cord causes neuron death and demyelination and these tissues have limited intrinsic regenerative capacity. Transplantation of neuronal cells to the lesion of the injured neural tissue may generate therapeutic effect. However few cells may survive in the hostile environment. Injectable hydrogel serving as cell carrier may overcome this challenge by providing the cells a permissive environment to generate function locally. In this study, we tested the ability of collagen hydrogel as a carrier for neuronal cell transfection and differentiation. PC12 cells were seeded in the collagen hydrogel and differentiated with nerve growth factor (NGF) stimulation. To study PC12 cell transfection and differentiation in the hydrogel, plasmids encoding NGF-ires-EGFP were complexed with Fugene transfection reagent. The complexed pNGF-ires-EGFP was incorporated into the hydrogel seeded with PC12 cells. We observed that PC12 cells were transfected in the hydrogel and expressed EGFP protein. PC12 cells differentiated and generated neurites. To investigate axonal myelination, we isolated oligodendrocyte progenitor cells and dorsal root ganglion (DRG) from neonatal rats. We characterized the phenotype of OPCs and induced OPCs differentiation into oligodendrocyte in cell culture. Myelination of axons in the co-culture of OPCs and DRG was observed. In the future studies, we will co-culture OPCs and DRG in the hydrogel to study the myelination of axons in this 3-dimensional cell culture system.

Emily Rose

Faculty Sponsor: George Bousfield
Fairmount College of Liberal Arts and Sciences
Natural Sciences and Engineering Oral Presentation

Follicle-Stimulating Hormone Receptor Binding By Glycoforms

Follicle-stimulating hormone (FSH) functions to stimulate ovarian follicle development in the ovaries in females, which is essential for oocyte maturation. In males, FSH regulates Sertoli cell function in the testis. Human FSH exists as a heterogeneous mixture of two glycoforms, differing in glycosylation of the beta-subunit. One major glycoform, FSH-24 is glycosylated at all 4 N-glycosylation sites and is indicated in Western blotting by the presence of a 24 kDa band. FSH-21 is characterized by a partially-glycosylated beta-subunit, and seen in Western blotting by the presence of a 21 kDa band. Glycosylation patterns of hFSH can affect receptor binding and activation.

As FSH receptors are known to exist as dimers or as oligomers, FSH binding to one ligand-binding site may influence binding to the other sites in the receptor complex. Our hypothesis was that negative cooperativity would limit FSH-24 to only one ligand-binding site per dimer, whereas FSH-21 would not exhibit negative cooperativity and could bind both sites. We tested this hypothesis by measuring dissociation in the presence and absence of cold FSH glycoforms.

Negative cooperativity was measured by loading FSH membrane receptors with ¹²⁵I-hFSH tracer for 24 hours at 25°C, followed by measuring dissociation over the course of 3 hours, at 30-minute time intervals in the absence of cold hormone, or in the presence of either pFSH (FSH-24 only) or eFSH (90% FSH-21). The amount of tracer bound to FSH receptor membranes was measured in a gamma counter and plotted against time.

Dissociation of ¹²⁵I-hFSH tracer at receptors occurred only in the presence of 1000-fold excess unlabeled FSH glycoform competitors. The dissociation from FSH receptors by both glycoform tracers was consistent with negative cooperativity by both pFSH and eFSH, causing us to reject our current working hypothesis.

Natasha Schlittenhardt

Faculty Sponsor: Mark Schneegurt
Fairmount College of Liberal Arts and Sciences
Natural Sciences and Engineering Poster Presentation

Isolation and Characterization of Halotolerant Bacteria from Oligohaline Soils

It is widely known that a variety of bacterial strains are capable of thriving in environments with temperature, pH, and salinity extremes. The current study aims to count, culture, and characterize halotolerant (can grow at high concentrations of NaCl) bacteria from common non-salty soil samples from a variety of biomes. It is unclear whether halotolerant bacteria would be present due to the low salt concentrations in these soils. It also was unclear whether cultivated isolates would correspond to genera associated with hypersaline environments, common soil bacteria, or novel phyla. Turf soils from the Wichita, KS area were used to inoculate liquid SP media containing 10 or 20% NaCl. Serial dilutions were used to statistically determine the most probable number of halotolerant bacteria. It appears that there are approximately 1.4×10^6 and 2.6×10^3 bacteria g soil⁻¹ that can grow in 10 and 20% NaCl, respectively. Following enrichment, isolates are obtained by repetitive streak-plating. More than two dozen isolates are being characterized. The isolates will be identified using PCR and 16S rRNA gene sequence phylogenetic analysis. Sampling will expand to include a wide variety of oligohaline environments. This work was supported by awards from NASA ROSES and NIH NCRN NIGMS KINBRE.

Jerret Ross

Faculty Sponsor: Huzefa Kagdi

College of Engineering

Natural Sciences and Engineering Oral Presentation

Investigating the Use of Design Patterns in Open Source Software Systems

OBJECTIVE

Study the usage patterns and trends of software design patterns in open source development.

II. QUESTIONS

How prevalent are design patterns? What is the distribution of different design patterns? How well existing tools identify patterns? How do these patterns evolve? Are design patterns prone to changes?

III. ACTIVITIES AND PLAN OF WORK

- Identify open source systems. Conduct a survey of pattern extraction tools.
- Design and execute an empirical study.
- Design and implement the tool support necessary execute an empirical study.

IV. FINDING AND INTERPRETATIONS

RQ1 The use of design patterns in open source projects is ubiquitous.

RQ2 We found Adapter, Composite, Observer, State, strategy and Template Method designs the most with the Factory Method, Singleton, and Observer method not far behind. While the Command pattern, Facade, Flyweight, Proxy, Chain of Responsibility, Mediator and Bridge pattern are used commonly. Leaving the Prototype Pattern to be rarely used.

RQ3 With the current state of automatic design pattern detection being where it is this is not an easy question to answer. We encountered four major obstacles in the evaluations of pattern detection tools.

- An inability to find working tools.
- A lack of locating the source code from detected patterns.
- A lack of Robustness with respect to the number of languages that constituted a tools domain.
- Inconsistent output from different tools on identical systems.

RQ4-5 Unable to answer due to constraints.

V. CONCLUSION

Before tools can be useful we need a benchmark where design pattern mining tools can be verified. Tools need to be more robust with respect to languages. Tools need to be created with long term maintenance in mind.

Chandler Williams

Faculty Sponsor: Philip Gaunt

Fairmount College of Liberal Arts and Sciences

Humanities and Social Sciences Oral Presentation

How University Students Continue to Live in a Bilingual Society in Puerto Rico

One of the most critical questions for Puerto Ricans today is whether or not to become the 51st state of the United States of America. In a recent interview with Pedro Pierluisi, Puerto Rican commissioner to the U.S. Congress, he discusses the advantages and disadvantages of becoming a sovereign state. One of the biggest disadvantages is that Puerto Rico would have to make English their primary language while currently Puerto Rico functions as a bilingual society. Why is the question of language so important? What role does language play in Puerto Rican culture? How does one culture survive with two national languages? Is one language used more than the other and why? I want to know in what social settings Puerto Ricans use Spanish and in what other social settings they use English. To do this I will compare how Puerto Rican college students use literature and social media inside and outside of their university.

Michael Staab

Faculty Sponsor: Scott Miller

College of Engineering

Natural Sciences and Engineering Oral Presentation

Analysis and Optimization of Axisymmetric Supersonic Inlets for Rocket-Based Combined Cycle Propulsion Applications

Rocket-Based-Combined-Cycle (RBCC) propulsion is an exotic propulsion concept which combines supersonic Ramjet, hypersonic SCRamjet and rocket propulsion into a single, integrated system. The advantage of RBCC propulsion lies in its ability to operate over a wide range of speed regimes - Supersonic to Orbital Velocity - providing both increased propulsive efficiency and versatility for operation in next generation Two-Stage-To-Orbit launch systems. One challenge for successful operation of an RBCC propulsion system begins with proper compression of intake air without sacrificing the energy of the flow used for combustion at large air-breathing Mach numbers (Mach 10 - 15). This is accomplished by operating inlets in optimal configurations which limit total pressure losses and maximize the capture of intake air mass. This study analyzed a wide range of Axisymmetric inlet configurations for Mach numbers ranging from Mach 1 to Mach 15 using a comprehensive MATLAB program which predicts local flow properties and Mach numbers, shock wave locations, shock wave reflection and refraction angles, and flow termination properties. The program determines the inlet mass flow rate of air, total pressure ratio and static pressure and temperature ratios for each inlet configuration-Mach number pairing. The primary goal of this research is to map the optimal flow properties over the air-breathing Mach number range (~ Mach 3 - 15).

Keely Wells and Diana Thompson

Faculty Sponsor: Barbara Hodson

College of Health Professions

Humanities and Social Sciences Oral Presentations

Phonological Systems of Spanish Speakers

The purpose of this project was to investigate phonological systems of Spanish speakers in depth in order to determine what major differences and similarities there are between Spanish and English. According to the most recent census, the Spanish-speaking population in the United States has increased to over 50 million individuals. Knowledge about Spanish has become increasingly important in this country, particularly for individuals in helping professions (from preschool teachers to nursing home caregivers), who report that they often have difficulty communicating with their patients/students. Research was conducted by exploring journal articles, books, and the internet. Major findings regarding similarities and differences between Spanish and English will be explained in this presentation. For example, (a) Spanish has only five vowels, (b) more Spanish words are multisyllabic compared to English, and (c) Spanish has very few word endings (i.e., final consonants) compared to English. Although there are many words in Spanish that English speakers can interpret (e.g., telefono), only 13 of the 24 English consonants occur in Spanish. Another difference relates to dialects. In English, dialects have the greatest effect on vowels, whereas in Spanish, consonants are altered more by dialects. The presenters, who speak Spanish fluently (one is from Colombia) will also demonstrate major dialect differences. In addition, examples of common mispronunciations of English words by native Spanish speakers also will be provided.

Nicholas Wasinger

Faculty Sponsor: Moriah Beck

Fairmount College of Liberal Arts and Sciences

Natural Sciences and Engineering Poster Presentation

Understanding Palladin's Mechanism for Nuclear Localization

Palladin, a crucial component of cytoskeletal development in all stages of cellular life, provides a method for rapid actin regulation, which includes binding, bundling, and cross-linking to other cytoskeletal components. Palladin not only plays roles with cellular cytoskeletal components, but has also been linked to metastatic cancer, through an up-regulated response seen in these systemic cancers. The protein palladin contains 7 different isoforms, all with different sizes and localization patterns in a multitude of cell and tissue types. One isoform of palladin (Ig345C), containing only the three C-terminal immunoglobulin domains, plays a somewhat enigmatic role in cancer metastasis, as it is the least studied of all the known isoforms. Ig345C is known to be localized primarily to the nucleus. The mechanism and reasoning why this localization occurs still remains unknown, but our goal is to use biochemical techniques to provide insight. Some of the most current published research suggests that a transcription factor called "Myocardin Related Transcription Factor" or MRTF may interact with the Ig345 isoform, providing one possible mechanism for nuclear localization of palladin. Using co-sedimentation assays, we have shown that Ig345C appears not bind actin unaided, an unexpected result as Ig3 and Ig34 both bind actin filaments. The most likely explanations for this inability for actin to bind this palladin isoform will be fully examined through several techniques. Different techniques will be employed based upon the type of inhibition suspected: gel-filtration chromatography to separate tightly bound actin from Ig345C and analytical ultracentrifugation for examination of autoinhibition via dimerization. Finally, MRTF and Ig345C will be co-incubated with actin and co-sedimentation techniques will be used to examine direct binding. This research will improve our understanding of how Ig345C is localized to the nucleus as well as examine regulation of actin binding by palladin.

David Wickell

Faculty Sponsor: Mary Jameson

Fairmount College of Liberal Arts and Sciences

Natural Sciences and Engineering Oral Presentation

Molecules, Morphology and *Mimeoma* Scarab Beetles: Evolutionary Implications for a Palm Associated Group

Scarab beetles in the genus *Mimeoma* (Coleoptera, Scarabaeidae, Dynastinae) feed on palms and are found in Mesoamerica, northern South America and the West Indies. The genus is united by a suite of characters including its acutely pointed clypeus, which is thought to have a role in pollinating while feeding on palm inflorescences. Currently, no data exist to distinguish *Mimeoma* from other palm visiting scarab beetles. We conducted an evolutionary study on the genus *Mimeoma* using molecular methods to address: 1) trait evolution associated with palm pollen feeding and subsequent pollination and 2) relatedness of species in the genus (i.e., whether the genus is a natural group). Results of our DNA sequence analysis unite *Mimeoma* as a natural group nested within a larger genus, *Cyclocephala*, demonstrating that *Mimeoma* is descended from a single common ancestor. This, in turn, suggests that the defining characters of the group, such as the pointed clypeus, evolved once in *Mimeoma*.

Monica Williams

Faculty Sponsor: Shukura Bakari-Cozart

College of Education

Humanities and Social Sciences Oral Presentation

From Dropped Out to Checked In: A Snapshot of Alternative Education

Many high schools today employ a conventional model of schooling for students in grades 9-12. This model includes traditional, lecture-style classes that follow a typical schedule of two semesters (four, nine-week terms), midterms, and finals. Although many students are able to conform to this model, for those who do not, research shows that alternative education can meet their needs. The purpose of this study was to determine the structure and effects of an alternative high school in a small, but growing, Midwestern school district. After a review of the literature, researchers completed a case study of this high school in order to review its history, necessity, student population, structure, and effects. This research encompassed both qualitative data (student surveys and principal/superintendent interviews) and quantitative data as it sought to determine why these students were in alternative schools as well as their outcomes. The results of this research may help pinpoint the continued need for these types of environments in districts and how they can be used effectively to serve nontraditional students as they find success. Keywords: dropouts, alternative education, nontraditional students, school structure