Program & Abstract Submissions

UNDERGRADUATE RESEARCH AND CREATIVE ACTIVITY FORUM (URCAF)

WICHITA STATE UNIVERSITY

April 15, 2022

RHATIGAN STUDENT CENTER, WICHITA STATE UNIVERSITY

Undergraduate Research & Creative Activity Forum (URCAF)
April 15, 2022 | Rhatigan Student Center

Event Schedule

8:45 – 9:30 a.m. Student Registration, RS 257 Ashton Bridges
Judge Registration, RS 261 Olive

9:30 – 12:30 p.m. Oral Presentations
- Natural Sciences & Engineering: RS 262 Herrman & RS 264 Spencer
- Social Sciences and Humanities: RS 265 Lucas
- Exhibition & Performance: RS 265 Lucas

9:30 – 1:00 p.m. Poster Presentations: RSC First & Second Floor
- Applied Sciences
- Natural Sciences & Engineering
- Social Sciences & Humanities

12:30 – 2:00 p.m. Lunch, RSC
- One meal ticket is provided to each presenter and judge. Tickets can be redeemed at Chick-fil-A, Panda Express, Freddy's, or Chaat House.

2:00 – 2:30 p.m. URCAF Awards Ceremony, RS 266 Pike

2021-2022 URCAF ORGANIZING COMMITTEE

Kelly Anderson, Chair
Associate Professor, Dental Hygeine, College of Health Professions

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Rannfrid Thelle
Associate Professor, History, Fairmount College of Liberal Arts and Sciences

Anne Wasinger
Student Representative

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POSTER PRESENTATION ABSTRACTS

Kelly Adams
Faculty Mentor(s): Mythili Menon
Fairmount College of Liberal Arts & Sciences
Poster Presentation: Applied Sciences

ŋ/ɜɪ/ʒə: A CONSTRUCTED LANGUAGE TO VERBALLY PORTRAY A SIGNED LANGUAGE OF ALIEN DESCENT

A human is tasked with deciphering an alien race's spoken language. The elders of the alien race have no mouths, therefore, communicate via sign language. However, the younger generations have mouths as a result of their race reproducing with a neighboring planet's race. The younger population has developed a spoken language to use simultaneously with their race's native sign language. The speaking generations have also added spoken, linguistic properties to represent the non-manual components of the sign language that retain grammatical information.

The new spoken language is called, ŋ/ɜɪ/ʒə, meaning 'mouth.' The name given to the younger population is, ŋ/ɜɪ/ʒəχɑ, meaning, 'mouth people.' American Sign Language was researched to determine various morphological components. ASL uses OSV for its main structure. Its determiners are indicated using indexing, creating non-gendered pronouns. It deploys reduplication to represent plurality. Nouns are non-gendered, and temporal markers are free morphemes which always occur at the beginning of a phrase. Affixations are used to change a verb/noun to a noun that references an agent. Some grammatical features in ASL are non-manual, therefore ŋ/ɜɪ/ʒə incorporates infixation of verbs to represent these features.

The phonology of ŋ/ɜɪ/ʒə is inspired by English, Scottish English and Elvish. The velar plosives 'k' and 'g' as well as the post-alveolar fricatives 'ʃ' and 'ʒ' have been derived from Scottish English. Due to the primitivity of the spoken language the phonology of ŋ/ɜɪ/ʒə uses open syllabification, as most beginning verbal utterances such as 'ba,' 'ma,' and 'da' mirror this type of system. This component is inspired by the constructed language, Elvish. Several of the phones are derivative of English.

Lauren Baalman, Cassie Forcum, Maria Thompson, Jade Burroughs
Faculty Mentor(s): Julie Martin
College of Health Professions
Poster Presentation: Applied Sciences

Educating Pregnant Women and Their Children on Oral Hygiene

Problem Statement: The lack of oral health education in pregnant women and their children is an overarching concern and the implementation of specific educational-based programs may provide improvements in this population. Purpose: This project focuses on information collected about the knowledge pregnant women, mothers, and their children have around the benefits of establishing a good oral hygiene routine. Methods: A review of national data using the National Center for Biotechnology Information (NCBI) databases and eight journal articles was performed to assess the oral health resources and needs of pregnant women, mothers, and their children. Results: There is a lack of knowledge regarding pregnant women, their oral health and the oral health of their child/children. Many oral changes are seen during pregnancy that include gingivitis, gingival hyperplasia, salivary changes, and pyogenic granulomas. In pregnant women, gingivitis, an early stage of periodontal disease, may be aggravated by changing hormones during pregnancy. Women of childbearing age have an increased risk for untreated cavities. Children of mothers who have high levels of untreated cavities or tooth loss are more likely to have cavities. Conclusions: Suggestions for programs to expand and educate multiple women and their children's oral health knowledge would be through daily classes that could be offered in community centers.

Additional information could also be gathered from different income levels to see if there are further discrepancies regarding oral health within pregnant women, mothers, and their children in order to expand on these educational programs.

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Jaylyn Bergkamp, Kennedy Camp, Sam Koch, Shadden Zapata
Faculty Mentor(s): Brandi Carlson
College of Health Professions
Poster Presentation: Applied Sciences

All Aboard for Healthy Smiles

Purpose: This educational program was to understand health disparities in Hispanic communities, specifically children and to provide education and access and care to this community. Methods: Search for oral health disparities in this population were found in the Centers for Disease Control and Prevention database and the United States Census focusing on Latino and Hispanic populations. A systematic literature review search utilizing the following key words "Oral Health and Hispanics," "Access," and "Healthcare". . The demographic of the community is of low income and low access to care. Oral hygiene education was provided to low income, Hispanic children at Aliento de Vida Brethren in Christ in Salina, Kansas. Results: The results connect to practice by educating Hispanic youth on oral hygiene. With primary prevention, the incidence of childhood caries in Hispanic youth may be decreased. Recommendations: This educational program could be followed up in the future with other students by expanding the study to not only children of the Hispanic community, but to the adolescent, adult, and older adult generations. New hands-on activities can be used to enhance learning.

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Lindsey Clark, Lauren Akin, Pili Bravo-Alvarez, Paige Counterman, Stephanie Webster
Faculty Mentor(s): Barbara Gonzalez
College of Health Professions

Poster Presentation: Applied Sciences

Oral Hygiene Modifications for the Intellectually & Developmentally Disabled

This program's goal is to inform individuals with intellectual and developmental disabilities (IDD) of the many different tools and ways a toothbrush can be modified to make oral hygiene easier. Different handle modifiers are discussed and demonstrated to show ease of use. According to the American Dental Association, individuals with IDD are more at risk for developing caries due to the lack of motor skills that have been acquired throughout their life span. This program involves individuals who are residents at an independent living center here in Wichita, Kansas. This group of people varies in age, gender, ethnicity, cognitive and physical ability. The independent living center is named Arrowhead West and serves the adult population of our community. There are many different tools available that can help someone with disabilities form a better grip and adapt their toothbrush in their mouth. Electric toothbrushes have been shown to remove plaque better than manual brushes and allow better grip. The IDD individuals were interested in their oral health and actively interacted with the demonstrations. To better understand how well the modifiers are being used and tolerated, a follow up program should be done with the participants and their healthcare aids to assess their oral health. A review of handle modifiers would be helpful in future programs like this. Follow up sessions should be done with both patients and caregivers to ensure that modifiers are being used correctly and proper oral hygiene is being conducted daily.

Carson Harris
Faculty Mentor(s): Gregory Houseman
Fairmount College of Liberal Arts & Sciences
Poster Presentation: Applied Sciences

Application of tetrazolium chloride for determining viability of L. cuneata seed

Lespedeza cuneata is an introduced species to tall-grass prairies of the Midwest region that classifies as invasive due to the harmful effects it creates to native prairies. When a plant invades a habitat it reduces the abundance and diversity of native plants and can create a detrimental impact on ecosystems. Invasive species such as L. cuneata rely on soil seed banks in which hundreds of seeds can remain viable for years. Increased knowledge of seed persistence in soil seed banks will improve the awareness of potential spread. The aim of this research was to determine a quick and effective germination technique to a specific seed (L. cuneata). The Tetrazolium test (TZ) delivers the viability of the cuneata seeds by displaying quick estimates of seeds' germinability through the process of dehydrogenase catalysis. The colorless triphenyl tetrazolium chloride solution turns into a red dye, formazan. Living tissues of seeds that absorb tetrazolium chloride will be stained red, while dead tissues will retain their natural color. In order to use TZ assay, the seeds of both the chasmogamous (CH) and cleistogamous (CL) variants of L. cuneata must be scarified, stained, and then incubated. Experimentation on CH and CL seeds shed new light on key differences between the two in regard to viability and opened the door for more testing. The results yielded both viable and nonviable seeds for each variant, CL at 28 viable and 7 abnormal; CH at 10 viable, 26 abnormal seeds. This indicates that TZ is the appropriate method for determining germination rates and can pave the way for invasive research and appropriate monitoring programs for eradication means.

Dennis Howard
Faculty Mentor(s): Dr. William C. Groutas
College of Engineering
Poster Presentation: Applied Sciences

STRUCTURE-GUIDED DESIGN AND SYNTHESIS OF SARS-COV-2 3CL PROTEASE INHIBITORS

There is a need for a diversified portfolio of direct-acting antivirals that can be used in the treatment and management of SARS-CoV-2 infections to complement the use of vaccines and monoclonal antibodies.

The research objectives of my project are the following:

1. Multi-step synthesis, purification, structural characterization of an unnatural amino acid (glutamine surrogate) that serves as the primary specificity residue recognized by the protease. The purification of all intermediates and final compound entails the use of flash chromatography, and the structure of these compounds will be established using high field NMR.

2. The glutamine surrogate will be subsequently used in the synthesis of an array of inhibitors of SARS-CoV-2 3CL protease. This will involve the coupling of the glutamine surrogate to Leucine and other natural/unnatural amino acids, as well as a design element, that collectively interact with the protease and facilitate the docking of the inhibitors to the active site. The final inhibitors incorporate an aldehyde or a masked aldehyde as part of their structure that reacts with the catalytic cysteine residue located at the active site of the enzyme.

I anticipate synthesizing a series of inhibitors that will be made available to two research groups that we collaborate with. One group at KU will be determining high-resolution x-ray crystal structures of our inhibitors bound to the enzyme. The second group at K-state-Vet school will be screening the compounds and conducting in-vitro studies to determine the potency of the inhibitors (IC50 values). My project will involve an iterative process of synthesis, cocrystal structure determination, and in-vitro screening.
At the end of my project, I anticipate generating one or more series of compounds that are effective inhibitors of the protease. These results will be disseminated by submitting manuscripts for publication in peer-reviewed journals (I will be listed as a co-author).

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Matt Miller, Wayne Stoner
Faculty Mentor(s): Bill Groutas
College of Applied Studies
Poster Presentation: Applied Sciences

Covid-19 Drug Design for Dummies

Scientific research is an essential part of modern society, but it often feels overly complex and hard to understand. Additionally, as the Covid-19 pandemic continues to rage on, there is a great need for society to be familiar with the science behind different treatment options. This requires scientific research to be presented in a way that is easy to grasp. This project details the creation, design, and improvement of a line of molecules that have shown to be effective in keeping this virus from reproducing. The goal of this presentation is to effectively educate anyone, specifically high school science students, on how viral drug design is done and carried out, through the framework of this line of molecules.

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Stacee Patton, Madison Hayes, McKayla Hoover, Gracie Musson, Katelyn Van
Co-Author(s): McKayla Hoover, Madison Hayes, Gracie Musson
Faculty Mentor(s): Natalie Delacruz
College of Health Professions
Poster Presentation: Applied Sciences

Educating Veterans with Upper Extremity Amputation: to Achieve Oral Health with Daily Modifications

The purpose of this applied program is to educate veterans, with limited dexterity due to upper extremity loss, about the importance of oral hygiene with modifications to achieve optimal oral health goals. The program follows veterans that have upper extremity amputations, activity limitation, lower psychosocial adaptation, and less prosthetic satisfaction while including the benefits of hygiene improvement after educating physical therapists of toothbrush modifications. Wichita State Dental Hygiene students will use the "tell-show-do" method to teach licensed physical therapists oral homecare modifications. By demonstrating a variation of modifications for different dental prostheses, licensed physical therapists will learn these techniques from the dental hygiene students and be able to teach veterans who seek their care in their practices. A modified version of brushing and flossing to help increase positive results in their homecare. The modifications applied to items like toothbrushes and floss holders would include using an object that would increase the diameter of the handle or adding supportive bands to the handle and making it easier for the patient to hold. The physical therapists will learn a variety of methods using a pool noodle, bike handle grip, tennis ball, or rubber banded towel to help increase stability when trying to brush their teeth with a toothbrush or using a floss holder that might be too slim to grip. The outcome of the program will indicate that upper extremity amputee veterans will receive oral home care methods from their physical therapists to improve oral health. Due to frequent physical therapy appointments, the physical therapist can monitor technique and oral health improvement on a routine basis. Through education and modification examples, physical therapists discovered the connection between dental hygiene and their own profession in regards to providing care to veterans with upper extremity amputation. With this knowledge, amputees will develop an increased awareness of maintaining oral hygiene in addition to comprehension of proper toothbrush modification instruction.

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Mayci Runyan, Jaiden Hess, Delanie Randolph, Michelle Armstrong
Faculty Mentor(s): Julie Martin
College of Health Professions
Poster Presentation: Applied Sciences

Saving Senior Smiles

Purpose: Saving Senior Smiles is to educate caregivers and nursing staff on the benefits of oral health for the older adult population. The project Saving Senior Smiles (SSS) is to assist in meeting the Healthy People 2030 Objectives which are to inform caregivers of the importance of proper oral care for their residents, teach them oral care personalized for each resident, and inform them about the correlation between oral health and systemic health.

Methods: This project was conducted to target the elderly adult population of an assisted living facility located in Wichita, Kansas. A scholarly article search was performed through PubMed. The search found statistical data from the National Center of Assisted Living concerning age, gender, and socioeconomic status for this population. The method of delivery included PowerPoint presentation delivered via zoom. This presentation included a pre/posttest in order to measure the level of increased knowledge of the nursing staff relating to oral health practices.

Results: The nursing staff had increased knowledge regarding personalizing care for each resident and the importance of oral health on systemic health.

Implications: Further suggestions for study would include revisiting Agape in six months to assess the resident's oral health as well as investigating staff's knowledge and implementation of daily oral health to their residents.
Additional Materials: Pie charts used to represent the demographics of SSS target population.

Maya Shuaib, Madeline Moyer, Alyssa DeVous, Marianna Vazquez
Faculty Mentor(s): Kelly Anderson
College of Health Professions
Poster Presentation: Applied Sciences

Improving Oral Health for Individuals with Autism Spectrum Disorder

Problem Statement: Individuals with Autism Spectrum Disorder (ASD) experience heightened sensory input resulting in difficulties when performing daily oral hygiene care. Most children and adults with ASD are less likely to receive preventative health care services due to sensory processing difficulties and lack of access to dental care. The oral health objective of Healthy People 2030 addresses awareness to the lack of oral health concerns for these individuals. Efforts to make homes, schools, workplaces, and public places easier to access can help improve quality of life and overall well-being for people with disabilities.

Purpose: The primary goal of this project was to educate ten paraeducators at Heartspring, a residential and day school which serves children with disabilities. The areas of educational focus were the importance of oral health, nutritional guidelines, how to provide daily brushing and oral health care using modifications for the residents with ASD in the age group of five to twenty-two (N=60).

Methods: Through systematic research in reviewing thirteen published articles, it was found that individuals with autism do not have a greater genetic risk of developing caries, however lack of proper daily oral hygiene care increases the risk of oral disease. The oral health education provided to the paraeducators focused primarily on oral hygiene instructions and nutritional counseling using a presentation, hands-on activities, and pamphlets. Modifications to home care include, social stories, placing a tennis ball on a toothbrush, and extended REACH flossers. Social stories consequently soothe the hypersensitivities for children and adults with ASD which may allow them to form an oral hygiene routine. Nutritional counseling was stressed for providing healthy options and avoiding sugary foods. Pre and post surveys were administered to the paraeducators.

Results: Ten paraeducators at Heartspring received a greater understanding of proper oral hygiene instruction and modifications to oral care. This type of educational effort ties directly to the Healthy People objective as described. Pre-test scores averaged at 70% and increased approximately twenty percent after the post-test was given.

Conclusion: The program provided paraeducators at Heartspring to be better prepared to assist individuals with home care habits and improve oral health. Using these educational tools will benefit individuals with ASD at Heartspring in reducing sensitivities, forming a routine, and having educated assistance, therefore leading to fewer dental visits due to dental disease.

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Kathryn Graves, Gabriela Burciaga, Mikayla Bell, Rosangela Pino
Faculty Mentor(s): Julie Martin
College of Health Professions
Oral Presentation: Social Sciences & Humanities

Program Planning Project

Nursing home residents frequently require partial or complete assistance in conducting activities of daily living, including oral care. They often house individuals that use oral prosthetics like removable partials and dentures. For most of these residents to receive adequate daily oral health practices they must rely on nursing home staff.

Patients with oral prosthetics are at higher risk of being vulnerable to harmful bacteria in their mouth, especially if they or the nursing home staff aren't educated properly on caring for oral prosthetics. Education is an essential factor in the improvement of oral health for vulnerable and underserved populations such as nursing home residents. Therefore, the purpose of this project is teaching the staff of the Bunyan Home how to properly care for dental prosthetics. The main objective is educating residents and staff on the importance of denture health including the proper way to clean dentures and the signs and symptoms that could indicate denture disease or ill-fitting dentures.

By creating an education presentation, we will improve the overall oral health of elderly population in nursing homes. This demonstration will be completed by way of the "tell, show, do" method tailored to specific needs of the residents and their caregivers. An explanation of common concerns, visual indications to watch for, and other possibilities that may arise from poor denture care will be presented. Education of the periodontal breakdown process caused by bacteria and its timeline will also be included. Very few lay people are aware that the oral cavity can be overtaken by bacteria or fungus especially when there is a dental prosthetic involved.

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Bader Altohol
Faculty Mentor(s): Dr. Mark A. Schneegurt
Fairmount College of Liberal Arts & Sciences
Poster Presentation: Natural Sciences & Engineering

MEASURING THE ABUNDANCE OF AIRBORNE HALOTOLERANT MICROBES

Biogeography studies have shown that microbes can travel long distances in the atmosphere and spread globally. Microbes appear to have no obvious geographical barriers. Baas Becking stated, "everything is everywhere, the environment selects." This statement suggests that microbes can be everywhere, but their survival depends on the properties of the environment. We investigated this question by sampling the atmosphere for the presence of halotolerant microbes. In the environment, microbes typically grow in freshwater, with little growth at higher NaCl concentrations. Seawater is 2% NaCl; in our experiments, we grow microbes in brines of 10% NaCl. We used R2A medium to create an oligotrophic environment that is more suitable for growing halotolerant microbes from the air or soil. We made two types of R2A media. One is a high-salt R2A medium which we supplemented with 10% NaCl, and the other is a low-salt R2A medium as our control. In addition to the selective media, all the media contained a fungicide cocktail. To collect microbes, we used a method called static air sampling. This is an environmental sampling technique where air is blown directly onto the surface of solid media. We observed about 5 to 10X more colonies on the R2A medium plates than on the high-salt R2A medium plates. In a trial consisting of 6 plates, three of the six were high-salt R2A medium and the other three were R2A medium. Our results showed 43, 29, and 54 colonies on the three high salt R2A medium plates and 459, 527, and 448 colonies on the three R2A medium plates. This led us to conclude that airborne halotolerant microbes are abundant in the atmosphere. We will apply these methods to a wide range of situations. We will conduct experiments to measure microbes in the soil for comparison. Supported by NASA and K-INBRE.

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Joel Berumen-Pacheco
Faculty Mentor(s): Yang-Seon Kim
College of Engineering
Poster Presentation: Natural Sciences & Engineering

Understanding Thermostat Usage Behavior for Energy Efficient Building Systems

Residential buildings account for 20% of the nation's total energy consumption. Although residential buildings represent a high energy demand, their high energy saving potential has not been reached. One of the most significant obstacles to reaching these potentials is the lack of understanding of building-occupant interactions. A deep understanding of occupant behavior is essential in lowering the energy consumption of residential homes. Since predicting occupant behavior seems difficult to discern, this study will use a different approach to identify the occupants behavior on building system usage with various sensors. For this purpose, we installed sensors to detect the residential building system usage, such as Heating, Ventilation and Air Conditioning (HVAC), window usage, cooktop usage, etc. HVAC systems consume a large portion of the residential energy consumption. However, it is not easy to detect the HVAC system usage. Therefore, we developed an algorithm to define the setpoint temperature and HVAC system run time based on the measured data (room temperature, outdoor air temperature, and supply grille air temperature). We will use the supply grille air temperature change over time (dT/dt) as an indicator of the HVAC system being on or off. The relationship between set point temperature and HVAC run time is the main driving force of how much energy is being consumed by the residential building. This paper employs the use of Python as well as various data analysis tools to analyze energy consumption in various types of homes.

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Ranveer Bhalla
Faculty Mentor(s): Dr. Laila Cure
College of Engineering
Poster Presentation: Natural Sciences & Engineering

Food Systems Modelling: Spatio-Temporal Access to Healthy Food in Sedgwick County

The purpose of this study was to make a gritty examination of the availability of Healthy food in Sedgwick County using the availability of time and the geographical location. Initially, the hours of stores in Sedgwick County and their GPS coordinates were documented using Google Maps data. Using this information, we calculated the distance between the centroid of the nearest census tract and the store. Further, we evaluated a Spatio-temporal accessibility measure in which we found out the number of stores within 2 miles of every census tract for different slots a day throughout the week. To show our findings graphically, we made a heatmap of the data using the Microsoft teams. Ultimately, our fundamental outcomes show that healthy food was broadly accessible during the busiest shopping times for more metropolitan census tracts. Whereas the rural regions experienced significantly longer drive times to get healthy food.

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Madison Carlgren, Laik Bradley, Jett Mattison, Andrew Goodwin
Faculty Mentor(s): Dr. Nils Hakansson
College of Engineering
Poster Presentation: Natural Sciences & Engineering

IL-6 Levels during BFR Exercise in Older Adults

One method to reduce the risk of falls and fall-related hospitalizations among older adults is to increase strength and muscular health. Heavy-weight resistance training is the standard exercise to build skeletal muscle and is typically undesirable for older adults. Blood flow restriction exercise is a low-intensity alternative to heavy weightlifting. Interleukin-6 (IL-6) has been shown in previous studies to be produced in skeletal muscles and released at higher levels during exercise. The purpose of the study is to determine if blood flow restriction (BFR) exercise increases IL-6 production in individuals in a shorter time than exercise without BFR.

Seven adults 55 years and older performed 30-minute pedaling sessions per week over 12 weeks. The participants were placed into two groups: aerobic exercise with BFR or aerobic exercise without BFR (control group. Each participant maintained an RPE score between 12-13 during the 30 minutes.

The findings of the study showed that IL-6 levels were significantly increased in the BFR participants as compared to the participants without BFR. Therefore, BFR may be a central mechanism to increase white blood cell recruitment for muscle growth without causing damage to the muscle.

Peter Herrmann
Faculty Mentor(s): Dr. Yongkuk Lee
College of Engineering
Poster Presentation: Natural Sciences & Engineering

FABRICATION OF SOLID STATE ELECTRODES FOR USE IN NONINVASIVE SWEAT SENSOR

Healthcare for a wide variety of illnesses ultimately requires some form of bloodwork, which can often be painful or stressful. Conversely, human sweat contains biomarkers that can indicate a patient's current glucose levels and pH, making it a potential tool in monitoring many illnesses that previously could not be studied noninvasively. Developing an affordable sensor that can effectively measure human sweat for these biomarkers begins with finding a way to develop a Solid State Electrode (SSE) pairing that can compete with commercially available electrodes.

Pairs of silver and platinum wires were used to construct an Ag/AgCl reference electrode (RE) and Pt/IrOx working electrode (WE), through a series of coatings and/or electroplating. Each pair was then submerged in varying pH solutions (pH 4-10) at 2 minute intervals, while being measured for voltage over time. A commercially available sensor was used as the control trial.

Following these initial tests, the RE was subjected to a salt bridge coating to increase the stability of the electrode's voltage, as well as its longevity. These new RE's were placed in a pH 7 solution for 24 hours to measure their stability and longevity, before a second wave of pH tests were performed alongside a new batch of WE's.

The results collected thus far indicate that the fabrication of accurate SSE's that function for an adequate amount of time at affordable costs is possible. Notably, the trials that featured the salt-bridge RE's were more in-line with the commercial sensor's results, indicating a greater degree of accuracy. A larger facility with better equipment should be able to produce the same quality of work at higher quantities, where they can begin to integrate the SSE's into a full sensory device.

Jake Huffman
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Poster Presentation: Natural Sciences & Engineering

Insect Response to Precipitation and Grassland Restoration in Kansas

Flowering plants and grasses play an important role in providing resources for insects, which in turn feed birds and other animals that prey on insects. The precipitous reduction in US grassland habitats (70% since industrialized settlement) is a leading factor in bird and insect declines, but restoration efforts can improve these habitats. In the US, one restoration

effort is the Conservation Reserve Program (CRP). In Kansas, restored grasslands use two major CRP seed mixes; one that is primarily native grasses (CP2) and one that is grasses and flowering forbs (CP25), both aiming to provide natural habitats for wildlife. The seed mixes and precipitation gradient in Kansas (drier in the west and wetter in the east) provide a basis for evaluating the health of insect populations, which is important in the proliferation of all life in grassland restorations. Prior studies suggest an increase in insect numbers and vegetation with increasing precipitation due to an increased resource availability, but a practical test of CRP restorations (CP2, CP25) has not been conducted. In this study, analysis was done on data from 108 CRP sites across Kansas with a precipitation gradient of 64cm (25in). Abundance of insects was measured at each site using 40 m sweep-net sampling twice in 2018. Results will be used to examine the response of insects to CRP restorations. We hypothesize that drier sites in western Kansas will have higher insect abundance associated with CP2, whereas wetter sites in eastern Kansas will have higher insect abundance associated with CP25. Our results provide a good basis for improving grassland habitats for wildlife.

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Mariam Jabr
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Poster Presentation: Natural Sciences & Engineering

FLEXIBLE, WIRELESS SMART WEARABLE MICRO-ELECTRONICS FOR FALL RISK MONITORING AMONG OLDER ADULTS

Falling presents a serious health issue and financial burden for elderly people aged 65 years or older. According to the WHO Global Report, 28%-35% of adults 65 years or older experience fall related injuries more than once per year. The CDC has also reported that more than $50 billion is spent on fall related injuries every year, which calls for the need of an automatic fall detection system for older adults. Current fall detection systems are classified into wearable and non-wearable systems. Non-wearable systems include camera-based systems; however, these systems have very complex setups, are highly expensive and are area constraint. Wearable systems use accelerometers and gyroscopes to obtain motion data; however, they are usually bulky and/or visually displeasing for older adults. Therefore, the overall objective of this research is to design a fall detection system using flexible, wireless smart micro-electronics which offer accurate fall detection and user comfort for long-term use due to their skin-like properties. To achieve this objective, the following specific aims were accomplished. 1) The smart skin-wearable device was designed and fabricated using microfabrication techniques. 2) Motion data was collected from 10 participants (5 younger adults aged 20-30 years and 5 older adults aged 65 years or older). Participants were instructed to perform 5 different human activities (falling, running, sitting, walking, and stairs to collect linear and rotational motion data. 3) Various deep-learning models (CNN, LSTM, CNN-LSTM, and ConvLSTM) were explored to train the data for accurate fall detection. The highest accuracy so far achieved among all models is 89%. Current work on this study includes optimizing hyperparameters of deep-learning models to achieve highest performance and accuracy. Deep-learning models will be compared to create the highest performance algorithm in order to achieve the automatic fall detection system.

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Sensor Fusion for Parameter Estimation of an Aircraft in the Approach Phase

Landing and takeoff are the two most critical and dangerous phases of flight. In recent years the aircraft industry has seen a stark increase in automated systems taking over both of these phases of flight, but more emphasis has been on landing. Many commercial aircraft are capable of performing fully autonomous landings and rollouts without pilot intervention. These systems however are heavily dependent on expensive ground based systems which makes it unfeasible for smaller, lesser used airports to acquire and operate. Other approaches such as Localizer Performance with Vertical guidance (LPV) approaches separate the aircraft from the ground based systems using GPS coordinates to guide the aircraft. This however is not perfect as LPV approaches only have a decision height of 200ft which introduces a place for human error to occur. A furthering of this technology would allow for cheaper airport construction and operation as well as further improving the capabilities of commercial and more directly general aviation aircraft as general aviation is where LPV approaches are primarily used. Presented here are the first steps of a broader investigation into the usage of advanced computer vision techniques as well as the introduction of GPS and RADALT data through data fusion algorithms to estimate landing parameters. This is done in an effort to improve the existing LPV approach by reducing the decision height to 0 ft.

David Liu
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Poster Presentation: Natural Sciences & Engineering

Defining the interface between palladin and actin using crosslinking mass spectrometry

Palladin was discovered in 2000 and has been shown to play a significant role in actin growth, also known as polymerization, which is a key mechanism in cancer metastasis. A single immunoglobulin domain (Ig3) of palladin has been identified as the portion which binds directly to actin and there are several lysine amino acids which have been shown to be responsible for this interaction with actin. Ig domains have not been previously associated with actin binding and it is not yet known which amino acids on the surface of actin participate in its interactions with palladin. Currently we are conducting chemical crosslinking mass spectrometry (XL-MS) experiments to gain a better understanding of which residues are found at the interface between actin and palladin. For crosslinking experiments, actin is polymerized before addition of crosslinking reagents that will form covalent bonds between specific chemical groups on the surface of palladin and actin. We have used the crosslinkers DMTMM, DFDNB, EDC-DE and intend to conduct triplicate trials with DMTMM and BS3 to confirm our results. Future experiments to confirm the XL-MS results will entail the expression of beta and gamma actin in Pichia pastoris. We will use site directed mutagenesis of actin residues identified in XL-MS to determine exactly which residue on actin is responsible for its interactions with palladin. This approach, if successful, will be a powerful tool for identifying specific residues that are involved in the palladin interaction with F-actin, which would consequently allow us to examine the biological role of this interaction, both in vitro and in vivo, using actin-binding-deficient or cancer-associated palladin mutants and has application in the development of therapies to drastically slow pancreatic cancer metastasis.

Katherine Moore
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Exploring Electron Transport Materials for Perovskite Solar Cells

At the forefront of today's photovoltaic research are Perovskite Solar Cells (PSCs). Currently, the materials of choice for the electron transport layer are precious metals that are expensive to buy and require costly deposition methods. SnO_2 is an emerging and highly researched alternative to the standard TiO_2. However, both materials face unique challenges as electron transport layers like stability, hysteresis, and transparency. Herein, TiO_2 and SnO_2 will be used in combination to form the electron transport layer and mitigate the negative effects of both materials. The expected results are increased power conversion efficiency and ease of preparation for our combination cells as compared to the SnO_2 and TiO_2 baseline results.

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SIXTH-SENSE DEVICE TO DETECT SURROUNDING ENVIRONMENT USING ULTRASONIC RANGEFINDER

Obliviousness to unfamiliar or hazardous environments create problems for people's safety. It is stated that in the night alone, an average of 39 percent of people in OECD countries feel unsafe. General knowledge of one's surroundings and dangers, limits the threat for accidents. Threats include vehicles, structures, uneven terrain, and suspicious people/animals. We seek to combat this issue by creating a device that generates instantaneous aid to one's awareness of their surroundings. This device utilizes ultrasonic to detect moving and stationary objects, with the option to refine its detection for specific desired hazards. This in turn, gives users mental solace by providing perceived safety. Experimentation will include applying multiple ultrasonic rangefinders on a person, testing the device's capability to operate between two different functions. Sending a narrow/farther distance soundwave to find singular objects far from the user, and a 360-degree short distance soundwave to find multiple nearby objects around the user. With this, a 6th sense of sorts can be simulated for a person. Users would be alerted of different objects near them via a directional vibration generated by the same ultrasonic device. Its effectiveness in detecting objects, large, small, and its precision in high obstacle locations, and detection of moving objects will be tested to see if the device is a viable form of security/6th sense, device to have awareness of your surroundings even when distracted. Therefore increasing any user's safety mentally and physically.

Hannah Newkirk
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Poster Presentation: Natural Sciences & Engineering

The Development of a Fully Wireless, Skin-wearable fetal ECG Monitoring device

Early detection of fetal abnormalities during pregnancy and delivery is critical to reduce fetal mortality, and the most effective way to accomplish it will be ambulatory fetal electrocardiogram (fECG) monitoring. For example, the most common birth defects, as well as the leading cause of infant death are congenital heart defects (CHD). CHDs can be identified by abnormal cardiac events. These abnormal cardiac events are also indicators of other complications such as fetal hypoxia and intrauterine growth restriction. Therefore, the long-term goal of this study is to develop an ambulatory noninvasive fECG monitoring device by discovering optimal electrode placements on the pregnant abdomen and fabricating skin-wearable electrodes and miniaturized flexible circuit using microfabrication techniques. To accomplish the goal, however, it is essential to establish an accurate fECG extraction since abdominal ECGs (aECGs) include maternal and fetal ECGs, and they often overlap in both the time and frequency domains. In the current work, a set of

realistic aECGs based on several non-stationary events (e.g., internal noises, fetal movements, and uterine contractions) were generated using an open-source FECGSYN toolbox. A number of existing fECG extraction algorithms such as blind source separation, template subtraction and adaptive methods were evaluated using the simulated aECG waveforms, and extraction results were compared with the original fECG waveforms to seek the most effective fECG extraction algorithm for our proposed device. The next steps of this study will be to collect aECG waveforms from participants and to find and develop optimal electrode placement.

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ASSESSMENT OF UPPER-LIMB TASK AND JOINT-BASED EXOSKELETONS FOR REHABILITATION

Exoskeletons and other robotics devices have been used as a common practice to assist and automate rehabilitation exercises. As new exoskeleton designs arise, so does the requirement to assess these devices to ensure efficiency, patient safety, and avoid further injury development. A common challenge in the exoskeleton development process is acquiring proper alignment and fitting of the robotic devices to the human body. This challenge is prevalent due to certain factors such as subject variability and the complexity of the human body and its range of motion. These challenges often dictate the exoskeleton design approaches. Some design approaches have a focus on simplifying and mimicking the human body and joints (joint-based), while others have a focus on generating a specific task without having to align the exoskeleton to the corresponding limb joints to perform a desired anatomical motion (task-based). In this study, both mechanisms are assessed and compared on their alignment and fitting through prototype testing and musculoskeletal modeling and simulation using OpenSim. The assessment will examine and quantify the muscle forces and tendon lengths of specific muscle groups of the users while wearing the exoskeletons and performing the desired rehabilitation tasks. These assessment methods will provide an insight on each mechanism's alignment to the human body, guide other exoskeleton researchers and developers to the most efficient and safest exoskeleton design, and encourage further exoskeleton design evolvement.

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Micah Self, Peter Herrmann
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Poster Presentation: Natural Sciences & Engineering

DEVELOPMENT OF A SKIN-WEARABLE, WIRELESS SWEAT-MONITORING SYSTEM FOR PH, SODIUM, AND GLUCOSE

Sweat is an important bodily fluid that can be non-invasively collected from many different areas of the body and contains valuable biomarkers for a variety of clinical and physiological applications, including early diagnosis of diseases. Current sweat analysis relies on sweat samples collected using absorbent pads or rigid tubes, which are inconvenient and not suitable for continuous, real-time monitoring. Therefore, this study seeks to create a sweat monitoring system that can offer continuous, wireless sweat analysis while maintaining user comfort. The goal of this study will be achieved by focusing on three specific aims: 1) the development of solid-state miniaturized electrochemical sensors for pH, sodium and glucose, 2) the optimization of Near Field Communication (NFC) antennas with longer working distances, and 3) the integration of components onto a low-profile, skin-wearable platform. To accomplish the first aim, various sensors have

been developed and fabricated to optimize performance and longevity. Testing is currently being carried out to experimentally determine thresholds and values that relate to physiological levels of pertinent biomarkers. The second aim is being researched by designing, fabricating, and testing antennas with varied parameters. The resonant frequency and working distance of the antennas are being analyzed to determine which parameters allow for optimal performance that will yield smooth and easy wireless transmission of data. Once this research has been completed, the focus will shift to developing a low-profile, user-friendly housing unit for the various components. This will be followed by experimentation to ensure optimal and accurate performance of the sweat-monitoring device.

Alex Sterzing
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Ascension in Flight Testing Capabilities

In conducting research, an effort is made for the most accurate experimental results. For years, enclosed-cockpit flight simulators have been the best way to provide an authentic flight simulation. Now that Virtual Reality (VR) technology has become mainstream, new opportunities for realistic simulations arise. While both of these methods individually provide great substitutes for real flight, a combination of the two methods could create the most ideal conditions to perform test flights. This would be done through a melding of Augmented Reality (AR) and VR technology to create a blended view. The goal is to use machine learning technology to stream video feed which an algorithm alters to remove everything in the field of view except for our physical console. This would then be blended into the VR video feed to allow the pilot to be in the virtual cockpit and be able to see and interact with the physical controls. In theory, this would better provide pilots with the tactile interactions of a real cockpit, as well as immerse them in the simulation. In theory, this would allow for more accurate results as pilots would be inside of a cockpit and be able to interact with it. This melding of views is to be done through DLLs in Microsoft Visual Studio and plugins in the flight simulator XPlane 11.

Anna Tri, Khoa Nguyen
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Poster Presentation: Natural Sciences & Engineering

INKJET-PRINTED ULTRATHIN STRETCHABLE ELECTRONICS FOR REAL-TIME AMBULATORY ECG MONITORING

In medical applications, there is a great interest in using wearable health monitoring systems to obtain physiological information because they are non-invasive and easy to use. Furthermore, the advancement of technology has allowed these electronics to be miniaturized. However, some wearable devices are still uncomfortable and rigid. To combat this, a new set of thin, soft, flexible skin-like electronics needs to be developed, which can significantly improve user comfort and the quality of signals. The objectives of this study were to characterize inkjet-printed skin-like electronics by optimizing inkjet printing parameters and surface energies of PI coated surface, which determine the drop size of silver nanoparticle (AgNP) inks. The optimal printing parameters were found the jetting voltage of 17 V with a drop spacing of 20 Âµm in the room temperature of 28Â°C. The PI coated surfaces were treated using carbon tetrafluoride (CF4) and oxygen gas (O2) to determine the degrees of hydrophobicity and hydrophilicity. Water contact angle measurements on PI substrates demonstrated 7.80Â°, 7.70Â°, and 7.20Â° for 30-second, 60-second, and 120-second O2 treatments, respectively and 78.4Â°, 88.6Â°, and 102.9Â° for 10-minute, 30-minute, and 60-minute CF4 treatments, respectively.

Corresponding widths of inkjet-printed lines were 63.0 Âµm, 44.5 Âµm, and 41.7 Âµm for 10-minute, 30-minute, and 60-minute CF4 treatments, respectively. Finally, we were able to successfully inkjet-printed stretchable electrodes with 60-minute CF4 treatment, which is constructed with 60 Âµm line width for serpentine interconnects and 1 cm diameter of circular disks. In addition, inkjet-printed ultrathin stretchable electrodes were used to measure biopotentials to compare with biopotentials measured using traditional methods. Overall, creating a thinner, more comfortable, and cost-efficient inkjet-printed electrode for physiological signal monitoring can help improve the future of wearable technology and human performance.

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A robust, calibration-free, and ultra-sensitive magnetometer for remote magnetic field sensing applications

Magnetometers or magnetic field sensors are frequently used on aircraft, spacecraft, drones, and navigational systems for oil and mineral exploration, geophysical surveys, and outer space exploration. These applications need calibration-free, highly sensitive, and fast magnetic field measurement scheme. The existing technology is heavyweight and bulky, and unsuitable for lightweight carriers such as drones. We are designing a compact and lightweight magnetic field sensing device using Nitrogen-Vacancy (NV) center in diamond as a magnetic field sensor combined with an accelerated measurement scheme called an optimal Bayesian measurement algorithm. The diamonds substrate is a good choice because it can sustain a harsh environment such as outer space. We will be using the electrically detected magnetic resonance (EDMR) technique to measure the magnetic field. The EDMR measurement is highly sensitive, relies on quantum physics, and is independent of environmental effects such as temperature changes. In this presentation, I will be discussing our progress towards prototyping such a magnetic field sensing device.

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Form and Function: Does the source of actin determine functional interactions with palladin?

Actin is one of the most abundant proteins in eukaryotes and regulates individual cell functions such as motility, cell shape, and muscle contractions. Yet, actin cannot work alone and interacts with over 150 actin-binding proteins (ABPs). Research in Dr. Beck's lab is focused on the ABP named palladin. Palladin has been linked to the regulation of normal embryonic development and wound healing, but also to cancer metastasis. Palladin is widely expressed in all different types of human cells, however, all prior research has utilized a form of actin from muscle cells.

Several different isoforms of actin vary in protein sequence, location, and function. The most notable being muscle actin, which is the isoform of actin that is most used in biochemical experiments as it is easy to isolate from tissue and is cost-effective. However, there are some drawbacks to using muscle actin such as its heterogeneity and post-translational modifications that are not found in non-muscle actin isoforms. Our hypothesis is that different forms of actin may alter the interaction and overall function of the paladin-actin complex. Therefore, we are working to implement a previously

established method of purifying non-muscle actin isoforms so that relevant studies can be carried out to examine the role of palladin in actin dynamics. In our studies, we used the yeast strain Pichia pastoris to express and purify the different non-muscle isoforms of actin. These results will help to elucidate the interactions between palladin and actin in eukaryotic cells and could help further the understanding of their roles in cancer progression.

Shazia Ahmed
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Poster Presentation: Social Sciences & Humanities

Accessibility of Treatment and Resources for Gestational Diabetes in Sedgwick County

Gestational diabetes is diabetes in pregnant women. These women have an increased risk of fetal and maternal complication. Women with gestational diabetes need to have access to treatment and resources that will decrease these risks and help create healthier lifestyles for these individuals. Sedgwick County's resources and accessibility for women with gestational diabetes are assessed in the study. Interviews are conducted at several clinics and facilities that potentially have resources for gestational diabetes. They consist of a series of questions for the clinic's representative. The questions consist of the treatment plan, cost, accepted insurance, availability, and educational process for patients. This will assess what the clinic has available for patients. The assessment is needed to provide an insight on the places that patients have access to and can receive adequate treatment for their condition in Sedgwick County. All of these elements that are asked about would be analyzed by evaluating them and concluding the accessibility in this specific county. The results are pending, and no conclusions can be made at this stage in the research.

Kaitlyn Carter
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Poster Presentation: Social Sciences & Humanities

MICROFOSSIL ANALYSIS OF A GRINDING STONE FROM THE ETZANOA ARCHAEOLOGICAL SITE

The archaeological site known as Etzanoa (14CO3) was established by Ancestral Wichita peoples from roughly 1450 to 1715 CE along the Walnut River in Southern Kansas. In the summer of 2021 a metate, a type of grinding stone tool that was used to process foodstuff, was excavated from the site. To better understand the food processing that transpired among Etzanoans, samples were taken from the metate are currently undergoing starch and other microfossil analysis to determine what types of residues are present on the artifact. As of yet, no starch has been discovered amongst these samples, but there has been a significant number of fungi, which can be responsible for the degradation of starch. The analysis of lithic materials is a useful method for understanding the food processing of ancient societies and is an insightful study in food history.

Siofra Havel
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Poster Presentation: Social Sciences & Humanities

Six-month Size Variation in Maize starch with Different Glycerin Concentrations

Starch granule analysis allows archaeologists to identify botanic resources utilized by ancient peoples, informing about past foodways and subsistence strategies. As a relatively new archaeometric technique, not many studies have been done over the viability of starch granules over time or the proper microscope slide preservation techniques. Starch granules are noted for their visible cross-hatching fissures (extinction cross), which are most visible through a polarized light microscopy. This is a pilot study in measuring starch granule changes over a period of time based on varying glycerin to water ratios. In order to study changes starch samples (particularly size), 100 randomly selected starch granules were measured. The first measurements were taken in mid-March and then taken again six months later in September. Four solutions were made with glycerin-to-water ratios varying from: 10%, 30%, 50%, and 70%. These solutions included the same amount of maize starch and Lycopodium spores (as a control). The four solutions were put on twelve corresponding slides. Starch concentration with lycopodium was also measured through total lycopodium count on one slide. Over the course of six-months there were significant changes among starch granule size and shape, with the average size dramatically increasing over time in all glycerin concentrations. It appears some starch granules underwent gelatinization likely due to taking in water within the solution. There is variation in the six-month random sampling, but it appears the 50% glycerin-to-water solution had the greatest size growth, followed the 70% concentration, then 30% concentration, and finally the 10% concentration. This study informs archaeologists that long-term storage of starch residues creates dramatic differences in the morphological characteristics of the starch granules and therefore must be used cautiously.

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Cameron Hill
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Poster Presentation: Social Sciences & Humanities

Actualistic Study of Puma (Puma concolor) Bone Surface Modification on Cow (Bos taurus) Remains

This actualistic study focuses on the bone surface modification patterns created by pumas (Puma concolor) on the bones of the animals they eat. The bones assessed in our study were modified by captive pumas from the Exotic Feline Rescue Center in Center Point, Indiana. The assemblage consists of 203 cow (Bos taurus) specimens. We analyzed each element by bone part, then identified the types of tooth marks- pits, punctures, scores, and furrows- and the damage level on a scale of 0-4. We found that scores were the most prevalent type of mark (37% of total marks), followed by pits. The ribs had the most scores and highest damage level on average. The majority of damage took place on the epiphyses of long bones, especially around large joints such as the proximal humerus and femur, which is consistent with findings from previous studies. Puncture size varied between 1.88 mm and 11.79 mm. The information gathered in this actualistic study can help shed light on the puma tooth mark evidence from North and South America, where this carnivore occurs. It can also provide comparisons useful to interpret zooarchaeological and paleoecological assemblages.

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Kristy Lowrey
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Poster Presentation: Social Sciences & Humanities

Availability of information about sexual assault medical forensic exams depends on state

Options for sexual assault medical forensic exams (SAMFE) following a sexual assault are unique to each state and clear information about those options can be difficult to find. This research project examined a random sample of states' laws/policies and resources for those seeking a SAMFE in order to understand what information is accessible in each state and how that information might inform help-seeking and decision making. Internet searches were conducted with standardized search terms to find what information is available to survivors. Some of the specific information gathered includes: who pays for a SAMFE kit to be collected; does who pays for a SAMFE vary depending on if a police report is filed; where and for how long non-report SAMFE kits are stored; if non-report kits are tested; if the survivor is notified before a kit is destroyed; if there is clear information about whether protections are provided in the instance that the reporting individual is not a documented citizen; if interpretation services are provided; and what situations require a mandatory report. Analysis is still underway, but results will communicate the availability of publically accessible information about SAMFEs across the United States. Implications for advocacy and medical response systems will be discussed, including areas in which clearer information might allow survivors to make more informed decisions about their post-assault medical care. Addressing these issues could allow traumatized individuals to more easily understand and, if desired, access their SAMFE options.

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Poster Presentation: Social Sciences & Humanities

AN EXPLORATION OF THE LINK BETWEEN MASOCHISM AND CRIME IN A POST-INCARCERATION SAMPLE

This study explores the relationship between masochism, narcissism, and violent criminal justice involvement. Understanding the association between these variables could aid in the treatment of criminal justice populations and inform a more general understanding as to why people engage in criminal activity. Participants (N=500) were recruited via Amazon Mechanical Turk and given $2.00 in compensation after completing an online survey. To assess an individual's level of narcissistic and masochistic thinking, a narcissism inventory (NPI-16; Ames, Rose, & Anderson, 2006) and an undeserving self-image scale (SELF-DISS; Atkinson, 2017) of a masochism measure were administered. Basic demographic information, psychopathy, IQ, personality, and cognitive flexibility were also measured and controlled for in the analyses. A linear regression indicated that high levels of masochistic thinking were correlated with violent criminal justice involvement, even when relevant covariates were controlled for. Narcissism was not strongly correlated with violent criminal behavior. The data from this study helps provide insight into some of the common characteristics of violent criminal offenders beyond the most commonly explored traits, such as antisocial personality disorder and psychopathy; in fact, according to our data, masochism proves to be a stronger predictor of violent criminal justice involvement than psychopathy. Understanding the connections between various personality traits and criminal behavior can help in both the prevention and rehabilitation processes by providing a better idea of possible root causes and predictors of violent criminal justice involvement.

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Poster Presentation: Social Sciences & Humanities

The impact of COVID-19 on interpersonal violence victim services: First responders' perceptions

During the COVID-19 pandemic, rates of sexual and intimate partner violence increased substantially. Victims were at greater risk for negative physical and psychological outcomes due to isolation policies, changes in resource availability, and increased exposure to perpetrators. First responders to interpersonal violence were impacted as their job structures changed, with anecdotal accounts suggesting duties increased, like advertising availability of resources and implementing novel ways for victims to report abuse. Previous research has only examined the impact of COVID-19 on victims and protocol changes without measuring mental health outcomes for first responders. There is consequently a gap in the literature surrounding how the increase in interpersonal violence during COVID-19 impacted first responders. The current study seeks to gather information about first responders' experiences working during COVID-19 and the impact it had on their wellbeing. This study surveyed 117 Kansas first responders (i.e., hospital employees, therapists, social workers, police officers and crisis center employees) who were recruited via email. Participants described how COVID-19 affected their ability to respond to victims, how their job changed, and what additional changes would have made working through the pandemic more effective. Short answer responses were qualitatively analyzed using thematic analysis and several overarching themes were identified and discussed. Findings demonstrated that the increased stress of trying to stay safe while managing new procedures and decreasing budgets made it more difficult to maintain satisfaction in their careers and that COVID-19 negatively affected the mental health of first responders and the quality and availability of services for victims.

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Hailey Warren, Morgan Jones, Jennifer Stoddard, Shae Weatherson
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Poster Presentation: Applied Sciences

The Importance of Early Dental Appointments & Oral Screenings for Children

Problem Statement: Millions of low income children go without dental care, including routine exams. Educating nursing students may improve this number significantly. Purpose: This project focus was to provide interprofessional collaboration between dental hygiene and nursing students. The goal was to provide pediatric oral health education to nursing students that they can then share with their own patients. Methods: A review of five journal articles from the PubMed database was performed to assess information related to dental disparities in pediatric patients. One journal article was specific to a study regarding how competent nursing students felt about dental hygiene procedures. Results: Participants felt most comfortable discerning normal and abnormal structures in their patient's mouths and felt least comfortable recognizing oral symptoms of systemic diseases as well as having discussions regarding the use of xylitol, chlorhexidine and fluoride. Data collected revealed that Latino and African American children had higher rates of dental caries than Caucasian children and low-income and rural children were less likely to have dental care or routine exams than urban and higher-income children. Conclusions: Suggestions for interprofessional education workshops with healthcare professionals to ensure oral screenings are given to all children regardless of access to dental care, with emphasis on Latino or African Americans, ranging from newborn to twelve years of age. The significance of the oral hygiene education was to emphasize the link between oral and systemic health and how some systemic diseases have oral manifestations that should be observed by all healthcare professionals to properly care for their patients.

ORAL PRESENTATION ABSTRACTS

Emanuel Andrade
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Oral Presentation: Natural Sciences and Engineering

Effects of Boric Acid on Electrospun Sulfonated PEEK

A growing number of flying hours dictates an improved safety level of crew, staff, passengers, and valuable assets. Improved material usage in the interior, as well as the structure of the airplane, is crucial. Flame-resistant electrospun polymeric nanofiber usage may improve safety and the anticipated impacts in manufacturing the structural parts. When looking at aviation history, aircraft accidents are mainly followed by fire that causes losses of lives as well as valuable assets. Flammability in an aircraft is a prominent cause that might be prevented by proper usage of flame retardant electrospun fibers for aircraft interior. The objective of this research is to develop flame-resistant electrospun nanofibers, which can be incorporated with aircraft interiors as insulation materials. The plan for this experiment is to use the appropriate mixture of sulfonated PEEK, boric acid, and DMF to generate a flame-retardant nanofiber mat. This mat's mechanical and flame properties will then be tested through means of thermogravimetric analysis, water contact angle measuring, scanning electron microscopy, and flammability testing to understand how boric acid will impact the flame resistance of PEEK.

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Gary Cicirello
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Fairmount College of Liberal Arts & Sciences
Oral Presentation: Natural Sciences and Engineering

Investigating Infrared Nonlinear Optical Chalcohalides with Distorted Ge3S9 Clusters

Nonlinear optical (NLO) materials in the infrared range are an essential part of the harmonic conversion process to expand the wavelength range of solid state lasers. Current IR NLO materials possess certain drawbacks that make them inefficient to produce high powered IR lasers. Strategies can be employed to design potential IR NLO materials that surpass the current commercial materials, including theoretical study of noncentrosymmetric (NCS) chalcogenides to find potential candidates, and the investigation of Ge3S9 clusters composed of multiple intrinsically distorted GeS4 tetrahedra combined to attempt to produce NCS crystal structures for NLO applications. Incorporation of halogens into sulfide compounds can also increase the band gap of the material and improve laser damage threshold. These strategies are combined and ignite our interest into one IR NLO candidate: KBa4Ge3S10Cl, derived from NaBa4Ge3S10Cl. Preliminary analysis on the compound has been performed, including solid state UV-Vis spectrophotometry to uncover optical properties and powder X-ray diffraction to confirm phase purity and crystal structure. Further investigations will be done on linear and nonlinear optical properties of this compound, as well as investigation into the synthesis of analogues to the compound and other new chalcohalides that incorporate Ge3S9 clusters.

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Aaron Fater
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Oral Presentation: Natural Sciences and Engineering

Watching Actin Grow to Help Understand Cancer Metastasis

The actin-associated human protein palladin plays a pivotal role in cytoskeletal organization in normal and cancerous cells. In pancreatic and breast cancer cell lines, palladin expression levels have been shown to correlate with metastatic potential. Previous work established that palladin contributes to actin dynamics by promoting nucleation of actin, crosslink formation, and filament stabilization. Actin polymerization assays have revealed that the Ig3 domain of palladin is involved in the nucleation step of actin polymerization. Bulk fluorescence assays were used to demonstrate that palladin Ig3 increased the polymerization rate of actin; however, the morphology of the filaments and mechanism remain unclear. It should also be noted that bulk assays cannot distinguish between increased nucleation, branching, or elongation. We have turned to total internal reflection fluorescence microscopy (TIRFm) to image individual actin filaments under different conditions to monitor actin polymerization dynamics and topology. This delves into areas of research that have previously been limited in bulk assay experiments and allows for tracking of actin polymerization in different phases: nucleation, early-stage polymerization, and late-stage polymerization. Up to this point, analysis of TIRFm images has been performed manually. Actin polymerized in the presence of palladin results in more crosslinking and suggests that the network morphology of the bundles may also be altered which we will detect and quantify using this technique. Recent work has shown that perturbations to actin polymerization rates can dramatically alter the architecture of crosslinked F-actin networks which could influence the metastatic motility of cancer cells.

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Carlos Gatti
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Energy Absorption of 3D Printed Lattice Structures

3D printed lattice structures is a rapidly advancing subject in the biomedical and aerospace industries because of its multifunctional properties. In this study, the energy absorption capability of 3D printed lattice structures with inner filaments made of commercially available Polylactic Acid (PLA) were analyzed. Characterization of the PLA filaments was performed through quasi-static tension testing and digital image correlation analysis to evaluate the most ideal printing parameters and its stress-strain behavior. The energy absorption capacity and mechanical properties of the gyroid and diamond structures were obtained through quasi-static compression testing. The results obtained indicated that the filament parameters have a significant effect on the mechanical properties of PLA. The energy absorption capacity of gyroid and diamond structures were increased with the addition of inner filaments, thus establishing a foundation towards multifunctional structures.

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Nathan Gonzalez
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UPPER ARM REHABILITATION EXOSKELETON DESIGN AND ASSESSMENT

Patients who have suffered severe damage to their nervous system, as caused by diseases such as stroke, sclerosis, or cerebral palsy, often experience spasticity. Spasticity is marked by forced contraction of the muscles, limiting the patient's bodily control and movement. Medical exoskeletons have been designed and utilized to help rehabilitate patients to restore the lost Degree-Of-Freedom (DOF); however, most of the existing exoskeletons are too expensive, bulky, or mechanically complex and difficult to align and properly fit to the users. In this research, we have developed a cost-effective, compact, and adjustable 4-DOF exoskeleton to fit various sizes of the upper arm. The design offers patients enough range of motion to accomplish most tasks of daily living while eliminating the risk of singularities and collision with the user's body. The design is lightweight and compact. Each DOF utilizes an RMD-X8 motor, which is built to withstand 300 N of axial loading and 1000 N of radial loading. The links and joints were 3D-printed using PLA, with some being reinforced with 3003 H14 Aluminum sheet metal. This reinforcement minimizes bending by handling the bulk of the exoskeleton's load and prevents damage to the 3D prints and motors. The alignment of the exoskeleton to the human anatomical joints has been analyzed through musculoskeletal modeling. Results are promising and further analysis will be done through human subject testing to assess the exoskeleton's effectiveness in rehabilitating patients, as well as gauge what modifications to make in future designs.

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Logan Janes
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LIFE TRAPPED IN ICE: MICROBIAL SURVIVAL AND ACTIVITY WITHIN MELTED BRINES IN LAYERED ICES RELEVANT TO MARS

Mars is a prime candidate for supporting living systems. Since liquid water is rare, Martian life might exist inside brine near the surface trapped between layers of pure water ice from frost and aeolian regolith deposits. Our lab examines whether salinotolerant bacteria including Marinococcus sp. str. HL11, Halomonas sp. str. BLE7, and Halomonas sp. str. GSP3 can survive and metabolize under artificial Martian conditions. The configuration that might best mimic natural Mars ices is ice lenses where pockets of bacterial cultures are entirely surrounded by pure water ice. We hope liquid culture encased in ice will prevent edge effects from containers. The ice lenses are created by freezing a layer of pure water with a central depression. Salty bacterial cultures are frozen in this well and pure water is frozen as a top layer. The salty culture melts at a lower temperature than the surrounding ice, so experiments can be performed with liquid culture encased in ice. A culture lens at 15% NaCl will melt at -12 Â°C, while the water ice layers remain frozen. We are working to understand how cells respond to entrapment inside the brine lens, including performing assays with XTT to study respiration and measuring survival rates with dilution plating. We believe that cells settle inside the lens and create a biofilm. This project will inform the search for life on Mars by identifying suitable habitats to target and contribute to planetary protection protocols by characterizing the limits of life. Funded by NASA and FYRE.

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William Johnston
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Oral Presentation: Natural Sciences and Engineering

Additively Manufactured Tensegrity Assisted Inflatable Structures (AMTAIS)

Inflation with customization: this research introduces a novel manufacturing process to produce inflatables with tailorable properties. Additive manufacturingâ€"especially Fused Deposition Modelingâ€"allows for rapid fabrication of almost any geometry imaginable. This research answers the question: can customizable inflatable structures be consistently fabricated using a novel additive manufacturing technique? Here, we introduce additively manufactured tensegrity assisted inflatable structures (AMTAIS). Fabricated using a patent pending design and manufacturing process, each structure maintains its complex shape after inflation. Using flexible material, airtight walls are printed to any user-specified geometry. Then, the G-codeâ€"or the set of printing instructionsâ€"is modified to incorporate fibrous tethers within the internal cavity. These tethers prohibit the structural walls from expanding, allowing the structure to hold its shape post-inflation. A valve is inserted into the AMTAIS to allow inflation using any standard bike pump. This technique permits the production of a myriad of inflatable shapes with improved load-bearing properties. The inflated structures can hold pressure for weeks, and can be folded for storage when not in use. As a lightweight alternative to current solid structures, these enhanced inflatables could offer strong commercial value, from aerospace applications to the fashion industry. These structures have already proven to be effective bespoke handbags that protect the user's devices from accidental falls. By redefining the future of tensegrity assisted inflatables, this research provides further innovation within the realm of 3D printing.

Sriram Srinivasan
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Detection of Malicious DoH traffic using Autoencoders

Domain Name System (DNS) is the phonebook of the Internet, translating domain names to IP addresses of Internet servers hosting information user wants to find online. DNS is unencrypted, revealing user's browsing habits to Internet Service Providers. To protect users' privacy, most major browsers replaced DNS with DNS-over-HTTPS (DoH), an encrypted form of DNS. Unfortunately, DoH can be exploited by botnets to communicate with Command-and-Control center. The reason is that they can use DoH to bypass traditional detection techniques that rely on the unencrypted DNS traffic. Therefore, this research aims to design a method to detect botnet activity that uses DoH, while protecting users' privacy.

To detect DoH traffic from botnet malware. we propose to use autoencoders, a form of deep neural network. The main idea of our detection approach is to use the autoencoder recreation error to find the malicious DoH traffic. Specifically, an autoencoder aims to recreate the input network traffic on its output. By training the autoencoder to recreate both benign and malicious network traffic, we can obtain a 3D visualization, called embeddings. . We then use K-means clustering to find the clusters of benign and malicious traffic in the 3D-space. We observe that the classification precision is 91.38 %, accuracy is 89.31 %, recall is 87.10 %, and f-score is 89.19 %.

In summary, the autoencoder provides a 3D representation using known labels for packet flows. K-means performs the detection of whether the traffic is legitimate or malicious. This yielded highly accurate and reliable classification results.

Radeef Ashhab Bin Karim
Faculty Mentor(s): Maggie Schoonover, Kristyn Smith
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H.A.R.V.I.E. (Holographic Augmented Reality Visualization Interface for Exploration) -- NASA SUITS Challenge

NASA SUITS Challenge is an opportunity for the students for designing an augmented reality for displaying the spacesuit data for navigation purposes. This challenge focuses on the Artemis mission which seeks to stabilize long term presence on the Moon so in the near future. It is very important for EVA members to be equipped with appropriate technologies to be shielded from the extreme terrestrial conditions and ease of exploration. Our mission focuses on various categories which has undergone tremendous research and is ongoing research as we continue to work. They address the research questions of how one must integrate long term and short-term navigation along with the need of Lunar search and rescue in any event of emergency? We have implemented the use of dead reckoning and positional tracking that has spatial learning features to navigate without the use of GPS. In an event of any emergency, another EV member can safely navigate to them as the home base data is saved. There are waypoint markers that will calculate the elevation and displacement for all these features. How must one have the functions of terrain sensing to identify hazards. If there is a hazard ahead, the system would recalculate the waypoints to avoid the hazard and use a route around it using spatial mapping. How must displaying of chats, suit status and vitals be utilized. These items were professionally color coded, and audio integrated to state warnings and notifications. We integrate these into the headset HoloLens 2 for user interface.

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Kylie Meier
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Artificial Neural Network Model to Predict the Future Trajectory of Anatomical Motion During Cancer Treatment

Organ motion is a major challenge in the radiation treatment of lung and abdominal cancers, which, if unaccounted for, may lead to the underdosing of cancer cells or overdosing of normal tissue, potentially causing treatment failure or normal-tissue toxicity. Recent developments in the field of radiation therapy have allowed for a real-time depiction of organ motion through MRI imaging to guide the radiation delivery process. The goal of this research is to develop and test artificial neural network (ANN) models to predict the future trajectory of anatomical motion during treatment. We employ image-processing tools to extract a one-dimensional signal from the sequence of acquired MRI images to describe the anatomical motion. We develop and train ANN models to predict the signal amplitude at future time points using the Neural Net Time Series toolbox in MATLAB. Using different prediction horizons, we apply the proposed ANN model retrospectively to de-identified cancer patients and compare the prediction accuracy against other autoregressive models for time-series prediction. The obtained results show that the ANN model outperforms linear autoregressive model.

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Gissele Mosqueda
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Oral Presentation: Natural Sciences and Engineering

Optimal Rest Interval Between Sets in Robot-Based Upper-Arm Rehabilitation

Muscular fatigue affects the muscle activation that is needed for producing the desired clinical outcome. Integrating optimal muscle relaxation periods into a variety of health care rehabilitation protocols is important to maximize the efficiency of the therapy. In this study, four muscle relaxation periods (30, 60, 90 and 120 seconds) and their effectiveness in producing consistent muscle activation of the muscle biceps brachii between sets of an elbow flexion and extension task was investigated among a sample of 10 subjects with no disabilities. The same resting periods were then utilized in a controlled exoskeleton-based exercise for a sample size of 5 subjects and have shown similar results. On average, the

muscle activity of the biceps brachii decreased by 0.3% when rested for 30 seconds, and it increased by 1.25%, 0.76% and 0.82% when using muscle relaxation periods of 60, 90 and 120 seconds, respectively. The preliminary results suggest that a muscle relaxation period of about 60 seconds is needed for optimal continuous muscle activation within rehabilitation regimens. Robot-based rehabilitation is good to produce repetitive tasks with the right intensity and knowing the optimal resting period will make the automation more effective.

David Nevarez-Saenz
Faculty Mentor(s): Bhisham Sharma, Ted Adler
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Oral Presentation: Natural Sciences and Engineering

Additive manufacturing of ceramic acoustic liners for aircraft noise reduction

Noise pollution in large cities has significantly increased in the last couple of years. The rise of air traffic and electric air taxis will not delay this growth. Solutions to address the large amounts of noise from turbofan engines are to place honeycomb sound absorbers made of stainless and aluminum. The location of the acoustic liners is around the inlet to the combustion chamber. The problem with the current method is that these sound absorbers cannot withstand high temperatures and high pressures. An alternate solution is to place fiberglass blankets on the inlet, but they can potentially block airflow. This paper investigates an inexpensive method to 3D print ceramic porous structures for noise reduction using a modified extrusion 3D printer. Our solution aims to minimize cost, design complex geometries, expand scalability, and use ceramic characteristics to withstand harsh environments on the engines. With a modified version of the Delta WASP 2040 Clay, sound absorbers are 3D printed with clay-based materials. The samples are tested using a two-microphone normal incidence impedance tube for acoustic properties. Our work shows a potential low-cost alternative with 3D printed clay-based ceramics in the future of acoustic liners.

Grace Peterson
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OPTIMAL FABRICATION METHODS FOR PEROVSKITE SOLAR CELLS WITH CARBON COUNTER ELECTRODES

Solar energy is a vital part of the search for viable renewable energy sources. Increasing the affordability of solar cells while maintaining their efficiency is critical to implementing them practically on a large scale. Currently, expensive materials, such as gold, are commonly used as counter electrodes. This study explores the use of carbon as a more affordable counter electrode material for perovskite solar cells. To fabricate the perovskite solar cells, the substrate was first spin coated with a titanium solution. After drying in the furnace, a layer of PbI2 was added by spin coating, the substrate was soaked in methylammonium iodide, and a layer of hole transport material (HTM) was added by spin coating. Finally, a layer of activated carbon was added on top of the perovskite layer. The I-V test (current-voltage test) was used to find the current and voltage when the solar cell was exposed to sunlight, and to calculate important parameters, including efficiency. Increasing the number of titanium layers improved the efficiency by helping to uniformly coat the surface. The efficiency was increased by using a thicker carbon layer and by increasing the amount of solution used when spin coating the PbI2. Drying the PbI2 and HTM layers on a heating pad also improved the

performance, especially when the solar cell was placed in a dark environment between stages of fabrication. Continued research is necessary to verify these results and further optimize the process.

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Kazune Tazawa
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Oral Presentation: Natural Sciences and Engineering

Pure Bending of Honeycomb Core

Honeycomb core is a cellular structure consisting of hexagonal cells. Honeycomb cores are widely used because of the ability enable sandwich structures to achieve high strength and stiffness with small density. Honeycomb is originally a natural structure in a beehive. Honeycomb cores are made by joining thin corrugated ribbons, which could be plastic or metal. The key property of honeycomb core is its relatively high-pressure resistance performance compared to the amount of material used, thus making it attractive for aerospace applications. We used two different types of honeycomb specimens conducting pure bending tests. This test applies both compression and tensile stresses on one structure. Each type of specimen is cut in three different ribbon directions. The aim of this research is to find the difference of strength and stiffness of honeycomb structure depending on the material direction and type of loading applied.

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Journi Brown
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Oral Presentation: Social Sciences & Humanities

Zora Neale Hurston: Forgotten Foremother of Anthropology

Zora Neale Hurston was a clandestine pioneer in anthropology until her rediscovery by the likes of scholars Gwendolyn Mikell and Irma McClaurin. Her contributions have been overlooked as a result of her writing style. It would be remiss to discuss the history of anthropology without discussing both Hurston's innovations in scholarship and her contributions to the body of cultural preservation and knowledge. She spearheaded the development and introduction of native and diaspora anthropology. Black and female anthropologists alike can trace elements of their theoretical and ideological heritage through Zora Neale Hurston.

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Kaitlyn Hemberger
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Oral Presentation: Social Sciences & Humanities

Investigating the Nature of French Color Terms in Congolese Kiswahili

Color terms in standard Kiswahili are plentiful and have varied lexical behavior. Some terms are adjectives, others are nouns, and a select few may be both. Only a few are basic color terms, and the rest are either derived or borrowed. French

color terms in Congolese Kiswahili, a newly observed phenomenon, have never been lexically or preferentially examined and are rarely even mentioned in current literature.

This honors thesis tests three questions. Are these color terms still in use and if so, how many? Are the French or the standard Kiswahili color terms preferrable to speakers? How are these terms lexically categorized?
Participants had the option to take this Qualtrics survey in French or in English and to take it online or with in-person or virtual assistance. They were asked 27 questions divided into three tasks: one multiple choice type, one fill-in-the-blank type, and one short sentence type. All 12 respondents were Congolese Kiswahili speakers in Wichita, Kansas and were over 18 at the time of completion.

This research is still in progress, but early linguistic morphological and syntactic analyses indicate that although some speakers recognize that French color terms are in use, just as many do not. Further, even fewer prefer them over standard Kiswahili color terms. Early results regarding lexical categorization are currently inconclusive; however, they suggest that they may act both nominally and adjectivally. These differences may be attributed to negative attitudes surrounding borrowing from French, hue-based word use, or even dialect variation.

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Rory Mata
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Studying Misinformation Surrounding COVID-19 in Hispanic Communities

This study will investigate the effects of COVID-19 misinformation spread in Hispanic communities in Wichita, KS. The pandemic saw a rise in the spread of false information through social media, which is well documented in English studies, but Spanish web pages are frequently overlooked. Often there is a delay in the removal of misinformation regarding COVID-19 in languages other than English. Consequently, Spanish medical interpreters facing the stress of an increased number of patients in the pandemic cannot rely on information from the web. This combination of negative effects emphasizes the need for availability of Spanish medical interpreters. Overall, limited English proficiency and a lack of ability to effectively communicate with a healthcare provider in Spanish decrease trust between patient and provider, as well as overall knowledge of the care being received.

The study will be conducted through surveys containing questions about experiences in medical settings regarding COVID-19. The survey will be circulated among students at Wichita State University. Preliminary results of the study suggest that among social media sources, trust is placed in only verified accounts, and that the validity of news sources may be called into question. Among bilingual speakers, there seems to be up-to-date knowledge of CDC policies, as well as access to COVID-19 resources in both languages. The goal of the study is that the experiences collected through these surveys will help understand the effects of COVID-19 misinformation, and provide insight into ways of preventing such spread in Hispanic communities in and around Wichita.

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Raúl Rangel
Faculty Mentor(s): Dr. Mythili Menon
College of Fine Arts
Oral Presentation: Social Sciences & Humanities

Legacy of colonialism in Mexican Spanish

Does the variety of Spanish spoken in Mexico exhibit examples of language imperialism in words and phrases (mexicanisms) that are known to all but marginalized by society? For the methodology I comprised a list of words using the "Diccionario de Mexicanismos Academia Mexicana de la lengua". I am also in the process of conducting interviews. Currently I am finishing up interviews and analyzing results.

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Ngoc Vuong
Faculty Mentor(s): Nikki Keene Woods, Rhonda Lewis
Fairmount College of Liberal Arts & Sciences
Oral Presentation: Social Sciences & Humanities

The Politics and Policies of Behavioral Health and Drug Policy Reform in Kansas

Substantial increases in suicides and drug overdose deaths, the lack of access to behavioral health care, and the effects of structural stigma on people with mental illness and/or substance use disorders underlie the need for behavioral health and drug policy reform in Kansas. However, many of the evidence-based strategies to improve behavioral health and reduce substance-related harms in Kansas face notable barriers. As part of a broader study on stakeholders' attitudes toward behavioral health reform and their recommendations to improve the behavioral health care system in Kansas, two qualitative research projects were conducted on (1) stakeholders' attitudes toward primary care and behavioral health integration, mental health parity, social determinants of health, and school-based mental health services; and (2) stakeholders' recommendations to prevent overdoses, underage substance use, and other substance-related harms. In the first research project, there were 9 interviewees, including elected officials, state employees, members of mental health advocacy groups, and payers. In the second research project, there were 11 interviewees, including elected officials, law enforcement/criminal justice officials, health care professionals, and members of substance use prevention and recovery groups. Thematic analyses will be conducted on interviewees' responses to identify themes related to policy-level factors that affect mental illness and substance use disorders and behavioral health care in general. Themes from these two qualitative research projects will be juxtaposed for an overarching, preliminary narrative on behavioral health, harm reduction, and drug policy reform in Kansas.

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Dominik David Lett
Faculty Mentor(s): Dr. Michael Hall
Fairmount College of Liberal Arts and Sciences
Oral Presentation: Social Sciences & Humanities

HYDROCARBONS AND CONFLICT: EVALUATING NATURAL GAS AND MILITARIZED INTERSTATE DISPUTES

To what extent does dependence on fossil fuels affect the likelihood of militarized interstate disputes? Existing literature evaluating the relationship between hydrocarbons and conflict primarily focus on the impact of oil. Because natural gas represents an increasing important hydrocarbon, this study seeks to determine the relationship between natural gas and militarized interstate disputes (MIDs). Independent variables are operationalized as annual consumption and production of natural gas in billion cubic meters as well as reserves of natural gas in trillion cubic meters. Two dyadic and two monadic datasets were generated using R and SPSS with data obtained from the Correlates of War (COW) MIDB 5.0 and COW Dyadic MID 3.1 as well as the 2020 BP Statistical Review of World Energy. Binary logistic regressions generated statistically significant results for all three variables in most models. Undirected results for both dyadic and monadic datasets suggest a strong positive relationship between MIDs and both the consumption and reserve variables. Additional

directed dyadic tests indicate states with large natural gas reserves tend to be targeted more frequently by aggressor states. The results remain robust to a variety of controls and changes in model specification. Analysis of the data offers several novel contributions to existing literature, opportunities for further research, and implications for policymakers.

PERFORMANCE & EXHIBITION ABSTRACTS

Kourtnee Cude
Faculty Mentor(s): Tom Wine
College of Fine Arts
Exhibition & Performance

All as One

All as One, Sing as One. All as One is a choral piece for SATB voices, cello, and piano, that I wrote and composed during the midst of the pandemic. These words have meant so much to me as I dreamed about getting back to normal life. Although we are not 100% there yet, we now value our time with each other more than ever. On the evening of October 5th, 2021, I had the privilege of the Wichita State Concert Chorale premiering this piece during the fall concert. As you listen, think of the words in your own life, and are inspired to come together as one.

When we sing, we sing all as one.
When we dream, we dream all for one.
We find a love that will grow as one,
Et lux in tenebris. (A light in the darkness)

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Brian Harris
Faculty Mentor(s): Tom Wine
College of Fine Arts
Exhibition & Performance

Dawn

https://photos.app.goo.gl/keZxPfBNwrjNqVFM6
I have attached a video link to my composition "Dawn" performed by the Wichita State Concert Chorale, conducted by myself.