November 21st, 2024

Welcome to the *23rd Undergraduate Research and Creative Activity Forum* sponsored by the Office of Undergraduate Research. This event showcases research and creative activity presentations by undergraduate students, and City View ISD Elementary students.

The following abstracts represent hard work and dedication to research and creative work. The program has been organized by presentation type.

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Undergraduate Presentations- Clark Student Center

Sessions will run simultaneously in the Clark Student Center (CSC) Atrium and Comanche, Cheyenne, and Kiowa rooms.

Oral Presentations

Poster Presentations

Oral Presentations

Cheyenne Session I- English, Mass Communication
9:30 pm- 11:30 pm

9:30-9:50
OP1 Travel (&/Or) Troubles: Travel Memoirs as a Source of Intercultural Communication Competence Skill
Sabrina Harrison
Mentor(s): Supriya Karudapuram, Mass Communication, Fain College of Fine Arts

Intercultural Communication is a major emphasis in the discipline of Communication. The field of Intercultural Communication provides important tools for individuals to navigate the terrain of cultural differences and communicate effectively across cultures. This study examines intercultural communicative competence (ICC) through the analysis and coding of travel memoirs. The four memoirs—two written by Western travelers visiting non-Western countries (an Australian woman in India and a Jewish-American man in China) and two by non-Western travelers in the West– that were read will be the basis of the study. The study is a qualitative textual study. The memoirs will be compared and contrasted according to the identity of the traveler and their destination through iterative readings and coding. This will allow for a nuanced understanding of how cultural perspectives influence communication. The memoirs will be coded based on Corbin and Strauss's open coding design. The memoirs will be coded based on the authors' awareness of the assumptions they hold about the culture they're interacting with, their ability to learn from mistakes, and their ability to acknowledge the cultural biases they have. The scale they each will be coded on ranges from "incompetent" to "very competent." This study aims to understand how the different aspects that make up a person's identity influence the interactions they have with other cultures. With this information, the hope is to provide travelers with insights not only on how to effectively communicate with cultures different from their own, but also on the broader principles that create effective cross-cultural communication.

9:55-10:15
OP2 Teens & Trends: How Brands Have Stayed on Teens' Radars Through The Years
Abigail Newlon
Mentor(s): Jim Sernoe, Mass Communication, Fain College of Fine Arts

We have known since the post-World War II era of the economic impact that teens can have. They serve as a vital audience for all brands as the newest generation of society that can provide for the economy. Despite rising inflation, teens are still spending money, though they're being more conscious about where they choose to do so. A number of teens are becoming more aware of their impact on Earth and choosing more socially conscious brands as well as corporations who support going green, LGBTQ rights and other societal movements. For better or worse for the company, teens will share their experiences or thoughts on brands via social media, which can spread quickly. With so much power, I wanted to know how brands stay on teens' radars in an ever-changing world of advertising and media. This research project will examine three of teens' top brands according to Piper Sandler Companies' latest Taking Stock

With Teens survey. I will be examining television commercials and social media advertisements for the three brands and discussing how they used relevant marketing tactics to target the teens of their time. Research questions include: What are the tactics these brands used to encourage teens?How did these tactics change over time, in terms of the actual message as well as adapting to newer forms of advertising? What did/do teens care about, how did the answers change over the years, and how did the brands adapt to these changing answers?

10:20-10:40

OP3 Growing Up in a Screen: The Affects of Growing Up on Reality TV

Madisyn Butler

Mentor(s): Jim Sernoe, Mass Communication, Fain College of Fine Arts

The purpose of this study is to see how growing up in a reality TV environment affects kids long term. In order to research this idea, I have chosen to look at the cast from the reality show Dance Moms, which followed young girls and their moms as they competed in dance competitions. Dance Moms was a popular reality show and aired 7 seasons from 2011-2017, with one revival season in 2019. The show featured dancers as young as 6 and as old as 13. Cast members, moms and their dancing daughters, signed a contract at the beginning of the show, and that made it hard to leave the toxic environment. This research seeks to discuss the daughters' experiences of being a child in a reality TV environment now that they are older and can reflect on their experiences. I will use published interviews and other media appearances since the cast members broke their contracts and left the show in an effort to find common experiences and any issues they deal with now as a result of their association with the show. The former dancers have discussed developing anxiety as a result of their time on the show as well as their lack of ability to tell the difference between what was real and what was for the show.

10:45-11:05

OP4 B(urn)an the Books: An Analysis of Modern and Historical Reactions to Books with Queer Content

Angelica Goins

Mentor(s): Hillary Coenen, Kirsten Lodge

English and Humanities, Prothro-Yeager College of Humanities & Social Sciences

Queer literature has an extensive history dating back thousands of years and has been both honored and villainized at different points. Decadence is notable in this tradition as the first literary movement to feature homosexuality and queerness as a common theme, creating room for future expansion of representation through modernism and following literary movements and genres. In this project, examples from the Decadent and following literary movements are analyzed based on their representation of queer identities and social reactions to them using Fantasy-theme rhetorical methods. Additionally, modern young adult novels featuring queer identities, and the discussions surrounding access to these materials, are analyzed with the same methods. This analysis is used to discuss the modern surge of censorship and banning that has seen a notable increase in virulence and activity since 2020 and its similarities to previous anti-queer cultural reactions.

11:10-11:30

OP 5 Exploration of the American West and Nature Writing

Michael Johnson
Mentor(s): Todd Giles and Jonathan. Price
Geosciences and English, McCoy College of Science, Mathematics & Engineering;Prothro-Yeager College of Humanities & Social Sciences;

The purpose of this research was to combine research between geology and literary works. The theme was exploring the American West and using works from Muir, Terry Tempest Williams, and John W. Powell. We approached this study with the thought of joining the conversation of nature writing and exploring research. The actual research aspect within the geology aspect is still emerging and is still to prove fruitful further down the road, but it is still currently a work in progress. There aren't any solid conclusions on the literary side either, but it has made me think about how I can join the conversation and connect with these great writers.

Cheyenne Session II- Computer Science, Geoscience
12:45 pm- 1:55 pm

12:45-1:05
OP6 Utilizing Terrestrial LiDAR for Enhanced Above-Ground Biomass Prediction of Urban Trees
Zantia King
Mentor(s): Elizabeth Elkins, Kashif Mahmud
Kimbell School of Geosciences, McCoy College of Science, Mathematics & Engineering;

Above-ground biomass (AGB) serves as a critical indicator of carbon storage within terrestrial ecosystems, particularly in urban environments where trees play a vital role. Despite their importance, accurately measuring AGB in urban areas is complicated by diverse species, variable tree forms, and intricate land cover. This study utilizes Light Detection and Ranging (LiDAR) technology to enhance the assessment of AGB in urban trees, offering a cost-effective and efficient solution. By extracting individual tree point clouds from LiDAR data collected at Midwestern State University (MSU Texas), we employ advanced digital tree segmentation and geometric modeling techniques to derive essential structural parameters, including height, diameter at breast height (DBH), volume, and surface area. We then validate our modeling approach by optimizing parameters and comparing model outputs with extensive field measurements of harvested total biomass and DBH from campus trees. This tailored model, focusing on key North Texas species such as Red Oak and Cedar Elm, aims to deliver precise estimates of urban tree AGB. The findings underscore the potential of non-destructive methods for AGB assessment, contributing valuable insights for urban carbon management and sustainable forestry practices.

1:10-1:30
OP7 Identify karst groundwater flow paths using cave water drips
Jarette Greene
Mentor(s): Dr. Kashif Mahmud, Department of Computer Science, McCoy College of Science, Mathematics & Engineering;

Cave drip water response to surface meteorological conditions is complex due to the heterogeneous nature of water movement in the karst unsaturated zone. Therefore, we aim to understand infiltration water hydrology in the Cretaceous karst formation of south-central Texas. This project utilizes the spatial survey of 20 automated cave drip loggers installed in Natural Bridge Caverns. Drip loggers were set up in approximate transects throughout the cavern from higher to lower elevations and have been monitored since May 2023. We analyzed drip time series for one hydrological year from all 20 sites taking advantage of an ensemble of drip loggers to extract common properties by clustering. A combination of multidimensional scaling and clustering by k means was utilized to classify similar drip types based on time series analysis. We used the coefficient of variation (COV) across different sampling frequencies (15 minutes to monthly) to determine the optimum sampling frequency that minimizes sampling artifacts while maximizing the capture of natural variability. The clustering reveals four unique drip regimes for better characterization of the limestone environment where flow occurs via fractures and storage. We found COV decreases with lower sampling frequency for all four cluster groups. We concluded that both daily and weekly sampling frequencies give the minimum COV, which does not change significantly with a finer sampling frequency and therefore we used one day as the optimum sampling frequency. By analyzing COV and cluster groupings, we discovered that age of limestone formation affects infiltration water flow pathways in heterogeneous karst formation.

1:35-1:55
OP8 Mustangs.ai – Developing an AI-powered Information Retrieval System for MSU Texas
Gabriel Gacovicaj, Brett Mitchell
Mentor(s): Lopamudra Roychoudhuri, computer science, McCoy College of Science, Mathematics & Engineering;

Generative AI is a type of artificial intelligence that can create new content, such as text, images, or code, based on the data it has been trained on. Large Language Models (LLMs), a subset of generative AI, are trained on vast amounts of text and can understand and generate human-like responses to a wide variety of questions. By combining generative AI with retrieval systems, this project leverages the strengths of LLMs and aims to develop a Retrieval-Augmented Generation (RAG) model designed to provide accurate and relevant responses to specific inquiries regarding MSU Texas. The proposed RAG system will provide relevant information on academic programs, campus services, and policies, making university knowledge more accessible and navigable. The project approach involves gathering and organizing data from MSU Texas resources (e.g., websites) into a knowledge base. MSU-specific data is embedded and stored using a vector store with Chroma. The model is integrated with GPT-4 to answer user queries, where the retrieved data enriches responses from the language model, ensuring they are factually accurate and aligned with university-specific content. Initial trials show the RAG model effectively retrieves and presents MSU Texas information with high accuracy. Testing has highlighted the model's potential for MSU specific use cases, revealing its capability to respond

to complex, context-sensitive questions that traditional search systems often fail to handle. This project underscores the potential of RAG models in streamlining university information access. Upon completion, it is anticipated that this tool will serve as a valuable asset for MSU Texas, improving information accessibility and potentially enhancing student and staff engagement with campus resources.

Cheyenne Session III- History, Political Science
2:10 pm- 3:45 pm

2:10-2:30

OP9 Lunatics, the Convulsed, and the Seized: The Ancient History of Epilepsy

Madelyn Sutton

Mentor(s): Mary Draper, History, Prothro-Yeager College of Humanities & Social Sciences;

What do the phrases "moon sickness," "the sacred disease," and "the falling sickness" have in common? They are all ancient terms to describe the modern condition of epilepsy. This paper analyzes the history of epilepsy and seizures in the ancient world. It is global in scope, using sources from the ancient Romans, Aztecs, and Egyptians to discuss how these cultures viewed this condition— what they characterized as a "disease." These cultures had different understandings about the diagnosis of epilepsy and how to treat it. Yet they all agreed on its divine origins. Some viewed it as God's blessing. Others, though, viewed it as an act of the devil. By unpacking familiar sources, such as Hippocrates, Galen, and the Bible, and comparing them with less familiar sources, such as ancient Babylonian texts and Aztec carvings, this paper shows how ancient cultures discriminated against those who suffered from epilepsy and seizures. This paper will address the following questions: Why was it called "the sacred disease," "falling sickness," and "moon sickness" in different locations? How did a culture's religion influence their understandings of epilepsy? How did these cultures think about treatment? Who attempted these healings? How did a culture's understanding of epilepsy perpetuate social stigmas against epileptics? When did people begin to view epilepsy as a medical condition as opposed to a supernatural curse? The unjust treatment of people with epilepsy influenced medical understandings of the disease and societal treatment of those who afflicted with it for millennia.

2:35-2:55

OP10 Brushstrokes of History: The legacy of Polly Cox in Wichita Falls

Alexis Washington

Mentor(s): Mary Draper, History/ Wichita Falls Musuem of Art, Prothro-Yeager College of Humanities & Social Sciences, Fain College of Fine Arts;

Polly Cox was an esteemed member of the Wichita Falls community in the 1970s and 1980s, a significant contributor to the art scene, and an artist who gave her all to showcasing the hidden charm of Wichita Falls. Cox left behind a lasting legacy and a beautiful collection of twenty-one watercolor paintings that would be the base of the research conducted at the Wichita Falls Museum of Art (WFMA). The primary aim was to investigate the history of each building depicted in Cox's work, tracing what became of the original structures and what stands in their

place today. The research was conducted through many online databases, including portals to access digitized works from MSU and UNT and a few public libraries from North Texas and Oklahoma. These databases were essential to understanding who wanted this collection to be created and how they made it. Through the MSU library, a unit for instruction was created about the work of early Wichita Falls artists, and this provided an in-depth history of Polly Cox and her impact on the area. Various resources were provided physically through the WFMA, and the online database allowed for much of the background for about 86% of the collection. The other 14% remains omitted from archival records, likely due to insufficient information. After analyzing all the research related to Polly Cox and her collection, the objective is clear: Wichita Falls is a beautiful town that deserves to be preserved whenever possible.

3:00-3:20

OP11 The More, The Better? Trends in International Environmental Agreement Formation

Abid Ali, Dylan Munguia

Mentor(s): Juheon Lee, Political Science, Prothro-Yeager College of Humanities & Social Sciences

International environmental agreements (IEA) have been an important part of solving transnational environmental problems and conflicts. While there are numerous case studies on the formation and the effectiveness of IEAs, large-scale studies, especially on the rise and fall of certain types of agreements, are still rare despite the recent development of database. This study therefore analyzed the International Environmental Agreements Database (IEADB) to demonstrate such trends and patterns. Thus far, we've found that IEAs have been declining since the early 2000s, and the decline is largely due to the decreasing number of bilateral IEAs, which suggest that more states are trying to solve environmental problems through multilateral agreements. We also found that states have been working on amending existing agreements than on negotiating completely new agreements. Third, the subjects of these IEAs varied and should be studied further to better understand how these trends reflect interactions in the international community.

3:25-3:45

OP12 How Racial Injustice Continue to Undermine the US Democracy Promotion

Khaleb Pierre

Mentor(s): Juheon Lee, Political Science, Prothro-Yeager College of Humanities & Social Sciences;

This study delves into the relationship between racial injustice in America and the country's democracy promotion around the world. Support for the Black Lives Matter movement has declined since its peak in 2020. However, racial disparity in law enforcement continues and the lives of Black Americans have not been improved significantly. Videos of the mistreatment of Black Americans are still spreading via social media. This is not just a U.S. domestic problem because such racial disparities will continue to feed into propaganda against America's promotion of democracy worldwide. This study argues that the US needs to regain its moral authority by addressing its own problems.

Kiowa Session I- Health & Human Sciences
9:00am- 10:10

9:00-9:20

OP13 Parents' Marital Status and its Effects on the Interpersonal Relationship among College Students

Luz Espinal, Janae Law, Terrell Brown, Mariah Wallace, Heather O'Neal

Mentor(s): Packiaraj Arumgham, Social Work, Education, Business, etc., Gunn College of Health Sciences & Human Services;

The purpose of this study was to examine the effects of parents' marital status on the interpersonal relationships among college students. The study participants (n=40) were drawn by using a convenience sampling procedure. After obtaining IRB approval (24101503) a survey was conducted using the Liking People Scale and a set of socio-demographic questions. The data was collected via paper surveys and google forms. The collected data was entered into and analyzed using SPSS 29.0 version. Preliminary data analysis has revealed that there is no statistically significant difference between the study participants' parents' marital status and their interpersonal relationships. Implications if the study and suggestions for future research are discussed. IRB#24101503

9:25-9:45

OP14 Effects of Childhood Trauma the General Well-being among College Students

Cheyenne Brown, Veronica Flynn, Julianna Heileman, Chelsea Overton, Pamela Hermosillo Torales

Mentor(s): Packiaraj Arumuham, Social Work Education, Gunn College of Health Sciences & Human Services

The purpose of this study was to examine the relationship between the effects of childhood trauma and the general well-being among college students. The study participants (n=40) were drawn by using a convenience sampling procedure. After obtaining IRB approval (24101504) a survey was conducted using the Child Abuse and Trauma Scale of Becker-Lauren et al. (1995), the General Well-being Scheduled (Dupuy, 1978), as well as demographic items. The data was collected via paper surveys and google forms. The collected data was entered into and analyzed using SPSS 29.0 version. Preliminary data analysis has revealed that there is no statistically significant correlation between the effects of childhood trauma and the general well-being of the study participants. Implications of the study and suggestions for future research are discussed. IRB#24101504

9:50-10:10

OP15 An analysis of Compton scatter intensities under different clinical conditions

Jessica Walla, Myia Davis

Mentor(s): Rodney Fisher, Radiologic Sciences, Gunn College of Health Sciences & Human Services;

This study continues a developed pilot study from fall 2023 where the objectives were to determine different radiation patterns and intensities of Compton scatter in diagnostic X-ray

procedures. The goal is to apply the methodology of the fall research to current research using a pelvis phantom. This includes clinical body and machine positioning, as well as, assigning the recommended pelvis technique range. The hypothesis is that as the spring research methodology is implemented, findings and patterns similar to those of the fall research will be observed relating to Compton scatter. Furthermore, the effects of tissue density will be observed. The hypothesis is that as the tissue density and exposure techniques increase, the amount of Compton scatter will increase. The findings can inform technologists of the importance of decreasing both occupational and patient doses. Through applying these concepts, occupational and patient safety can be improved. This can be accomplished by conducting clinical positioning and determining the recommended technique range. The research process includes taking exposures, then correcting for a deviation index (DI) goal of zero, and lastly measuring Compton scatter and entrance skin exposure (ESE). After the research, the data collected will be compared, contrasted, and analyzed. The research question, objectives, methodology, and results will be formatted into an oral presentation. We aspire to publish our process for others to use in their radiologic curriculum, allowing others to visualize radiologic theories of physics and their effects. Upon completion of the research, the hypothesis and findings will be resolved.

Kiowa Session II - City View Elementary 4th Grade Science Class
10:30-10:50

Monarch Migration

Rodri Cruz, Liam Thacker, Olivia York, Loyd Alexander-Bittoncourt, Jouryne McKinney, Emmaleena Griffin

Mentor(s): Laura Wetzel

Purpose - What can we do as scientists and engineers to help aid the Monarch migration? In this project, students will learn about the annual migration of the Monarch butterfly. Through a combination of art, technology, as well as core curriculum classes, students will educate others on the importance of the Monarch butterfly migration and how it impacts our environment. Method - As the 4th grade class at City View Elementary, we will create an engineering design project with the goal of promoting awareness and knowledge of the migration. Students will use math to determine distance traveled. They will use science to explore the attributes for migration. Students will also publish stories including informational content for the Monarch butterfly. Results - The results for this project is for students to understand, demonstrate, explain and record their evidence, and provide the purpose for the need of migration. They introduce themselves to an audience during the project. With this project, students will achieve higher regards and respect towards geographical migration. Conclusion - City View Elementary's 4th grade class will be responsible for their individual STEM journal as they partake in discovering science on a new level of the engineer design process. The overall goal for this project is to learn about migration and all of its particular distinctions.

Kiowa Session III- Engineering
12:30-2:30

12:30-12:50
OP16 Emissions Study and Equipment Design/Build for Stripper Well Production
Jabez Mackey, Nolan Sila, Taikoran Phillips, Mario Sanchez
Mentor(s): Mahmoud Elsharafi, Engineering, McCoy College of Science, Mathematics & Engineering;

Global warming and the rise of greenhouse gasses in the atmosphere are at an all-time high and continue to increase. One of the major contributors to this is methane (CH_4) in natural gas form being released into the atmosphere. Government agencies, both domestically and internationally, have raised concerns about this rise in greenhouse gas levels, recognizing its harmful effects on the environment, as demonstrated by global warming. In response, these agencies have implemented laws requiring companies to decrease the greenhouse gas emissions released from their oil wells into the atmosphere. In the context of oil wells, about 80% of U.S. oil and natural gas production sites are classified as low-production or small well sites. In fact, these low-production wells release approximately 50% more methane than the entire Permian Basin, one of the largest oil and gas-producing regions globally. It is estimated that these wells are responsible for nearly half of all methane emissions from oil and gas operations, emphasizing the need for more effective emission control strategies for smaller sites. Conventional natural gas management methods are often inefficient or too large-scale for the limited methane produced by these wells. For this reason, our team has developed a compact flaring tower add on designed to connect to smaller wells and burn off emitted methane, converting it into CO_2 and water. The goal of this project is to safely and efficiently reduce greenhouse gas emissions from smaller well facilities.

12:55-1:15
OP17 Eddy Brake Dynamometer
Austin Pencheon, Jose Espinoza, Deon Pleasant
Mentor(s): Pranaya Pokharel, Engineering, McCoy College of Science, Mathematics & Engineering;

Dynamometers were created in the 18th century, first introduced by Edme Régnier with the mechanical dynamometer that was used to measure force exerted by horses when pulling. Dynamometers, often referred to as “dynos,” are measurement tools used to calculate force, torque, horsepower, engine speed and other engine parameters. By gathering data from sensors, they help to optimize engine performance. This project is focused on an Eddy Brake Dynamometer, which uses magnetic fields to create resistive forces for measuring an engine’s torque and power. It uses eddy currents to apply a load on an engine, as the engine’s shaft rotates, it uses electromagnetic coils to turn a disk within a magnet. This movement creates eddy currents in the disk, creating a resistive force, thus, braking the engine. The torque exerted by the eddy brake is measured with a load cell, enabling calculation of the engine's imposed torque. The project will test and optimize the performance of a Formula SAE engine under various conditions. Specific objectives include investigating and reducing system vibrations,

programming the eddy brake using Arduino IDE for calculated braking in different driving scenarios, designing a safety enclosure for safe operation, and automating the clutch, throttle, and transmission. The resulting data from FSAE driving scenarios will be generated for optimization and publication. Currently, the team is testing the dynamometer to reduce vibrations, programming the eddy brake for the required torque, and sourcing parts for the safety enclosure. Automation and further testing are planned for next semester to complete the project.

1:20-1:40

OP18 Optimization of Jet engine through thermal, flow and structural analysis

Aayush Shrestha

Mentor(s): Pranaya Pokharel, Engineering, McCoy College of Science, Mathematics & Engineering;

This research focuses on optimizing jet engine performance, particularly the compressor, through thermal, flow, and structural analysis. With rising global air traffic, there is an increasing demand for efficient and eco-friendly aviation solutions. Our approach centers on enhancing the designs of compressors and turbines, guided by the principles of the Brayton Cycle, to achieve optimal pressure ratios, maximizing efficiency while ensuring durability and reliability. We began by utilizing the thermal efficiency formula to identify strategies for increasing the pressure ratio generated by the axial compressor. Using ANSYS software, we employed a Moving Reference Frame (MRF) approach for our computational fluid dynamics (CFD) simulations. Initial simulations are performed on both the basic and modified compressor designs, revealing critical performance metrics such as pressure ratios, efficiency, and flow characteristics. Based on the analysis of these simulations, we plan to design a modified compressor aimed at enhancing pressure output. This phase involved optimizing blade geometry and inlet configurations to align with our strategic design goals. We also emphasized the importance of material selection, evaluating options capable of withstanding high pressures and temperatures, while considering processes to improve the strength and durability of compressor components. Currently, we have completed the initial phase of procuring a testing kit. This kit will enable us to establish real boundary conditions that match our simulations, allowing us to validate our ANSYS results through empirical testing. Future work includes the completion of simulations and testing of the new design.

1:45-2:05

OP19 Design, Fabrication, and Control of a Planar Robotic Manipulator

Mason Denefield, Austin Childs, Shermain McDaniels

Mentor(s): Zeki Ilhan, Engineering, McCoy College of Science, Mathematics & Engineering;

This work aims to conduct a comprehensive analysis of the kinematics, dynamics, motion planning, and control of a simple, two-link planar robot arm. As interest in robotics continues to grow, the two-link arm remains fundamental for the development and control of more advanced serial robotic manipulators and humanoid robots. Therefore, an extensive literature review is first conducted to understand the state of the art on relevant technologies. A morphological chart is also prepared to visualize an overall design matrix, which includes the major design categories along with the proposed physical solution alternatives under each category. Through a careful

evaluation of the alternate solutions, the best concept design has been proposed and visualized in a virtual assembly. On the other hand, an inverse kinematic analysis is conducted to determine the target joint variables for executing circular and rectangular motions in the task plane. Additionally, a simple 3D-printed prototype has been prepared and a series of efforts have been made to perform tracking experiments using both servomotors and stepper motors to implement joint control. Fabrication plans are discussed based on the preliminary results, and possible improvement areas will be addressed.

2:10-2:30

OP20 Wind Tunnel Testing of a Dual-Venturi Vertical Axis Wind Turbine

Newton Sinyangwe, Nicholas Stubblefield, Calvin Walmer

Mentor(s): Salim Azzouz, Engineering, McCoy College of Science, Mathematics & Engineering;

This research project is designed to test whether or not the addition of converging-diverging nozzles (Venturi), located above and below the rotor of a Vertical Axis Wind Turbine (VAWT), are able to increase the operating efficiency of the apparatus. Horizontal Axis Wind Turbines (HAWT) are limited in their power generation capabilities due to the limited size of the electrical generator that can be mounted on the tower. VAWTs do not have this limitation on the size of the generator since it is placed directly on the ground; meaning that more power can be produced. If this technology shows an improvement, VAWTs could prove to be a viable alternative to HAWTs. All components of the experimental apparatus were designed using the SOLIDWORKS CAD software. Then, the parts were 3D-Printed using SLA technology due to its ease of use and good surface finish. Once the parts are assembled, the VAWT will be placed in the wind tunnel located in the McCoy Engineering Hall for testing. To take measurements, a Raspberry Pi in combination with a multimeter will be used to measure the voltage, current, RPM, and electrical power produced by the generator. In parallel, a flow simulation using Ansys Fluid Flow (Fluent) is conducted to verify that a low-pressure zone is produced at the throat of the Venturi. By the end of the Fall semester the group expects to have the parts 3D-printed and assembled so that testing can begin next Spring semester.

Kiowa Session IV- Engineering

2:35-5:00

2:35-2:55

OP 21 Generation of Dynamic Forces Along an Egg-Shaped Bearing Race

Joaquin Traslosheros, Cesar Lim, Nathaniel Joseph

Mentor(s): Salim Azzouz Engineering, College of Science, Mathematics & Engineering;

This project is designed to recreate a failing bearing race and to measure the dynamic forces that occur due to the loss of symmetry. The race was simulated by creating an egg-shaped model. The equation for an egg shape was programmed into MATLAB to provide a set of discrete points. These points were used to draw a geometric model using a protractor, a ruler, and a pencil to acquire the outline. Following this outline, the use of screws as a frame to constrain PVC allowing the shape to be molded using a heat gun. Construction of the model

included the use of SolidWorks to design the magnetic coils, Infrared (IR) sensor holders, electrical components housing, and the legs to hold the apparatus. The Arduino software allowed for the ability to control the impulses given to the steel ball when it crosses the four coils. This was done using relays, IR sensors and power sources. The IR sensors allowed for the detection of the ball when approaching the coil sending a signal to the Arduino. This powered the relays, energizing the four coils creating a magnetic pulse propelling the ball. The four coils sets of controls allowed the system to run independently enabling the observation of the model's dynamic forces. By the end of the fall semester the model will be fully constructed and operational. Testing of the model is expected to start at the

3:00-3:20

OP22 Leakage Dynamics in Sucker Rod Pump Systems: A Combined Experimental and Analytical Study

Clayton Brasher, Pavle Kalaba, Jimmy Tran

Mentor(s): Sheldon Wang, Engineering, McCoy College of Science, Mathematics & Engineering;

A sucker rod pump is an artificial lift system used primarily in oil wells to extract crude oil from deep underground. It consists of a long rod connected to a pump and is typically driven by a pump jack at the surface which moves the sucker rod up and down inside the well. The system is made up of two main components, the plunger and the barrel. As the mechanical lever lifts the rod string, the plunger travels upward within the barrel lifting a column of oil. Due to clearances between the stationary barrel and plunger, a phenomenon termed slippage occurs. Slippage is a term used in the oil and gas industry to describe the column of oil that passes between the clearances of a sucker rod pump assembly. Excessive clearances can contribute greatly to the reduction of oil well production, and can be caused by a change in the centric nature of the pump. If equations were derived, and correctly predicted slippage, production specialists within the industry would be able to represent and predict losses within oil wells. This is extremely important as there is an estimated 2-5% of oil not recovered in wells throughout their daily operation. The goal of this project is to develop a mathematical model that will define the flow and forces associated with slippage between the barrel and plunger, and then verify these derived equations through running tests with our physical sucker-rod pump model located in McCoy Engineering Hall.

3:25-3:45

OP23 Hypersonic Test Device for Aerodynamic and Impact Analysis

Kory Prather, Alexis Camarena

Mentor(s): Yu Guo

Engineering, McCoy College of Science, Mathematics & Engineering;

Since its conception, hypersonic flight has proven to be the newest frontier of aerodynamic capabilities. The many flight factors that become present at speeds exceeding Mach 5 (hypersonic range) have proven to be exceedingly difficult to generate reliable calculations or models of flight vehicles at those speeds. Currently, hypersonic wind tunnels are used to recreate the effects of hypersonic speed although effective, they can be costly and large. This paper presents a new method for conducting hypersonic flight testing using smokeless powder propellant. Modern rifle cartridges are consistently able to generate projectile speeds of around

4000 feet per second (around Mach 3.5). Therefore, we explore a method of building a test device based on the structure of a rifle capable of firing projectiles at speeds exceeding Mach 5. The overall flight mechanics can be determined through the repetitive accuracy of the projectile's impact. This will be achieved by constructing a durable target capable of withstanding high-velocity impacts. By analyzing the consistency and precision of the impacts, we can infer the aerodynamic stability and performance of the projectile at hypersonic speeds. Next, we will explore the effects of changing the projectile geometry and analyze which shapes offer the most stable flight. By systematically testing various shapes, we can identify optimal designs that enhance stability and performance. The simplicity of this device will greatly reduce the overall cost of hypersonic testing which in turn will allow for a larger number of tests and geometries to be tested at hypersonic speeds.

3:50-4:10

OP24 Design of A Ground Hovering Robot

Michael Morrell, Kevin Muñoz

Mentor(s): Yu Guo, Engineering, McCoy College of Science, Mathematics & Engineering;

UAVs have certain inefficiencies related to flight time. A ground hovering robot will be designed to optimize several variables affecting the efficiency of air thrust in order to maximize time in the air. The approach to designing the robot started with constraints, initially focusing on designing a hovering robot that's size fits within the dimensions of an A4 paper and then to maximize its efficiency through flight time. Additional goals that have been placed after maximizing the efficiency, The robot will then prioritize the control of the drone when hovering by avoiding turbulence and considering environmental variables. The variables being tested in this research include different motor and propeller sizes that are available in the market, along with the effects of varying the number of blades on the propeller and different designs for air ducts that will surround them. With the use of a custom test rig, the different variations of motors, propellers, and air ducts will be evaluated before assembling the robot in order to identify the best combination to keep the drone steady while hovering. Challenges that will be anticipated include encoding the control unit, calculating the thrust-to-weight ratios, forces, and the overall analysis of the apparatus through ANSYS. The ultimate goal is to create an optimized hovering robot that can autonomously avoid obstacles. Preliminary findings indicate that for extended flight time as a measure of efficiency, the number of propellers, use of ducts, and battery sizing are the greatest contributors to the efficiency of a hovering robot.

4:15-4:35

OP25 Autonomous Stabalized High Powered Rocket

Adolf Frederic, Thad Taylor, Zachary Lewis

Mentor(s): Yuo Guo, Engineering, McCoy College of Science, Mathematics & Engineering;

The Autonomous Stabilized High Powered Rocket will be designed to sustain a stable, upright flight path in order to continue scientific research. Currently, to achieve this goal, we will include autonomous control fins that will maintain the rocket orientation by countering the common forces acting against the rocket. The Autonomous Stabilization System will be controlling the fins that will read the sensor data, such as orientation and acceleration, and rotate fins appropriately. This system will also require a recovery system and a backup recovery

system. The recovery system will determine the optimal point within the flight path of the rocket to deploy both the drogue and main parachutes in order to safely recover and the backup recovery system in case of hardware failure. We have successfully completed soldering the circuit, tested it, and ensured the recovery system is operational. Now that the recovery is optimal, our next possible objective is to deploy both drogue and main parachutes to see if it is functional. These parachutes are what helps the rocket to safely land to the ground and make it retrievable. A simulation that will take in the sensor data will be implemented in order to test the stabilization system before we launch the main rocket.

4:40-5:00

OP26 Kawasaki Robot: Robust Flexible Drilling and Pin Insertion Work Cell

Mateo Luna, David Aleamotua, Daniel Paniagua

Mentor(s): Jan Brink, Engineering and Department of Industrial Technology, McCoy College of Science, Mathematics & Engineering;

An industrial robot is defined by the RIA (Robotics Industries Association), as an automatically controlled, multi-functional, reprogrammable manipulator with multiple axes, which is widely used in industrial automation to improve processes. The project utilizes a Kawasaki RS005L robotic arm. It is a jointed robotic arm that will be used to function within a robust, fixed work-cell to facilitate drilling, pin insertion, stamping, and palletizing tasks. Our setup has seen key updates from previous designs, including the removal of last year's drilling and reaming assemblies. The new drill assembly features a ⅜-inch drill bit, a smooth-shaft drill chuck, a keyway coupling, and a larger air motor to provide greater power and stability for a precision drilling operation. Another future system expansion will include a pin insertion system with a pin hopper using a pneumatic spring-return cylinder designed to perform this task. The work cell will also incorporate a Cognex vision system to verify correct pin insertion on the finished part. This work cell will allow flexible order sizes for the number of finished parts and stacking patterns on pallets using the Kawasaki AS programming language. The project's goal is to advance flexible and lean manufacturing principles within the work cell, emphasizing modularity and adaptability for scalability. This project demonstrates how a Kawasaki RS005L robotic arm uses an efficient, streamlined, and flexible system, which will meet modern manufacturing demands, optimize workflows, and deliver high-quality parts.

Poster Presentations

Comanche Session I Health & Human Sciences, Social Sciences
9:00 am- 10:00 am

P1 The Effects of Radiation on Tradescantia pallida
Paige Cartwright
Mentor(s):Rodney Fisher, Radiologic Sciences, Gunn College of Health Sciences & Human Services;

This study examines the properties and potential uses of the Tradescantia pallida plant, commonly known as Spiderwort. This plant is typically grown outdoors where it can develop into extensive vines if left untended. It is not known to be cultivated indoors. The plant produces blue flowers at maturity. The Spiderwort plant exhibits the remarkable ability to undergo visible mutations when exposed to ionizing radiation. Specifically, the stamens may change to shades of pink, as a result of a mutation from the DNA damage of ionizing radiation. This mutation is inheritable and can be passed down to the plant's offspring through cuttings or seed germination. The primary goal of this research is to explore the feasibility and implications of cultivating Tradescantia pallida indoors, and to explore the plant's response to radiation exposure under controlled conditions. First, this study will investigate the requirements for indoor cultivation, such as special care, lighting conditions, and how often the plant is likely to bloom. Once the plants adapt to indoor growth and the most suitable growing method is determined, the next phase will involve exposing it to X-rays and alpha radiation to replicate the DNA mutations that produce the pink stamen phenotype. Finally, this research aims to determine the specific radiation doses required to induce this mutation. The outcome of this study is to explore how Tradescantia pallida might serve as a biological indicator of radiation exposure and potentially offer insights for radiologic research applications.

P2 Thermoregulatory Differences Between Uniform Type in Brazilian Jiu-Jitsu Practitioners
Esther Coronado
Mentor(s): Brett Crossland, Athletic Training & Exercise Physiology, Gunn College of Health Sciences & Human Services;

Brazilian Jiu-Jitsu (BJJ) is a grappling-based martial art that emphasizes ground fighting and submission techniques. The uniforms worn in BJJ, commonly known as the gi and no-gi, play a crucial role in both training and competition. PURPOSE: The purpose of this study is to determine potential differences in physiological responses between the two uniform (gi vs. no-gi) types. METHODS: Twenty male and female participants between the ages of 18 and 50 will be recruited. Following the signing of informed consent and medical screening participants will be measured for height (cm), weight (kg), and body composition (%BF) using the Seca mBCA 554 (Seca, Hamburg, Germany). Participants will then be fitted for devices to measure heart rate (HR; b/min), core body temperature (CBT; °C), sweat rate (SR; L/hour) and blood lactate (L; mmol/L). Resting values will be taken for HR, CBT, and BL with participants seated in a chair. Following a 5-min warm-up, participants will complete 10 minutes of running at 6 mph at a 2% incline on a

Wahoo KICKR RUN treadmill (Wahoo Fitness, Atlanta, GA) in either the gi or no-gi uniform. Values for BR and CBT will be recorded each min, with SR and L taken immediately upon completion. PRELIMINARY RESULTS: Based on the results of 3 participants, it appears that the gi uniform elicits higher physiological response in HR, CBT and L. CONCLUSION: Based on preliminary findings our results indicate the gi uniform elicits higher physiological response therefore requires more caloric expenditure to perform. MSU IRB approval #24101001.

P3 Mental Health of Commuter and On-Campus College Students
Carley Koski, Joanna Estrada, Brenda Castro, Isabella Grisham, Louisa Barrick
Mentor(s): Packiaraj Arumugham, Social Work, Education, Nursing, Gunn College of Health Sciences & Human Services;

The purpose of this study was to examine the difference between the mental health of students living on campus and that of commuter students. The study participants (n=40) were drawn using simple random sampling for the residents and convenience sampling procedures for the commuters. After obtaining IRB approval (2410505) a survey was conducted using the Patient Health Questionnaire-9 (PHQ-9) and General Anxiety Disorder Questionnaire-7 (GAD-7) relating to mental health and socio-demographic questions. The data was collected via google forms. The collected data was entered into the SPSS 29.0 version. Preliminary data analysis has revealed that there is no significant difference between commuter and resident study participants regarding their mental health issues. Implications of the study and suggestions for future research are discussed. IRB# 2410505

ERP1 Do Judgments of Learning Improve Memory for Educationally Relevant Study Materials?
Mckinzie Adkins
Mentor(s): Nicholas Maxwell, Psychology, Prothro-Yeager College of Humanities & Social Sciences;

Previous research indicates that Judgments of Learning (JOLs) enhance memory for cue-target word pairs (e.g., cat-dog). Having participants rate their ability to remember these pairs boosts memory recall compared to a silent reading control group. However, these benefits do not extend to more complex educational materials, such as text passages (Ariel et al., 2021) or general facts (Schäfer & Undorf, 2024). The effectiveness of JOLs may depend on the testing format and the type of JOL used. JOL benefits are more likely to emerge with recognition-based tests (e.g., multiple-choice) rather than recall-based tests (Maxwell & Huff, 2024), especially when JOLs focus on specific elements of the material. Experiment 1 sought to replicate the absence of JOL benefits for recall with educational materials by testing two types of JOLs. Participants studied four text passages from a Teaching of English as a Foreign Language workbook and were assigned to one of three conditions: (1) making four JOLs per passage for key items (Item JOLs), (2) making a single JOL estimating their ability to recall important information (Global JOLs), or (3) silently reading the passage (Control group). All participants were later tested using free-recall. Results showed no significant memory differences among the three groups, reinforcing findings that JOL benefits for cue-target pairs do not extend to educational text passages in this context. Experiment 2 will further explore whether JOLs can improve memory for these materials when multiple-choice testing is used (IRB #24041702

Comanche- Session II Biology & Chemistry
10:00 am- 11:00 am

P4 Differences in Plant Biodiversity Around Different Agricultural Ponds
Joyce Reed
Mentor(s): Timothy Pegg, Biology, McCoy College of Science, Mathematics & Engineering

The purpose of this project was to study the differences in plant biodiversity around four different agricultural ponds, each with a different purpose. Two of the ponds were used for cattle grazing, one was residential in nature and exhibited constant upkeep, and the other was unkept and functionally abandoned for roughly 15 years. In the beginning, it was hypothesized that the ponds used for grazing would show the lowest amount of biodiversity around the pond, followed by the residential pond, and the unkept pond showing the greatest biodiversity. This was done by setting up six belt transects perpendicular with the perimeter of the pond, with five-meter squares placed on varying sides each a meter apart from each other. After the squares were placed, the different plant species were identified and counted within each square. This process was completed twice for each pond, with each outing being spaced four to six weeks apart. The results of the outings were compared with each other and the other ponds to identify possible trends and differences in plant diversity. The ponds that were used for cattle showed the least amount of biodiversity with peaks being in places that would be unreachable to cattle. The residential pond showed a band of biodiversity around the whole pond, with the highest levels being in a range of 0 – 5 meters from the edge of the water. As expected, the unkept pond showed the highest levels of biodiversity, showing a wide range of various species.

P5 Identification and Characterization of Bacterial Isolates from Local and Migratory Waterfowl
Zaniya Medlin
Mentor(s): James Masuoka, Biology and Chemistry, McCoy College of Science, Mathematics & Engineering;

Antimicrobial resistance (AMR) is a major global public health threat by making treatment of infectious diseases more difficult. The CDC has estimated that AMR results in 35,000 deaths in the US annually. Genetic transfer between cells can spread antimicrobial resistance and other virulence factors, resulting in difficult-to-treat multidrug-resistant strains. Migratory birds can act as bacteria carriers, introducing new strains into their seasonal habitats. We hypothesized that gulls arriving in Wichita Falls each winter play such a role and that the virulence factors present would change each time the gulls arrive. Fecal samples were collected from resident Canada geese (Branta canadensis) for a year, and bacterial isolates, presumptively identified as Escherichia coli, were selected. The presence of genes coding for AMR and other virulence factors was screened by multiplex PCR. While initial results suggested that virulence factors were present in some isolates, absence of an expected amplicon for the uidA gene suggested that these bands may have been artifacts. After troubleshooting the various parameters involved in PCR, we concluded that multiplex screening would be more effective on isolates of confirmed identity. Our current project is working to confirm isolate identity using an updated metabolic screen and by DNA sequencing. After identity confirmation, the pattern of gene sequences present using multiplex PCR will allow us to group the isolates by pathotype and to determine pattern changes

over time. Understanding how genes associated with virulence are introduced to our local environment will help inform decisions related to public health and antibiotic stewardship.

P6 Antimicrobial and Anti-Venomous Activity of Historical Native American Medicinal Plants Against Escherichia coli

Joshua de Waal

Mentor(s): Elizabeth Machunis-Masuoka, Chemistry, McCoy College of Science, Mathematics & Engineering;

According to the World Health Organization, antimicrobial resistance (AMR) continues to endanger the future of medicine. Antibiotic discovery accounts for nearly 70% of current medications, but no recent progress. Studies of cultural medicinal practices provide evidence that AMR could be targeted using the unique properties and functions of native plants. One area of compelling interest focuses on medicinal practices among Native American tribes who used native plants to treat different ailments or injuries, including venomous snakebites. Our lab is investigating the potential antimicrobial properties of these plants. Of particular interest is rattlesnake master, purported to have both antibiotic and antivenom properties. Soxhlet extraction in ethanol and hexane was used to obtain complex extracts that were concentrated using a rotary evaporator. Extracts were used to perform standard Kirby Bauer antibiotic susceptibility testing on Escherichia coli. The following zones of inhibition were measured: thyme 14mm, fresh lavender 12-14mm, old lavender 8-10mm, yarrow stem 9-10mm, and pumpkin seed bottom layer (of two) 8mm (trimethoprim/sulfamethoxazole- susceptible Enterobacteriaceae show a ring ≥16mm). Currently, hot and cold water extractions are being investigated. Separation protocol for the plant extracts employing thin layer chromatography and flash chromatography will be used on compounds for further testing and identification. Separation protocols using thin layer chromatography and flash chromatography are being developed to deconstruct whole plant extracts.

P7 Antibiotic Stewardship in Human and Veterinary Medicine, a Response to Antibiotic Resistance

Kaitlyn Postell

Mentor(s): James Masuoka. Biology, McCoy College of Science, Mathematics & Engineering

Antibiotic resistance is a major challenge modern healthcare faces. It results in increased medical costs due to prolonged medical care periods and other complications. Resistance is responsible for thousands of excess deaths in the US annually. Modern antibiotics were developed within the last century and resistance appears shortly after their development. While some bacteria are intrinsically resistant to some antibiotics, resistance can be acquired from other bacteria or the environment through mutations and horizontal gene transfer. To combat antibiotic resistance, the concept of antibiotic stewardship was created and implemented in facilities that prescribe antibiotics. Antibiotics are prescribed not only to humans, but also to non-human animals. One Health is the notion that humans and our health are not isolated from all other living beings, but instead we are all intertwined with one another. Under the umbrella of One Health, how is antibiotic stewardship applied to veterinary medicine? To address this question, an extensive literature search of primary and secondary sources that discuss stewardship in human medicine and veterinary medicine was conducted. This search revealed

both similarities and differences. The present review discusses these similarities and differences, describes the process of stewardship guidelines, and emphasizes how these policies strive to preserve antibiotic efficacy through their meticulous and restricted use, as well as to help monitor the dissemination of antibiotic resistance. This discussion highlights how antibiotic stewardship, as a critical component of One Health, is not only important in human medicine, but in animal medicine as well.

P8 Synthesis & Electrochemistry Results of Diethyl-2-[3-nitrophenylmethylene]malonate & Diethyl-2-[4-nitrophenylmethylene]malonate

Glenna Linthicum, Iryna Hotsuliak

Mentor(s): Chris Hansen, Jianguo Shao Chemistry, McCoy College of Science, Mathematics & Engineering;

The purpose of this experiment was to synthesize and analyze the electrochemical properties of diethyl-2[3-nitrophenylmethylene] malonate & diethyl-2-[4-nitrophenylmethylene] malonate. Electrochemistry results on the malonate derivatives compared to starting materials will be reported. The testing of the nitro functional group on the meta and para position of the phenyl ring is our main comparison. The goal is to identify whether or not the positions will affect the electrochemistry results.The identities of the compounds were confirmed with the use of GC-MS, NMR, & IR-Spectroscopy.

P9 Extraction and Identification of Novel Antibiotics in Plant Matter Effective Against Staphylococcus epidermidis with further analysis of Antivenom Properties

Austin Groth

Mentor(s): Elizabeth Machunis-Masuoka, Chemistry and Biology, McCoy College of Science, Mathematics & Engineering;

According to the World Health Organization, antimicrobial resistance (AMR) remains a serious global public health threat. There is a critical need for novel antibiotics as medical facilities continue to face rising levels of resistant organisms. The historical record provides centuries of evidence for the medicinal practices of aboriginal peoples using common herbs and native plants to treat diseases. Our lab is currently investigating both herbs and native plants forming part of the Native American pharmacopeia. Soxhlet extraction in ethanol and hexane was used to obtain complex extracts that were concentrated using a rotary evaporator. Extracts were used to perform standard Kirby Bauer antibiotic susceptibility testing on Staphylococcus epidermidis. The following zones of inhibition were measured for the most effective complex ethanol extracts: thyme 25mm, yarrow 16mm, pumpkin seed 15mm, and lavender 15mm (vancomycin-susceptible Staphylococcus shows a ring ≥17mm). Additionally, three variations of simple water extractions are being performed to analyze the difference in chemical content and antimicrobial effectiveness. Separation protocols to fractionate plant extracts are being developed to test individual components for antimicrobial properties. Additional plants will be tested. Once individual active compounds have been identified, we will perform chemical crosslinking experiments to create combination therapies for treatment of multi-drug resistant infections. An extension of this project centers on rattlesnake master, used by Native Americans to treat snakebite and infection. We plan on isolating, identifying, and characterizing compounds in rattlesnake master with antivenom/antimicrobic properties.

P10 Exploring the Impact of Salt on Protein Aggregation Kinetics in Familial Alzheimer's Disease Mutations

Andrea Granados Millan

Mentor(s): George Liang, Chemistry-Biology, McCoy College of Science, Mathematics & Engineering;

Alzheimer's disease (AD) is a devastating neurodegenerative disorder marked by progressive cognitive decline, for which no cure currently exists. A central feature of AD pathology is the aggregation of amyloid beta (Aβ) peptides, leading to amyloid plaque formation. The familial E22G mutation in Aβ (substitution of glutamate with glycine at position 22) is associated with early-onset AD due to its rapid aggregation and plaque deposition in the brain. Emerging evidence also links high-salt diets to accelerated cognitive decline, though the underlying mechanisms remain unclear. This study aims to determine how elevated NaCl concentrations influence the aggregation kinetics of the Aβ E22G mutant. Given that the E22G mutation reduces electrostatic repulsion, we hypothesized that increasing NaCl levels would minimally impact its aggregation kinetics. To investigate this, we overexpressed and purified Aβ E22G from bacterial cultures, followed by affinity and size-exclusion chromatography. Aggregation kinetics were monitored using the Thioflavin T (ThT) fluorescence assay, a method commonly used to assess beta-sheet-rich amyloid structures, as ThT binding produces enhanced fluorescence and a characteristic red shift in its emission spectrum. Our results contradicted our hypothesis, showing that Aβ E22G is highly sensitive to NaCl, with aggregation rates significantly faster than those of wild-type Aβ under high-salt conditions. This suggests that hydrophobic interactions, rather than electrostatic forces, play a dominant role in promoting Aβ E22G aggregation in saline environments. These findings provide insight into how environmental factors, such as dietary salt, may exacerbate aggregation, potentially contributing to the onset and progression of AD.

Comanche- Session III Education

11:00 am- 12:00 am

ERP2 Factors Impacting Education Students' Choice to Attend MSU

Brylie Green, Lauren Conner

Mentor(s) April Crutcher, Elizabeth Barnard, Undergraduate Education, BAAS, West College of Education;

The objective of this study is to pinpoint the factors that draw in education majors to Midwestern State University. This study is important because the results will support the West College of Education and Professional Studies figure out ways to bring more people to MSU and possibly keep students attending. The recruitment and retention rate data collected through MSU shows that there is a -14% growth at WCOE. Many students have no interest in becoming teachers which has been a factor leading to a national and state teacher shortage. Through this study we hope to see the factors that bring in education major students to MSU, then in the future the WCOE can use those factors to lead to an increase in retention and recruitment. Our research question is why do education degree students choose MSU? We are using a quantitative

methodology for this research study by collecting survey data and analyzing. The data that will be collected and stored for this research will be through Google Forms with full confidentiality. The IRB has been submitted; we are waiting for the approval. In conducting our literature review, we found that the main factors leading into college decisions are location, cost, and major offered at the Universities. We anticipate that we will find majority of students choose MSU for the location. In conclusion, our aspiration is that this study can be used to help MSU to determine some of the key factors that attract new education students to the university. IRB is in progress.

ERP3 How Effective are Accommodations for Students in College and How can they be Improved
Noor Ul Eman
Mentor(s): Emmanuel Sefah, Edward Schultz Education, West College of Education;

Accommodations are often misinterpreted, leading to their being viewed as interventions or modifications of students' work. Accommodations differ from interventions because they adapt students' tasks without altering their skills and abilities. This allows students to engage with coursework, leveling the playing field while maintaining traditional instructional methods (Lovett & Lewandowski, 2015). This research aims to understand how accommodations for college students with disabilities help eliminate barriers and improve equal access to high-quality education. A mixed-method approach will be employed to gather comprehensive data, starting with a literature review that aligns with the research question and analyzing existing theories and previous findings. Surveys and focus groups will be conducted to gauge the perspectives of students receiving accommodations, assessing their satisfaction and whether they feel adequately supported for academic success. Integrated data analysis will be utilized to interpret the quantitative and qualitative data thoroughly. Preliminary literature review results indicate that while accommodations assist students in overcoming barriers, improvements are necessary. There is a noted lack of faculty training in interacting with students with disabilities, highlighting the need for enhancement in this area. Survey and interview questions are being developed, so IRB approval will follow the completionof these tasks. However, the literature suggests that while accommodation systems are effective, further enhancements are necessary for better outcomes. IRB in-progress

P11 Reflective Ethnography Shapes How Pre-Service Teachers Can Best Support Classroom Learning
Mallory Frederick, Natasha Moore
Mentor(s): Emily Reeves Fyfe, Christina Janise Wickard, Undergraduate Education, West College of Education;

The purpose of this reflective ethnography research is to explore the impacts that a photography portfolio has on pre-service teachers in a study abroad program on their culturally responsive teaching efficacy. Specifically, our project focused on the importance of learning about our students' cultures and then using that knowledge to better support their learning journey. While in London, we were struck by the many doorways, gateways, and archways of each building that we walked through and how each time we passed through them we gained a deeper knowledge of the cultures there whether we were at museums, schools, neighborhoods, or culturally significant locations. In our project we also looked at how to build on students' understanding of their cultural background and how to use that knowledge and build upon it.

When we were visiting London, there were many hurdles we had to overcome when we were coming to a new country. This gave us the perspective of what our students might feel in the classroom and new understanding to help them overcome these obstacles. This is represented by the scaffolding and construction on all the buildings that we saw. By visiting these locations, we were able to obtain a more well-rounded view of the multicultural diversity and various life experiences that our students will bring to our future classrooms and how we can best support their learning as educators.

P12 Some things are universal and constant despite the cultural differences

Evanne Kleinert, Lexus Aquallo, Mia Miller

Mentor(s): Emily Reeves Fyfe; Christina Janise Wickard, Undergraduate Education, West College of Education;

The purpose of this reflective ethnography research is to explore the impacts that a photography portfolio has on pre-service teachers in a study abroad program on their culturally responsive teaching efficacy. We explored skills in visual literacy through the use of photography as a tool to explore and develop culturally responsive teaching efficacy. The participants were given the challenge to take a single photo that expressed a message, emotion, attitude, or mood, ensuring that the visual connection to the subject had a distinct viewpoint or attitude. The distinctions across generations were apparent while looking at a single shot. The younger generation relies heavily on technology for convenience and rapid access to information, while the elder pair uses a traditional map on the tube. This generational divide emphasizes how resilient and adaptive previous generations were, having grown up without the aid of modern technology. The second photo shows an elderly couple in a bustling cafe and highlights their enduring bond, resilient and unwavering. Their presence gave a reminder that love and companionship are universal and was an enrichment to the study abroad experience, blending the new with the timeless. Overall, both photos show that despite the cultural differences, some things are universal and constant

P13 Reflective Ethnography in London

Anthony De La Cruz, Wynn Isham

Mentor(s): Emily Reeves Fyfe; Christina Janise Wickard, Undergraduate Education, West College of Education

The purpose of this reflective ethnography research is to explore the impact that creating a photography portfolio has on pre-service teachers participating in a study abroad program, particularly on their culturally responsive teaching efficacy. The research utilizes visual literacy skills, employing a photography portfolio as a transformative tool to aid students in developing their culturally responsive teaching practices. Participants engaged in taking photographs of diverse individuals and various cultural settings, followed by guided reflections that encouraged them to consider their thoughts and feelings about each image. This reflective process facilitated the deconstruction of personal biases, both positive and negative, allowing participants to examine how these biases could influence their teaching approaches. Through this analysis, we uncovered significant insights regarding the societal importance placed on cultural experiences and how these experiences shape community values. The reflections not only enhanced students' appreciation of cultural diversity but also fostered a deeper understanding of their own

perspectives and teaching philosophies. Ultimately, this research emphasizes the value of integrating visual literacy into teacher education, highlighting how creative expression can significantly enhance one's efficacy in culturally responsive teaching, thereby better preparing educators for diverse classroom environments.

Comanche- Session IV Engineering, Geoscience
12:00 pm- 1:00 pm

ERP4 Mapping Texas Air Pollution Driven by Wildfire Using Modeling and Geostatistical Method

Javaughn Bullard
Mentor(s): Kashif Mahmud, Department of Geoscience, McCoy College of Science, Mathematics & Engineering;

In the last few decades, wildfires in Texas have increased in intensity and frequency. 1 in 6 Americans live in areas with significant wildfire risk in 2022. Between 2018 - 2022, 43,351 wildfires burned 1,789,914 acres across the state of Texas and during this 5-year period, 84% of all wildfires ignited within 2 miles of a community. The largest wildfire in Texas history occurred this year on February 26 in Hutchinson County, burning over 1 million acres of land. The wildfire smoke affected surrounding areas like El Paso, listing an air quality index (AQI) of about 126. This AQI indicates an unhealthy air quality for sensitive groups of people, especially elderly and kids. We use various geoprocessing tools and ArcGIS Pro to map the major wildfires in Texas during the last 10 years (2013-2023). Wildfires that burned at least 10,000 acres are considered major fire events. We investigate various attributes of wildfires such as acres burned, duration of fires, vegetation type burned, cause of fire, etc. and plot these data to illustrate the spatial distribution. Particulate matter (PM), an air pollutant, is emitted from wildfires, which can lead to cardiovascular and respiratory diseases. Using wildfire data from the National Interagency Fire Center and air quality data from the U.S. Environmental Protection Agency, we will find the impacts of wildfire events on PM concentrations in Texas. The outcome of this project will help us identify the contribution of wildfire-driven PM in Texas.

P14 Fossil Plants from the Permian Colwell Creek Pond locality, Foard County, Texas

Indigo Burke
Mentor(s): Steven Rosscoe, Geosciences, McCoy College of Science, Mathematics & Engineering;

A slab of shale from the Colwell Creek Pond bed, infamous for its plant fossil assemblage was provided by the Whiteside Museum of Natural Science for investigation. The early Permian (Kungurian Stage) shale was recovered from the middle Clear Fork Formation. The rock is steel grey in color with layers of deep red and yellow-orange mixed throughout, the later coloration caused by iron oxidation. Yellow-orange goethitic horizons preserve high-quality plant fossils. The slab was split open in laboratory settings and the specimens were photographed under natural light conditions. The dominant plants found in the slab were Walchian conifers. They exhibit bilaterally symmetrical woody branches arranged in a pleiotropic branching pattern. Petioles are

woody, the needles are awl-shaped (curved inward at their distal end), and pectinately arranged on branchlets. Specimens found were largely isolated, with each located on its own goethitic layer in the rock without overlapping other specimens. Specimens will be further prepared and exposed using air scribes. This will allow for more observations and aid in describing and identifying the specimens. Detailed macroscopic and microscopic photographs will be taken and some specimens of interest will be illustrated through drawings. The fossils will be fully described and identified using proper terminology. A museum-worthy display will be constructed to educate staff and students about the plant fossils, the Colwell Creek Pond deposit, the importance of paleontology, and what we can learn about the past using these fossils.

P15 How does Tectonism Control Basin Evolution and Reservoir Potential?
Nathalie Devoir
Mentor(s): Andrew Katumwehe, Geosciences, McCoy College of Science, Mathematics & Engineering;

Tectonism involves forces that deform the Earth's crust and is crucial in the evolution of basins and hydrocarbon reservoirs. It shapes basin structures, sedimentation, and faults, impacting reservoir quality by creating necessary traps and seals for hydrocarbon accumulation. Similarly, Tectonic stress can alter porosity and permeability, influencing reservoir potential. Critical structures like anticlines, fault traps, stratigraphic traps, and impermeable seals enhance reservoir potential. This study focuses on mapping structural traps in Semliki Basin, part of the East African Rift System. The basin is one of the few non-volcanic basins where tectonic forces generate complex structures that act as hydrocarbon traps and seals. However, the North American fault zones have technically been inactive for millennia. These zones feature stable fault systems with continuous sedimentary units, resulting in predictable reservoir potential. Understanding tectonic history is crucial in the oil and gas industry. By examining tectonic patterns, we can predict the locations of high-quality reservoirs and identify areas at risk for unfavorable tectonic activities. This insight enables a more targeted approach to exploration, minimizing financial risks and environmental impacts while concentrating efforts on regions with substantial reservoir potential. To extract basin structures, we utilize Petrel software to enhance the identification and interpretation of faults and horizons, leading to a more accurate assessment of reservoir potential. We will conduct detailed structural analyses of seismic data using Petrel's advanced modeling capabilities, facilitating precise mapping of subsurface features. The software will assist us in identifying traps and seals that significantly impact hydrocarbon accumulation. This method allows for a thorough evaluation of reservoir potential and the continuity of hydrocarbon-bearing units. Additionally, Petrel offers a robust framework for assessing the spatial distribution of reservoirs, thereby improving the accuracy of predictions regarding potential zones.

P16 Characterizing the Basaltic Dike on Highway 49-Medicine Park, Oklahoma
Anna Kough
Mentor(s): Jonathan Price, Geosciences, McCoy College of Science, Mathematics & Engineering;

A characterization of the basaltic (diabase) dike in Medicine Park, Oklahoma is being conducted through field and lab methods. High-accuracy GPS measurements of the dike were taken for graphical use, as well as hand samples for geochemical analysis. The diabase rock

sample was crushed into a fine powder and run through X-ray Diffraction (XRD) and X-Ray Fluorescence (XRF) to respectively determine mineral and elemental composition. When compared with more pristine diabase in the Wichitas, this dike exhibits a significant degree of weathering. Results from the XRD shows an abundance of montmorillonite (clays), plagioclase, and augite pyroxene, suggesting intermediate levels of alteration to the rock. Little augite is present due to the alteration of pyroxenes into clay minerals. Qualitative analysis results of the XRF reveals 44.39% SiO_2 (silica), 18.69% Fe_2O_3 (total iron oxide), and 7.13% MgO (magnesia); prominent abundance of silica is to be expected from this siliciclastic rock. The presence of elevated iron oxide and lower magnesia is consistent with rift basalts and comparable to other Wichita diabase. We are also working with previously collected dike samples of the Medicine Park area with thin sections (30-micron thick rock slabs under glass) for comparison. These examples of more pristine material are dominated by plagioclase laths surrounded by augite, with lesser orthopyroxene and rare olivine. Alteration of these mafic silicates into clays at the highway 49 dike suggests that, despite its recent excavation as a road cut, the dike was subject to extensive groundwater incursion in the shallow subsurface.

P17 Microstratigraphy of the Craddock Bone Bed

Kyler Kenvin

Mentor(s): Steven Rosscoe, Geosciences, McCoy College of Science, Mathematics & Engineering;

The Craddock Bone Bed, located on the Craddock Ranch (Seymour, Texas) is world-renowned for its well-preserved fossil Dimetrodon and other vertebrates. The bone bed is within the Permian (Kungarian-Artinskian) Clear Fork Formation of north Texas. Detailed stratigraphic study of the Craddock Bone Bed has yet to be completed. Large-scale depositional interpretations indicate the fossil locality was a freshwater pond near a stream that was subject to intermittent flooding. High-resolution stratigraphic study of the bone bed will involve collection of geophysical data (spectral gamma ray and magnetic susceptibility) and physical sampling in 10-centimeter intervals. Spectral gamma ray, which distinguishes natural radiation sources of potassium, uranium, and thorium, will allow for analysis of depositional rates, environments, and organic content. Magnetic susceptibility, which measures magnetic material in the rock, will provide further insight into depositional rates and the source of the sedimentary material. This data can be used to recognize gradual trends and sharp changes in depositional conditions within the deposit. Spikes in this data will indicate short term depositional events. Uranium spikes indicate an increase in organic content, potentially indicating horizons more productive in important fossils. The physical samples collected will be processed for insoluble residues. These residues will be processed for grain-size and other grain characteristics to determine changes in siliciclastic content related to shifting rates of deposition. The insoluble residues will also contain fossil content that may provide deeper insight into smaller and even microscopic organisms living in the environment at the time of deposition.

P18 Investigating the Combined Nonlinear Behavior of Structural Flat Panels when Subjected to Flutter and Uniform Temperature

Calvin Walmer

Mentor(s): Salim Azzouz, Engineering, Computer Science, McCoy College of Science, Mathematics & Engineering;

When aircraft fly at high speed, the skin panels of the aircraft are subjected to air friction and consequently the panels' temperature rises. Additionally, due to the high speed, the panels may experience a flutter phenomenon. Flutter is a peculiar type of oscillation, limit cycle, or chaos behavior that the panel experiences and is not yet very well understood. Furthermore, the temperature increase might have an adverse effect on the strength of the panel and lead to a catastrophic failure. The purpose of this project is to investigate the combined nonlinear behavior of flat plates when subjected to flutter conditions and a uniform temperature. The plate will be subjected to simply supported or clamped boundary conditions and as it is considered to be part of a larger aerospace structure. Though there has been extensive research in the field of the dynamic behavior of flat panels, few studies have investigated the combined effects of temperature and flutter related dynamic behavior. In order to investigate and simulate these dynamic nonlinear behaviors, the Finite Element numerical method will be used. As the plate experiences flutter and higher temperatures, the plate should deflect in such a way that the minimum displacement of the plate is proportional to the order of the thickness of the plate. It is expected that the outcome of this project will be a MATLAB program that predicts the dynamic behavior of a structural plate under the combined loading of flutter and temperature

P 19 The effectiveness of a surfactant/alkaline on enhanced oil recovery (EOR) on a mature reservoirs

Taylor Robinson

Mentor(s): Mahmoud Elsharafi, Engineering, McCoy College of Science, Mathematics & Engineering;

When oil wells get low oil production they start to introduce Enhanced Oil Recovery methods to increase oil recovery from mature reservoirs. A chemical called Surfractaning/Alkaline can be used to change wettability of the rock and to extract more oil from those reservoirs. We have used several rock samples collected from several resources including sandstone and shale cores. We have used three different surfactant/alkalines. All core samples are heat dried, vacuumed, and soaked with crude oil. The weight of the samples have been taken before and after the chemical treatment to determine the oil recovery. The outcome of this can be used to help the oil industry to move more remaining oil from the mature reservoirs. We have tested both a miscible and immiscible surfactant/alkaline. The immiscible is better since the oil will also float on top giving it a better upward drive and will avoid the extra separation and maintenance procedures for it.

P20 Self-Adjusting Mechanical PTO Clutch

Brittany De Hoyos, Eric De Hoyos, Michael Nwoye

Mentor(s): Sheldon Wang, Engineering, McCoy College of Science, Mathematics & Engineering;

This project aims to redesign a Power Take-Off (PTO) system manufactured by WPT

Power, focusing on developing a self-adjusting clutch system. The current PTO requires manual adjustments to address wear in the friction material, leading to inefficiencies and maintenance needs. The main objective is to create a clutch that can self-adjust, eliminating manual intervention and enhancing operational reliability while reducing downtime. In this design phase, the project is focused on analyzing the PTO's over-center locking mechanism, a central component in its function. This mechanism is crucial for understanding how adjustments are made manually and will guide modifications for self-adjustment. By closely examining the mechanics of this locking system, the project aims to identify design improvements that allow for automatic wear compensation. SolidWorks is used to model PTO components, facilitating visualization and exploration of potential design solutions for a self-adjusting clutch. Currently, no physical testing or operational condition analyses are planned. Instead, the design approach relies on virtual modeling and conceptual analysis, emphasizing refinements to the self-adjusting features within the locking mechanism. The anticipated outcome is a PTO design that autonomously compensates for wear, reducing the need for manual adjustments. This redesigned system holds significant potential for applications where minimal maintenance and continuous operation are essential. Once the design phase is complete, further evaluations may be conducted to assess the feasibility of implementing the proposed self-adjusting mechanism. Findings from this initial design will lay the groundwork for future development, contributing to a more efficient and sustainable PTO system for industrial use.

Comanche- Session V Finance, History, Creative Activity Theatre
1:00 pm-2:00 pm

P21 How effective is microinsurance in providing financial protection and enhancing resilience among low-income individuals and marginalized communities in Wichita Falls?

Romario Hughes
Mentor(s) Qian Li, Finance, Dillard College of Business Administration

Microinsurance, designed to cater to the insurance needs of low-income individuals and marginalized communities, plays a pivotal role in safeguarding them against financial vulnerabilities. This research delves into the multifaceted role of microinsurance in providing financial protection and promoting resilience among underserved populations. The exploration begins by delineating the challenges faced by low-income individuals and marginalized communities, emphasizing their heightened exposure to various risks such as illness, natural disasters, and crop failures. Traditional insurance products often remain out of reach due to factors like high premiums, intricate procedures, and distrust in formal financial systems. Consequently, microinsurance emerges as a critical alternative, offering affordable premiums, simplified processes, and tailored coverage options. This study assesses the impact of microinsurance on promoting financial inclusion by extending insurance coverage to those previously excluded from formal financial systems. By facilitating access to insurance, microinsurance empowers individuals to manage risks effectively, accumulate assets, and plan. Furthermore, microinsurance enhances the resilience of communities by providing timely financial support in the aftermath of adverse events, enabling quicker recovery and reducing the

long-term socio-economic impact. Drawing on evidence and case studies from diverse geographical contexts, this research evaluates the effectiveness of these programs in reaching and serving low-income populations. It investigates the uptake and utilization of microinsurance products, identifying factors influencing consumer behavior and program sustainability. Additionally, the study examines the role of microinsurance in fostering social cohesion, strengthening community networks, and promoting sustainable development. Through a comprehensive analysis of the benefits, challenges, and potential pitfalls of microinsurance initiatives, this research aims to inform policymakers, practitioners, and stakeholders about the critical importance of microinsurance in advancing financial inclusion goals and building resilient societies. By identifying best practices and lessons learned, this study seeks to contribute to the ongoing dialogue on inclusive finance and sustainable development, ultimately striving towards a more equitable and resilient future for all.

P22 Bias in Lao Media During the Vietnam War

Patrick B. Redder

Mentor(s): Mike Rattanasengchanh, Eric Lynch, History, World Languages & Cultures, Prothro-Yeager College of Humanities & Social Sciences;

This project consists of translating newspaper articles from the Lao newspaper the Lao Presse from French into English. The current time frame for my part is from April 17, 1965 to 1966. The focus is on how Laotians viewed American intervention in Vietnam, which had ramped up in early 1965. My conclusion at this point is that the Lao Presse is subtly biased in favor of the government, against the growing communist influence in the country at the time. This is shown in what the newspaper chose to report on during the selected time frame. In the April 17th issue, the newspaper chose to publish the Prime Minister's New Year Message, but didn't report anything from the opposition. Again, in the April 21st issue, they chose to only report the New Year's message from South Vietnam and the King's New Year's message to North Vietnam. In addition to these New Year's messages, the paper also reports on the Vietnam War mostly from the South Vietnam or American side, describing North Vietnamese movements through a South Vietnam / American perspective. One of the possible reasons for this could be that since it was a French language newspaper, it probably catered more to the elites in Laos instead of the common people and the elites of a country tend to have the most to lose in a communist revolution. Another reason could be that the paper could actually be reflecting the general feelings of the general population, telling them more about the communist threat to their east.

CAP1 Mr. Burns' Bike

Emma Boatright

Mentor: Grace Edgar, Theatre, Fain College of Fine Arts

In the production of Mr. Burns; A Post-Electric Play the Theatre Department of Midwestern State University, through an EURECA project, will design and build a bike that fits within the world of the play and will generate electricity. To begin this project, I started with designing meetings with my mentor and director of the show. Once my mentor had given me a brief understanding of what the world of the play would be like along with set design provided by our set designer I was able to start designing my bike. The first part of designing the bike was to figure out how exactly the bike was to make electricity. After understanding the basic

mechanics of the bike, I then had to design the bike to fit into the world the director has created. As soon as my bike design was agreed upon I made a shopping list of material that was needed for the bike. As the materials arrive I will start to put the bike together and follow the agreed upon design. Finally, once the bike is built and “decorated” to fit into the play’s world and can create electricity to power some lights, we will have our final product.

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