11th Annual Exhibition of Undergraduate Research and Creative Activities

EXPO 2024

April 18 – 19, 2024

Location: **Setzer Student Center**

Lamar University

Book of Abstracts

Part I - Oral Presentations

Plenary Session PL_1 – Sponsored Research I

Location: Ballroom 110A-B

Presenter: Jacob Thompson [$]
Mentor: Dr. Maryam Vasefi [$]
[$] Department of Biology, Lamar University

PL_1_T1 / URG-S / Advanced

CBD-modulated Synaptic Plasticity and BDNF Expression in Alzheimer's Disease.

Alzheimer's disease (AD) is known to chronically decrease synaptic plasticity and impair cognitive function through abnormal neural aggregations of β-amyloid (Aβ) and tau. Brain-derived neurotrophic factor (BDNF) plays a supportive role in moderating brain health and is a veritable measure of synaptic plasticity/dysfunction. Cannabidiol (CBD) is known to increase endogenous levels of BDNF and protect synaptic plasticity in vitro and in vivo, however, these effects have not been well-explored in the presence of AD hallmarks. Therefore, this project aimed to investigate CBD's synapto-protectiveness by analyzing its effect on BDNF expression and cell viability in neurons pre-seeded with Aβ and/or tau. SH-SY5Y neuroblastoma cells were used as a cellular model of AD neurodegeneration. Dose-dependent CBD treatments in amounts of 0.1, 1, 5, 10, and 15μM were conducted, followed by analysis of BDNF expression via ELISA and cell viability via MTT assays to assess synaptic plasticity and neuroprotection. ELISA analysis revealed that 0.1μM CBD treatments increased endogenous neuronal expressions of BDNF, with subsequently decreased expression as dosages increased. MTT results showed a similar trend with regard to CBD-mediated neuronal survival, with improved viability at 0.1μM. This study's results indicate that CBD protects synaptic plasticity in settings of neurodegeneration, with consistent benefits found at lower concentrations. These results provide evidence for CBD's previously under-investigated usefulness in attenuating neurodegeneration in AD, suggesting potential clinical applications in cases of dementia. As such, further investigations are warranted to determine the mechanisms underlying CBD's synapto-protectiveness and the neurological interplay between Aβ, tau, and BDNF expression in humans.

Presenter: Mohamed Irhabi [$]
Mentor: Dr. Ashwini Kucknoor [$]
[$] Department of Biology, Lamar University

PL_1_T2 / URG-S / In-progress

DNA Barcoding and Species Identification of Mosquitos in Jefferson County.

Accurate identification of mosquito species provides insight into breeding habitats, host preferences, and which mosquito-borne diseases they can transmit and to reduce the health risk to a community. This project uses a molecular approach—DNA barcoding—for identifying mosquito species in Jefferson County,

in collaboration with the Jefferson County Mosquito Control Program. Utilizing the cytochrome c oxidase subunit I (COI) gene and the internal transcribed spacer 2 (ITS2) gene primers, this method will accurately identify the species, which surpasses the traditional morphological based identification. Mosquitoes were captured using New Jersey style light traps and gravid traps at 14 predetermined locations across the county, focusing on capturing both Aedes aegypti and Culex species. Following the collection and morphological identification, mosquitoes were brought into the lab for DNA extraction, and PCR amplification. Amplification was verified via agarose gel electrophoresis and then sequenced using Sanger's dideoxy method (Epoch Life Sciences). The sequences were then used for BLAST analysis to enable precise species identification. The samples collected since January 2024 have been analyzed so far, and the work is still ongoing. Outcomes include a comprehensive list of mosquito species prevalent throughout the seasons. Results so far matches with that of the morphological identification, in few cases, the molecular methods yielded the species level identification. The next step is to detect if these specimens also carry any pathogens, and this will be accomplished using qPCR analysis. These findings will be contributory for local vector control strategies and could lay the basis for future research.

Presenter: Harvest Prater [$]
Mentor: Dr. Raul Prezas [$]
[$] Department of Speech and Hearing Sciences, Lamar University

"Hair Depression" in African American College Youth.

The American system traditionally holds African Americans to a higher standard in order for them to prove their equality. This generational trend has led to a phenomenon called hair depression. This is a modern term used to describe the emotional and negative distress of black individuals and their inward view of society's beauty standards. This study covers a sample size of 44 surveyed Lamar University students' thoughts and stories related to 'black' hair. Using a Likert scale to assess whether Eurocentric views are internalized in African American college youth, the majority of the African American participants grew up with the belief that their hair was not good enough for societal ideals. However, as a consensus, the participants reported that they do not experience hair depression as students of a predominantly white institution.

Presenter: Kaitlyn Cherry [$]
Mentor: Dr. Gina Hale, PhD, RN, CNE [$]
[$] JoAnne Gay Dishman School of Nursing, Lamar University

Exploring Causes, Manifestations, and Interventions of Autism Spectrum Disorder Among Nursing Students.

There have been many speculated causes of Autism Spectrum Disorder (ASD), however there is not a definitive cause in the literature. Individuals with ASD present different clinically and it is important for nurses to recognize and care for each patient according to their individualized needs. This quasi-experimental pre-test post-test research study explored nursing students' baseline knowledge of ASD and evaluated if an educational intervention would improve knowledge. Through Qualtrics, data was obtained

from 23 Lamar University JoAnne Gay Dishman School of Nursing (SON) students with a researcher-developed survey. This survey was administered before and after an educational intervention. Data was analyzed using descriptive statistics and a paired t-test. This research project demonstrated an increase in scores following an educational session. The scores of nursing students prior to the educational intervention ranged from 26 to 100 (M = 62.88). The paired t-test displayed a statistically significant (p=<.001) difference between the means of the pre-test and post-test. Providing education about ASD can enhance a nurse's ability to individualize care and facilitate health promotion for this patient population. The results of this study will be used to bridge gaps in knowledge about ASD, enhance the clinical practice of the SON graduates, and promote high-quality, holistic, patient-centered nursing care. However, further research is needed with larger sample sizes and extended periods of time between educational interventions and post-tests.

Presenter: Natalie Bean [$]   PL_1_T5 / URG-H / In-progress
Mentor: Dr. Gina Hale, PhD, RN, CNE [$]
[$] JoAnne Gay Dishman School of Nursing, Lamar University

Firearm Safety and Injury Prevention in Healthcare

In the United States, there is growing concern regarding firearm violence. Licensed nurses, as frontline healthcare providers, may encounter victims of firearm injuries in multiple specialty areas. Licensed nurses may have little to no knowledge about firearm safety which impedes their ability to communicate with patients and families about this important safety measure. This research study utilized a quasi-experimental pretest-posttest research design aimed at improving firearm safety knowledge among licensed nurses after an educational intervention. The study was conducted at Baptist Hospitals of Southeast Texas with licensed nurses employed at the hospital as the study population. Data analysis is in progress. Educating licensed nurses about firearm safety will likely prepare them to apply this knowledge in their clinical practice and teach patients and families about firearm safety.

Presenter: Chloe Doyle [$,%]   PL_1_T6 / URG-H / In-progress
Mentor: Dr. Christina Gregory [$] and Dr. Tilisa Thibodeaux [#,%]
[$] Department of Political Sciences, Lamar University
[#] Dean of the Reau Honors College and [%] Texas Academy

Digital Capital: The Effect of the Duration of Acquisition on Social Spaces.

Utilizing Pierre Bourdieu's theoretical framework of capital to scrutinize contemporary social inequalities in the United States, this research interrogates the concept of digital capital as a pivotal determinant of societal stratification. This analysis aims to broaden the understanding of inequalities by studying the intertwined relationship between digital capital and power structures. The anatomy of social systems within the U.S is becoming increasingly more intertwined with the digital realm. By examining the accumulation and transmission of digital capital, this study aims to analyze power structures and provide a more nuanced comprehension of the expression of digital cultural capital within social spaces.

Presenter: Eunice Yi [$,%]
Mentor: Dr. Thinesh Selvaratnam [$]
[$] Department of Civil and Environmental Engineering, Lamar University
[%] Texas Academy

Bioremoval of Heavy Metals from Synthetic Wastewater Using *Galdieria sulphuraria*.

Large volumes of metal-rich waste are released into the environment due to the extensive use of heavy metals (HMs) in various industrial processes. These HMs can enter the human body in a variety of ways and may result in health issues and symptoms ranging from mild to severe, such as headaches, arthralgia, mental disorders, altered liver and kidney function, or cancer. Physical, chemical, and biological processes like adsorption, ion exchange, chemical precipitation, and electrochemical treatment can remove metal ions from aqueous solutions. However, most of these technologies have limitations such as high energy requirements, incomplete HM removal, production of secondary contamination, and high operation and maintenance expenses. Biological algal-based treatment systems are often viewed as a potential alternative treatment process. This study evaluates the removal potential of nickel and zinc using a red algal extremophile found in acidic hot springs, Galdieria sulphuraria. This research also quantifies the metal uptake through the biosorption and bioaccumulation pathway using synthetic wastewater samples.

April 18, 2024 – 2:00 to 3:15pm
Plenary Session BO_1A – Sponsored Research II
Location: Ballroom 110A-B

Presenter: Kellen Middleton [$]
Co-author: Marharyta Baravok [$]
Mentor: Dr. Ali Koymen [$]
[$] Department of Physics, University of Texas at Arlington

Antimatter Containment Chamber: A Theoretical Approach.

Antimatter is a topic of interest in the world of propulsion and energy applications, despite its current practical unsustainability. One method for antimatter containment is diamagnetic levitation of solid-state antimatter particles. Diamagnetism is a property of matter, which, in theory, transfers over to antimatter, allowing us to model the behavior of anti-lithium deuteride (DLi) inside a magnet chamber by using graphite in a laboratory environment. By experimenting with various magnetic matrix configurations, magnetic trap configurations, and magneto-lithography we aim to prove the scalability of the diamagnetic properties to micron levels. With findings that support the concept of diamagnetic forces at micron levels capable to suspend a graphite particle, that opens the door to discussing the storage of antimatter, thus providing a commercially viable alternative to cryogenic liquid and gas antimatter containment chambers.

Presenter: Victoria Nguyen [$]
Mentor: Dr. Robert Kelley Bradley [$]
[$] Department of Industrial and Systems Engineering, Lamar University

The Potential of Milled Oyster Shell Fillers on the Properties of Thermoplastic Composites.

Polyethylene is known for its high durability and serves as the most widely used plastic today. Meanwhile, oyster shells are made of nacre, a material that provides excellent compressive strength while avoiding the tendency of ceramics to fracture easily. We investigated thermoplastic composites with milled oyster shell filler as a biomimetic material in hopes of achieving nacre-like properties. The project yielded a total of eight sample types that differed between two oyster shell products, two sieve mesh sizes, and two weight percentage loading. A custom creep test rig was assembled and used to measure the sample deformation that under constant stress.

Presenter: Brandon Stumpf [$]
Mentor: Dr. Jeff Forret [$], Dr. Yasuko Sato [$] and Dr. Yan Yan [#]
[$] Department of History, Lamar University
[#] Teacher Education Department, Lamar University

Intellectual Filth: Nazification and Resistance at the University of Munich.

The White Rose organization was a small, clandestine group consisting of students and a professor who defied Adolf Hitler and distributed leaflets intended to invoke an insurgency against the Nazis between 1942 and 1943. My research concentrates on the administrative, legislative, and political transitions Ludwig-Maximilians-Universität München (LMU), or the University of Munich, underwent from Germany's Weimar era through the end of World War II. It argues that the White Rose plight was an inevitable reflection of the University's history during the Nazi period. Although a progressive and prestigious university in the early twentieth century, it ultimately failed to protect its students and faculty from Nazi intrusions.

Existing scholarship on German universities during the Nazi period neglects to construct a digestible narrative of the University of Munich's Nazification or an explanation for the formation of the White Rose. A case study of the University of Munich provides a more complex narrative of the Nazification of German universities because, while LMU ultimately embraced the Nazi project, it also played host to resistance groups like the White Rose circle.

Presenter: George A Kidane [$,%]
Mentor: Dr. Lloyd L Lumata [$,%]
[$] Department of Physics, School of Natural Sciences and Mathematics; The University of Texas at Dallas, Richardson, TX
[%] Department of Neuroscience, School of Behavioral and Brain Sciences, The University of Texas at Dallas, Richardson, TX

Lactate Metabolism in Glioblastoma Under Conditions of Metabolic Stress.

The Warburg effect distinguishes cancer cell metabolism, whereby increased glucose uptake preferentially yields lactate production over pyruvate during glycolysis. Lactate protects the tumor microenvironment through extracellular acidification. However, low serum content and low oxygen in vitro can induce a state of metabolic stress which more accurately represents the tumor conditions during rates of high proliferation of cancer when glucose levels are low. It is unknown whether cancer cells can use lactate productively under stress. The purpose of our study is to understand the effects of stress on lactate metabolism and determine how glioblastoma, a malignant form of brain cancer, responds. We hypothesized viability would not significantly decrease in either normal or stressful conditions, and lactate could be taken up for production of tricarboxylic acid (TCA) cycle intermediates in the mitochondria. All experiments were performed with the SFXL and LN18 glioblastoma cell line. We used single and time-point colorimetric assays and compared the absorbance of treated cells grown in normal conditions to cells under stress to measure viability following a media change with 13C lactate in media. We grew cells with 13C lactate in normal and stressful conditions and analyzed cell, mitochondrial, and media extract metabolic profiles using 13C nuclear magnetic resonance spectroscopy to determine whether glioblastoma can use different carbon sources for cellular processes in absence of glucose. We monitored ATP production of cancer cells using 31P nuclear resonance magnetic spectroscopy. The results of our findings will broadly demonstrate how glioblastoma uses circulating downstream glycolytic metabolites under stress.

Presenter: Sarah Anderson [$]
Mentor: Dr. Millicent Musyoka [$]
[$] Department of Deaf Study and Deaf Education, Lamar University

BO_1A_T5 / SURF-H / Advanced

Deaf Parents Supporting Hearing Children Language and Literacy Development: A Narrative Study.

The focus of this research study is to explore how Deaf parents support the language and literacy development of their hearing children, as well as how hearing children of Deaf parents experience language and literacy development within the home environment. Emphasizing understanding the strategies and techniques that Deaf parents employ to support their children's language and literacy skills, the study also aims to uncover the challenges and opportunities that arise from the unique status of Deaf parents teaching hearing children. This research will utilize qualitative methods to collect data from both Deaf parents and hearing children of Deaf parents. Thematic analysis will be employed to analyze the data. The study's findings are expected to contribute to a deeper understanding of the role of Deaf parents in supporting their children's language and literacy development, uncovering the unique challenges and opportunities that arise from this dynamic. Furthermore, this research has the potential to inform educational and social policies and practices related to language and literacy development for hearing children of Deaf parents, ultimately promoting a more inclusive and equitable society.

Presenter: Mohammad Saleh Malekinejad [$]

BO_1B_T1 / GRAD / In-progress

Mentors: Dr. B. Eren Tokgoz [$] and Dr. T. Selvaratnam [#]
[$] Department of Industrial and Systems Engineering, Lamar University
[#] Department of Civil and Environmental Engineering, Lamar University

Application of Principal Component Analysis to Dimensionality Reduction in Community Resilience.

Community resilience can be defined as a community's capability to proactively anticipate, absorb, recover from, and adapt to actual or potential adverse events in a timely and efficient manner. This encompasses the restoration and enhancement of fundamental functions and structures. One of the most important dimensions in community resilience is Physical Infrastructure, which includes transportation systems, communication networks, utilities, and all physical systems of a region that often produce goods and services. The aim of this study is to review physical infrastructure-based frameworks and propose a custom framework for Jefferson County, TX, US. First step to create a custom framework is variable assessment that was done by expert perspective orientation. Then, Principal Component Analysis (PCA) was utilized to condensate of data into definable and utilizable subsets beside assigning specific weights to each indicator, component, and dimension over time. A significant consideration in this process is the availability of historical functionality data spanning several years. In this study, we use selected variables in the energy field as main component of physical infrastructure dimension and mock data to create a model. For calculations based on this data, PythonTM programming was employed. By revealing the energy score, decision-makers will be able to plan and implement practical solutions to increase corresponding resilience in the communities.

Presenter: Paul Byaruhanga [$]

BO_1B_T2 / GRAD / Advanced

Mentor: Dr. Shuo Chen [$]
[$] Department of Physics and Texas Center for Superconductivity, University of Houston

Ce-doped NiFe-Layered Double Hydroxide for Oxygen Evolution Reaction.

Pursuing hydrogen fuel via water electrolysis has attracted a lot of attention to overcome the diminishing reserves of fossil fuels and their environmental repercussions. The efficiency of water electrolysis largely hinges on overcoming the inherently sluggish kinetics of oxygen evolution reaction (OER). The innovation of highly active, durable, and cost-effective OER electrocatalysts is essential, especially in alkaline environments. NiFe-layered double hydroxides (LDH) holds promise as one of the most active electrocatalyst for the OER in alkaline environments. Nonetheless, its advancement demands improved activity and stability under harsh alkaline

conditions. Different from the previous studies, we synthesized cerium-doped NiFe-LDH nanosheets through a single step hydrothermal method. Introducing cerium in place of iron atoms boosts the catalytic efficiency and enriches the materials with more active sites. Our optimized Ce-doped NiFe-LDH/NF electrocatalyst demonstrated remarkable OER activity, requiring overpotentials of just 247 mV and 304 mV to achieve current densities of 100 and 1000 mA cm-2, respectively, with a low Tafel slope of 34.5 mV dec-1 in 1 M KOH. Notably, the electrocatalyst exhibited exceptional stability, maintaining robust performance in up to 6 M KOH solutions at room temperature and 65 oC, respectively, for about 300 h at elevated current densities of 500 mA cm-2, outperforming all the Ce-doped catalysts reported before in both performance and stability tested under identical conditions. These results underline the potential of Ce-doped NiFe-LDH as a cost-effective and highly efficient catalyst for sustainable hydrogen production, highlighting the importance of the one-step synthesis approach in advancing electrocatalytic materials.

Presenter: Sadia Rahman Jhilik [$]
Mentor: Dr. Muhammad Huda [$]
[$] Department of Physics, The University of Texas at Arlington

BO_1B_T3 / GRAD / Early-stage

Effects of Nitrogen Doping on Magnetic Moments in 4H SiC.

Silicon Carbide (SiC) has drawn significant attention for its superior properties, such as a wide bandgap, higher breakdown voltage, higher thermal conductivity, and higher operating frequency and temperature characteristics. Among its 200 polymorphs, 3C, 4H, and 6H stand out, with 4H SiC identified as the most suitable for power electronics based on Baliga's figure of merit. Furthermore, 4H-SiC holds promise as a material for qubits at room temperature. Given the critical role of impurities and defects in semiconductor performance, a thorough and insightful study on defects and impurities in 4H-SiC is essential. We will be presenting our results regarding magnetic moments in 4H-SiC structure due to defects and doping.

Presenter: Ahmed Abuali [$]
Mentor: Dr. Claudia Ratti [$]
[$] Department of Physics, Theoretical Nuclear Physics Group, University of Houston

BO_1B_T4 / GRAD / Advanced

A Deep Learning Approach for Phase-Transition Recognition: Application to 2D Ising, 3D Ising, and Classical 3D Heisenberg Models.

This work is about the application of ML/DL techniques for the classification of phase transitions in statistical models, with a focus on binary classification. The study concentrates on the recognition of phase transitions in prominent spin models such as the 2D Ising model, 3D Ising model, and classical 3D Heisenberg model. The primary objective is to construct robust ML and DL models capable of accurately distinguishing between different phases, thus aiding in the identification of phase transitions. The proposed methodology involves training ML and DL models on extensive datasets generated from simulations of the aforementioned statistical models. The training process encompasses diverse configurations representing distinct phases to ensure model generalization. We use the performance

measures of the model to mimic the behavior of order parameters. These measures serve as indicators of phase transitions.

Presenter: Savannah Rose [$]

Co-authors: Jackson Wilkins [$] and Dr. Trevor Fleck [$]

Mentor: Dr. David Jack [$]

[$] Department of Mechanical Engineering, Baylor University

BO_1B_T5 / GRAD / In-progress

In-Situ Thermoset Resin Cure Monitoring Using Indirect Contact Ultrasound.

Thermoset resins are used in multiple applications across multiple industries, of specific interest to this study is the area of carbon fiber laminates for the aerospace and automotive industries. The cure process is crucial to the final manufactured mechanical performance, but also can be optimized to maximize the production efficiency. One optimization is to minimize the time that the component is required to cure for before demolding. However, determining the minimum required time can be both time consuming and expensive. Thus, this work uses a low-cost method, ultrasound testing, to monitor to current cure state, with a future goal of determining the minimum cure time for neat resin and carbon fiber laminae filled resin. The study is performed in temperature ranges that are standard for air production facilities in the southern United States that typically range from 22°C to 40°. Several factors are analyzed, including speed of sound through the resin and mold over cure time, signal intensity over cure time, and the power under the resin peak over cure time. Results are compared to conventional rheological data to validate this data. The acoustic behavior is in excellent agreement with the rheological profiles and in estimating the cure percentage of the component. This method is an indirect contact ultrasound method because the contact transducer is placed on the mold of the component instead of directly on or in the curing resin. Thus, this method is removable and can be placed on the mold at any point in the cure cycle.

April 18, 2024 – 2:00 to 3:15pm

Breakout Session BO_1C – HASBSEB Research I

Location: Sabine II – room 121

Presenter: Harley Perkins [$]

Mentors: Dr. Mamta Singh [$] and Dr. Elizabeth Casey [$]

[$] Teacher Education Department, Lamar University

BO_1C_T1 / UG-H / In-progress

How Resilient Are Our Elementary Preservice Teachers?

Teacher resilience is the ability to adapt and recover from challenging situations. It is an essential quality for educators, especially during times of crisis. This study examined the challenges and solutions that elementary school teachers encountered and created since the COVID-19 pandemic. The findings highlight the importance of teacher resilience and the need for ongoing support.

Presenter: Audrey Vincent-Eze [$]
Mentor: Dr. Christina Gregory [$]
[$] Department of Political Sciences, Lamar University

Unveiling Contrasting Family Lifestyles: A Comparative Analysis of Family Policy in Iceland and the United States.

This research project conducts a comparative analysis of family policies between the United States and Iceland. The paper delves into the diverse approaches these nations employ to support families. The analysis juxtaposes the United States' multifaceted yet fragmented family support systems with Iceland's comprehensive and inclusive policies. The research explores three primary pillars of family welfare: parental leave, childcare support, and tax incentives; assessing the strengths, limitations, and societal impacts of each country's policies. The findings highlight the disparities in accessibility, affordability, and coverage between the two nations' family support structures. Moreover, the study delves into these policies' societal and economic implications, emphasizing their influence on population demographics, workforce participation, and societal well-being. This research aims to provide insights into effective family policy frameworks through a comparative analysis, shedding light on potential avenues for improvement and adaptation in the United States.

April 18, 2024 – 3:30 to 4:15pm

Workshop #4 – W_4 – Two Photon 3D Stereolithography

Location: Sabine I – room 123

Presenter: Alireza Godsi [$]
Mentor: Dr. Robert Kelley Bradley [#] and Dr. James Henry [%]
[$] Department of Biology, Lamar University
[#] Industrial and Systems Engineering, Lamar University
[%] Chemical and Biomolecular Engineering, Lamar University

Effects of Pore Size and Length on Release Rate of Drug-Analog Dyes in Two-Photon 3D Stereolithography Printed Microstructures.

Controlled release delivery systems dispense drugs over an extended period, reducing fluctuations in drug levels that could cause adverse reactions, ultimately improving treatment outcomes. Gel-based structures have achieved controlled release, but regulating hydrogel properties like porosity and microarchitecture makes precision control difficult. Two-photon 3D stereolithography (TPS) uses photoresist materials under a focused laser beam, through a microscopic lens on an accurate piezo stage, to create microscopic 3-dimentional structures. 3D structures are made by importing an STL file, and then printing through localized polymerization where the laser contacts the photoresist. This capability allows the creation of

drug release structures with precise control over pore size and other critical parameters impacting desired release functions. To simulate the body's environment, a pH 7.4 buffer solution is prepared, and fluorescein is used as a drug analog to detect concentration over time with a Shimadzu RF-6000 Fluorescence Spectrometer. The project aims to observe prolonged release rates by modifying pore geometry and size. By leveraging two-photon 3D stereolithography's ability to fabricate intricate microstructures, researchers can develop controlled release systems with optimized pore architectures, potentially leading to enhanced drug delivery and improved therapeutic outcomes for patients.

April 18, 2024 – 3:30 to 4:15pm

Breakout Session BO_2A – HASBSEB Research II

Location: Sabine I – room 123

Presenter: Lindsey Barrera [$]
Mentor: Dr. Yan Yan [$]
[$] Teacher Education Department, Lamar University

BO_2A_T1 / URG-H / In-progress

Increasing Compliance in Elementary Ages Students with Autism.

Educators in the special education field often struggle with low compliance from their students, specifically students who have been diagnosed with autism. Children with autism have a harder time grasping instructions and doing set tasks, so a structured schooling environment with strategies that cater to the student's needs and help facilitate their learning is a great necessity. Understanding the difficulties students with autism face including changes in routines, less social connection, altered support networks, and exploring approaches to support students with autism in the face of these developments are critical in ensuring their academic success and overall well-being. This study will employ a quasi-experimental study to investigate the effectiveness of using intervention including high-compliance, moderate-compliance, and low-compliance tasks for increasing the initial level of compliance with elementary school aged students with autism. The researchers will employ three different types of intervention based on students' initial compliance level such as Spike the Fine Motor Hedgehog, Birds in a Nest Sorting Set, and a color-by-numbers worksheet. This study extends the literature on high-compliance intervention and activities to enhance academic compliance behaviors for students with autism. Family members and those who interact with their child who has autism will benefit from seeing a change in their child's behavior and their ability to follow structure and routine. The child will also benefit by gaining the ability to meet teaching objectives and increasing their self-esteem.

Presenter: Laci Graham [$]
Mentor: Dr. Yan Yan [$]
[$] Teacher Education Department, Lamar University

Emotionally Responsive Teaching Through "Read Aloud" for Pre-K Children in Southeast Texas.

This research examines the impact of the pandemic on Pre-K students' reading ability in Southeast Texas and proposes the use of Emotionally Responsive Teaching (ERT) to address identified gaps. Our research will focus on implementing the "Read-Aloud" strategy from ERT, using the book "Big Dog...Little Dog," to foster resilience and emotional connections among students. By employing ERT in the classroom, we aim to improve communication skills, promote resilience, and facilitate meaningful learning experiences for Pre-K students.

Researchers will conduct a quasi-experimental study using ERT strategies, focusing on positive story reading activities, to enhance social-ecological resilience among Pre-K children. The Child & Youth Resilience Measure-Revised (CYRM-R), a 17-item scale suitable for ages 3-4, will assess resilience levels through pre- and post-tests. Quantitative analysis of CYRM-R responses will identify reframed resilience elements for children experiencing homelessness, while qualitative data from open-ended responses and researcher notes will examine shifts in Pre-K children's attitudes towards reading. ERT methods, including read-aloud activities with selected children's books, will be implemented during four teaching sessions. These sessions will be evaluated using CYRM-R scales, focusing on positive language to ensure students' confidence. The combined analysis of CYRM-R data and qualitative feedback will provide insights into the impact of ERT and positive read-aloud activities on students' social-ecological resilience over time. The project aims to elucidate resilience's importance for Pre-K children, evaluating "Read Aloud" effectiveness in reframing resilience amid pandemic stressors. It also seeks to support local communities by providing emotional and educational assistance.

Presenter: Faith Singh [$]
Mentor: Mrs. Debra Greschner [$]
[$] Mary Morgan Moore Department of Music, Lamar University

A Guide to Vocal Health for Pre-professional and Neophyte Music Teachers.

Vocal music educators use their voice from the time they arrive at work until the end of the school day. In fact, these educators use their voice outside of school as well in rehearsals, lessons, and extra-curricular activities. The act of instructing a class, singing parts for students and doing other academic duties can put strain on the vocal of these teachers. Out of a survey of 148 vocal music educators, approximately 53% of them use their voice 36+ hours a week including after school activities. Many music educators are not aware of the long-term affect teaching music can have on their vocal health. This study consisted of nine in-person interviews as well as an online survey to determine the effect of teaching on the vocal health of vocal music educators at different levels of experience. Using the data gained, we could observe how many of these educators were experiencing problems and the root of said vocal issues. Overall, the data collected aided the participants in evaluating their personal vocal health. With these results, it was clear

that there was a need for a resource to prevent the vocal difficulties from occurring. From this study, we created a guidebook of vocal health for beginner and neophyte music educators. It includes aspects of quick vocal warmups, vocal health information, and hygiene tips.

April 19, 2024 – 10:15 to 12:00pm

Plenary Session PL_2 – Sponsored Research III

Location: Ballroom 110A-B

Presenter: Caleb Gregory [$]
Mentor: Dr. Rafael de la Madrid [$]
[$] Department of Physics, Lamar University

PL_2_T1 / SURF-S / Advanced

Building a Neutron Veto for Dark Matter Detection.

Dark matter is a hypothetical form of matter that is believed to make around 85% of the universe's total matter. There has been many experiments trying detect dark matter, but so far there has been only indirect evidence of its existence. Direct detection of dark matter remains one of the most important challenges of twenty-first century physics.

Presenter: Tyler Stuck [$]
Mentor: Dr. Cristian Bahrim [$]
[$] Department of Physics, Lamar University

PL_2_T2 / SURF-S / Advanced

Generating the Curve of Dispersion for Silica Glasses Using a Diode Laser and an Isotropic Source of Energy.

The index of refraction represents the optical response of a material at a given radiation. The curve of dispersion reveals the optical response to various wavelengths of the radiation used. We analyze flint (a heavy silica with PbO_2) glass because it has a steeper curve of dispersion which allows to better resolve the small changes produced by an incident radiation. Also, flint has a large first transparency band for our radiation of 650nm from a diode laser. A voltage, V, set across the glass surface alters the light-glass interaction. This voltage provides an external energy to the surface dipoles and allows to finely adjust the frequency of the radiation perceived by silica dipoles. Thus, the energy of the surface dipoles is increased by some eV, shifting the vibrational frequency of the dipoles by a few eV/h (h is the Planck constant), an interpretation consistent with Lorentz harmonic model for light-matter interaction. For assessing laser-surface interaction and generating the curve of dispersion, we analyze the parallel component of the reflectance normalized to the total reflectance near Brewster angle. This procedure allows us to control

the instability of the laser used, which increases as the experimental time increases, mainly due to temperature. We show that for low voltages, which allows to explore the lower 20% of the first absorption band for flint glasses, the silica dipoles vibrate quasi-harmonically to the incident radiation. But as the voltage increases, an anharmonicity factor builds up and starts to challenge the vibration of flint's surface dipoles.

Presenter: Jiyoon Jeon [$]
Co-author: Arizbeth Lopez [$]
Mentor: Dr. Maryam Vasefi [$]
[$] Department of Biology, Lamar University

PL_2_T3 / GRAD / Advanced

The Effect of Stress and Pharmacology of CBD in the Progression of Alzheimer's Disease.

Alzheimer's Disease (AD) is the most predominant type of dementia and a neurodegenerative disorder that impacts more than 55 million people and their families worldwide. AD is characterized by the aggregation of Amyloid beta (Aβ) and progressive cognitive declines. The increased level of cortisol, a stress hormone, by catastrophe or prolonged exposure to distress can accelerate the progression of AD by enhancing the activity of β- and γ-secretases which facilitate Aβ production. Cannabidiol (CBD) is a non-psychoactive phytocannabinoid and based on the cross-sectional survey data, around 60% of adults in the US have tried it in their life to reduce anxiety or other symptoms. CBD has been investigated for its analgesic, anxiolytic, anti-depressive, anti-seizure properties, as well as reducing cortisol release and Amyloid Precursor Protein (APP) expression. To investigate the effect of stress and/or CBD on the progression of AD, various ranges of cortisol and CBD were independently treated to the SH-SY5Y neuroblastoma cell line in the presence or absence of Aβ. The Dot blot assay was used to confirm the presence of Aβ peptide oligomers and the MTT assay was used to measure cell viability. Based on the MTT assay, a low concentration of cortisol was neuroprotective against a low level of Aβ toxicity. However, a high dose of cortisol was detrimental to the cell alone and in combination with Aβ, and CBD could not rescue the cells from Aβ toxicity. In conclusion, alleviating the amount of stress following a catastrophe needs to be prioritized to slow down the progression of AD.

Presenter: Aaron Tabor [$]
Mentors: Dr. Millicent Musyoka [#] and Dr. Vidisha Worley [$]
[$] Department of Criminal Justice, Lamar University
[#] Department of Deaf Studies and Deaf Education, Lamar University

PL_2_T4 / URG-H / In-progress

Deaf Interactions within the First Responder World: The Communication Issue.

The knowledge of American Sign Language and various communication technologies used by Deaf and Hard-of-hearing (DHH) rarely exists or does not exist in the first responders' world, particularly among law enforcement officers. Since communication is vital for DHH individuals and law enforcement officers in every incident, challenges in communication can create a barrier. The communication barrier can make it

more challenging for the DHH individuals to express themselves, resulting in misunderstandings and delays in dispatching and receiving first responder services from the law enforcement officers who arrive on the scene. The current research has two primary purposes. First, to examine the nature of communication and interaction between law enforcement officers and DHH individuals. Secondly, to know the perceptions of DHH individuals when interacting with a police officer. The current study will adopt a narrative inquiry to address these two goals. The data will involve individual interviews of both police officers and DHH individuals. Content analysis will be done, and emerging themes will be discussed to provide guidelines to better the interaction between the Deaf and Hard-of-Hearing, and law enforcement officers.

Presenter: Kristin Hebert [$]
Mentor: Dr. Shannon Jordan [$]
[$] Department of Health and Kinesiology, Lamar University

PL_2_T5 / SURF-S / In-progress

Landing Mechanics and Muscle Activation in Modern Dancers.

Previous literature has largely focused on ballet dancers and risk of lower extremity injury. Modern dancers differ from ballet dancers in their body movements. Few studies exist addressing modern dance. This study will utilize multiple tests for postural instability and pair it with a measurement of muscle activation (EMG) to gain insight into postural instability in modern dancers. Previous studies addressing modern dance have not paired these tests with EMG. Knowledge of muscle activation along with scores associated with lower extremity injury will lead to specific recommendations for strength & conditioning to correct the muscular deficits and reduce injury risk. Data collection for this student is currently ongoing as we have experienced computer issues and loss of data. However, from the data collected, it seems that modern dancers engage lower extremity muscle groups in a different pattern compared to recreationally training healthy controls. For example, a dancer may demonstrate higher muscle activity in the Vastus Lateralis while the control may demonstrate more activity in the Semitendinosus. In this presentation, I will demonstrate one aspect of the data collection aspect and present preliminary data collected to date. In addition, I will share plans for completion of data collection and analysis.

Presenter: Philippine Broussard [$,%]
Mentor: Dr. Matthew Hoch [$]
[$] Department of Biology, Lamar University
[%] Texas Academy

PL_2_T6 / URG_S / In-progress

Limno-terrestrial tardigrades from lichen habitats on Quercus virginiana trees at different exposure to sea salt aerosols in Southeast Texas.

Limno-terrestrial tardigrades react to environmentally stressful conditions by going into a cryptobiotic tun state. Salinity, an osmotic stress driving osmobiosis, also creates physiological stress which may reduce population abundance and differentially selects species composition in tardigrade communities. Tardigrade community abundance and composition in coastal zones may differ with proximity to the coast due to the degree of sea salt aerosol (SSA) exposure. This hypothesis was tested in summer 2023 by comparing tardigrade communities in lichen habitats epiphytic to Quercus virginiana (Live Oak) trees of

Southeast Texas at a coastal stand of trees versus another 30 km inland. Coastal site SSA content collected for a month was 3-fold greater than at the inland site. The lichen samples from six trees per site were sorted for tardigrades under stereomicroscopy and a total of 158 specimens were observed by differential interference contrast microscopy and identified to species based on morphological characters. There was no significant difference between coastal and inland communities regarding abundance and composition, based on Bray Curtis distance analysis. Tardigrade communities appear resilient to salinity variation within the range studied for this limited study. However, of the nine species identified, three were unique to either site. Species identification based on morphological characters are being confirmed by molecular phylogenetic analysis of 28SrRNA gene and cytochrome oxidase I gene sequences. With molecular confirmations of identifications, these data will contribute to understanding the biogeography for tardigrade biodiversity of the Gulf Coast of North America.

Presenter: Chiagoziem Ngwadom [$]
Mentor: Dr. Caroline Ajo-Franklin [$]
[$] Department of BioSciences, Rice University, Houston

PL_2_T7 / GRAD / In-progress

Sugar, Spice, and Everything Nice: Directed Evolution of Glucose-Dependent Enzymes via Growth Complementation of Glucose Non-Utilizing *E. coli.*

Soluble pyrroloquinoline quinone (PQQ)-glucose dehydrogenase (PQQ-GDH) emerges as an exceptionally active sugar-converting biocatalyst, with catalytic turnover independent of oxygen and a broad tolerance for pH and temperature variations. Recent elucidation of its native sequence, structure, and function has paved the way for versatile modifications, particularly in the realms of biosensing and bioenergetics. Our investigation into the structure-function-sequence of PQQ-GDH has yielded a breakthrough: a simple, two-component switch capable of detecting cancer biomarkers such as estrogen and its analogs. Moreover, our recent publication in Nature highlights our innovative approach in creating a point-of-care therapeutics sensor, leveraging protein engineering, electrochemical sensing, and electronic integration. This underscores the profound impact of enzyme engineering across diverse domains and opens new avenues for real-world applications. However, our current screening techniques remain primitive, curtailing the potential of semi-rational or rational design strategies. To surmount this challenge, we've harnessed glucose-negative *Escherichia coli* (*E. coli*) strains, achieved through strategic mutations, for the functional complementation of PQQ-GDH. This innovative approach streamlines directed evolution, facilitating the rapid selection of favorable PQQ-GDH mutants. Our ongoing endeavors target the further engineering of PQQ-GDH to incorporate allosteric regulation, a pursuit hampered by the absence of predictive engineering methodologies and high-throughput selection techniques for desired properties. Previous research within our lab have laid a sturdy foundation. However, the new project could greatly benefit from enhancements in the screening mechanism to accelerate progress and improve outcomes.

April 19, 2024 – 2:00 to 3:15pm

Breakout Session BO_3A – Sponsored Research IV

Location: Ballroom 110A-B

Presenter: Haley Perkins [$]
Mentor: Dr. Zanthia Smith [$]
[$] Department of Deaf Studies and Deaf Education, Lamar University

BO_3A_T1 / SURF-H / In-progress

Leveling Up: A Tri-state Exploration of BEI Interpreter Certification.

While 11 states accept the Board of Evaluators of Interpreters (BEI) certification, only four offer the BEI test. As an indication of cultural and language proficiency, interpreters must obtain and maintain certification. While obtaining higher levels of certification should be a career goal, the timeline for advancement can often extend beyond the maximum recertification period. This project proposes to determine the rationale of interpreters in Missouri, Michigan, and Illinois for extended recertification without advancement. A Qualtrics survey will be utilized to identify potential factors for certification stagnation. The intent of the researcher is to suggest revisions for training programs.

Presenter: Zoe Griffin [$,#]
Co-author: Bonnie Kircher [#]
Mentors: Dr. Richard Behringer [#]
[$] Department of Biosciences, Rice University, Houston
[#] Department of Genetics, University of Texas MD Anderson Cancer Center, Houston

BO_3A_T2 / UG-S / In-progress

Skin Color Development and CRISPR Genome Editing in the Brown Anole Lizard *(Anolis sagrei)*.

Scavenger Receptor Class B Member 1 (scarb1) is a receptor associated with yellow pigment development in birds and fish, and reverse cholesterol transport in mammals. Although scarb1's role is well-studied in many vertebrates, its function in reptiles remain unexplored. In Anolis lizards, a group which relies on visual communication cues, scarb1 expression is correlated with yellow coloration in the dewlap, a flap of neck skin anoles uses to communicate. Here, we investigate the role of scarb1 in skin color development of the brown anole, *Anolis sagrei*. We find that this gene is well conserved in Anolis and across vertebrates and demonstrate success targeting scarb1 with guide RNAs. The goal of this project is to utilize these CRISPR gRNAs to create mutants to study the functional role of scarb1 in color development in reptiles. We hypothesize that the disruption of scarb1 will result in mutants lacking yellow pigment in the skin. These data will further our understanding of whether color patterning genes play a conserved role in development across tetrapod species, strengthening our understanding of color-based signaling and the development of these signals in an understudied phylum.

Presenter: Lois Armendariz [$]
Co-authors: E. Tjahjono [$], A. Chan [$], and A.V. Revtovich
Mentor: Dr. Natasha V. Kirienko [$]
[$] Department of BioSciences, Rice University, Houston

The Role of Lipids in Host Defense and Mitochondrial Surveillance.

The development and spread of antimicrobial resistance have dramatically increased in recent decades. Simply relying on existing (or even new) antimicrobials will not solve this crisis. One innovative solution is to modulate host and bacterial pathways in order to favor the host. This requires extensive understanding of the pathways involved in innate immunity and host defense.

Previous research in Caenorhabditis elegans suggests lipid metabolism could be involved in host response to infection. It was shown that the oleic acid is required for innate immune activation. Additionally, it was demonstrated that the evolutionarily conserved mediator subunit: MDT-15/MED15, which regulates lipid metabolism, is involved in inducing an immune response against Gram-negative pathogens.

We set out to characterize the host lipid metabolism pathways promoting survival against infection with the Gram-negative, opportunistic pathogen: Pseudomonas aeruginosa, using a well-established, liquid-based pathogenesis model called Liquid Killing (LK-Pa). Previous research in our lab established that pyoverdine, a siderophore from P. aeruginosa is produced in liquid and damages C. elegans mitochondria, resulting in a hypoxic crisis and eventual host death. To mitigate mitochondrial damage, C. elegans activates the Ethanol Stress Response Element (ESRE), a mitochondrial surveillance pathway.

We looked at C. elegans' transcriptome during LK-Pa and saw significant enrichment of lipid metabolism genes. Screening under LK-Pa conditions revealed 22 lipid genes are indispensable for host defense. Additionally, five of these genes are required for ESRE activation, indicating a relationship between lipid metabolism and mitochondrial surveillance in host defense.

Presenter: Qi Xu [$,#]
Co-authors: Donghoon Kang [$], Matthew D. Meyer [%], and Christopher L. Pennington [%]
Mentor: Dr. Natasha V. Kirienko [$]
[$] Department of Biosciences, Rice University, Houston
[#] Department of Bioengineering, Rice University, Houston
[%] Shared Equipment Authority, Rice University, Houston

Cytotoxic Rhamnolipid Micelles Drive Acute Virulence in *Pseudomonas aeruginosa*.

Pseudomonas aeruginosa is an opportunistic human pathogen that has developed multi- or even pan-drug resistance towards most frontline and last resort antibiotics, leading to increasing infections and deaths among hospitalized patients, especially those with compromised immune systems. Further complicating treatment, *P. aeruginosa* produces numerous virulence factors that contribute to host tissue damage and immune evasion, promoting bacterial colonization and pathogenesis. In this study, we demonstrate the importance of rhamnolipid production in host-pathogen interactions. Secreted rhamnolipids form micelles that exhibited highly acute toxicity towards murine macrophages, rupturing the plasma membrane and

causing organellar membrane damage within minutes of exposure. While rhamnolipid micelles (RMs) were particularly toxic to macrophages, they also caused membrane damage in human lung epithelial cells, red blood cells, Gram-positive bacteria, and even non-cellular models like giant plasma membrane vesicles. Most importantly, rhamnolipid production strongly correlated to *P. aeruginosa* virulence against murine macrophages in various panels of clinical isolates. Altogether, our findings suggest that rhamnolipid micelles are highly cytotoxic virulence factors that drive acute cellular damage and immune evasion during *P. aeruginosa* infections.

Presenter: Hannah Li [$]   BO_3A_T5 / GRAD / In-progress
Co-authors: Allie Judge [%], Erica Lynn [%], and David Lo [%]
Mentor: Dr. Lauren Colbert [%]
[$] Department of Natural Sciences, Rice University, Houston
[%] Colbert Laboratory, Department of Radiation Oncology, MD Anderson Cancer Center

Characterizing the Effects of Tumor-Resident Lactic Acid Bacteria on Cancer Cell Metabolism and Proliferation.

Tumor microbiota interplay with immune cells to regulate local immunity and modify cancer cell biology and resulting response to cancer therapies. Recently, we uncovered the presence of a cervical cancer-associated Lactobacillus iners (CC-L. iners) strain that was significantly associated with decreased survival and increased treatment resistance in cervical cancer patients.

L. iners is an anaerobic, obligate L-lactate-producing bacterium typically found in the cervicovaginal microbiome. Unlike other lactobacilli, L. iners harbors only the L-lactate dehydrogenase (L-LDH) gene in its genome and exclusively produces the L-enantiomer of lactate used in mammalian cells and tumors. CC-L. iners differ from commensal L. iners through altered lactate signaling pathways encoded in key genes lacG, lacD, lacR, and lacA (abbreviated lacGDRA), as well as upregulated Warburg effect and glycolysis. In CC-L. iners, the reversible L-LDH enzyme converts between lactate and pyruvate, enabling efficient lactate shuttling to cancer cells via monocarboxylate transporters (MCTs). However, the exact mechanism by which tumoral bacteria exchange lactate with tumor cells to promote cancer progression remains unclear.

Survival analysis indicated that lactic acid bacteria with similar lactate-signaling genes (lacGDRA) to CC-L. iners correlate with reduced survival across various cancers. I aim to extend our characterization of CC-L. iners by comparing cancer-associated lacGDRA bacteria with beneficial lactic acid bacteria, and ultimately identify key differences in lactate-mediated bacterial metabolism that influence cancer development. Uncovering the role of lactic acid bacteria in inducing cancer progression and treatment resistance can help develop a new generation of microbiota-informed therapeutics.

April 19, 2024 – 2:00 to 3:15pm

Breakout Session BO_3B – HASBSEB Research III

Location: Neches – room 120

Presenter: Alexis Burnett [#]

Mentor: Mr. O'Brien Stanley [#]

[$] Department of Social Work, Lamar University
[#] Department of Communication and Media, Lamar University

BO_3B_T1 / UG-H / Early-stage

The Female Gaze in Portrait of a Lady on Fire.

Céline Sciamma directed a movie entitled Portrait of a Lady on Fire that is an incredible representation of pure femininity. The main characters, Marianne and Héloïse, fall deeply in love when they are tasked to create a portrait of Héloïse for the man to whom she is betrothed. The film rarely shows any men, which provides the characters, as well as the audience, a brief reprieve from the pressures of male perception. The lesbian lovers find freedom in their isolation, while still feeling the effects of patriarchal society holding the women to standards they never agreed to. Director Sciamma depicts the complexity of women-loving-women relationships by the lovers relating to each other in platonic, maternal, and sexual ways. The artistry of their relationship is also navigated through paintings. This film identifies the ways in which art can be not only a form of expression, but also a form of solidarity. Artwork depicted in the film such as a portrait of an abortion being executed is a physical representation of the unwritten means of human connection.

Presenter: Jack Hiatt [#]

Mentor: Mr. O'Brien Stanley [#]

[#] Department of Communication and Media, Lamar University

BO_3B_T2 / UG-H / Advanced

There Are No Adults in Neverland.

In Stephen Spielburg's 1991 film Hook took audiences on an adventurous romp through Neverland following a grown-up Peter Pan, now Peter Banning. The film serves as a sequel to J. M. Barrie's original work Peter and Wendy and focuses on the titular Captain Hook's plot to provoke a war for his band of pirates with Peter by kidnapping his children.

In my analysis of the film, I compare the film to the Monomyth as described by Campbell and Palumbo as Peter takes up the hero's mantle throughout the film. Afterwards, I dive into one of the fundamental rules of Neverland as established in the film, that there are no adults in Neverland. The actions of the pirates are those of children fulfilling a villainous role and even Peter reverts to a child-like mentality over the course of three days in Neverland. The effect of Neverland on those who find their way there traps them into an eternal struggle of Lost Boys against Pirates until their eventual deaths or unlikely escape.

Presenter: Keilah Baaheth [#]
Mentor: Mr. Stephan Malick [#]
[#] Department of Communication and Media, Lamar University

Book Banning in School and Public Libraries.

This research addresses the present issue of book banning among school and public libraries in the United States. Book banning is a plague that reaches beyond children and libraries. Book vendors, publishers, and other parties are also negatively affected by censorship. This paper explores the purpose and guidelines given to school and public libraries through leading organizations such as American Association of School Libraries and American Library Association. These entities also present foundational library ethics for school and public library practices. One such foundational document adopted by the American Library Association is the Library Bill of Rights. This document stresses the First Amendment Right of every individual to receive service and acquire information, regardless of class or subject. Policies and justification for material selections are observed and taken into consideration. Current U.S. legislation such as Freedom to Read Act, Right to Read Act, Pornography, and Child Pornography are addressed due to the fact that both opposing parties (those for book banning and those against book banning) lean heavily on these laws for argumentative support. These laws acknowledge legal obligations given towards content and minors (ages 17 and younger), and to emphasize the First Amendment Rights of students. Upon reviewing foundational guidelines, policies, and laws, it is found that U.S. libraries (school and public) are held to straightforward measures. Materials purchased for the educational and recreational needs of students are strongly urged to maintain certain benchmarks set forth by leading organizations. This work concludes to firmly advise librarians to adhere to above board standards, and also recommends parents and guardians to use varying solutions in place of book banning.

Presenter: Daniela Contreras [#]
Mentor: Mr. O'Brien Stanley [#]
[#] Department of Communication and Media, Lamar University

Dead Poet Society: An Eastern Western.

The Dead Poet Society (1989) directed by Peter Weir, is a feature film traditionally classified as a Drama. The film follows a group of schoolboys and their new English teacher, Mr. Keating (played by Robin Williams), in Welton Academy, a prestigious private institute. In their Senior year, the boys learn to uncover their individuality and personality through the help of Mr. Keating. When classifying feature films, there are many theories and genres from those theories that can be applied. For example, I mentioned earlier that this film classifies as a Drama. According to Barsam and Monahan, there are six main American genres: Gangster, Film Noir, Science Fiction, Horror, Musical, And Western (2021). Barsam and Monahan's theory des not include Drama, and therefore, would classify the Dead Poet Society as something else. Using Barsam and Monahan's theory, the Dead Poet Society is classified as a Western film. The classification superficially looks like a rough comparison because the film is set in late 20th-century New England. However, through more than superficial Western factors the film uses, like a vast landscape or the presence of a gun, the Dead Poet Society characterizes an American Western seen through a deeper

analysis. In this paper, I will classify the Dead Poet Society according to the Barsam and Monahan model of the genre by using a process of elimination of the six main American genres, an analysis of women roles and Native American roles, and an analysis of Mr. Keating in the protagonist role.

Presenter: Sergio Mendez [#]
Mentor: Mr. O'Brien Stanley [#]
[#] Department of Communication and Media, Lamar University

BO_3B_T5 / UG-H / Advanced

Analysis of the Auteur Theory in Tim Burton Films.

Auteur theory is a concept that has existed in the film industry that demonstrates the director's aesthetic while neglecting the overall art of filmmaking. This theory excludes the work conducted by the film crew due to crediting the director as the sole "author" of a film. Unfortunately, one can argue Tim Burton falls into this category awarding him the recognition. Throughout his career, Burton created a reservoir of films that can be immediately pointed to him taking on the role of the author. Drastic contrasts of color, characters, and overall mise-en-scene in his films under Burton illuminate his expertise in the field providing the audiences with an immediate recognition of his work. Through the analysis of selected films including Edward Scissorhands (1990), The Nightmare Before Christmas (1993), Alice in Wonderland (2010), and the new series Wednesday (2022), a manifestation of common concepts can be distinguished in these films demonstrating both the mystical and morbid characteristics of reality. Why did Burton pursue to create his visions in the fashion constructed? What hidden significance did he wish the audiences would grasp both with the mise-en-scene and implicit details? Utilizing these films, how can the auteur theory connect Burton to his films while also insinuating the meanings he wishes to come across in his films?

April 19, 2024 – 2:00 to 3:15pm

Breakout Session BO_3C – STEM Research

Location: Cypress I – room 125 & 127

Presenter: Rishi Bharadwaj [$]
Mentor: Dr. Cristian Bahrim [$,#]
[$] Phillip Drayer Department of Electrician and Computer Engineering, Lamar University
[#] Department of Physics, Lamar University

BO_3C_T1 / GRAD / Advanced

The Influence of the Polarization of a Coupling Laser on a Probe Laser.

Light interacts with matter in various ways like reflection, refraction, diffraction, and interference. Electromagnetic induced transparency is another emerging area where light can be stopped inside matter. But the retrieval of light is problematic because it loses coherence, and therefore, it has limited

applications. Here we focus on the interference patterns due to the interaction between a weak probe laser (of 650nm) and a stronger coupling laser (of 532nm) on a non-conductive surface. A capacitor configuration is used to adjust the vibration of dipoles under the probe laser field, and thus, to modify the interference pattern. We analyze the interference using a normalized parallel component of the reflectance to the total component of the irradiance reflected by the surface. From our previous studies we know that the normalized parallel component has a parabolic variation with a minimum at Brewster Angle (BA). We set up two polarizations of the coupling laser: one is parallel to the plane of incidence, and another is perpendicular to this plane. We extract the parallel normalized component within 90 around BA. In both cases, a region 20 wide around BA with a vanishing parallel normalized reflectance is identified. Here the coupler totally inhibits the interaction of the probe laser with surface dipoles. Outside this region, we see a regular interference pattern for a parallel polarization configuration of the coupler to the plane of incidence, as compared to the perpendicular configuration. For higher angles, the interference pattern diminishes, thus indicating a negligible influence of the coupler on the probe laser.

Presenter: Ailinh A Tran and Ybinh C. Tran [#]

Mentor: Dr. Sylvestre Twagirayezu [#]

[#] Department of Chemistry and Biochemistry, Lamar University

BO_3C_T2 / UG-S / Advanced

Conformational Studies of Perfluorooctanoic Acid (PFOA) in Presence of its Helicity.

As flexible molecules with long fluoroalkyl chain and multiple internal rotations, Perfluorooctanoic Acid (PFOA) is an excellent candidate for the studies of molecular helicity and resulting dynamics. Additionally, the exact structure of PFOA, as a man-made environmental pollutant, is highly desired for the development of new tools for its detection in environmental samples. We present rotational fingerprints of PFOA monohydrate (PFOA-H2O) recorded using MRR technique and conformational energy landscape of PFOA-H2O obtained using quantum chemistry calculations at Density Functional Theory levels with B3LYP and 6-31G basis set. The analysis of a two-dimensional(2D) potential energy surface obtained by scanning $\tau 6$ and $\tau 5$ dihedral angles show two stable helical structures that are separated by a saddle point at ~180 degrees. The present result is consistent with our previous work [Chem Phys Lett 2021, 778, 138789] which suggest helical coiling of PFOA as the most preferred structure. The nature of helical coiling has been further explored by computing helical angles in different halo octanoic acids (HOAs). The increase of helical angle as C-X(X=F,Cl,Br) bond changes suggest that the nature of helicity is also sensitive to the strength of C-X. The work to evaluate the effect of displacing the haloalkyl chain away from trans configurations back to the stable helical coiling structures will be reported in the future.

Presenter: Rebecca Bundu [#]

Mentor: Dr. Sylvestre Twagirayezu [#]

[#] Department of Chemistry and Biochemistry, Lamar University

BO_3C_T3 / UG-S / In-progress

Development of Sampling Methods based on Molecular Rotational Resonance (MRR) Technology for Petroleum Applications.

Molecular rotational resonance spectroscopy (MRR), also often referred to as rotational spectroscopy, is a high-resolution spectroscopic technique that operates in the microwave and millimeter wave regions of the electromagnetic spectrum. Among its compelling strengths for petroleum applications include the ability to relate molecular geometry and rotational transition through its moments of inertia. Therefore, any change in the molecular geometry caused by either chemical or physical changes can be differentiated from other constituents in a mixture without the need of standard separation techniques. Separation techniques have traditionally used purge and trap sampling for improving the sensitivity. This procedure relies on bubbling inert gas (i.e., He) in the liquid samples to create a headspace containing volatile compounds. The resulting volatiles are then retained in the trap. After a certain period, the trap is rapidly heated to release the compound into the gas analysis system for further processing. In this work, we have examined the utility of purge-and-trap(P&T) as a new sampling method for molecular rotational resonance (MRR) technique. The work is done by coupling a commercial P&T to a K-Band MRR which operates in 18-26GHz ranges. The initial results suggest that the current sensitivity has been improved by a factor of 10. The work to improve the current methods is underway and the progress will be reported in this presentation.

Presenter: Byanca L Mccray [#]
Mentor: Dr. Sylvestre Twagirayezu [#]
[#] Department of Chemistry and Biochemistry, Lamar University

BO_3C_T4 / UG-S / In-progress

Direct Measurements of Ammonia in Zantac by a K-Band Molecular Rotational Resonance (MRR) Spectroscopy.

Zantac is a pharmaceutical drug commonly used for treating gastroesophageal reflux disorder, and stomach ulcers. This drug has been recently removed from the US market due to the presence of impurities of nitrosamine that contribute to an increased risk of liver, gastric and pancreatic cancers. In this work, a k-band molecular rotational resonance spectrometer, which operates in 18-26GHz, has been examined for the fast detection of polar impurities in Zantac by measuring the rotational spectrum of heated samples of Zantac at 100°C. The initial analysis of the observed MRR spectrum confirms the presence of ammonia and water due to the current sensitivity of a K-Band MRR to small polar species. The present measurements have been further used to determine the content of ammonia using Henry constants and the measured partial pressure. The work to improve the sensitivity, reproduce the data, and validate MRR for the measuring impurities in Zantac is underway and the progress will be reported in this talk.

Presenter: Sushma K.C. [# F]
Mentor: Dr. Cagatay Tokgoz [#]
[#] Phillip M. Drayer Department of Electrical and Computer Engineering, Lamar University

BO_3C_T5 / GRAD / Early-stage

Limitations of Asymptotic Methods in Predicting Radiation from a Monopole Antenna on a Conducting Convex Surface.

Asymptotic methods in electromagnetics provide fast and accurate results in simulating the radiation from monopole antennas on an electrically large conducting convex surface, which can model part of the

exterior surface of an aircraft fuselage. However, the asymptotic nature of these methods requires the radii of curvature of the convex surface as well as the radiation distance to be electrically large compared to the wavelength of the antenna operation frequency. This study investigates the limitations of asymptotic methods in predicting the radiation from a monopole antenna on a conducting convex surface. Numerical results pertaining to asymptotic methods are compared with those of accurate full-wave methods obtained using FEKO commercial electromagnetic simulation software to assess the limitations of asymptotic methods in predicting the radiation from a monopole antenna on a conducting convex surface.

Glossary:

HASBSEB – Humanities, Arts, Social and Behavioral Sciences, Education, and Business

STEM – Science, Technology, Engineering, and Mathematics

PL_1_T1 means Plenary Session #1 – Talk #1 (all plenary sessions are in the morning from 10:15 to 12:00pm)

BO_2B_T1 means Breakout Session #2 – concurrent session B – Talk #1 (all breakout sessions are in the afternoon)

GRAD means Graduate student.

UG-H means Undergraduate student in HASBSEB area.

UG-S means Undergraduate student in STEM area.

SURF-H means SURF research in HASBSEB area.

SURF-S means SURF sponsored-research in STEM area.

URG-H means URG sponsored-research in HASBSEB area.

URG-S means URG sponsored-research in STEM area.

W_4 means Workshop #4

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Live Oak Ballroom – room 110A-B

Lamar University

Book of Abstracts

Part II - Poster Presentations

HASBSEB – Posters – Undergraduate Level

Presenter: Maddison Bean [$]
Mentor: Dr. Millicent Musyoka [$]
[$] Department of Deaf Studies and Deaf Education, Lamar University

Poster_1 / URG-H / In-progress

A Three- Dimensional Narrative Exploration of the Life of D/HH Individuals Who Use Assistive Hearing Technologies.

Deaf and hard of hearing individuals(D/HH) are a heterogeneous population whose hearing levels vary from mild to severe hearing loss. Some D/HH individuals use assistive hearing technologies with and without sign language to support their hearing and interactions within a majority-hearing community. In recent years, with the advancement of technology, there are various types of assistive hearing technologies, including hearing aids and cochlear implants. Debates on the use and impact of assistive hearing technologies on D/HH continue to flood the field of Deaf studies/Deaf education and Speech and Hearing Sciences. The current study adopts a qualitative narrative research design to examine perceptions and experiences of D/HH using assistive hearing technologies. The researcher will conduct an individual semi-structured interview to allow the D/HH individuals to share their experiences and opinions about assistive technology in various settings, including home, school, and community. The guiding research question is "What are the perceptions and experiences of D/HH individuals who use assistive technologies? Data collection includes 3-D concept maps, demographic surveys, and narrative interviews. Data analysis will use Connelly and Clandinin's (2006) three-dimensional narrative structure that examines the data by clustering it into three components: time, space, and interactions. Also, the researcher will adopt a Deaf critical theory lens to assist in interpreting the findings and drawing conclusions and suggestions to contribute a deaf perspective in the debate of assistive technologies. The study's findings will provide valuable insights into the use of assistive hearing technologies and have implications for D/HH individuals, parents, audiologists, speech and language pathologists, educators, and policymakers concerned about assistive hearing technologies.

Presenter: Lillian Brunner [$]
Co-authors: Camila Berrios [$], Lillian Brunner [$], Andrew Farris [$], Alijah Luna [$], Tanner Theriot [$]
Mentor: Dr. Millicent Musyoka [$]
[$] Department of Deaf Studies and Deaf Education, Lamar University

Poster_2 / UG-H / In-progress

Usage of ChatGPT within college students.

Since many colleges and schools around the US went under quarantine, online classes and instruction have been on the rise. With the increase of technology-based learning, the growth of Artificial intelligence has matched the expanding usage. While there are many studies already on the usage of ChatGPT in higher

education, there is scarcity on how university students use ChatGPT in different disciplines. The purpose of this study is to better understand college students' usage of Chat GPT across disciplines. This sequential explanatory mixed method examines the use of ChatGPT and college students. The primary research question is "How do university students use ChatGPT across disciplines?" Data collection will start with quantitative data using an online survey questionnaire. A sample of 200 university students will respond to the survey questionnaire on items about their use of ChatGPT and 20 of them will participate in interviews. Our research is expected to be used to determine how students can better incorporate Artificial intelligence into their learning process by examining how students use ChatGPT in different majors. The findings from this research have implications for the students, faculty members, and administration in the university setting. The students will better understand the use of ChatGPT by providing them with information about the use of ChatGPT. In contrast, the faculty members will better understand how to use that information to support their students in each discipline field, while the administration will have a better guideline and policies for using ChatGPT for both the students and faculty members.

Presenter: Deidre Dages [$]
Mentor: Mrs. Lori Wenner, MSN, RN [$]
[$] JoAnne Gay Dishman School of Nursing, Lamar University

Factors Influencing Insulin Availability and Diabetic Management.

According to a 2021 report from the Centers for Disease Control, an estimated 38.4 million Americans have been diagnosed with diabetes (National Diabetes Statistics Report, 2024). This quantitative research study was conducted to determine if a correlation exists between socioeconomic status and the ability to manage diabetes in the United States.

Study samples (N = 17) were obtained through convenience sampling with an online survey distributed via social media platforms and paper flyers using Qualtrics. Data was collected about demographics, insurance, medications, diet, access to resources, affordability of supplies, and perception of healthcare and community support.

Survey responses were insightful and offered opinions on the perception of barriers interfering with diabetic management. The age range for participants was 20 – 79. 76.5% of participants were type 2 diabetics, and 64.7% received their diagnoses five or more years ago. Thirteen out of 17 participants agreed they have received sufficient support from their healthcare providers and community regarding the management of their diagnosis.

Although the sample size is small, the results confirm similar studies that found a positive correlation between education, income, and access to adequate care. Future research should be conducted to identify sources of diabetic management obstacles faced by the majority of the general public.

Centers for Disease Control and Prevention. (2023, November 29). National Diabetes Statistics Report. https://www.cdc.gov/diabetes/data/statistics-report/index.html#

National Diabetes Statistics Report. (2024). Centers for Disease Control and Prevention. https://www.cdc.gov/diabetes/data/statistics-

report/index.html#:~:text=Top%20of%20Page,Prevalence%20of%20Diagnosed%20Diabetes,US%20youth
s%E2%80%94had%20diagnosed%20diabet.

Presenter: Aurian Elms [$]

Poster_4 / UG-H / In-progress

Co-authors: Cassidy Robertson [$], Sarah Hagest [$], Madison Chadwick [$], and Lannah
Barbosa [$]

Mentor: Dr. Millicent Musyoka [$]

[$] Department of Deaf Studies and Deaf Education, Lamar University

Perception of ChatGPT: A Sequential Explanatory Mixed-Method Study.

With artificial intelligence on the rise, the use of ChatGPT among students is becoming more frequent and controversy over the ethics and usefulness of using them is questioned. This research proposal aims to investigate the perception and beliefs of university students across multiple disciplinary studies about ChatGPT. Although there are other studies concerning ChatGPT, this study is unique because it primarily focuses on perceptions that may vary across disciplines depending on the students' perceptions of usefulness and benefits in their learning process. Hence, the purpose of this study is to collect and document how their perception varies depending on their discipline(s) being studied. This mixed-method study will employ a sequential explanatory design, starting with a quantitative survey followed by qualitative interviews. The primary research question guiding the study is "How do university students perceive ChatGPT across disciplines?". The quantitative phase will involve administering a survey about the perception of ChatGPT to a sample of 200 university students from diverse academic disciplines and levels. Subsequently, semi-structured interviews will be conducted with a subset of participants (20) to explore their experiences, perceptions, and lines of thinking related to ChatGPT. We anticipate that our findings from this study will provide valuable insight for faculty and college students' their perception of ChatGPT. The results of this research will have implications, with the students, professors, and policymakers concerned with the influence that ChatGPT would have on college students and their perspective on the tool.

Presenter: Alexa Heng [$]

Poster_5 / SURF-H / In-progress

Co-author: Dr. Jeremy Shelton [#] and Dr. Jennifer Fagen [$]

Mentor: Dr. Jennifer Fagen [$]

[$] Department of Sociology, Lamar University

[$] Department of Psychology, Lamar University

Understanding Victims of Sexual Assault: Deconstructing Emotional Manipulation Tactics Perpetrated Against Asian American Women.

This research investigates sexual assault tactics perpetrated against Asian American women on college campuses. The researcher explored Asian American women's experiences with a focus on emotional manipulation, cultural influences, and institutionalized racism. Through online surveys constructed to delve deeper into respondents' sexual assault experiences, we will focus on the tactics used against Asian American female victims. The main goal of this research is to excavate overlooked racial dynamics involved in sexual assault against Asian American women.

Presenter: Vavah Kamasa-Quashie [$]
Mentor: Dr. Raymond Doe [$]
[$] Department Psychology, Lamar University

The Monkey and Ladder Experiment: Does Conformity Stunt Critical Thinking?

This paper seeks to recreate the analogy of the "monkey and ladder experiment," using human beings. This study highlights the need to critically think in situations where conformity is present. It also prompts people to start questioning social norms, traditions, and cultures that have descended over the years. For this study, we will try to inquire if conformity limits or stunts critical thinking. A total of 128 participants are needed. To make the experiment better suited for human beings, the bananas in this case would be the chairs. The deterrent or the water would be the use of actors. This study will also use deception to avoid the Hawthrone effect. The preliminary results showed that participants in the experimental group conformed more than the participants in the control group. The results also showed that there was a relationship between the group a participant belongs to and whether they conformed or not conformed. This study encourages the audience to be more aware of social and cultural norms that they conformed to and critically analyze the information that surrounds them.

Presenter: Isabella Sandino [$]
Mentor: Dr. Zhe Luo [$]
[$] Department of Construction Management, Lamar University

Application of Virtual Reality in Construction Safety Training.

The presence of technology in modern society has reshaped how information is delivered and processed, challenging traditional learning paradigms that predominantly cater to auditory learners. However, research suggests that a significant portion of the population learn best through hands-on instruction. In industries where high-risk environments are the norm (such as construction), ensuring workers possess the knowledge and skills to identify and mitigate potential hazards is paramount for preventing occupational injuries and fatalities. This report will delve into the potential of Virtual Reality (VR) as a transformative tool for construction safety training. It seeks to assess workers' perceptions of VR compared to traditional training methods and identify barriers to its widespread adoption.

The study employs a multifaceted approach, encompassing a comprehensive literature review, survey gauging workers' attitudes toward a VR-based safety training, a practical demonstration utilizing VR headsets, a post demonstration survey to capture participants' observations and opinion, and rigorous data analysis to draw meaningful conclusions. By examining the efficacy of VR in enhancing safety training, this research aims to contribute to the development of more efficient and cost-effective training programs in the construction industry.

Furthermore, the findings of this study have the potential to catalyze the adoption of VR technology in safety training initiatives, thereby fostering a safer work environment for construction workers. Ultimately, this endeavor seeks to not only reduce occupational injuries and fatalities but also advance the broader utilization of VR technology in educational and training contexts.

STEM – Posters – Undergraduate Level

Presenter: Helena Bautista-Mathias [$]

Poster_8 / UG-S / Early-stage

Co-authors: Sergion Mendez [$], Estrella Balderas [$], and Jordan Nelson [$]
Mentor: Dr. Ashwini Kucknoor [$]
[$] Department of Biology, Lamar University

A Survey of Awareness of Antimicrobial Resistance among the University Community on Lamar campus.

Antimicrobial resistance (AMR) is a hidden problem that affects individuals of all groups. Our study focused on understanding the student body's knowledge of AMR on campus and to increase awareness of this problem. A survey was conducted amongst the student body and faculty at Lamar University with 100 participants in total. The survey used was adapted from the World Health Organization's "Antibiotic Resistance: Multi-Country Public Awareness" . The modified survey consisted of five sections. The first section was over demographic information which included gender, age, where you live, and level of higher education. The results were analyzed in tables and charts, and conclusions were drawn.

Most responses were neutral, when asked whether antibiotic resistance was a leading problem in the world. Many participants had a neutral response on important topics regarding AMR with 49% of participants (n=46) believing medical experts will solve antibiotic resistance. Additionally, 69% (n=65) of those surveyed believe that the flu can be treated with antibiotics. Although most of the data reflects neutrality, the surprising number of students who misuse antibiotics prescribed both off the counter and by a physician has nearly doubled in comparing it to other categories expressed throughout the survey. The results varied due to unfamiliarity of AMR amongst the participants on campus, but the questionnaire aided in the recognition that improvements should be made for campus-wide efforts to increase knowledge of antimicrobial resistance among individuals. This emphasizes the need for action and antimicrobial stewardship from all parties involved to combat this grave problem.

Presenter: Marharyta Baravok [$]

Poster_9 / UG-S / in-progress

Co-authors: Kellen Middleton [$], Alfredo Barajas[$], Dr. James Rejcek [$], and Dr. Weiss [$]
Mentor: Dr. Ali Koymen [$]
[$] Department of Physics, University of Texas at Arlington

Antimatter Containment Chamber: Measurements and Technology.

Diamagnetic levitation is a concept that will find its uses in many areas. Our team explores diamagnetic levitation for the purpose of antimatter containment. Antimatter is a topic of interest in the world of propulsion and energy applications, despite its current practical unsustainability. Our goal is to provide a "bottle" that could hold antimatter. Many potential designs exist for achieving levitation. We use graphite particles in a laboratory setting, to test different configurations of magnetic traps. The concept has proven functional, however scaling it into proper dimensions has shown problematic. The current model in the works is called Haulton Magneto-Gravitational Trap and includes two field-shaping cones sitting on top and on the bottom of a pair of N-52 Neodymium magnets. We hope that providing a stable and secure

antimatter storage chamber will open the door for further scientific and commercial endeavors regarding antimatter.

Presenter: Cayson Beal [$]
Co-author: Trent Bryant [$]
Mentor: Dr. Minkyum Kim [$]
[$] Department of Construction Management, Lamar University

Poster_10 / UG-S / Early-stage

Refinery Carbon Capture Systems and Their Impact on the Industrial Construction Sector.

This research investigated the efficacy of carbon capture technologies in mitigating carbon emissions from key sources within refinery operations, namely flares, furnaces, and fluid catalytic cracking units. Refineries release high amounts of Carbon Dioxide (CO_2) through these major processing units, and many solutions for reducing the carbon emissions have been proposed for the past decades. The objectives of this study were to prove that carbon capture systems are effective in mitigating carbon emission in refineries and define how the implementation of the technology would affect the industrial construction sector. These were achieved through a literature review, utilizing Google Scholar and the Mary and John Gray library Journal Database as the main search engines. Based on the summaries of literature and in-depth analysis of the reported findings, it was indicated that carbon capture technologies offer a viable solution for reducing carbon emissions from the refinery processes investigated. By capturing carbon emissions, these technologies contribute to climate change mitigation efforts and enhance the environmental sustainability of the refinery processes. In addition to the improved sustainability, it was found that the implementation of carbon capture technologies comes with significant construction activities and a consequential increase in demand for related construction services. This increased workload presents lucrative opportunities for the industrial construction sector, stimulating growth and employment within the industry, and highlighting the potential synergy between environmental concerns and the economic development of the industrial construction sector.

Presenter: Destiny Block [$]
Co-author: Emma Brasher [$]
Mentor: Dr. Matthew P. Hoch [$]
[$] Department of Biology, Lamar University

Poster_11 / UG-S / Advanced

Microbial and water quality changes within a constructed wetland for tertiary wastewater treatment.

Constructed wetlands (CW) are valuable to wastewater treatment. Their function is to take water that has already gone through a conventional wastewater treatment plant and remove more fecal indicator bacteria (FIB) and pathogens so that the outcome of the water from the wastewater treatment plant (WWTP) can return to more natural conditions with greater biodiversity. This function was tested for the CW at the WWTP in Beaumont, Texas, Cattail Marsh. Three samples were taken from the input of water from the WWTP and three from the output of water flowing out of the Cattail Marsh. Tests were run to gain data on the community-level physiological profiling (CLPP), most probable numbers (MPN) of

Enterococcus, the total direct count (TDC) of bacteria, and phylogenetic community composition by 16SrDAN sequence analysis. Our studies showed that there was a change in the microbial community from the inflow to outflow of the CW. Our experiments concluded that there was a 10-fold increase in Enterococcus from the input to output and a 9.2x10^6 amount decrease in overall bacteria from the input to output. Phylogenetic diversity of microbial community changes significantly. The data collected showed that due to the abundance of wildlife from the CW, there was an increase in FIB considering that Enterococcus is found in all of the wildlife fecal matter. Furthermore, the CW served its purpose in returning the WWTP's water quality and aquatic microbial community to more natural conditions.

Poster_12 / UG-S / Early-stage

Presenter: Omar Cabrera [$]
Co-author: Adam Roccaforte [$]
Mentor: Dr. Minkyum Kim [$]
[$] Department of Construction Management, Lamar University

The Future of Construction Robots.

In an era defined by the relentless march of technological progress, few industries remain untouched by the power of innovation. Among these, the construction industry stands out as a critical area in need of new cutting-edge technologies to improve efficiency, safety, and sustainability. Recently, the construction industry has been confronted with a significant challenge: a widespread shortage of labor. This shortage has not only strained resources but also compromised safety standards, inflated project costs, and extended project durations. Given the importance of safety and sustainability in the future of construction, the potential for time savings and cost as well would be revolutionizing for the construction industry. This study's main objectives are to introduce the latest advancements in construction equipment and critically review the pros and cons of the technologies. The main methodology used to discover the resources has been from Google Scholar, news articles, research papers, trusted websites, and even YouTube videos from reliable sources. We expect the research will reveal the pros of automated construction equipment out way the cons, and how each piece of equipment will contribute to enhanced efficiency, safety, and sustainability in the construction industry.

Poster_13 / UG-S / Early-stage

Presenter: Taylor Dutschmann [$]
Co-authors: Carlos De La Rosa [$] and Jaime Villanueva [$]
Mentor: Dr. Minkyum Kim [$]
[$] Department of Construction Management, Lamar University

Safety Innovation in Construction: Wearables and IoT for Accident Reduction.

Because of its dynamic nature and inherent risks, the construction industry necessitates innovative techniques to protect worker safety and well-being. Accidents continue to be a major worry despite conventional safety precautions, underscoring the need for innovative solutions. This study looks into how wearable technology and Internet of Things (IoT) sensors may work together to transform construction safety management. This study addresses the critical problem of worker fatigue, which is made worse by the physically taxing nature of construction work. It also highlights the potential of wearable technology

and the IoT to reduce safety hazards. Using a mixed-methods approach that includes case studies, questionnaires, interviews, and literature reviews, the study investigates the best practices, obstacles, and advancements in integrating these technologies. Quantitative data analysis sheds light on how wearable and IoT technologies are now used in construction safety procedures, as well as their efficacy and results. Statistics on accident rates, safety enhancements, and trends in the adoption of new technologies are available from industry reports and scholarly investigations. Qualitative insights derived from case studies and interviews provide complex viewpoints on expectations, perceptions, and experiences with wearable and IoT technology in construction safety. In addition to identifying adoption barriers and best practices, the assessment criteria evaluate the direct impact of these technologies on accident reduction and safety improvement. The ultimate goal of this research is to offer construction management businesses and professionals insightful advice that will help to create a safer and more productive industry by strategically integrating wearable technology and IoT sensors.

Presenter: Chase Fondren [$]
Co-author: Sergio Gomez Montemayor [$]
Mentor: Dr. Minkyum Kim [$]
[$] Department of Construction Management, Lamar University

Developing Site Strategizer: A Real-Time Data and AI Analytics App.

Bridging the divide between the boots-on-the groundwork at the construction site and the strategic planning done in the office has always been a challenge. Traditional methods often fall short, leading to the missed deadlines, budget blowouts, and a juggling of limited resources. While advancements in digital tools have been overwhelming, the industry barely scratched the surface of it. One of the biggest glitches is the disconnection between the field and the office, which requires a continuous data flow for accurate schedule management. Therefore, the primary objective of this study was to build an app, called Site Strategizer, that brings real-time field data into the heart of project management. It was also aimed at making a top-to-bottom overhaul of how projects are tracked and managed, making every decision, from the big strategic moves to the daily grind, as informed as possible. Google Sheets were used for keeping the site data in line, while BIM 360 was used for keeping the associated drawings up to date. Then, OpenAI was used to integrate the essential raw data into more insightful overview of the infield progress and outlook of the project progress against the existing schedule. With the developed Site Strategizer running on a pilot project, it was clearly observed that the project ran smoother and smarter. The synergy between Google Sheets and BIM 360 has been found to be promising. The lessons learned from this development project goes beyond just one tool or app—it's about the power of digital transformation in the construction industry. The Site Strategizer is a strong example and evidence that the potential of such integration of advanced technologies will result in more efficiently and smarter construction management in the near future.

Presenter: Clayton Hearn [$]
Mentor: Dr. David Jack [$]
[$] Department of Mechanical Engineering, Baylor University, Waco, TX

Ultrasonic Inspection of Ply-Drops in Tapered Composite Laminates.

The required thickness of a given laminated composite stack may vary due to design requirements and expected loading scenarios. This variation in thickness is accomplished by removing material within a given lamina, termed a ply-drop. This allows for customizable and unique composite designs. This work focuses on ultrasonic non-destructive inspections for detecting where ply-drops occur. For this study, multiple carbon fiber parts were manufactured to include ply drops of various heights and in various laminate stacks as well as ply drops of complex shapes. The parts are inspected with pulse echo ultrasound immersion techniques. A custom MATLAB program to analyze the full captured acoustic waveform is used to determine where the planar locations of the ply-drop is located within the laminate.

Presenter: Mackenzy Henry [$]
Co-authors: Jesus A Ayala [$] and Dario Moreno [$]
Mentor: Dr. Minkyum Kim [$]
[$] Department of Construction Management, Lamar University

A Study on Energy Efficiency in Residential Construction.

In 1992, the United States EPA and the Department of Energy introduced the Energy Star program to promote energy-efficient products that perform better than their counterparts without the Energy Star certification. In this research, data was analyzed from Energy-Star Certified Homes that include energy-efficient construction materials and methods: high-performing fenestration & insulation, tight air sealing, and energy-efficient windows (Low E3).

Despite increasing availability, consumer understanding of energy-efficient homes remains limited, impacting adoption and leading to higher energy consumption. This study explores strategies to promote energy-efficient homes in the United States, focusing on potential homebuyers' preferences. Through a comprehensive consumer survey, desirable energy-saving features were identified, alongside assessments of awareness and willingness to pay for such homes. Utility bills were analyzed between energy-efficient and non-energy-efficient to reveal the long-term economic benefits of energy-efficient technologies.

Findings from a Gulf Coast area survey indicate varied perspectives on energy-efficient homes, with respondents willing to learn more. A comparison of Energy Star and non-Energy Star homes revealed significant performance differences such as interior walls remaining 2-3 degrees cooler, highlighting Energy Star homes. The savings on utility bills are expected to impact consumers' benefits.

These findings would inform future homebuyers entering the housing market about the value of energy-efficient homes. Ultimately, the study emphasizes the tangible benefits of Energy Star certification, aligning with both environmental concerns and economic considerations for homeowners.

Presenter: Qingyang Liu [$]
Co-author: Dr. Jian Fang [#]
Mentor: Dr. Qin Qian [%]
[$] Department of Mechanical Engineering, Lamar University
[#] Center for Advances in Water and Air Quality, Lamar University
[%] Department of Civil & Enviromental Engineering, Lamar University

Runoff Water Quality in Southeast Texas Coastal Region.

Nonpoint sources (NPS) including oil/ grease from urban area, toxic chemicals from energy production plants, and bacterial from residential areas with on-site sewage facilities (OSSFs) deteriorate water quality in the Southeast Texas coastal waterbodies due to recent flooding events. The study is to identify NPS from runoff samples collected at Lamar University in Beaumont representing high impervious urban area, at Montrose Park in Port Arthur surrounding with oil and energy production plant, and sites identified according to historical OSSF's data are in Orange, TX. The COD, total alkalinity, orthophosphate, TOC, TDS, TSS, VSS, coliform and E. coli, elemental analysis with ICP, and anion detection with IC were conducted for samples from Beaumont and Port Arthor. The results showed dissolved contents are Ca, K, Mg Na, Si, chlorides, sulfates, nitrate and nitrite and their quantities are below EPA standard. The total coliform possible from animal feces was detected with very low concentration at both sites. The total of 49 samples were collected in Orange from May 2023 to January 2024. Temperature, DO, pH, conductivity, ammonia, turbidity, and nitrate were measured at sites with YSI sensors and NH3-N, NO2-N, NO3-N, PO43-, Total-N and E. coli were determined in the lab. It found elevated E. coli concentrations occur with higher rainfall intensity at sites with old OSSFs. In conclusion, NPS from urban area and energy production plants are not a concern, while overflow from OSSFs can be a major NPS to elevate bacteria loadings for Southeast coastal waterbodies.

Poster_18 / UG-S / In-progress

Presenter: Pranav Mandyam [$]
Co-authors: Yifei Yang [$], Yu Ouyang [$], and Yang Gao [$]
Mentor: Dr. Yizhi Jane Tao [$]
[$] Department of Biosciences, Rice University, Houston, TX

Expressing and Purifying Stable *Colletotrichum camelliae* Filamentous Virus 1 (CcFV-1) Replisome for Structural and Biochemical Analysis.

The vast majority of double-stranded RNA (dsRNA) viruses have icosahedral capsids that remain intact during infection to allow efficient viral genome transcription without triggering the host's innate immune response. However, the discovery of a filamentous dsRNA virus, *Colletotrichum camelliae* Filamentous Virus 1 (CcFV-1), challenges this evolutionary trend. Studying the structure and function of the CcFV-1 replisome would address how the transcription and replication of CcFV-1 may differ from typical dsRNA viruses. The CcFV-1 P1, or RNA-dependent RNA Polymerase (RdRP), has been purified individually and found to be active. However, Alphafold2 predicted that other CcFV-1 proteins may interact with P1, indicating they could affect P1 activity. These include putative methyltransferases P2 and P3 and unknown proteins P6 and P7. Pulldown of P1 during purification with a tagged P3 demonstrated that P1 and P3 interact strongly. Thus, we designed purification studies with truncated versions of P3 to determine the interaction interface between P1 and P3. Understanding the interactions between P1 and these CcFV-1 proteins will help elucidate the mechanism of the CcFV-1 replisome.

Poster_19 / UG-S / In-progress

Presenter: Gabriela Meriano [$]
Mentor: Dr. David Jack [$]
[$] Department of Mechanical Engineering, Baylor University, Waco, TX

Manufacturing Fiberglass Filament-Wound Cylinders.

Filament winding is a manufacturing method for making composite tubing and pressure vessels. It consists of winding one continuous strand of filament around a mandrel form and enriching the entire part with resin. Much of the current filament winding technology is used in large scale industrial applications with carbon fiber filament. This study addresses the feasibility of manufacturing filament wound tubing out of fiberglass filament and developing a manufacturing process for achieving quality parts on the small scale. An X-Winder 4 Axis filament winder was purchased and assembled to use for manufacturing fiberglass tubing. Multiple fiberglass tubes have been manufactured using the X-Winder to determine the techniques that improve the quality of the finished part. The knowledge learned from the part manufacturing has resulted in a better understanding of the limitations of filament winding with fiberglass and areas where the X-Winder needs to be modified.

Presenter: Jordan C. Nelson [$]
Co-authors: Sergio Mendez [$], Estrella I. Balderas [$], and Muneeb Akhtar [$]
Mentor: Dr. Zhifo Guo [$]
[$] Department of Chemistry and Biochemistry, Lamar University

Poster_20 / UG-S / In-progress

Structure of Controlled Fluorescence Chemosensor for Detecting Zinc (II) Ion in Aqueous Medium.

A set of carefully designed N-Amidothioureas derivatives were created with methoxy groups positioned at various locations on the terminal benzene ring. All four potential sensor candidates were thoroughly analyzed to make sure they are correct by using proton and carbon-13 nuclear magnetic resonance, infrared, and high-resolution mass spectroscopies. Among the four ligands, ligand 2p demonstrated the highest sensitivity and selectivity towards Zn2+ in a water-based solution, producing a "turn on" fluorescent signal that illuminates the blue channel. Through the study of structural and functional relationships, it was discovered that the para-electron donating methoxy group is more favorable than the ortho- or meta-position for enhancing chelation-induced fluorescence. Titration and the Job's plot confirmed a 1:1 binding ratio between ligand 2p and Zn2+ ion, while a competition test revealed a strong binding affinity between the two. The encouraging results suggest a high potential for biological applications.

Presenter: Gabriella Ozuna [$]
Mentor: Dr. Daniel Cherdack [$]
[$] Department of Physics, University of Houston, Houston

Poster_21 / UG / Early-stage

Data Visualization for Neutrino Interaction Physics.

Neutrinos are fundamental subatomic particles that are extremely difficult to measure and study due to its elusive nature. Multiple collaborations, such as that of MINERvA at Fermi Lab, work hard to contribute data that aids the scientific community in the goal of discovering these mysterious neutrino properties. This research re-envisions data from the MINERvA collaboration in an effort to provide physicists with a new tool to help visualize and interpret neutrino momentum data. The graphs created in this research, via

Mathematica, turn MINERvA's data from a 2-dimensional plot to a 3-dimensional interactive display. They also allow individuals to select out specific plots as they probe and compare accordingly. This research was conducted to aid in the grand objective of better understanding the enigma of neutrinos.

Presenter: Nikhil Patel [$]

Mentor: Dr. Shannon Jordan [$]

[$] Department of Health and Kinesiology, Lamar University

Poster_22 / UG-S / In-progress

Does Vaping Nicotine Produce Biomarkers of Oxidative Stress (8-F2-Isoprostanes) in Expired Respiratory Condensate?

Oxidative stress is an imbalance between reactive oxygen species and antioxidants. 8- isoprostane regioisomers have been used a measurement of oxidative stress in individuals who smoke cigarettes. Purpose: To assess oxidative stress in airways of non-tobacco versus nicotine vapers. Secondary Purpose: To compare lung function between the two groups. Methods: Healthy college-aged participants free from lung disease and not taking anti-inflammatory medications were recruited for this study (non-tobacco user or nicotine vape). All participants performed two tasks: breathing into an RTube for 10 min and a lung function test (spirometry). Expired respiratory condensate (ERC) was collected from the RTubes and stored in a -80 degree C freezer for later analysis using an ELISA kit measuring 8-F2-Isoprostanes once all samples have been collected. Spirometry values collected: forced vital capacity (FVC), forced expiratory volume 1 sec (FEV1), and FEV1/FVC. Results: 32 participants have been tested (20 control, 12 vape). Spirometry values between the two groups were compared using normative data for percent of predicted values. Analysis of spirometry data shows no significant difference between groups for Percent Predicted FVC and FEV1 (p=.479 and P=.185, respectively). However, FEV1/FVC is significant ($p < 0.05$). Conclusion: No definitive conclusions can be made yet as we are still collecting data. Preliminary data suggests participants who vape demonstrate a lower FEV1/FVC, which may indicate airway obstruction similar to cigarette smokers. ERC samples will be compared with spirometry results to determine if there is any association with low spirometry values and oxidative stress in the airways.

Presenter: Casey Poppinga [$]

Co-authors: Jonathan Richard [$], Adam Feltman [$], Juana Perez [$], Peggy Bryan [$], Betty Kamara [$] and Faria Jahan [#]

Mentor: Dr. Matthew P. Hoch [$]

[$] Department of Biology, Lamar University

[#] Department of Department of Civil and Environmental Engineering, Lamar University

Poster_23 / UG-S / Advanced

Post-drought methane biogeochemistry of natural and restored coastal marsh in the Texas Chenier Plain.

Coastal marshes are very effective in net atmospheric CO_2 sequestration, yet can also be a source of the more potent greenhouse gas, methane, when sediment salinity is less than 18 ppt. Texas Chenier Plain marshes experience inundation stress driven by subsidence and sea level rise which causes vegetation dieback. Efforts to restore coastal marsh health in the J.D. Murphree Wildlife Management Area

(JDMWMA), Jefferson County, TX, involves dredge material placement across the marsh surface to increase elevation and hydrologic modifications to reduce marsh salinity. This study investigated methane emissions and surface sediment methane inventory, as wells as other porewater and sediment metrics, at the JDMWMA in October 2023 following the severe drought of summer 2023. Sediment salinity was expected to be elevated and methane production negligible. Although salinity was greater than 18 ppt some subsided sites with vegetation die back had significant methane emissions to the atmosphere and the greatest sediment inventory than healthy and restored marsh sites. In addition to lowest elevation, reduced sediment sulfate and greater organic matter content compared to healthy and restored sites are consistent with our understanding of competition between sulfate reducing and methanogenic prokaryotes. An implication of these results is that sediment elevation with dredge material to restore marsh vegetation production may not only increase carbon sequestration but also mitigate methane emissions from dieback marsh area.

Presenter: Xochitl Ramirez [#]

Mentor: Dr. Robert Kelley Bradley [$]

[$] Department of Industrial and Systems Engineering, Lamar University

[#] Galveston College Honors Program, Galveston

Poster_24 / UG-S / Early-stage

Creep Test Rig.

Creep is the permanent deformation of a material under a constant force. We studied compressive creep in low density polyethylene (LDPE) and LDPE nanocomposites. LDPE is an economically important thermoplastic and the most common one, frequently showing up in products that we use in our everyday lives. Compounding LDPE with nanoparticles may change the creep rate from that of pure LDPE; we tested both pure LDPE and LDPE with ten percent iron (II, III) oxide nanoparticles, 50nm-100nm diameter, in order to make a comparison. To determine the creep rate, we fitted a line to travel versus time data and used the slope. The work was conducted with the creep test rig built by Galveston College and Lamar University students as part of a research collaboration.

Presenter: Rima Shaaban [$]

Co-authors: Vishal Mundodi [$] and Robert Corbett [$]

Mentor: Dr. Ashwini Kucknoor [$]

[$] Department of Biology, Lamar University

Poster_25 / UG-S / In-progress

Evaluation of essential oils for the anti-protozoal activity against Trichomonad pathogens.

Due to the rise in metronidazole-resistant trichomonads, there is a need to search for an effective treatment option for trichomoniasis, a prevalent sexually transmitted disease in humans and a cause of reproductive issues in cattle. In this study, various essential oils were evaluated for their antimicrobial potential against the human pathogen: Trichomonas vaginalis (TV) and the cattle pathogen Trichomonas foetus (TF). Concurrently, the oils were assessed for their impact on HeLa cells to ensure cellular safety of the mammalian host. Following a screening process, five essential oils exhibiting antimicrobial activity

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against TV and TF while being non-toxic to HeLa cells were identified. Subsequently, the selected oils were subjected to testing across three distinct concentrations: 0.05%, 1%, and 1.5%. Among the oils tested, rosemary and rose essential oils emerged as the most efficacious in eradicating the protozoan cells, notably at the lowest concentration. This efficacy can be attributed to the presence of terpenes, prominent constituents known for their antimicrobial properties. These findings underscore the potential of rosemary and rose essential oils as promising candidates for the topical treatment of trichomoniasis. Their selective action against pathogenic protozoa, coupled with the preservation of HeLa cell integrity, highlights their suitability for further exploration as alternative therapeutic agents against trichomoniasis.

Presenter: Tanner Sims [$]
Co-authors: Victor Maravilla [$] and Francisco Ceja [$]
Mentor: Dr. Minkyum Kim [$]
[$] Department of Construction Management, Lamar University

Poster_26 / UG-S / Early-stage

Beyond Blueprints: Adopting AR & VR Into The Construction Industry.

The Construction industry in today's world stands at a pivotal moment considering the constant development of new technologies. The Construction industry will be challenged to embrace two transformative technologies known as Augmented reality and Virtual reality. As these immersive tools lead to revolutionizing visualization, communication, and safety protocols throughout the construction industry, the adoption of both technologies presents compelling opportunities and daunting challenges. This research was aimed to provide details of the integration process of AR/VR in construction, driven by the research question: How can the construction industry harness the full potential of AR/VR considering it imposing obstacles? This research was primarily based on a comprehensive literature review of published papers and in-depth examination of existing construction companies utilizing AR/VR, extracting these insights into implementation strategies, project applications, benefits, and challenges to overcome obstacles. Considering the evolution and technological advancement, the study investigated the unknowns of AR/VR adoption, addressing issues that might hinder the adoption progress from overcoming resistance to change in the construction firms to navigating the complex hardware and software limitations. Through the process, this study ultimately aimed to provide guidance for smoother integration of AR/VR technologies into construction practices, unlocking unprecedented efficiency, collaboration, communication, and innovation. Also, the research findings are anticipated to provide a pathway forward a comprehensive analysis of key beneficiary areas such as cost savings, workforce training, safety management, and system integration. Educated with these insights, construction industry stakeholders can navigate the AR/VR scene with confidence, transforming and propelling the construction industry into a new era of technology, and discover new levels of success.

Presenter: Jacob Thompson [$]
Mentor: Dr. Maryam Vasefi [$]
[$] Department of Biology, Lamar University

Poster_27 / UG-S / Advanced

Increased Risk of Dementia and Cognitive Decline following Natural Disasters: A Meta-analysis and Systemic Review.

No other meta-analysis has investigated the association of natural disasters and the development of all-cause dementia, Alzheimer's disease (AD), or cognitive decline (CD) in individuals affected by disaster. Recently, some studies have noted a negative cognitive impact on individuals in the short-term and long-term aftermath of large-scale natural disasters, however the literature is limited and the causal relationship between disasters and cognitive/neurodegenerative effects remains widely unexplored. This review analyzed the impact of natural disasters on the state of cognitive health and neurodegeneration in disaster victims. Inclusion criteria required that articles must discuss the cognitive effect of natural disasters, neurological evaluations of displaced victims of disaster, psychological changes after natural disasters, and/or change in medical needs after disasters. Current literature regarding natural disasters and disaster victim cognitive functioning was examined following PRISMA guidelines. Data from 30 studies, representing a total of 74,252,976 individuals, 179,697 dementia events, 47,193 AD events, and 158,994 CD events, met inclusion criteria and were included in the analysis. Overall, the pooled odds ratio (OR) and 95% confidence interval (CI) estimates showed that natural disasters significantly increased the risk of CD (OR: 1.25, CI: 1.20-1.30), all-cause dementia (OR: 1.07, CI: 1.05-1.08), and AD (OR: 1.07, CI: 1.05-1.10) in disaster victims as opposed to non-disaster controls, victims prior to disaster, or less impacted disaster victims. The greatest effect was noted following hurricanes, earthquakes with tsunamis, and heat waves. The findings from this meta-analysis indicate that natural disasters are significantly associated with the development of all-cause dementia, AD, and CD.

Presenter: Ryan Wilson [#]

Poster_28 / URG-S / Early-stage

Mentors: Dr. Cengiz Sen [$] and Dr. Sidney Lin [%]

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[%] Dan F. Smith Department of Chemical and Biomolecular Engineering

Effects of Engineering Oxygen Vacancies in Copper Oxides for Water-Splitting Photocatalyst Applications.

The generation of hydrogen gas through the process of water-splitting ($2H_2O \rightarrow 2H_2 + O_2$), as a means of producing a clean and environmentally sustainable energy source, holds great significance in tackling worldwide energy-related issues. Copper oxide, an attractive material for the photoelectrochemical splitting of water, has received substantial recognition owing to its abundance in nature and its favorable bandgap characteristics. Nonetheless, copper oxide faces challenges associated with its limited efficiency and stability, primarily stemming from its restricted charge carrier mobility and propensity for high recombination rates. In recent years, the technique of oxygen vacancy engineering has emerged as a promising approach to improve the performance of copper oxide-based photoelectrodes. The current project seeks to explore the influence of oxygen vacancies in the production of hydrogen gas via the water-splitting process.

<mark>Graduate Posters</mark>

Presenter: Md Saffiquzzaman Chowdhury [$]

Mentor: Dr. Yong Je Kim [$]

[$] Department of Civil and Environmental Engineering, Lamar University

Ground Deformation Monitor and Analysis on Beaumont, Texas's High-Traffic Zone Highway by PSInSAR and SBAS Approaches.

The phenomenon of ground deformation, driven by natural and anthropogenic factors, poses significant challenges to the sustainability of urban and industrial landscapes. The selection of the Gulf Coast of the United States is motivated by its susceptibility to ground deformation due to a combination of geological, hydrological, and anthropogenic factors. Persistent Scatterer Interferometric Synthetic Aperture Radar (PSInSAR) and Satellite Based Augmentation Systems (SBAS) is economically viable for continuous subsidence monitoring in vast regions like US Gulf Coast because of it's automated, non-intrusive techniques that improve efficiency compared to GPS and LiDAR surveys. The precision and dependability of the ground deformation assessment in places like Beaumont in the US Gulf Coast can be improved by PSInSAR and SBAS methodology. Employing these techniques, images acquired from 1/1/2023 to 1/31/2024 were meticulously processed to extract valuable monitoring data on Beaumont, Texas's High-Traffic Zone Highway. We will use PSInSAR and SBAS approach through SNAP (Sentinel Application Platform) software to generate time series graphs for ground deformation over time to monitor our study area and the result will provide valuable insights into ground deformation over time. Concurrently, we will do an extensive analysis of the soil properties in the selected highway zone, including liquid limit, plasticity index and groundwater. Anticipated findings are anticipated to play a crucial role in measuring the pace of sinking, visualize the influence of soil properties in ground deformation and improving our comprehension of the dynamics of ground deformation in the selected study area.

Presenter: Pranab Mujamder [#]

Mentor: Dr. Evgeny Romashets [$]

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Prediction scheme for an Ap index based on Fourier extrapolation.

The magnetopause changes due to variations in solar wind speed and density, as well as due to changes in the interplanetary magnetic field magnitude and orientation. The magnetopause shape and location can vary but the most important is the changing distribution of the surface currents on it. They provide a jump of the magnetic field tangential component from the Earth's mostly dipole magnetic field modified by the screening effect of the magnetopause to the magnetosheath magnetic field. The magnetosheath is the region between the bow shock and the magnetopause. We believe that this study can improve our general knowledge of the solar–terrestrial relations and the process of Romashets and Bothmer (2001) suggested that the function Ap(t) can be approximated by a sum of sin and cos with periods T, T/2, T/3.., T/N where T = 27 days and N=100. In our analysis, we use the data from 27 days preceding the moment at

which the forecast should be issued. The least squares method is utilized in order to determine the coefficients an and bn. The measure of success is the root mean square of the difference between actual and predicted values of the planetary index Ap in the next three days, divided by its averaged value in these days. We tested the approach on data for 2003, 2017, and 2023 and found that the percentage error is within the range of 20-30. The number of harmonics N is the free parameter, which can be adjusted, depending on the level of geomagnetic activity. In quiet times, it can be kept much smaller of the order of 30 short–term forecast of geomagnetic activity. Usually, there is a seven–hour delay between the arrival of a geo-effective disturbance to the magnetopause and the beginning of the growing phase of the sub–storm. The instant geo-effectiveness can be expressed in terms of the root mean square current density on the upstream part of the magnetopause. It is proportional to the square root of the rate of energy transfer from the solar wind into the magnetosphere.

Presenter: Temitope Owoyombo [$]

Poster_31 / GRAD / Advanced

Mentor: Dr. Joseph Kruger [$]

[$] Department of Earth and Space Sciences, Lamar University

Recent Subsidence Rates in Jefferson County from Repeated GPS Benchmark Measurements.

Land subsidence, a globally significant geological hazard impacting urban areas, has garnered attention, especially in the United States. The National Research Council's 1980s study unveiled its pervasive influence, spanning over 44,000 square kilometers across 45 states. This project focuses on Jefferson County, Texas, utilizing Global Navigation Satellite System (GNSS) and Geographic Information System (GIS) technologies to reassess benchmarks, analyzing elevation changes, and identifying regions affected by subsidence. A prior GPS-based study in southeast Texas, conducted by Dr. Joseph M. Kruger, highlighted accelerated subsidence rates.

The project initiates with equipment testing, ensuring data gathering tools meet standards. Subsequent steps involve determining field deployment schedules, reviewing NGS datasheets for enhanced data collection understanding, and utilizing Garmin devices for benchmark location. The RTK GPS system, relying on a minimum of four satellites, measures precision, elevation, and coordinates. Survey-grade GPS (RTK) heads on benchmarks, subjected to intentional satellite disruptions, yield 290 meticulously logged measurements. Trimble Business Center imports data for absolute value and subsidence rate computation.

Benchmark dates and elevations align with the 2011 GPS survey's datum and geoid. Historical assessments reveal varied vertical movement rates, from -15.54 mm to +5.50 mm per year. Recent measurements in Jefferson County range from -13.4 mm to +10.0 mm per year, reflecting ongoing subsidence and uplift patterns.

Recommendations advocate re-monumentation of poor-quality benchmarks to improve the quality and ease of future studies, extension for future subsidence research to other counties in southeast Texas, including those examined in Dr. Kruger's 2011 study and those where subsidence remains an unstudied potential concern. Furthermore, comprehensive research is needed to gain a deeper understanding of the underlying causes of subsidence and uplift in southeast Texas, along with factors contributing to fluctuations in subsidence/uplift rates.

Presenter: Joshua Aaron Schussler [$]
Mentor: Dr. Kaloyan Penev [$]
[$] Department of Physics, NSM, University of Texas at Dallas

Constraining Tidal Dissipation in Kepler Binaries Via Bayesian Techniques.

Tidal dissipation, a process where energy from an object's orbit is transferred to spin or dissipated as heat, can dramatically change the orbit of short period binary systems. As such, it is crucial to understanding their evolution; despite this, the mechanisms underlying tidal dissipation are poorly understood. What we need is more information against which to test our current models. It is, of course, prohibitively difficult to build a binary star system in the lab. By taking advantage of Bayesian analysis and MCMC techniques in conjunction with computational simulations of orbital evolution, we are able to find constraints on tidal dissipation on a system-by-system basis. We plan to perform our analysis for relevant systems identified in the Windemuth *et. al.* 2019 paper; however, we are currently at the very beginning of this process. We present our findings to date.

Glossary:

HASBSEB – Humanities, Arts, Social and Behavioral Sciences, Education, and Business

STEM – Science, Technology, Engineering, and Mathematics

GRAD means Graduate student.

UG-H means Undergraduate student in HASBSEB area.

UG-S means Undergraduate student in STEM area.

SURF-H means SURF research in HASBSEB area.

SURF-S means SURF sponsored-research in STEM area.

URG-H means URG sponsored-research in HASBSEB area.

URG-S means URG sponsored-research in STEM area.