

# HONORS RESEARCH SYMPOSIUM

## POSTER PRESENTATION

### ABSTRACTS



#### COLLEGE HALL

Honors College  
Office of the Dean  
Honors Advising  
Carolyn A. Barros Reading Room  
Honors Academy

Department of Military Science  
Recruiting  
Administration  
Hall of Honor - Sponsored by the Corps of Cadets Alumni Chapter

**NOVEMBER 14, 2025**

UNIVERSITY OF TEXAS AT ARLINGTON



---

**MISTURAT ADEGBITE, BIOMEDICAL ENGINEERING**

*Engineered Electrically Conductive Hydrogels for Bone Graft Applications*

Faculty Mentor: Dr. Kamal Awad

Large bone defects pose major clinical challenges due to the bone's limited self-repair capacity beyond critical sizes. Although autologous bone grafts remain the gold standard for treatment, their use is constrained by donor shortages, surgical risks, and associated morbidity. This study investigates gelatin methacrylate (GelMA) hydrogels as biocompatible scaffolds for bone regeneration, enhanced through the incorporation of conductive titanium carbide (TiC) and titanium boride (TiB<sub>2</sub>) nanoparticles. GelMA provides a collagen-derived extracellular matrix-like environment that supports cell adhesion and remodeling, yet its softness and low conductivity limit performance. By integrating TiC and TiB<sub>2</sub>, the hydrogel's mechanical integrity and electrical conductivity are improved, mimicking bone's electroactive nature. The synthesized GelMA–TiC/TiB<sub>2</sub> nanocomposites were characterized and evaluated for their physicochemical and biological properties. Results demonstrate enhanced osteogenic activity and bone tissue formation, highlighting the potential of these multifunctional hydrogels to advance bone regeneration strategies through integrated structural, biological, and electrical cues.

---

**MALAK AL-NOUBANI, BIOMEDICAL ENGINEERING**

*Characterization of Cancer Cell Migration through Brain Vascular Endothelium Model*

Faculty Mentor: Dr. Michael Cho

One of the hallmarks of cancer is increased vessel growth to feed the tumor's rapid expansion. The newly formed blood vessels are immature and often leaky due to structural and functional abnormalities. This leads to ineffective anti-cancer drug delivery and provides tumor cells with additional opportunities to metastasize. We propose to develop an in vitro vascular endothelium model and introduce aggressive breast cancer cells (4T1) to mimic the tumor environment. We will then assess the impact of 4T1 cells on vessel permeability and their ability to migrate across a compromised endothelial cell monolayer. Using immunofluorescence imaging, the compromised monolayer will be quantitatively determined by detecting the 4T1 cells that successfully migrated. From this study, we expect to find disrupted endothelial cell tight junctions and an influx of 4T1 migration across the endothelium.

---

**DAYANARA ARCE, BIOLOGY**

*Taxonomy of *Gonatodes machelae* Populations in Mainland Venezuela and Margarita Island*

Faculty Mentor: Dr. Walter Schargel, PhD

Small Neotropical geckos of the genus *Gonatodes* show variation in coloration and scalation that can obscure species boundaries. One unresolved case involves *Gonatodes machelae*, found on both Margarita Island and mainland Venezuela. Determining whether these populations represent a single species or distinct evolutionary lineages is important for taxonomy and conservation. This study integrates external morphology and cranial osteology to assess population differentiation. Thirteen body and head measurements were analyzed using Principal Component Analysis (PCA) and Multivariate Analysis of Variance (MANOVA). PCA showed clear clustering between island and mainland individuals, and MANOVA confirmed statistically significant differences in overall body shape. Micro-CT skull scans provided 3D models for comparing cranial features, with preliminary observations indicating consistent variation in snout and quadrate regions. These results suggest meaningful morphological divergence that may reflect independent evolutionary histories. Ongoing osteological and mitochondrial analyses will contribute to targeted conservation strategies for populations vulnerable to habitat loss.

---

**MITHILA ASHRAFEE, BIOMEDICAL ENGINEERING**

*PDMS Device Fabrication in Physical Confinement During Cancer Cell Migration and Therapeutic Resistance*

Faculty Mentor: Dr. Young-Tae Kim

Cancer drug screening using microfluidic devices ensures controlled, reproducible environments for studying cell behavior under different conditions. However, optimizing device fabrication parameters (channel dimension, etc.) is essential for ensuring reliable cell culture and drug testing. This project investigates the fabrication and preparation of PDMS-based microfluidic devices designed for cancer cell testing. PDMS and curing agent mixtures were prepared under varied temperature and time conditions to achieve the desired device geometry, and 3D printing of custom rulers for precise cutting. The PDMS layers were cleaned, ozone-treated, bonded, and integrated into 96 well-plates to maintain hydration and functionality for cell seeding. The completed fabrication phase showed stable channel formation and leak-free performance under vacuum. These experiments find that using similar devices showed consistent fluid flow and maintained hydration until cell seeding. Based on the results, the current system is expected to support effective cancer cell growth and reliable drug delivery for subsequent testing phases.

---

**KORTLYNN BODDIE, ARCHITECTURE**

*Housing Provision in the United States: How Sustainability Methods Can Address Homelessness*

Faculty Mentor: Dr. Mahmoud Bayat

There are over 771,000 people experiencing homelessness (PEH) in the United States, with job loss and natural disasters threatening to increase this number. This project reviews two possible means of providing affordable housing for PEH: using existing buildings, and Additive Manufacturing or 3D printed housing. Twenty cities in fourteen American states were reviewed for current housing unit vacancy, future planned building-to-housing conversions, and requirements to provide Additive Manufactured housing. The number of PEH found in each city was compared to the number of vacant housing units and planned building conversions. Additive manufacturing was studied through its cost and time efficiency, land availability for housing, and its ability to house those displaced following natural disasters. When combined, more housing units, future building conversions, and land exists than PEH in each city. This implies that through consistent funding efforts towards housing PEH, affordable housing options can significantly decrease overall homelessness in America.

---

**ZAYAAN SHARIF CHOWDHURY, ELECTRICAL ENGINEERING**

*Digital Signal Processing System for Guitar Effect Analysis and Reversal*

Faculty Mentor: Dr. David Wetz

This project develops a Digital Signal Processing (DSP) system that analyzes and reverses audio effects produced by a custom-built multi-effect guitar stomp box. Using real-time input from the stomp box, the DSP system digitizes the audio signal through an analog-to-digital converter and processes it in Python using NumPy and SciPy libraries. It visualizes parameters such as frequency spectrum, modulation rate, depth, and total harmonic distortion (THD) to evaluate the quality of analog effects like tremolo, delay, vibrato, and reverb. Beyond visualization, the system explores reversing these effects through digital filtering and signal reconstruction, effectively restoring the original unprocessed sound. By bridging analog hardware and digital analysis, this project demonstrates how computational methods can deepen our understanding of sound manipulation and contribute to advancements in music technology, signal restoration, and interactive audio education.

---

**M. DANIELLE DANSO, ARCHITECTURE**

*Retrofitting through the Facade*

Faculty Mentor: Dr. Atefe Makhmalbaf

Dynamic facades can serve as architectural tools to reduce heat gain in buildings. This kinetic design tool reforms energy efficiency and can improve user comfort. Additionally, this architectural approach can control internal heating and cooling loads by managing the intake of sunlight. This study investigates a dynamic facade as an architectural tool to substantially reduce the heat gain of the Engineering Research Building on the campus of The University of Texas at Arlington. In Grasshopper, the modeled facade responds to a stimulus, which in this case is the Sun. Heat gain, thermal comfort, and energy efficiency are analyzed in the extension Ladybug. The results yield that dynamic facades are effective in reducing heat gain in buildings and increasing thermal comfort. This study concludes that dynamic facades are successful and can become economical with the use of simple mechanisms.

---

**BRIANNA DE JESUS, PHYSICS**

*Probing Neutron Star Thermonuclear Burning via Elemental Yields from Type I X-ray Burst Winds*

Faculty Mentor: Dr. Nevin Weinberg

This study investigates the complex thermonuclear burning that powers Type I X-ray bursts on accreting neutron stars to gain insight into fundamental physics. The research analyzes the composition of especially powerful X-ray burst winds to use them as diagnostics for the surface burning processes. The MESA (Modules for Experiments in Stellar Astrophysics) stellar evolution code is used to model thermonuclear burning, atmospheric hydrodynamics, and elemental yields. This helps refine theoretical models by linking observable wind signatures to underlying nuclear burning. The current focus of the project explores the parameter space and identifies how different modeling assumptions impact observables and establishes a baseline for comparison to future measurements. This research will improve our understanding of thermonuclear burning on neutron stars and constrain their properties, which can feed into profound questions about the nuclear equation of state and the nature of the strong nuclear force, the fundamental interaction that holds atomic nuclei together under extreme pressure and density.

---

**MARZUQUE MASHRUR FARIZ, COMPUTER SCIENCE**

*Secure Code Generation with LLMs: A Comparative Security Analysis*

Faculty Mentor: Dr. Faysal Hossain Shezan

Large Language Models (LLMs) such as GPT-4 have revolutionized programming assistance but often generate insecure code, posing challenges for users without strong security backgrounds. Prior studies show that prompt phrasing can influence code safety, yet most assume expert-level knowledge of vulnerabilities or CWE guidelines. This project investigates whether specific keywords and prompt formulations can improve the security of Python code generated across domains such as file handling, DevOps, and web development. By testing naive and security-focused prompts and evaluating outputs using Bandit and CodeQL, this study identifies linguistic features that consistently reduce vulnerabilities. The goal is to create a domain-specific database of effective prompt patterns that non-expert users can reference when generating code. By combining empirical evaluation with practical tool design, this project aims to make secure code generation more accessible and bridge the gap between academic research and real-world LLM use.

---

**DEREK GOODRICH, POLITICAL SCIENCE**

*Church Attendance, Gender Roles, and Human Sexuality*

Faculty Mentor: Dr. Mark C. Hand

This research examines how the frequency of religious attendance impacts views on gender roles and sexuality in Christian subgroups in the United States. Prior research of American Christians has revealed a diverse group of opinions that cannot be explained solely by denominational affiliation. Using social identity theory, this study explores whether the frequency of attendance at religious services influences congregants' beliefs on gender roles and human sexuality issues. Based on data from the Pew Religious Landscape survey ( $n = 36,000$ ), the study employs binary logistic regression models to demonstrate a correlation between church attendance and traditionally conservative views on gender roles and human sexuality within different Christian subgroups. However, this relationship is insignificant for many mainline and other Christian respondents. Clarity on how these patterns function is crucial for understanding how religiosity influences social attitudes in America's diverse Christian landscape.

---

**ARÓN HERRERA, BIOLOGY**

*Drosophila Melanogaster Domesticated Transposable Protein DPLG3 Function in Oogenesis and Fitness*

Faculty Mentor: Dr. Esther Betrán

Transposable elements (TEs) are selfish DNA sequences capable of replicating and reinserting themselves in genomes, often harming hosts. However, if advantageously inserted, they can become functional genes through molecular domestication. One example essential in *Drosophila melanogaster* gonad development is *DPLG3*. Several testis-specific genes are upregulated in *KO* ovaries, leading to malformations, though their expression patterns are not understood. Using qRT-PCR, we plan to quantify the expression of three testis-specific genes from cDNA synthesized using non-rudimentary ovarian RNA in early and late oogenesis. Significant upregulation of these genes will suggest *DPLG3* as a testis-gene regulator in ovarian development. Given its suspected developmental importance, we are also comparing wild-type and *DPLG3-KO* fitness in a simulated natural selection experiment. We follow a dump-and-cross model to create new generations biweekly and collect data every five generations. We anticipate an increase in the wild-type allele frequency, reinforcing the importance of *DPLG3*.

---

**MICHELLE IZUWAH, NURSING**

*Round 1: Social Support vs Stress, and the Winner Is...*

Faculty Mentor: Dr. Leslie Jennings

The nursing shortage is a problem in America due to the large gap between the supply and demand for nurses in hospitals. Pre-nursing students face a unique set of struggles due to the pressure of prerequisite classes, as well as fears of not being accepted into a nursing program. Therefore, it is important to find ways to help these students with their stress so they can continue their nursing career path. This research project aimed to determine the influence of social support on the stress levels of pre-nursing students. Inductive thematic analysis was used to analyze qualitative short-answer data. Participants were asked to complete a survey in which a question about how social support influences their stress levels was asked. The responses indicated that social support positively influenced the stress levels of pre-nursing students, demonstrating a need for more focus on providing pre-nursing students with adequate support that will allow them to manage their stress.

---

**JAHNVI JHA, ECONOMICS**

*Human Capital Migration and International Trade in Germany and Austria (2000-2024)*

Faculty Mentor: Dr. Antonia Gkergki

This study examines the migration of people and international trade in Germany and Austria between 2000 and 2024. Both countries saw sharp rises in immigrant populations, with foreign-born residents reaching 18 percent in Germany and 22 percent in Austria, while their exports grew to record levels. The research explores whether human capital migration, workers bringing skills, education, and networks, has complemented or substituted trade. Evidence shows migration often reduces barriers to commerce by creating trust, demand for home-country goods, and professional connections. Case studies of the Polish and Turkish diasporas in Germany and Balkan communities in Austria highlight how migrants have strengthened trade ties. Skilled workers in high-tech industries further boosted export capacity. Contrary to fears that migrants might weaken competitiveness, the data suggest migration supported both growth and exports. The findings underscore that open societies and open economies reinforce each other, with migration serving as a driver of global integration.

---

**KATHERINE JOHNSON, LINGUISTICS**

*English Reading Proficiency Among Balinese Students*

Faculty Mentor: Dr. Jeffrey Witzel

English as a Foreign Language (EFL) education has had a complex history globally. This is especially true for Bali, Indonesia, where tourism is the main driver of the local economy. Learning English is highly valued, yet many students are left struggling. In this action research study, the primary goal was to analyze students' reading proficiencies to recommend a reading program that could be appropriately tailored to individual students. This was done through administering a reading test, tracking both comprehension and reading speed, and a survey to gauge the students' self-perceptions of their English language abilities. There were correlations drawn between an individual's self-perceived ability and average reading speed, while there was no clear correlation between self-perception and comprehension ability. Results suggest that collecting data on self-perceived ability may be enough to make appropriate reading recommendations to students, provided teachers are able to confirm student comprehension ability is of a comparable level.

---

**SERENA KARIM, NURSING**

*Bridging Disability Studies and Nursing Education: A Curricular Intervention*

Faculty Mentors: Dr. Sarah Rose, Michael Holmes

Although one in four Americans experiences disability in their lifetime, the majority of nurses and other healthcare professionals feel ill-prepared to care for patients with disabilities (PWD). Factors such as inaccessible healthcare facilities, insufficient clinical knowledge, and biases about the quality of life of PWD contribute to mounting health inequities between PWD and non-disabled people. To further understand how education can impact nursing students' comfortability and confidence toward caring for PWD, a 30-minute disability studies lesson was implemented for junior-level nursing students. Fifty-one students who attended the lecture provided anonymous pre- and post-lecture surveys, which contained eight Likert scale questions and 10 free response questions gauging comfortability and competence toward caring for PWD. Quantitative results analyzed in Microsoft Excel revealed statistically significant increases in comfortability for seven out of eight questions. Qualitative results are expected to show high prevalence of the terms "empathy," "assumptions," and "treated differently."

---

**NABA KHAN, PSYCHOLOGY**

*Coping Strategies as Predictors of Acculturative Stress Among International College Students*

Faculty Mentor: Dr. Amandeep Dhaliwal

This study examined how international and multicultural college students experience acculturative stress and the coping strategies used to manage cultural and academic challenges. Both general coping behaviors and those specific to academic stress were assessed to address a gap in existing research on how coping strategies influence stress levels among international students. A quantitative correlational design was employed using data from 36 participants recruited through convenience sampling at the University of Texas at Arlington. Participants completed four standardized Likert-type scales measuring acculturative stress, general coping, and academic coping strategies. A hierarchical multiple regression was conducted to examine whether coping strategies predicted acculturative stress. In the first model, situational and avoidance coping significantly predicted stress,  $F(2,33) = 7.242$ ,  $p = .002$ , explaining 30.5% of variance. When cognitive coping was added, the model did not improve, and only situational coping remained significant ( $\beta = -.340$ ,  $p = .042$ ). Findings suggest that situational coping uniquely and negatively predicts acculturative stress among international and multicultural students.

---

**DUA KHOWAJA, ECONOMICS AND ACCOUNTING**

*Do Financial Concerns Make Workers Less Productive?*

Faculty Mentor: Dr. Ashish Sedai

Financial stress does not just affect people's finances; it can change the way individuals behave. This project asks whether short-term financial difficulty damages worker performance or if alleviating it improves focus and accuracy. Using data from a field experiment in rural India, this research examines how labor payment timing variability is related to workers' productivity and error rates. The study randomized payment dates across a sample of employees, so that employees paid early can be compared to employees paid on standard or later dates. It is investigated as to whether the subsidy of payments relieves stress and enhances task performance by minimizing stress, enhancing mood, concentration, or decreases anxiety. Generally, this study finds a relationship between economic stability and human performance and how even minimal economic interventions can bring about more productive and equitable workplaces. The evidence can guide employers in designing more equitable pay frequencies and can guide policymakers who are interested in enhancing worker well-being.

---

**CAROLINE KING, NURSING**

*Exploring the Association Between Nurse Characteristics and Intent to Leave Their Current Position in Counties with Rural Hospital Closures*

Faculty Mentor: Dr. Jessica Smith

Increased rural hospital closures and nursing burnout may lead to greater morbidity/mortality for rural residents. Current literature fails to capture whether rural hospital closures influence nurses' intent to leave their current position. In this cross-sectional study, descriptive and correlational statistical analyses were conducted on survey responses from a sample of nurses who lived in a rural county that experienced a hospital closure. Sixty-six percent of nurses stated that, at one point, they had considered leaving their primary nursing position. Logistic regression model results revealed that nurse-reported age and gender were significant predictors of a nurse's intention to leave their current position. Factors such as opportunities for better pay/benefits, lack of good management/leadership, inadequate staffing, and an overall stressful work environment were the biggest contributors to intention to leave. Internal hospital and statewide policy changes are needed to implement protective factors that will decrease nursing burnout and subsequently increase nursing retention.

---

**MARGARET KOUASSI, PUBLIC RELATIONS**

*The Impact of Strategic Guidelines in Healthcare Communication*

Faculty Mentor: Amanda Jordan

This study examines how implementing a written, research-informed social media guideline can improve hospitals' communication strategies and engagement across digital platforms. Building on Phase One findings that identified a lack of audience segmentation, message consistency, and measurable goals as key barriers to engagement, Phase Two tested whether a structured framework could address these issues in practice. Using an applied quantitative design, two surveys were distributed to hospitals in Texas, Arkansas, and Oklahoma before and after a two-month guideline implementation period. Results indicate improvements on most platforms, particularly Facebook and Instagram, as well as overall content planning consistency and strategic alignment. Seventy-five percent of participants rated the guideline as effective in improving engagement, introducing the use of primary and secondary platforms, and providing industry reminders of best practices. These outcomes showcase the practical value and importance of structured, research-based planning in strengthening healthcare communication and contribute to broader discussions on applying theory-driven frameworks to digital engagement.

---

**ABHIDHA KUNWAR, BIOMEDICAL ENGINEERING**

*Signal Analysis of Calcium Dynamics in Pancreatic Cells*

Faculty Mentor: Dr. Michael Cho

Calcium ( $\text{Ca}^{2+}$ ) signaling plays a critical role in insulin secretion from pancreatic  $\beta$ -cells. Photobiomodulation (PBM) of red or near-infrared wavelength is applied to enhance cellular metabolism and  $\text{Ca}^{2+}$  activity in pancreatic cells. This study aims to rigorously analyze how PBM influences calcium dynamics in pancreatic cells by applying the Fast Fourier Transform (FFT), converting  $\text{Ca}^{2+}$  spiking patterns to the frequency domain to determine dominant oscillatory behaviors. Using a calcium-binding fluorophore,  $\text{Ca}^{2+}$  activity was acquired before and after PBM at 810 nm, processed with a machine learning algorithm, and further analyzed in MATLAB using FFT to assess changes in calcium signal frequency and amplitude. Preliminary results suggest PBM increases calcium activity and spiking patterns, indicating potential modulation of insulin secretion. This study compares calcium dynamics before and after PBM to characterize its effect on  $\beta$ -cell signaling and function, providing insights into potential non-invasive strategies for diabetes management.

---

**CYDNEE LACY, SOCIAL WORK**

*Study of Parental Substance Use Effects on Children*

Faculty Mentor: Dr. Hui Huang

Research has shown a strong connection between parental substance use disorders (SUDs) and the likelihood of children engaging in similar behaviors. The existing literature uses data collected before the COVID-19 pandemic, whereas the research for this study utilizes data collected during the pandemic. Having data collected during the COVID-19 pandemic allows us to examine whether substance use problems became more prevalent among parents involved in the child welfare system. It is also essential to determine whether the relationship between parental substance use and children's substance use increased, as children spent more time at home during the pandemic. Analysis of frequencies and percentages was used to examine the prevalence of substance use problems among parents and children, respectively. Additionally, bivariate correlations were used to examine the relationship between parental alcohol and drug dependence and their children's substance abuse and dependence scores. The results showed that both parental alcohol and drug dependence are positively associated with their children's substance abuse and dependence scores.

---

**LAUREN LIEU, BIOMEDICAL ENGINEERING**

*Binaree Application to Cancerous Organoids Sampled via Light Sheet Microscopy (LSM)*

Faculty Mentor: Dr. Juhyun Lee

While the rate of surviving a myocardial infarction has increased in the past 60 years from 60% to 90%, the rate of Americans developing chronic heart disease, such as heart failure, arrhythmias, and hypertensive heart disease has risen. This has led to the development of imaging technology such as Light Sheet Microscopy (LSM) and Light Field Microscopy (LFM) to study heart contractility and congenital heart disease via models such as cancerous organoids or Zebrafish. However, LSM and LFM results are highly dependent on the quality of the staining and cleared samples. This study looks to add to the growing field of optical tissue clearing (OTC) using the Binaree rapid clearing system based on non-organic electrophoresis clearing. The Binaree rapid clearing system demonstrated optimal results in microscale organoids in the passive method, which had required re-staining after clearing.

---

**JAVIER MARTINEZ, MANAGEMENT**

*Diverse Bodies, Inclusive Shopping? How Representation of Body Diversity Shapes Consumer Experiences*

Faculty Mentor: Dr. Daniel Martinez

This systematic literature review aims to summarize prior research on the impact of body diversity representation on consumer behaviors in the fashion retailing industry. Utilizing 33 peer-reviewed research articles we explore how body diversity representation in advertisements and product assortment affects consumer self-evaluation, shopping behaviors, and the nuances within the luxury fashion sector. Consistent with self-congruence theory, findings show that diverse and natural model representation improves body image and purchase intentions. In contrast, idealized portrayals and limited size options reinforce exclusivity, deepen social divides, and harm the self-esteem of excluded consumers, a model that is utilized in luxury fashion. This exclusion is compounded by supply chain segregation that limits access to products for plus-size consumers. Moreover, positive body image and the perceived exclusivity of luxury goods can heighten fashion involvement and impulsive purchasing, particularly under the fear of missing out.

---

**CAITLIN MCCAIN, KINESIOLOGY**

*From Urban Models to Rural Realities: Adapting Hepatitis C (HCV) Care for Underserved Spanish-Speaking Rural Communities*

Faculty Mentor: Dr. Erin Carlson

This literature review examines how Hepatitis C (HCV) screening and care programs can better serve underserved populations, particularly Spanish-speaking rural communities in border states. The research supports the Hep C-Colonias Advancing & Restoring Esperanza (C.A.R.E.) program's mission by incorporating recent findings from 32 studies gathered through PubMed, Medline, and Google Scholar. Hep C C.A.R.E., expanded from the HepVISTA expansion project, provides HCV screening, education, vaccination, and linkage to care for uninsured patients at partner sites in Laredo and Maverick County. Results indicate that while HCV elimination is feasible, significant gaps persist among rural uninsured and minority populations. Effective strategies include community, jail and pharmacy-based treatment models, telehealth, and jail-based screening. Patient navigation improves linkage to care and treatment completion, yet barriers such as stigma limited access and inequities disrupt progress. These findings highlight the importance of culturally tailored approaches to guarantee HCV elimination and advance health equity in vulnerable populations.

---

**ALEXANDRIA MCKAHAN, PSYCHOLOGY**

*Exploring the Impact of Inpatient Mental Health Care on Adolescents*

Faculty Mentor: Dr. Bonnie Laster

Adolescent mental health hospitalizations are rising, yet little is known about what makes inpatient care effective from both patient and staff perspectives. This study explores how structure, staff communication, and therapeutic approaches influence adolescent engagement and recovery at Mesa Springs Behavioral Health Hospital. A mixed-methods design was used, combining field observations from the adolescent girls' and boys' units with interviews from therapists, nurses, PCAs, and a psychiatrist. Observations showed that structured and consistent routines helped adolescents feel safe and supported during treatment. Staff tone and collaboration were essential for maintaining calm environments and building trust. Gender differences were also evident: boys responded best to structured, activity-based groups, while girls were more open in creative and reflective sessions. These findings highlight how structure, teamwork, and communication can improve engagement and promote recovery in inpatient mental health settings.

---

**MADLINE MCNULTY, NURSING**

*Exploring the Barriers to the Implementation of Acute Care Nurse Practitioner Roles*

Faculty Mentor: Dr. Kristin Hittle Gigli

Acute care nurse practitioners (ACNPs) are associated with positive patient outcomes and constitute one of the fastest-growing professions in healthcare. However, this growth is accompanied by barriers to ACNP roles. Little research describes these barriers or strategies to minimize barriers in an acute care setting. This study aims to identify and describe how to overcome barriers to ACNP practice. A qualitative descriptive design was used. Twenty-one pioneering ACNPs participated in semi-structured interviews. Data were analyzed using the “Sort and Sift, Think and Shift” method. Themes included the role of physician influence, role confusion, support from professional organizations, emphasizing the value of NPs, and establishment of credentialing/licensure. As the ACNP role expands, these findings can inform future practices and policies that facilitate ACNP integration. Further research should focus on current persistent barriers and what novel strategies are necessary for further growth.

---

**ZAINEEL MITHANI, COMPUTER SCIENCE**

*Rotary Operations Management and Automation Platform (ROMAP)*

Faculty Mentor: Dr. Christopher Conly

As technical lead of the Rotary Operations Management & Automation Platform (ROMAP), my Honors contribution focused on developing a Bluetooth Low Energy proximity-based attendance system enabling automatic, hands-free member check-ins. I researched and selected beacon hardware, designed RSSI-based distance calculation algorithms, and implemented platform-specific background processing for iOS and Android, achieving 97% detection accuracy. Beyond this Honors component, I architected the complete backend infrastructure, including a Node.js API with 20+ endpoints, PostgreSQL database with Prisma ORM, and JWT authentication. I also developed a novel GPT-4 Vision automation system that intelligently populates web forms through computer vision, achieving a 95% success rate across portal updates. The pilot deployment validated my implementations: the BLE system achieved 97% accuracy, AI automation eliminated 17 hours of manual work monthly, and check-in time reduced from 3-5 minutes to 15 seconds, demonstrating advanced expertise in IoT systems, AI integration, and full-stack development.

---

**SADID MORSHED, BIOCHEMISTRY**

*Identifying the constituents of pyrolysis oil using Supercritical Fluid Chromatography-Fraction collector (SFC-FC) and Gas Chromatography-Mass Spectrometry/Vacuum Ultraviolet (GC-MS/VUV)*

Faculty Mentor: Dr. Kevin A Schug

Plastic waste continues to accumulate as production increases and disposal methods remain insufficient. Even with recycling programs in place, much of the discarded plastic still ends up in landfills or waterways, eventually breaking down into harmful microplastics. One promising solution is the conversion of plastic waste into pyrolysis oil, which can also serve as a usable fuel. Pyrolysis oil is produced by heating plastics to approximately 800 °C in the absence of oxygen, resulting in a complex mixture of hydrocarbons that includes paraffins, isoparaffins, olefins, naphthenes, and aromatics. Analysing the amount of oxygen, nitrogen, and sulphur in these hydrocarbons is important for further refining and processing. To study the oil’s composition, two instruments were used: Supercritical Fluid Chromatography with a Fraction Collector (SFC-FC) and Gas Chromatography combined with Mass Spectrometry and Vacuum Ultraviolet detection (GC-MS/VUV). Previous SFC work revealed unique fingerprint regions that could distinguish whether the oil came from polyethylene or polypropylene. Fractions from these regions were then analysed using GC-MS/VUV to gain a deeper understanding of the chemical composition of the different pyrolysis oils.

---

**GRACE NWAEGE, PUBLIC HEALTH**

*Lost in Translation: How Health Literacy Impacts Pharmaceutical Interactions from Healthcare Professional to Patient*

Faculty Mentor: Anita Corbitt

Health literacy is a core element of public health, involving the ability to access, understand, evaluate, and use information to maintain well-being. In the United States, it aligns with an average reading level of about an eighth grader, which continues to decline over time. As pharmacists serve as the final point of contact in most outpatient settings, their ability to communicate effectively at this literacy level is crucial. This study examines how pharmacies address this challenge using qualitative methods, including health literacy assessments of patient consent forms and stakeholder interviews with pharmacy technicians about resource use. Findings show materials higher than national literacy levels and above the American Medical Association and National Institutes of Health's sixth-grade recommendation. Interviews reveal time constraints that are not conducive to teach-back methods and the utilization of all pharmacy services. The results highlight the need for improved communication, patient engagement, and policy attention to reading level standards in healthcare.

---

**JORDAN PRUITT, POLITICAL SCIENCE**

*The Feminine Way of Campaigning: How Female Politicians Navigate Gender Bias*

Faculty Mentor: Dr. Bai Linh Hong

Women are rapidly taking over the world of politics, holding more elected positions than ever before. With the increase of women in politics, we begin to question how gender stereotypes and bias affect female politicians. The main objective of this project is to learn how gender affects women's campaign strategies or public personas, and how this differs from their male counterparts. Through interviews with women in locally elected positions, this study examines these issues through the lens of female politicians themselves. The results indicate that gender plays a significant role in the careers of female politicians, influencing various aspects of their careers. The interviewees agree that women in politics face obstacles that their male colleagues do not and often encounter unique situations with their constituents due to their gender. The research conducted in this study opens doors for further study, especially at the federal level, and raises awareness of the experiences of female politicians.

---

**ATIQR RAHMAN, COMPUTER SCIENCE**

*Advancing MobileCLIP Through Hybrid Quantization Strategies: A CPU-Focused Approach*

Faculty Mentor: Dr. Marnim Galib

MobileCLIP is a compact model that connects images and text, allowing it to perform tasks like identifying images or answering questions without needing to be retrained for each new task. Although it's designed to be lightweight, it still runs slowly on regular computers that do not have powerful graphics cards (GPUs). This research focuses on making MobileCLIP run faster and smaller using a technique called post-training quantization, which reduces the precision of the model's numbers after it has been trained—without hurting performance. We combined several strategies: analyzing which parts of the model are more sensitive to changes, applying targeted adjustments to its structure, and running everything using CPU-only tools. Our tests showed we could reduce the size of the model's text processing part by 75% and cut the processing time by about 24%, while keeping its accuracy nearly the same. This work shows it is possible to run advanced AI models on everyday computers, opening the door to more accessible and energy-efficient AI.

---

**JACHIN RAMIREZ, MECHANICAL ENGINEERING**

*Virtual Process Modeling of Metal Additive Manufacturing Based on Direct Energy Deposition*

Faculty Mentor: Dr. Shiyao Lin

Additive manufacturing (AM), often called 3D printing, builds a part layer by layer using computer-aided design (CAD) data. This fabrication technique would allow industries to make highly complex parts that would be too complex for traditional manufacturing methods. When metals are printed, the rapid heating and cooling during deposition can cause internal stresses to form, which may lead to distortion or cracking. To understand where these stresses build up and how they lead to failure, a finite element simulation was created in ABAQUS at the meso-scale. The model includes heat flow, cooling, and stress accumulation as each layer is generated, using temperature-dependent material data for alloys like Inconel 718. The simulation tracks how stress evolves with each layer and identifies regions where cracks are most likely to start, matching patterns seen in experimental studies. The expected outcome is to develop a file that can stop the simulation in situ and identify internal failures as they form.

---

**ISABELLA RIOS, GEOLOGY**

*Occurrence of Melamine and Its Derivatives in Children's Splash Parks and Associated Exposure Assessment*

Faculty Mentor: Dr. Un-Jung Kim

Cyanuric acid is used in chlorination processes to efficiently sanitize water circulated in children's splash parks. Cyanuric acid is one of three major melamine derivatives. Linked to kidney complications, exposure to melamine and its derivatives pose a threat to infants and young children, especially when various compounds are present. This project aims to quantify the presence of compounds such as cyanuric acid, melamine, ammeline, and ammelide in splash parks across the North Texas metroplex. Sourced biweekly from Grand Prairie, Mansfield, and Arlington municipalities from August 2024 to September 2024, samples were collected to analyze diurnal and daily fluctuation of melamine and its derivatives. Water samples were processed using solid phase extraction, isolating the aforementioned target, analytes. Chemical analysis was performed using gas chromatography-mass spectrometry. From this study, we expect to find high concentrations of cyanuric acid and varying concentrations of melamine, ammeline, and ammelide based on the water treatment system, time of sample collection, and location.

---

**DEON RODRIGUES, CRIMINAL JUSTICE**

*Comparative Analysis of Domestic Violence Laws in India and the United States*

Faculty Mentor: Dr James Kelsay

Domestic violence continues to affect millions of individuals worldwide, yet legal systems respond to it in very different ways. This study compares India's Protection of Women from Domestic Violence Act (2005) and the United States Violence Against Women Act (1994, reauthorized 2021) to evaluate how each law protects victims and holds offenders accountable. Through comparative legal analysis of statutes, court cases, and government reports, the research identifies major differences in enforcement and victim support. India's act remains largely civil, limiting its ability to deter offenders and protect survivors, while the United States model provides stronger enforcement, federal funding, and comprehensive support services. By highlighting these contrasts, the study suggests reforms that could strengthen India's legal framework and promote greater accountability and safety for victims of domestic abuse. The findings aim to contribute to more inclusive and effective protections against domestic violence globally.

---

**MD RASHIDUL ALAM SAMI, COMPUTER SCIENCE**

*Advancing MobileCLIP through Enhanced Data Efficiency*

Faculty Mentor: Dr. Marnim Galib

Vision–language models (VLMs), such as MobileCLIP, achieve strong zero-shot performance but typically require millions of images–text pairs and large-scale computational resources, multi-GPU, and long training time, limiting broad use and study. This project investigates a data-efficient training strategy for compact VLMs. We propose Neighbor-Guided Multi-Modal Reinforcement (NGMMR), a teacher-student approach that transfers relational knowledge from a large CLIP teacher to a lightweight student. We first build a feature bank and nearest-neighbor graphs from the teacher’s embeddings, then augment standard contrastive learning with two consistency terms that encourage the student to preserve the same-modal neighborhoods and cross-modal alignments observed in the teacher. Using freely available datasets and modest resources (e.g., Google Colab), we evaluate retrieval and zero-shot classification under varying data fractions to quantify data-efficiency. Our goal is to enable training of capable, mobile-friendly VLMs with significantly less data and compute, improving accessibility and sustainability for universities and independent researchers.

---

**KAZ SCHOFIELD, ENGLISH**

*“It Is Always Too Late For Truth:” Surveillance and Masculinity in Wide Sargasso Sea*

Faculty Mentor: Dr. Penelope Ingram

Significant analysis has been done on Jean Rhys’ 1961 novel *Wide Sargasso Sea* examining gender in relation to the women in the novel, but very little analysis has been conducted on the men. Using the work of Simone Browne, who has theorized how racial categories are maintained through surveillance, I examine how three men in the novel, a white colonist and two mixed-race colonial subjects are restricted or otherwise kept docile through their differing masculinity. This study argues that it is not only the women in the novel who are oppressed or otherwise disenfranchised by their race and gender, but the male characters are also imprisoned by colonial regimes of visibility. This analysis complicates and extends existing research about gender in *Wide Sargasso Sea*, exploring how the male characters can act as both bearers of imperialist ideals and victims of the kinds of violence they enforce and enact.

---

**BRIANNA SEXTON, PSYCHOLOGY**

*The Gender Gap in Crime Perception: Exploring How Severity and Stereotypes Influence Individuals*

Faculty Mentor: Dr. Erin Austin

While research has shown gender differences in emotional and moral responses to crime, few studies have examined how factors such as crime severity, perpetrator gender, and monetary value interact to shape these perceptions. The present study explores these relationships in an area with limited prior investigation, contributing to a broader understanding of gendered moral judgment. Participants completed a survey featuring twelve randomized scenarios that varied in crime severity, perpetrator gender, and stolen item value. They rated their levels of trust, sympathy, and willingness to help after each scenario. This design allowed for a nuanced exploration of how moral and emotional evaluations shift across contexts. Although results did not yield statistically significant effects, the study highlights the importance of continued research into gender-based perceptions of crime and demonstrates a methodological framework for investigating subtle psychological patterns that may emerge with larger or more targeted samples.

---

**TALHA TAHMID, COMPUTER SCIENCE**

*Improved Context for LLM Queries on Knowledge Graphs Using the Model Context Protocol*

Faculty Mentor: Dr. Ashraf Aboulnaga

This Honors Capstone evaluates whether the Model Context Protocol (MCP) can broker large language model access to RDF knowledge graphs to improve factual accuracy. Targeting multi-hop, relation-heavy questions, our system runs an MCP server that queries SPARQL endpoints (e.g., Wikidata), converts natural-language intents into parameterized SPARQL templates, and injects retrieved triples and passages into the model's context. We compare this graph-RAG pipeline against a vector-only RAG baseline on shared evaluation sets, measuring accuracy, consistency, and latency. Ablations assess MCP overhead, caching, and template quality. Deliverables include an open-source MCP server, reusable templates, and a reproducible evaluation harness. Preliminary results indicate graph-aware retrieval improves compositional accuracy with modest latency. This project provides a practical blueprint for integrating LLMs with verifiable, structured sources, enabling domain-aware assistants for scientific, civic, and enterprise knowledge.

---

**KENDALL TREVINO, HISTORY**

*Beyond Words: Analyzing the Effectiveness of Land Acknowledgements*

Faculty Mentor: Dr. Sam Haynes

Indian Land Acknowledgements (ILAs) have recently become common across cities, sports organizations, universities, and other institutions. However, many were created to avoid criticism rather than to show genuine respect. Tribal members and both Indigenous and non-Indigenous scholars emphasize that ILAs must meet specific criteria to be considered meaningful. An ILA should promote tribal sovereignty and establish strong relationships with the communities they acknowledge. This research draws on academic articles, examples shared on official websites, and conversations with tribal members to assess how genuine certain ILAs are. Findings show that most ILAs are done respectfully, but some are for appearance. A strong ILA actively supports the nation it acknowledges, as seen in the Chicago Blackhawks' approach. The University of Texas at Arlington's ILA meets most standards but could improve, while the City of Kirkland, Washington's statement falls short. Ultimately, true respect requires moving beyond statements to genuine, continuous engagement with Indigenous nations.

---

**JD UPSHAW, BUSINESS MANAGEMENT**

*Unraveling Equity: The Consequences of Dismantling DEI Initiatives in Education*

Faculty Mentor: Dr. Lesley Regalado

Recent political and institutional shifts have led to the dismantling of Diversity, Equity, and Inclusion (DEI) initiatives across schools and universities, raising concerns about how these changes affect both students and the future workforce. This research investigates how the removal of DEI programs influences student belonging, academic access, and long-term workforce diversity. Using a mixed-methods approach, the study combines qualitative interviews with professors and students and quantitative analysis of enrollment, retention, and diversity data from universities affected by DEI policy changes. Preliminary findings suggest that dismantling DEI initiatives leads to decreased student support, reduced faculty morale, and declining representation among marginalized groups. These outcomes narrow the diversity of the workforce pipeline and may limit future innovation and productivity. By connecting educational policy changes to workforce outcomes, this research underscores the critical importance of maintaining DEI frameworks to foster inclusion, equity, and long-term social and economic advancement.

---

**ANN VARGHESE, NURSING**

*Bridging Education and Practice: The Role of Academic EHRs in Developing Nursing Workforce Readiness*

Faculty Mentor: Dr. Mari Tietze

Charting plays a vital role in nursing practice, yet many new graduate nurses find it difficult to master as they learn to document accurately while managing multiple patient care responsibilities. The integration of electronic health record (EHR) training into nursing curriculum aims to bridge the gap between education and clinical practice. This study explores whether the use of an academic EHR named “EHR Go” helps prepare nursing students for documenting in real-world clinical settings. Thematic analysis of student feedback related to EHR Go was conducted using the Delphi technique and Microsoft Copilot 365. IBM SPSS was then used to compare mean rankings of student experiences across nursing cohorts. Results showed that senior nursing students rated EHR Go as less effective in promoting workforce readiness than junior students. These findings highlight the need to examine how EHR Go can better align with clinical documentation expectations.

---

**HELEN VU, BIOLOGY**

*Characterizing MHC IIB Genes in the Parthenogenetic Gecko *Lepidodactylus lugubris**

Faculty Mentor: Dr. Matthew Fujita

The major histocompatibility complex (MHC) is a set of genes that helps the immune system recognize and fight infections. In most animals, MHC diversity is maintained through sexual reproduction, which reshuffles genes each generation. The mourning gecko (*Lepidodactylus lugubris*), however, reproduces asexually, making it an ideal species to study how immune gene diversity persists without recombination. Using genomic data collected by the Fujita Lab, we compared the gecko's genome to known lizard MHC sequences. We identified five highly probable MHC genes, including two likely class IIB genes. Sequence comparisons and phylogenetic analysis revealed more variability at gene ends, consistent with patterns seen in other vertebrates. Unlike previous transcriptome-based studies, this genome-wide approach provides a more complete view of MHC diversity in this asexual species. These results highlight both the challenges of studying immune genes in non-model organisms and the limited but retained MHC repertoire in a clonally reproducing vertebrate.

---

**KADE WINTERTON, FINE ARTS**

*The Alienated Self: A Solo Exhibition*

Faculty Mentor: Carlos Donjuan

Exhibiting works is an essential step for every artist; this capstone is a creative research project that explores feelings of alienation and otherness, as well as the multiple causes they stem from, resulting in a body of work ready for exhibition. First, research was conducted on exhibiting and curating works. Next, works by contemporary artists who also explored the same topic were examined. Completed works were curated, and an inventory of what was needed to create an exhibition-ready body of work was defined. After this was done, new works were uniquely created, each starting with an idea and a sketch. After brainstorming the concept, these works were then brought into realization. The results are a cohesive body of work that is ready for exhibition.

---