

HONORS RESEARCH SYMPOSIUM
POSTER PRESENTATION
ABSTRACTS

NOVEMBER 6, 2026

UNIVERSITY OF TEXAS AT ARLINGTON

Honors Research Symposium 2026

Poster Abstracts

Chinemerem Adams, International Business-Spanish

Title: From Dollarization to Multinational Strategy: What the Walmex - El Salvador Case Can - and Cannot - Tell Us

Faculty Mentor: Dr. Anne Kurzweg

The paper is about the impact of a dollarized economy on U.S. companies conducting business in a country that uses the U.S. dollar as legal tender using El Salvador and Walmex as a case study. The research included gathering information about dollarization on a macroeconomic level. The marketing strategies of Walmex were examined thoroughly to identify any potential linkages to dollarization. This was followed by bank and professional interviews to gather insight and knowledge. The research had conflicting conclusions about the real impacts of dollarization for businesses; however, dollarization has no direct impact on whether a company chooses to do business in a foreign country. Dollarization has a compact influence on pricing, market entry and marketing strategies from a banking perspective. However, from an economic and business perspective, dollarization makes pricing, financial planning, and general business conduct straightforward for the parties involved.

Yash Ajariwal, Information Systems

Title: Data Centers in the AI Era: Balancing Economic Growth, Resource Demands, and Community Impact

Faculty Mentor: Dr. David Joel Shurtleff

The growth of artificial intelligence and digital services has made data centers essential to economic activity, healthcare, and everyday life, while raising concerns about electricity, water, infrastructure, and community impacts. This study examines how data center expansion can create sustainable value for host communities by balancing economic and societal benefits with environmental and infrastructure costs. An integrative literature review, policy analysis, and comparison of Dallas–Fort Worth, Phoenix, Dublin, and Frankfurt examine computing needs, local benefits, resource demands, the distribution of gains and burdens, and responsible development. Findings identify opportunities for business efficiency, innovation, employment, and recurring tax revenue that can support public safety, roads, schools, and other services. Advances in cooling, power supply, efficient hardware, and AI-assisted operations can reduce resource requirements per useful service, while appropriate architectural design can improve neighborhood compatibility. The study proposes a Responsible Data Center Development Framework based on credible demand, durable local value, resource fit, infrastructure cost responsibility, fair distribution, and enforceable accountability. The findings support responsible expansion that converts technological progress into economic opportunity, stronger public services, and lasting community benefits.

Khaylia Bullen, B.S. Biology

Title: The effects fragment size and habitat type on predator prey-dynamics

Faculty Mentor(s): Taylor Wright-Poteet & Luke Frishkoff

Over time, human societies have shifted from hunter-gatherer cultures toward industrialized societies. As urban cities have expanded, they push into natural areas, creating fragments. Habitat fragmentation divides continuous habitats into smaller, isolated patches, disrupting ecological processes such as predation and immigration. Studies have been done to understand the effects of fragmentation on predator–prey dynamics with mixed results. This research explores whether predation rates vary among urban and natural habitat fragments of various sizes and employs binomial generalized linear models to evaluate links between fragment size, habitat type, and predation. We found a slight, non-significant, increase in predation frequency in urban sites relative to natural, and preliminary evidence that predation is more frequent in smaller fragments. These findings generally contrast with previous research and may reflect differences in predator activity or habitat characteristics. However, no significant relationship between fragment size and predation was established, highlighting the need for further research.

Linh Dang, Electrical Engineering

Title: Fabricating Pin Photodiodes Enable Radiation-Hard eSwir Sensing for Deep Space Exploration

Faculty Mentor: Dr. Seunghyun Lee

Infrared sensors are imperative for applications in space exploration and having long-term sensor reliability is essential. As time goes by, the sensors degrade and challenge the reliability of the device. Research has shown that GaAs devices are prone to oxidation and can be defective in the long run. As these materials degrade, it increases leakage current and reduces the performance of the sensor. This study investigates the performance reliability of GaAs photodiodes versus an externally supplied substrate provided by an industry partner. GaAs photodiodes will be fabricated, and the performance of the device will be evaluated through electrical characterization to evaluate the leakage current, dark current, and device stability. By comparing 2 different substrates using the same fabrication steps, the most reliable device will be determined, possibly enabling reliable infrared sensors for future space missions and other operating environments.

Vaidehi Gandhe, Biology

Title: Investigating the Impact of Calcitriol on the NF-κB Pathway in an In Vitro Model of Human Uterine Smooth Muscle Cells

Faculty Mentor: Dr. Jennifer Woo

Preterm birth (PTB)- birth before 37 weeks of gestation- is a leading cause of infant mortality. Inflammation plays a critical role in spontaneous PTB (sPTB) by activating the NF-κB signalling pathway, which regulates pro-labor gene expression. Calcitriol, the active form of vitamin D, has anti-inflammatory properties that may help reduce the risk of sPTB. To investigate these mechanisms, PHM1-41(USMC's) were treated with 10 nM calcitriol and compared with untreated cells using an NF-κB signalling pathway array to assess changes in gene expression. Results showed upregulation of HMOX1, suggesting cellular protective mechanisms, while increased expression of NF-κB signalling regulators CARD11, IKBKB, IKBKG, MALT1, and NFKB2 indicated changes in inflammatory signalling. Additionally, upregulation of apoptosis-related genes BCL2A1, CASP8, and TNFRSF10B suggested potential effects on cellular survival mechanisms. The significant upregulation of CARD11 requires further investigation. These findings provide insight into how calcitriol may influence uterine inflammation and potentially reduce the risk of spontaneous PTB.

Irene Flores, Cultural Anthropology

Title: The Wings of Hope Is Not Horsing Around: How Equitherapy Brings Changes to Behavioral Therapy in the Disability Community

Faculty Mentor: Dr. Amy Speier

A non-profit organization, Wings of Hope, seeks to reform equitherapy by challenging the medical model of disability. Their programs emphasize accommodating an individual's physical limitations and diagnosis to expand their skills in independence. This ethnographic research questions how equine-assisted therapy reshape behavioral support for disabled individuals through community and human-animal bonds. I question the different benefits and limitations from clinical intervention and equitherapy. I also examine how healing can emerge through relationships and responsibility against a society that has ostracized them. I applied my own research methods to conduct participant observation, interviews, and surveys with clients, parents, and volunteers. My research prioritizes how lived experiences examines how meaning is constructed and shared within this microculture setting. I examined this through everyday interactions between clients, families, volunteers, and animals. I have witnessed the resilience of a community whose welcoming and inclusive nature counters the isolation they feel from society. It has inspired me to further explore how other non-profit organizations serve individuals with disabilities to produce supportive communities that challenge society's traditional expectations of them.

Brioche Glikin, B.S. Mathematics

Title: How you wish you learned calculus: The bigger Picture painted by the generalized stokes' theorem

Faculty Mentor: Dr. Barbara Shipman

Have you taken the calculus sequence as a rite of passage to complete your degree? Or have you taught calculus procedures without exploring the ideas that connect them? Few instructors and even fewer students realize that calculus is more than a collection of isolated techniques. This paper offers an alternative approach: a sequence of familiar questions designed to help students discover the relationship among these concepts. Questions about exterior derivatives, coordinate transformations, line integrals, and vector calculus theorems may seem unrelated, yet they share a unifying answer: the Generalized Stokes' Theorem. Rooted in differential topology, this perspective reveals mathematical structure underlying the computations, one that students rarely have the opportunity to explore. Designed for mathematics undergraduates and as a resource for calculus instructors, this paper offers a guided journey in which students uncover how familiar concepts fit together into one coherent whole.

Rachel Goodner, Biomedical Engineering

Title: Size-Based Filtration in Microfluidics for Caenorhabditis elegans Reproductive Research

Faculty Mentor: Dr. Salman Sohrabi

Caenorhabditis elegans is widely used to study reproductive effects under various conditions, but traditional reproductive assays require substantial manual handling and counting. This project aims to develop a microfluidic platform for reproductive quantification by retaining adult mothers while allowing offspring assessment and removal. The device was fabricated using CNC-machined acrylic components and mesh-based size separation. Detachable components facilitate worm loading, and the design accommodates inverted microscopic imaging. An initial prototype was fabricated and tested to evaluate its structural integrity, sealing, and potential for offspring separation. Preliminary testing identified leakage and sealing limitations that interfered with device operations. Design modifications are currently underway to improve the seal and fluid containment during device inversion and offspring removal. Further testing will evaluate adult mother retention, offspring separation, and feasibility of repeated reproductive quantification. This project seeks to establish a foundation for a more controlled microfluidic approach to C. elegans reproductive assays.

Ariel Huang, BBA in Accounting and Finance

Title: *The Cost of Information: The Economics of Going Concern Opionions*

Faculty Mentor: Dr. Nicholas Mitchell

In financial statement audits, going concern opinions (GCOs) convey informational value to stakeholders: financial distress, investment risk, or regulatory duty. This paper examines existing literature on GCOs to investigate the determinants, consequences, and economics of their issuance. Through a systematic literature review, this research synthesizes academic findings on key incentives and disincentives for issuing GCOs, as illustrated by real-world cases. Findings suggest that GCO firms experience a higher cost of equity and more reliance on debt financing, creating a negative demand for them. However, GCOs, when appropriate, to reduce information asymmetry for investors. Auditors balance between reporting responsibility and economic consequences of issuing a GCO. False positives (Type I errors) and false negatives (Type II errors) in GCOs can expose auditors to either reputational or litigation risk. By examining the economics of GCOs, this research identifies literature gaps in the dynamics among clients, investors, and auditors.

Jayeda Aziz Jebun, Architectural Engineering

Title*: Development and Evaluation of a Digital Twin-Enabled Extended Reality Training System for First Responder Drone Operations*

Faculty Mentor: Dr. Nazmus Sakib

First responders often operate in hazardous environments where traditional drone training can be costly, risky, and difficult to repeat. This study presents the development and evaluation of an Extended Reality (XR) training system integrating digital twin technology to simulate realistic indoor fire emergencies. A digital twin of a building was developed to create a physics-based virtual environment where participants completed an indoor search mission involving navigation, fire hazard identification, victim detection, and emergency reporting. System performance was evaluated through mission completion, hazard identification accuracy, the System Usability Scale (SUS), and a modified NASA Task Load Index (NASA-TLX). Findings demonstrate the potential of digital twin-enabled XR environments to provide safe, repeatable training for improving situational awareness without exposure to real world hazards. Future work will incorporate additional emergency scenarios, multi-user collaborative training, and validation with professional emergency response agencies.

Brooke Kerk, Biomedical Engineering

Title: *Influence of Lipid Composition on Synthetic Vesicle–Chitosan Interactions*

Faculty Mentor: Dr. Tam Nguyen

Conventional nanoparticle drug delivery systems may face toxicity, immune recognition, and rapid clearance. Extracellular vesicles (EVs) offer potential biocompatibility advantages, but their heterogeneous membranes complicate studies of how individual lipids influence vesicle behavior. Synthetic lipid vesicles provide controlled models for investigating these effects. Chitosan, a biodegradable, positively charged polysaccharide, may associate with lipid membranes to form protective coatings, depending on membrane charge. This study examined how lipid composition affects synthetic vesicle size, surface charge, and chitosan interactions. DOPA (anionic), DOTAP (cationic), and DOPC (zwitterionic) vesicles were formulated with cholesterol and characterized using dynamic light scattering, zeta potential measurements, and fluorescence microscopy. After chitosan treatment, DOPA/cholesterol vesicles increased in hydrodynamic diameter and shifted from negative to positive zeta potential, consistent with electrostatic association. DOTAP/cholesterol and DOPC/cholesterol formulations showed inconsistent changes and visible aggregation. These findings highlight charge-dependent vesicle–polymer interactions, with relevance to engineered delivery systems.

Niyati Khanal, Physics

Title*: Magnetic field verification of the Project 8 Neutrino Experiment*

Faculty Mentor: Dr. Benjamin Jones

Neutrinos, a particle in nature, is of fundamental importance to particle physics and cosmology. This research about neutrinos was conducted as a part of Project 8 at the University of Texas at Arlington, where I worked as an undergraduate research assistant focusing on magnetic field data analysis and experimental calibration. Project 8 is a next generation neutrino experiment that aims to measure the neutrino mass by detecting cyclotron radiation emitted by beta decay electrons in a magnetic field. This work presents an analysis of magnetic field data collected in support of Project 8 at the University of Texas at Arlington. Magnetic field measurements were recorded in a quadrupole magnet configuration across multiple spatial positions relevant to the detector geometry. Using Python, the data was processed, visualized, and analyzed to evaluate field uniformity, stability, and alignment. The measured fields were compared with expected configurations to assess calibration accuracy and identify potential sources of systematic error. The results contributed to verification of the previously calculated theoretical requirements for the magnetic field and understanding of the magnetic field required for the neutrino experiment. This study highlights the essential role of detailed magnetic field mapping and data driven calibration in advancing high precision experimental neutrino physics.

Feifan Liu, Public Health

Title: *Beyond Benign: Psychological and Quality-of-Life Effects of Symptomatic Vitreous Floaters*

Faculty Mentor: Dr. Erin Carlson

Vitreous floaters are moving spots, lines, or shadows in vision. Although often described as benign after serious retinal conditions are excluded, symptomatic floaters can interfere with daily activities and emotional well-being. This narrative review examines the psychological and quality-of-life effects of symptomatic vitreous floaters and whether standard clinical measurements fully capture patients' experiences. Studies and reviews were identified through PubMed/MEDLINE, ScienceDirect, and reference lists of relevant publications. No original patient data were collected. Reviewed studies reported anxiety, depressive symptoms, stress, and difficulties with reading, driving, computer use, and work, including among patients with normal visual acuity. Findings varied across studies, and the reported associations did not establish that floaters cause psychological disorders. Differences in questionnaires and outcome measures also limited comparisons across studies. Patient education may reduce anxiety and uncertainty. Vitrectomy may provide symptom relief for selected patients but carries risks, including cataract and retinal detachment. These findings support considering daily functioning and emotional well-being alongside clinical eye measurements, with patient education and shared decision-making guiding individualized care.

Sairam Marupudi, English

Title*: Writing the Book While Building the Audience*

Faculty Mentor: Professor Laura Kopchick

Authors are increasingly expected to market their work before a book is completed or published. For emerging writers, this expectation creates a unique challenge: balancing the creative demands of writing a novel with establishing an online presence. This capstone examines how an emerging author can simultaneously complete a novel and begin building an audience through digital marketing. Over the course of one semester, I documented my process of drafting and revising a novel while creating and publishing promotional and behind-the-scenes content across social media platforms. The project explores how different forms of content can be used to develop an author identity and encourage audience engagement before a book is available for purchase. Ultimately, the project demonstrates that early-stage book marketing can function as more than promotion but can become part of the writing process itself.

Zainab Siddiqui, Data Science

Title: *Hide and Seek: Tracing the PRDM9 Locus in Crocodilians Through Synteny*

Faculty Mentor: Dr. Matthew Fujita

The PRDM9 gene is of notable importance within the animal kingdom for its role in dictating meiotic recombination sites. It has been thoroughly defined within mammals, aiding in our understanding of genetic variance within this clade, however, the same cannot be said about Crocodilians. As a whole, this group seems to be glossed over. This genomic study aimed to use computational methodologies to investigate the presence or absence of the PRDM9 gene within a wider range of Crocodilians than explicitly previously defined. Through the use of tools such as BLAST, Tiberius, and Python, syntenic outgroup analysis with Chrysemys picta bellii (the Western Painted Turtle) yielded a lack of significant indication of the presence of the PRDM9 gene within all investigated genomes except one, wherein no positive or negative result could be derived. These findings give insight into the bigger picture of how recombination evolves in lineages without PRDM9, as well as the potential trigger for its loss, supporting a hypothesized absence of PRDM9 in the ancestral Archosaurian.

Sanjana Sriramoju, Business Analytics (Now AI for Business), Minor in Data Science

Title: *Macroeconomic Shocks and Household Finances: Scenario-Based Modeling with Synthetic Households*

Faculty Mentor: Dr. Sridhar Nerur

When the economy changes, the news reports numbers, but households want to know what these changes mean for their wallet. Real household data is often private and rarely available. This study asks: How do changing economic conditions, including crises, affect the simulated finances of different types of synthetic households, and do these effects hold across different machine learning models and economic periods? Publicly available macroeconomic data from 2017 to 2025, compiled by the researcher and refined with AI assistance, served as a baseline for AI assisted generation of a synthetic household dataset with diverse financial characteristics. Machine learning models predicted financial outcomes based on macroeconomic indicators and household characteristics. The simulation examines how different households respond to changing economic conditions and assesses prediction consistency and uncertainty across models and periods. For households and financial professionals, the takeaway is simple: preparing for a crisis starts with your own situation, not the headlines.

Hailey Tang, Psychology B.S.

Title: *Taxonomic Classification and Appearance: Evaluating Human Perception of Animals with Fear, Endearment, and Safety Scales*

Faculty Mentor: Dr. Amandeep Singh Dhaliwal

Humans often judge animals based on appearance and phylogenetic closeness with previous research highlighting the general population's favoritism towards mammalian animals over avian and reptilian animals. This study aimed to understand why certain conservational campaigns receive more popularity over others. The researchers tested how human perception may change based on an animal's classification and physical appeal, through an online survey by showing the participants (n = 107) a picture of an animal to measure levels of fear, endearment, and safety. There was no interaction effect between appearance and classification. However, there was a significant difference in fear and safety between classifications with the participants, unexpectedly, favoring reptiles and a significant difference in endearment between appearances with participants favoring appealing animals. The findings highlighted the need for education about the importance of biodiversity, especially in the context of animal conservation.

Elizabeth Tran, Biology B.S.

Title: *The Role of Antennae and Cuticular Chemical Cues in Opponent Recognition and the Loser Effect in Gnatocerus corunutus*

Faculty Mentor: Dr. Olivia Williams

Male-male competition in the broad-horned flour beetle (*Gnatocerus cornutus*) is influenced by physical traits and chemical signaling. Previous studies have thoroughly examined the role of large mandibles in male aggressive behavior; however, the role of cuticular hydrocarbons in opponent recognition and the loser effect (LE) phenomenon (a temporary decrease in aggression after defeat) has not been studied sufficiently. This study aims to determine whether antennae are necessary for chemical communication and how their absence affects opponent recognition and the duration of the loser effect. Male individuals of similar size will take part in the fighting process in sequence. Some individuals will have their antennae removed, and CHX injections will prevent protein synthesis. Afterward, the males will be paired with familiar and unfamiliar opponents to identify changes in their retreat behavior and the period of LE.
