33RD ANNUAL STUDENT RESEARCH CONFERENCE AT SOUTHEAST MISSOURI STATE UNIVERSITY

33RD ANNUAL
SRC
STUDENT RESEARCH
CONFERENCE

APRIL 15TH AND 16TH 2025

SCHEDULE:

APRIL 15

33RD ANNUAL SRC STUDENT RESEARCH CONFERENCE

SEMO

ORAL PRESENTATIONS SESSIONS

Time	Presenters	Location
8:00AM - 9:00AM	**PRESENTERS:** Brianna Mills Delaynie Spies - G Hannah Lynch*	University Center Ballroom A
9:00AM - 10:00AM	Batuhan Tanrikulu - G Hannah Witty* Nora Kilburn - G	University Center Ballroom A
10:00AM - 11:00AM	Gwen Squires Pavan Subhash Nara* - G Kavya Nikhita Meda* - G	University Center Ballroom A
2:00PM - 3:00PM	Sophie Martin Alison Venus Krishna Thakar	University Center Ballroom A
3:00PM - 4:00PM	Nweli Sain* Emilie Torres Sagar Kandel - G	University Center Ballroom A
4:00PM - 5:00PM	Abhishek Shrestha Lucky Atabo* Nyasha Anne Ndirwo - G	University Center Ballroom A

G = Group Presentation
* = Graduate Student
Everyone on Tuesday is Competing

SCHEDULE:
April 15
Poster Presentations Sessions

SEMO

8:00AM - 9:00AM	PRESENTERS: Jannat Ara Ferdouse Raya* Lillian Gildehaus - G Caitlyn Slaughter - G	University Center Ballroom B
9:00AM - 10:00AM	S M Tahmid - G Christopher Kirchhofer - G Emilie Torres Brianna Mills	University Center Ballroom B
10:00AM - 11:00AM	Julia Riley* - G Kristina Allen* - G Margaret Martinez - G Shelby Rall-Jokerst* - G Deonty Eastmon - G	University Center Ballroom B
2:00PM - 3:00PM	Samir Das* Margaret Martinez Jamie Moncheski*	University Center Ballroom B

G = Group Presentation
 * = Graduate Student
Everyone on Tuesday is Competing

SCHEDULE:
April 16
Oral Presentations Sessions

8:00AM - 9:00AM	**PRESENTERS:** Graysen Johnston Tsunami Briseno-Mora Sierra Brown	University Center Ballroom A
9:00AM - 10:00AM	Savannah Greenwood Michael Mugan	University Center Ballroom A
10:00AM - 11:00AM	Nicholas Dietrich Kale Moneyhun Mathew Smith Genevieve Moore	University Center Ballroom A
2:00PM - 3:00PM	Duc Huy Nguyen* Deepshikha Karki Jacquelynn Moungowoolford Arin Moore* Nguyen Anh Huy Pham*	University Center Ballroom A

G = Group Presentation
* = Graduate Student

SCHEDULE:

APRIL 16

POSTER PRESENTATIONS SESSIONS

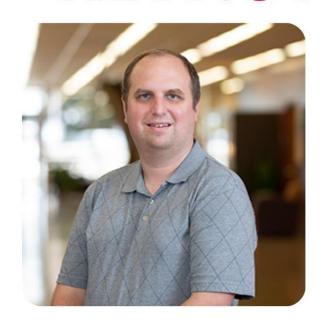|		
8:00AM - 9:00AM	**PRESENTERS:** Joshua haugh - G Vernonica Heinen - G Cadrian Hutsell Noor Jahan Jedne* - G	**University Center Ballroom B**
9:00AM - 10:00AM	Grant Gibson Emily Hudgins* Delaynie Spies Sophia Bussard* - G Mia Ogle - G	**University Center Ballroom B**
10:00AM - 11:00AM	Sabrina Stavely Dekyria Jones Kortney Scoggins* - G Gillian Sherp* - G	**University Center Ballroom B**
2:00PM - 3:00PM	Sydney Provo - G Joshua Haugh - G Nipesh Pant Shruti Bhattarai Emma Newell* - G	**University Center Ballroom B**

G = Group Presentation
* = Graduate Student

SCHEDULE:
APRIL 15-16
SPECIAL PRESENTATIONS SESSIONS

33RD ANNUAL
SRC
STUDENT RESEARCH CONFERENCE

SEMO

Date/Time	Session	Location
APRIL 15TH **11AM - 12PM**	**HOW TO PRESENT RESEARCH WORKSHOP** Dr. Sarah Dietrich	University Center Ballroom B
APRIL 15TH **1PM - 2PM**	**KEYNOTE ADDRESS** Dr. Abram Book	University Center Ballroom B
APRIL 16TH **11AM - 12PM**	**PUBLISHING RESEARCH ROUNDTABLE** Dr. Dustin Siegel	University Center Ballroom B
APRIL 16TH **1PM - 2PM**	**ETHICS IN RESEARCH ROUNDTABLE** Dr. Paige Northern	University Center Ballroom B
APRIL 16TH **4:00PM - 5:30PM**	**AWARDS CEREMONY**	University Center Ballroom A

KEYNOTE ADDRESS

Dr. Abram Book
Keynote Address
Tuesday, April 15, 2025
1:00pm - 2:00pm

"Creating Knowledge in the Age of Artificial Intelligence and Podcast Pontificating: A Sacred Responsibility"

Dr. Abram (Abe) Book has taught communication in higher education for 14 years. Prior to coming to SEMO in 2021, Dr. Book taught public speaking and interpersonal communication at Indiana State University. He currently serves as Second Vice-President of the Kentucky Communication Association, and as co-editor of the Kentucky Journal of Communication. His research interests include communication within religious organizations, media ecology, fact-checking and crisis communication. His work has been published in the Journal of Communication and Religion, Artifact Analysis (an open-access journal devoted to the study of communication artifacts) and the Kentucky Journal of Communication. His first book, titled "Uncle Bud" Robinson: Enduring Lessons in Communication from a Simple Folk Preacher," is scheduled for release late this summer from Integratio Press.

WORKSHOPS AND ROUNDTABLE SESSIONS

Dr. Sarah Dietrich
SRC Workshop
Tuesday, April 15, 2025
11:00am - 12:00pm

"How to Present Research"

Dr. Sarah E. Dietrich teaches in and co-coordinates the Masters in TESOL at Southeast Missouri State University. A key part of her work includes serving as a supervisor for thesis projects and helping students prepare for conference presentations. Over the course of her career, she has given more than 90 presentations and workshops. Her current research and publications explore interconnections among teacher education, person-to-person peacebuilding, and international virtual exchange.

Dr. Dustin Siegel
SRC Roundtable
Wednesday, April 16, 2025
11:00am - 12:00pm

"Publishing Research"

Dr. Siegel, Ph.D. STL University, has extensive experience in research on the reproductive biology of amphibians and reptiles. Such research includes primarily the urogenital morphology of salamanders and squamates but also includes projects on sperm morphology/physiology, the morphology of secondary sexual characteristics, the evolution of reproductive cycles, and the odd morphological inquiry into fishes. He was mentored by renowned herpetologists Robert D. Aldridge and David M. Sever during graduate school. He is currently a Professor of Biology at Southeast Missouri State University in the Department of Biology.

Dr. Paige Northern
SRC Roundtable
Wednesday, April 16, 2025
1:00pm - 2:00pm

"Ethics in Research"

Dr. Paige Northern in her applied and educational-focused program of research, conducts research aimed at identifying factors that impact students' learning and learning environments, developing strategies to improve students' learning, and identifying pedagogical tools instructors can implement in their classes to support students' learning.

FULL ABSTRACTS

A CONTINUATION OF THE ASSESSMENT OF LIGHT POLLUTION ON SEMO'S CAMPUS
Briana Mills; Faculty Sponsor: Dr Murphy, Dr Hill

The purpose of this project is to assess the efficiency of different light fixtures around SEMO's campus. Using a Light Master IV, we can measure the illuminance and color temperature of fixtures throughout campus. We chose eleven different fixtures to capture the different types of light around campus. At every light fixture, three measurements are taken, and an average of the 3 measurements is then created when the data is analyzed. At each light, the measurements are taken 9 feet away from the fixture. We determined that the illuminance of each fixture varies from 7 to 208 lx, with color temperature ranging anywhere from 2000-4500K, implying that all light fixtures on campus use a range of warm lighting. The color temperature is not directly correlated to the illuminance measurement of each fixture. Combining this data with previous data collected using a Sky Quality Meter, we can see the illuminance level is not the main factor in brightness levels at measured locations on campus. These results imply that further studies to determine efficient light pollution reduction methods are needed.

Techniques for development of latent fingerprints
Delaynie Spies; Faculty Sponsor: Dr Jim McGill

Latent fingerprints are a heavily relied upon form of evidence in many criminal cases. No two fingerprints are identical, however many can look very similar if a print lifted from a crime scene does not have enough distinguishing characteristics, which can be caused by method of xxx or by environmental degradation. Oil Red O is a lipophilic reagent that has been used in some cases to dye latent prints a dark red color to make them more visible. Another method that has been used to some success has been superglue fuming, a process that dusts fingerprints white. Presented will be our attempts to combine both methods in series to create a more visible fingerprint profile on latent prints that have been degraded.

Narratives of Justice: Exploring TikTok Users' Responses to Police Use of Deadly Force
Hannah Lynch; Faculty Sponsor: Dr. Monica Radu

TikTok is a popular social media app where users create and share short videos with friends, followers, and strangers. With millions of users engaging in online interactions through this app, TikTok provides a space where people form narratives and share their reactions at a rapid pace. Research suggests that social media influences the public's perception of key social institutions, including topics surrounding the criminal justice system and police. However, less is known about how TikTok contributes to online discourse about potentially controversial issues, such as police use of deadly force. Therefore, this study draws from social constructionism and examines how TikTok users formulate and share their opinions in response to a video shared online showing a police officer using deadly force in an interaction with the victim, Sonya Massey. Several themes emerged from the data, including disapproval of the police officer's actions, questions about the victim's actions, and a call for change at both individual and structural levels. The findings are important because these online narratives reflect TikTok users' opinions and contribute to a collective narrative that may pressure institutions to respond to the criticism.

SAWTC: Token-Weighted Consensus for Role-Based Access in Hybrid IoT-Web Blockchain Networks
Batuhan Tanrikulu, Saurav Ghosh; Faculty Sponsor: Reshmi Mitra

This project presents a hybrid blockchain-based access control system integrating on-chain smart contracts with off-chain APIs to balance security and efficiency. Designed for decentralized environments, it enforces role-based resource management where peers (users/devices) gain dynamic permissions through ERC20 token-weighted consensus. The system employs a dual-layer architecture: on-chain components handle role assignments, policy enforcement, access control mechanisms, and token-based penalties/rewards via Solidity contracts (RoleToken, JudgeContract), while off-chain services (Spring Boot API) manage real-time data, encrypted resources, and user interactions through optimized database queries.Innovations include a validator consensus mechanism for role assignment using weighted random selection (based on token holdings), ensuring decentralized approval processes. Validators receive WebSocket notifications and face token incentives/penalties for timely responses. A scheduler automates role swaps based on token balances and monitors consensus timeouts. The hybrid model separates transaction execution (on-chain) from data retrieval (off-chain), achieving low-latency access checks while maintaining auditability via blockchain events. Real-time updates and malicious activity alerts are broadcast via WebSocket, ensuring system responsiveness. This architecture enhances scalability in IoT/enterprise

networks by mitigating blockchain latency, while tokenomics incentivize honest participation and deter abuse

A Metalinguistic Approach to How ChatGPT-4o Answers Subjective & Non-Subjective Questions
Hannah Witty; Faculty Sponsor: Sarah Dietrich

This study used metalinguistic analysis to identify patterns in language use, self-referential identity, and response consistency in the way ChatGPT-4o responds to subjective and non-subjective questions. Data for this analysis was collected through a python program that generated responses to four prompts: How are you doing? What is your favorite color? Create a sentence about a girl and her dog. How many Rs are in strawberry? Overall, ChatGPT-4o was found to favor neutral phrasing, impartial opinions, and highly formulaic responses. These findings suggested that ChatGPT-4o's responses are likely influenced by one of OpenAI's moderation application programming interfaces, which filters "negative" or "harmful" content and limits response variability and subjective expression. The research, and these questions, underline the importance of transparency in AI moderation and its broader implications for human-machine communication

Using Historic Death Certificates to Relocate Forgotten Unidentified Remains in Missouri: A Pilot Study
Nora Kilburn, Shianne Glass; Faculty Sponsor: Jennifer Bengtson

The Missouri Death Certificate Database currently provides public access to death certificates filed from 1910-1974. These certificates provide valuable information regarding cause and manner of death, demographics, and burial information. We searched for certificates filed for people whose identities were unknown at the time of death to determine whether their remains can be relocated as a first step toward potentially applying advanced DNA testing for identification. We focused on 191 death certificates for Unidentified Persons (UPs) filed between 1950 and 1974. Demographic and circumstantial information for each case was entered into a spreadsheet. We then chose three counties, contacting the funeral homes and coroners' offices listed on the death certificates to ask for any records documenting precise burial location of remains. To date, we have acquired burial location data for two UPs in Cape Girardeau County and one UP in New Madrid County. We are working with the St. Genevieve Coroner to find burial location for their UPs. This research is important because finding the remains allows us to apply new techniques for identification. Record keeping, especially prior to the digital era, is inconsistent, but this pilot project demonstrates that there is hope for relocating at least some older UPs.

Machine Learning-Based Classification of Alzheimer's Disease, Mild Cognitive Impairment, and Normal Controls Using Baseline Data

Gwen Squires; Faculty Sponsor: Mohamed Abu Sheha, Emmanuel Thompson

Alzheimer's disease is a progressive neurodegenerative disorder that significantly impacts cognitive functions such as memory, thinking, and behavior. As the disease progresses and symptoms worsen, individuals can experience severe dementia and lose the ability to live independently. Therefore, early diagnosis of subjects into Normal Controls (NC), Mild Cognitive Impairment (MCI), and Alzheimer's Disease (AD) are crucial for effective treatment, and supervised machine learning can be leveraged to predict an initial diagnosis. This study aims to develop a classification model based on data collected at each patient's baseline visit to diagnose patients as NC, MCI, or AD. The data consists of demographics, clinical test results, neuroimaging (MRI) data, and genetic characteristics, which function as independent variables in several classification models to produce diagnostic predictions. Applied machine learning methods include multinomial logistic regression, random forest classification, and k-nearest Neighbors (KNN). The models are then evaluated based on precision, recall, F1-score, and AUC-ROC on unseen test data. With these machine learning tools, diagnostic predictions can help identify individuals at risk of developing Alzheimer's disease and prompt early treatment. This research could provide valuable insights into early detection and support clinical decision-making, ultimately contributing to improved patient management and care

Prompt Tree: Enhancing Guided Interactions for Accessible Cybersecurity Training

Pavan Subhash, Kavya Nikhita Meda, Chandrabose Nara; Faculty Sponsor: Reshmi Mitra

This research introduces the Prompt Tree framework, a novel method to improve the use of Large Language Models (LLMs) for solving cybersecurity issues. The framework, inspired by the fishbone diagram, provides a structured and visual way to organize prompts. It incorporates key cybersecurity dimensions like threats, vulnerabilities, skills, work roles, and certifications, using sources such as NVD, CVE, and NICE Framework. We conducted a usability study with 51 graduate students demonstrated that the Prompt Tree enhances prompt clarity and LLM response quality in realistic threat scenarios. Participants using the Prompt Tree created more precise prompts, leading to more accurate and informative LLM outputs.The framework's adaptability supports various security tasks and evolving

threats, making it a valuable tool for cybersecurity education and application. This research shows that structured prompts can improve communication between humans and LLMs, making cybersecurity knowledge more accessible.

Cybersecurity Analysis Using Retrieval-Augmented Generation (RAG) based LLMs
Kavya Nikhita Meda, Pavan Subhash, Chandrabose Nara; Faculty Sponsor: Reshmi Mitra

Cybersecurity professionals face challenges in identifying threats, analyzing vulnerabilities, and mapping relevant skills and certifications. Existing solutions often lack real-time intelligence and structured recommendations, leading to inefficient risk management and workforce gaps. This project proposes an advanced cybersecurity knowledge system leveraging Retrieval-Augmented Generation (RAG) to enhance threat intelligence, vulnerability assessment, and skill mapping to the LLM. By integrating FAISS for vector-based retrieval, BM25 for keyword relevance, and Lang Chain for structured response generation, the system ensures accurate and efficient information retrieval. Industry frameworks like MITRE ATTACK, NIST, CIS Controls, and OWASP are incorporated to align recommendations with best practices.

Belonging and Engagement in the Classroom
Sophie Martin; Faculty Sponsor: Shawn Guiling

This project explores the importance of belonging and engagement in the college classroom by combining article research findings with insights from two focus groups consisting of both students and professors. The existing studies show that students who feel connected to their university, supported by professors, and included in classroom discussions are more likely to succeed academically (Maghsoodi et al., 2023). However, traditional participation methods may exclude quieter students (Medaille & Usinger, 2019). Additionally, professors' demeanor plays a key role in shaping student motivation (White et al., 2024). Shane-Simpson et al. (2024) emphasize the importance of professor involvement, especially in online and hybrid courses. This presentation will blend a review of these studies with real-world perspectives from student and professor focus groups. This can offer a deeper understanding of how belonging is experienced in academic settings and potential ways to improve. This project will highlight strategies to create more inclusive and engaging learning environments for all students.

The Effect of Aphasia on Certainty/Uncertainty in Decision-Making

Alison Venus; Faculty Sponsor: Dr Jeremy Heider

A survey investigated the correlations between individuals with aphasia's general self-efficacy, mental and physical health, anxiety, depression, social support, and self-efficacy regarding verbal communication abilities. The survey included components from the General Self-Efficacy Scale (GSE), Short Form-36 Health Survey (SF-36), Hospital Anxiety and Depression Scale (HADS), ENRICHD Social Support Instrument (ESSI), and an adapted form of the GSE that focuses on verbal communication abilities. The data will be collected using a Qualtrics survey completed by clients at the Center for Speech and Hearing who have a previous aphasia diagnosis. The data collected will be used to generate scores for each scale for participants, and the goal of the survey is to study the correlations between these scores. It is hypothesized that aphasia will have a significant correlation with the scores from the adapted GSE that focuses on verbal communication abilities. It is also hypothesized that the GSE will have a significant correlation with the adapted GSE scores. This study is awaiting IRB approval and will be ongoing at the time of SRC presentation.

Sentiment Analysis of Yelp Review Dataset: A Comparative study of Machine Learning Methods
Krishna Thakar; Faculty Sponsors: Dr. Mohamed Abu Sheha, Dr. Emmanuel Thompson

Sentiment analysis involves analyzing text to determine whether the sentiment expressed is positive, negative, or neutral. In the context of online reviews, such as those on Yelp, sentiment analysis helps businesses assess customer satisfaction and identify areas for improvement. Given the large volume of user-generated content, restaurants often struggle to extract actionable insights from feedback, making sentiment analysis an efficient tool for categorizing reviews and highlighting customer concerns. This study focuses on sentiment analysis of Yelp reviews. The main research question is: How can Natural Language Processing (NLP) combined with statistical machine learning methods be applied to classify sentiment in Yelp reviews and provide actionable insights for improving customer satisfaction, service quality, and business performance? The study employed 200,000 Yelp reviews, utilizing NLP approaches - tokenization, stop-word removal, and vectorization. Comparative classification predictive modeling and analysis were done across traditional machine learning (Logistic Regression, SVM, Naïve Bayes, Random Forest), deep learning methods (LSTM, CNN), service quality, address customer complaints, and support positive aspects, eventually improving customer satisfaction and business performance. These findings highlight the potential of

advanced NLP techniques to improve customer satisfaction, enhance service quality and drive business performance.

Exploring Teaching and Learning Strategies for Multilingual Classrooms in Bandarban
Nweli Sain; Faculty Sponsor: Dr. Sarah Dietrich

The aim of this study is to explore teaching and learning strategies using ELT approaches that will lead to creating support and acceptance for heritage language in the multilingual classroom. UESCO's International Literacy Day 2024 theme "Promoting Multilingual Education: Literacy for Mutual Understanding and Peace" promotes heritage language education with a belief that empowering Indigenous communities in their mother tongue, through multilingual education and literacy development, is particularly effective for cognitive, pedagogical, and socio-economic benefits of the indigenous communities. Through this study, the ways to enrich mother-tongue based education in multilingual classrooms will be highlighted with impactful solutions.

The Ethics of Human Brain Organoids
Emilie Torres; Faculty Sponsor: Shawn Guiling

Brain organoids, lab-grown, simplified models of the human brain, are revolutionizing neuroscience by allowing experimental insights into medication efficiency and psychiatric and neurological conditions, such as aggression and lack of impulse control. These neurological advancements allow scientists to study brain function in new ways that were previously impossible. However, with these rapid advancements, there are also ethical concerns regarding the consciousness and sentience of these organoids. If these organoids develop awareness, for example, what are the moral responsibilities of the researchers? This poster analyzes the definition of consciousness, ethical constraints of deliberately modifying brain functions, and the moral implication of experimentation, therefore highlighting the increasing need for ethical guidelines and advocating for a balance between ethical responsibility and innovation.

Antiproliferative Effects of Low-Level Light and Low-Dose Magnetic Nanoparticle Exposure on Human Umbilical Vein Endothelial Cells: A Novel Anti-Angiogenic Strategy in Cancer Therapy
Sagar Kandel, Malsha Nerthasingege Nanayakkara; Faculty Sponsor: Dr Santaneel Ghosh

Angiogenesis—the formation of new blood vessels—is a hallmark of cancer progression, enabling tumors to acquire essential nutrients and oxygen while facilitating metastasis. Endothelial cells, particularly Human Umbilical Vein Endothelial Cells (HUVECs), are central to this process. Inhibiting their proliferation represents a promising therapeutic strategy for suppressing tumor growth and spread. This study explores a novel, non-invasive approach to impair endothelial cell proliferation using the synergistic effect of low-level red light exposure and biocompatible magnetic nanoparticles (MNPs). We hypothesized that this dual treatment could selectively induce apoptosis in HUVECs without causing significant damage to surrounding healthy tissue—an ongoing challenge with traditional therapies that often lead to off-target side effects such as poor wound healing or cardiovascular complications.

Infections in Kidney Patients: A Survival Analysis of Recurrence Times Using Nonparametric and Semiparametric Methods
Abhishek Shrestha; Faculty Sponsors: Dr Emmanuel Thompson, Dr Mohamed Abu Sheha

Recurrent infections in renal patients undergoing portable dialysis present a significant challenge to treatment outcomes. This study investigates time-to-infection data in kidney patients to identify key risk factors associated with both initial and subsequent infection recurrences. Using nonparametric and semiparametric survival analysis techniques, we analyzed temporal patterns of infection recurrence in patients with glomerulonephritis (GN), analgesic nephropathy (AN), polycystic kidney disease (PKD), and other kidney conditions. The dataset included both censored and uncensored observations, with infection occurrence durations ranging from 2 to 562 days. Kaplan-Meier survival curves were constructed to compare recurrence durations between male and female patients, as well as across different disease types. Statistical tests were employed to assess significant differences. Additionally, Cox Proportional Hazards models were applied separately for the first and second recurrence events to identify significant predictors of infection risk. The findings provide valuable insights into the characteristics and factors contributing to infection recurrence. The findings have implications for enhancing patient care, optimizing treatment strategies, and reducing infection-related complications in dialysis patients.

Demographic assessment of habitat quality for the Mississippi Kite in a landscape of energy development
Lucky Atabo; Faculty Sponsor: Dr. Atuo Fidelis

In mixed-grass ecosystems of the central Great Plains, the proliferation of oil infrastructure in wildlife reserves presents a broad-scale threat to several species and wildlife management goals. In this study, we analyzed a decade-long dataset to understand broad- and fine-scale environmental covariates that influences the breeding success and daily nest survival of Mississippi Kites in a landscape of energy development. We conducted daily searches for Kite nests from May to July through systematic inspection of preferred habitats, observation of kite's breeding behavior, and information from other researchers working in the area. At the broad scale, Mississippi kites demonstrated strong resilience to oil-related activities in this system, attaining a breeding success rate of >75%. Nonetheless, the kite occupancy rate was inconsistent, with breeding territories shifting frequently to avoid or reduce the impacts of oilrelated activities. Kites that nested in proximity to oil infrastructure were twice less likely to fledge a chick compared to individuals that bred >100-m away. Albeit the Mississippi Kite has been shown to tolerate a suite of human activity in urban environments, our study suggests a decline in the fitness value of kite territories with increasing proximity to novel disturbances in this landscape. This could explain the poor recruitment and population growth currently experienced in many kite populations.

ThermoKneeHab: An AI-Integrated Smart Brace for Optimized ACL Rehabilitation

Nyasha Anne Ndirwo, Steven Luong, Dan Duong, Beenish Paul, Alyssa Moore; Faculty Sponsor: Dr Jim Mcgill

Anterior cruciate ligament (ACL) injuries require rigorous rehabilitation and usually patients need separate heating pads and cold compression therapy. There is also danger of reinjury if patients overwork the injured leg during the recovery process. Frequent clinical visits increase costs and inconvenience for patients who live in remote areas. ThermoKneeHab is an AI-integrated smart knee brace that seamlessly transitions between heating and cooling therapy depending on the pain level and swelling the patient will be experiencing thereby optimizing recovery without the need for multiple devices. The system incorporates electromyography (EMG) sensors to monitor muscle activation, preventing atrophy and ensuring proper rehabilitation progress. Through Bluetooth-enabled remote monitoring, healthcare providers can track patient recovery in real time, reducing the need for frequent check-ups. Patients also have full control over the device via a mobile app, allowing them to personalize their therapy. This integration of temperature regulation, muscle engagement tracking, and real-time feedback enhances rehabilitation efficiency, lowers costs, and provides greater flexibility for patients. It also frees up the schedules of doctors so that they can tend to other patients. This

device is a groundbreaking advancement in ACL recovery by offering an all-in-one solution that improves patient outcomes while increasing accessibility and convenience.

EEG-Based Biomarker Extraction and Classification for Schizophrenia Diagnosis Using Machine Learning
Jannat Ara Ferdouse Raya; Faculty Sponsor: Octavio Hector Juarez Espinosa

Electroencephalography (EEG) has emerged as a powerful tool for studying neurological disorders, particularly schizophrenia. This study focuses on the extraction and classification of EEG-based biomarkers to distinguish schizophrenia patients from healthy controls. We analyze event-related potential (ERP) data from nine critical EEG channels, leveraging a multi-domain feature extraction approach. A total of 72 features were extracted, spanning time domain (mean, variance, zero-crossing rate, approximate entropy, Hjorth activity) and complexity measures (Higuchi Fractal Dimension, Petrosian Fractal Dimension, Lempel-Ziv Complexity). The extracted features were used to train machine learning models, where a Random Forest classifier achieved high classification accuracy in differentiating schizophrenia patients from controls. Our findings demonstrate the significance of EEG-based biomarkers and highlight the potential of machine learning in clinical diagnostics. Future work will explore deep learning architectures for improved classification. These results contribute to the advancement of AI-driven neurophysiological analysis and could aid in the development of automated diagnostic tools for schizophrenia.

Forage digestibility comparing a bovine environment in vitro and in situ
Lillian M. Gildehaus and Indi S. Braden, PhD; Faculty Sponsor: Kevin M. Sargent, PhD

Understanding the digestibility of different feedstuffs in a ruminant's digestive system is key to creating efficient, cost-effective diets for livestock. This study compares in vitro and in situ digestion methods to provide producers with practical insights for optimizing feed formulations. A variety of forages, grains, and byproducts were tested in different forms, such as pelleted and ground, to assess how processing affects nutrient availability. Before digestion trials, dry matter and ash content were measured. Samples were ground using a Wiley Mill and then placed into detergent bags, with three replicates per feed type and negative controls. In vitro digestibility was evaluated using the ANKOM Daisy Incubator, while in situ digestibility was measured in a 12-year-old cannulated heifer. After incubation, samples were analyzed for Neutral Detergent Fiber (NDF) and Acid

Detergent Fiber (ADF) using the ANKOM fiber analyzer. To provide a broader picture, soil samples were collected to assess forage-growing conditions, and the heifer's vitals were monitored to ensure accurate digestion representation. The findings will highlight how digestibility varies across feed types and testing methods, helping producers select the most effective feed processing techniques to maximize animal performance and operational efficiency.

The Power of Labels: An Exploration of Gender Representation in Eponyms
Jamie Moncheski; Faculty Sponsor: Dr. Sarah Dietrich

This research project explores gender representation in eponyms, words derived from people's names, within medical terms and scientific species names. Eponyms have been a popular form to honor prestigious scientists and medical professionals over the years. To explore potential changes in gender representation over time, data was collected from the First Aid for the USMLE Step 1 study guide (1998 and 2024 editions) and The Audubon Society Field Guide to North American Mammals (1980 and 1996 editions). The study identified eponyms in the indices of these texts and determined the gender of the individuals after which they were named. In the 1998 edition of First Aid for USMLE Step 1, the data sample showed that 93% of the eponyms were named after males, and only 7% after females. In the 2024 edition of the same book, 98% of the eponyms were named after males and only 2% after females. All editions of The Audubon Society Field Guide to North American Mammals had no eponyms named after females. The research concludes that gender disparity exists in eponyms across fields, and has only remained the same over time, potentially reflecting historical biases in the recognition of women's contributions in these fields.

The Impact of Screen Time on Children's Anxiety and Literacy
Caitlyn Slaughter, Jackson Lee Haertling; Faculty Sponsor: Dr Paige Northern

The currently proposed study will examine the impact of screen time on young children's anxiety and literacy development, considering influences such as parental screen time and environmental factors. Participants will consist of kindergarten students from an elementary school in Southeast Missouri, with data collected over three months. Parents will report both their own and their children's screen time and assess anxiety using the Preschool Anxiety Scale (PAS); during this, teachers will evaluate literacy skills using the Dynamic Indicators of Basic Early Learning (DIBEL) test. The study hypothesizes a positive correlation between screen time and anxiety levels, and a negative correlation between screen time and literacy skills. Additionally, the study will explore the relationship between parental and child screen time. The findings will hopefully contribute to

understanding how screen use influences developmental outcomes, highlighting the need for balanced screen time and supportive environments for healthy childhood development.

Preliminary Study of the Synthesis and Electrochemical Properties of Naphthoquinone Derivatives with Potential Anti-Bacterial Properties and Anti-Parasitic Properties
S M Tahmid, Fariha Alam Bushra; Faculty Sponsors: Dr Sajan Silwal, Dr Shariful Islam

Many quinone derivatives are known to have biological properties. We recently synthesized a series of naphthoquinone derivatives possessing different functional groups including amines, amides, carbamates, and urea. Some of these derivatives are known to possess antiparasitic properties, the mechanism of which is believed to involve inhibition of the electrochemical potential of the Leishmania mitochondrion. Because of this, the redox properties of these derivatives were studied in dimethyl sulfoxide (DMSO) using cyclic voltammetry. Electrochemical reduction occurs in two successive, reversible (or quasi-reversible), one-electron steps. The first step involves formation of a radical anion: $Q + e- --> Q \cdot-$. The relationships between molecular structure, reduction potential, and biological activity were investigated. The antibacterial properties of the naphthoquinone derivatives on Staphylococcus aureus wild type were studied by application of antibiotic discs on a culture of Staphylococcus aureus and the zone of inhibition measured. The antibacterial properties of the naphthoquinone derivatives are set to be replicated with different strains of Staphylococcus aureus and Pseudomonas aeruginosa.

Nest site selection and breeding success of the Red-winged Blackbird (Agelaius phoeniceus) at the Miller Reserve in Southeast Missouri
Christopher Kirchhofer, Lucky Atabo; Faculty Sponsor: Dr Fidel Atuo

Land conversion for agriculture and urbanization has significantly altered and reduced the vast networks of historic wetlands and bottomland hardwood forests of the Lower Mississippi Alluvial Basin. Restoration efforts require monitoring of processes and species indicative of the integrity of this system. Here, we assessed restoration efforts including tree planting, natural vegetation recovery, and water management on nest-site selection and breeding success of a wetland associated bird — the Red-winged Blackbird (Agelaius phoeniceus) at the Miller Reserve in Southeast Missouri. During the 2024 breeding season (March – July), we segmented the reserve into blocks of 20-m × 20-m and searched for Red-winged

Blackbird nests by systemically inspecting all grass, shrubs, and trees in each block. Red-winged Blackbirds nested 76% of the time on vegetation directly above water bodies (e.g., swamps) or less than 10-m away. Breeding was mostly successful with 60% of nesting attempts fledging at least one chick. Reproductive success was significantly improved by the presence of conspecific concurrent nesters with mean nearest neighbor distance of 23-m compared to >40-m for failed nests. Threats to breeding success were mainly from reptilian predation, brood-parasitism, and adverse weather conditions (i.e., storms). Nest predation accounted for ~60% of all failed nests, while broodparasitism and windstorms accounted for 20% and 15% respectively. Further, all recorded nests were on native vegetation and nest success increased with distance away from the edges suggesting a suggesting avoidance of non-native species associated with edges on the landscape. Overall, our study suggests that habitat restoration effort on previously degraded agricultural lands is possible and relevant to reestablishing and improving bottomland hardwood forests cover in the Lower Mississippi Alluvial Basin.

Navigating Social Media Crisis: A Lesson From September 13-16, 2024
Emilie Torres; Faculty Sponsor: Michelle Kilburn

The rapid advancements in social media threats against schools has generated concerns about their impact on trust, safety, and the reputations of these institutions. While the majority of threats turn out to be hoaxes, their rapid spread creates a burden in law enforcement resources, distrust in the community, and forces institutions to close, intensifying student anxiety. In response to these threats, schools have increased the presence of School Resource Officers (SROs), created threat assessment protocols, and have made use of advancing technology to monitor potential threats. However, ethical concerns about student privacy, extreme disciplinary actions, and over policing along with balancing First Amendment rights with the safety of the public can become overwhelming. This presentation analyzes the social media threats that took place September 13-16, 2024, studying crisis communication strategies, gaps in legal policy, and the communities reactions. Through observing current school protocols, this presentation provides recommendations to help schools better navigate social media threats and increase the safety of their students.

THE ASSESSMENT OF LIGHT POLLUTION ON SEMO'S CAMPUS
Brianna Mills; Faculty Sponsor: Dr. Murphy

The purpose of this project is to measure the night brightness levels at different points around SEMO's campus. The main objectives of my project are to gain a

better understanding of light pollution across campus, and brainstorm potential solutions that could reduce light pollution on campus, while keeping student safety and needs in mind. To take measurements, a Sky Quality Meter (SQM) is held up to the sky at 8 locations across campus. I chose to analyze data by comparing the averages for each site. All measurements we have taken on SEMO's campus have been 19 mag/arcsec2 or below, showing that even our darkest areas are still bright compared to higher readings that may be found at places like National Parks. The brightness levels on SEMO's campus impact both the student and natural environments. There is still a large amount of research that can be done regarding light pollution and ALAN on SEMO's campus and this data could then be used to identify other areas of study.

A Survey Study of Allied Professionals' Knowledge of a Speech-Language Pathologist's Scope of Practice
Julia Riley, Abbey Ernst, Christine Nall; Faculty Sponsor: Dr. Susan Fulton

Speech-language pathologists (SLPs) address a broad range of issues, including speech, language, social and cognitive communication, and swallowing disorders. Despite their wide scope of practice, many aspects of their role are often misunderstood by other professionals, impacting interdisciplinary collaboration. Existing research highlights limited awareness of SLP responsibilities among allied professionals. This study investigates the knowledge of various professionals regarding the SLP scope of practice. An online survey with 16 questions was distributed via social media and email to professionals such as teachers, occupational and physical therapists, nurses, physicians, respiratory therapists, dietitians, and audiologists. Participants working in diverse healthcare and educational settings completed the survey, which included multiple-choice, yes/no, and scale-based questions. Statistical analysis was used to assess their understanding of SLP roles. Preliminary findings indicate an informational gap regarding the comprehensive nature of SLP practice. This highlights the need to educate other professionals on the full scope of SLP responsibilities, aiming to improve interdisciplinary collaboration, enhance service delivery, and ensure accurate referrals.

Augmentative and Alternative Education: Addressing the Knowledge Gap in the College of Education, Health, and Human Studies
Kristina Allen, Bailey Helbling, Hanna Kirkiewicz, Kyla Raftery; Faculty Sponsor: Misty Tilmon, EdD, CCC-SLP

Augmentative and alternative communication (AAC) allows individuals to communicate across environments. Successful AAC implementation requires collaboration between a variety of disciplines (Hetzroni & Ne'eman, 2023; Ramirez & Lynch, 2024). Lack of pre-professional education about AAC poses risks to effective care for individuals with complex communication needs (CCN) who use AAC (Costigan & Light, 2010; Finke & Light, 2008). The purpose of this study was to examine the effects of AAC education on pre-professional students' (a) perceived knowledge of AAC, (b) confidence in preparedness to communicate with individuals who use AAC, and (c) likelihood to collaborate with other professionals regarding AAC. Participants included approximately 160 undergraduate and graduate students enrolled in courses in the College of Education, Health, and Human Studies at Southeast Missouri State University. Participants completed a pre- and post- Qualtrics questionnaire pertaining to perceived knowledge, levels of confidence, and likeliness of future collaboration. Participants utilized a rating method for 10 statements using a visual analog scale with a range of 0-100 (0 - lowest; 100 - highest). Researchers presented a 10-minute educational video, showed video examples of individuals utilizing AAC, and provided hands-on experiences with AAC devices. Results and conclusions will be available at the time of presentation

Reproductive Cycle of Male Notoph Thalmus viridescens from North Carolina

Margaret Martinez, Dustin Siegel, Hayleigh Locke, Johnathan "JT" Gruber, Mallory Kist, Kenzie M. Stemp, Samantha D. Trame, Jon M. Davenport; Faculty Sponsor: Dr. Dustin Siegel

The reproductive cycle of male Notophthalmus viridescens from a high-altitude population in North Carolina, U.S.A. was outlined through histological examination of testes, genital ducts, and secondary sexual characteristics (genial glands and collecting ducts of the kidneys). Similar to other populations of N. viridescens, proliferation of spermatogonia was a spring event with the meiotic stages of spermatogenesis restricted to the months of June through August. Spermiation immediately followed in September with sperm filling the Wolffian ducts. Spermiation continued until the following summer where mature sperm from the previous summer could still be found in cranial portions of testes while the more caudal portions of testes were undergoing meiosis to produce sperm for the subsequent season. This overlap of spermatogenic cycles was not observed in studies of N. viridescens from other populations. Sperm were found in Wolffian ducts until the following July, indicating potential for mating from September to July. Secretory granules filled epithelial cells of genial glands and collecting ducts

from September to July, providing support for this prolonged potential mating season. In other populations of N. viridescens, secondary sexual characteristics were atrophied for a longer window of time, at minimum July through August.

Investigating the Origins of Stuttering Beliefs: A Comparison between Educators and SLPs
Shelby Rall-Jokerst, Cierra Adkins, Cassidy Hughes; Faculty Sponsor: Dr Samantha Washington

This presentation explores where perceptions about stuttering have developed amongst educators, speech-language pathologists (SLPs), and college students. The purpose of the study is to reveal how the perceptions of stuttering and people who stutter develop among these individuals. Researchers aimed to determine the factors contributing to the perceptions of stuttering and current stuttering resources, identify if the perceptions of stuttering are consistent among the SLPs and educators, and identify assessment and treatment methods commonly used by SLPs. Two separate surveys were administered through the Qualtrics database. Researchers recruited participants for the survey through social media platforms, email, and by utilizing flyers. The surveys addressed the above-mentioned individuals' beliefs, knowledge, and treatment of stuttering. SLPs and educators additionally completed questions examining their perceptions regarding classroom accommodations, the referral process, treatment methods, training, and preparedness in supporting students who stutter. Data collection is ongoing. Results and conclusions will be presented at the poster presentation.

Mapping and Locating Scott County Fire Hydrants to Enhance Fire Response Times: A GIS-Based Approach to Improve Efficiency and Safety
Deonty Eastmon, Alec Nichols; Faculty Sponsor: Dr Man Hwang

This project was created and pursued in the interest of aiding Scott County, Missouri's first responders by locating and assessing fire hydrants, preferred routes, firehouse capability, and levels of risk. The primary purpose is to pursue and surpass the NFPA 1710 standard, which sets a benchmark of 5 minutes and 20 seconds for fire response (including turnout and travel time) by helping first responders become more spatially aware of their area, their tools and resources, and their own proximal impact on their community.

Multi Interval Mixed Integer Linear Programming for Microgrid Energy Management

Samir Das, Faculty Sponsor: Md Rasheduzzaman PhD

This paper presents a mixed integer linear programming (MILP) formulation for microgrid energy management over a 24-hour horizon (1-hour intervals). The system consists of solar, wind, diesel, and battery storage. All fixed numbers (capacities and cost factors) are defined as parameters using abbreviated symbols to enhance clarity and flexibility. The load profile remains unchanged from our original study. A pseudocode algorithm and a sample table of profiles are also provided.

Exploration of Novel Treatments for Cytauxzoonosis: A Literature Review
Margaret Martinez; Faculty Sponsor: Dr. Dustin Siegel

Cytauxzoonosis is a rapidly developing and severe disease in domestic felids caused by Cytauxzoon felis (C. felis), an apicomplexan hemoprotozoa closely related to Theileria species, which is transmitted by the Lone Star tick (Amblyomma americanum). Currently, C. felis cannot be cultured due to its complex life cycle. For the purpose of this paper, hypotheses drawn will be based on current literature on C. felis and similar parasites like Plasmodium falciparum (P. falciparum) and Theileria and Babesia species. This assumption can be supported by the similar life cycles, anatomy, and phylogeny of each pathogen (P. falciparum and C. felis specifically). Despite the inability to culture this parasite, there have been advancements made in treatment, raising the survival rate from 0-3% to 60% in domestic felids. Atovaquone and Azithromycin (AA) is the top choice of treatment where Atovaquone targets the cytochrome b (cytb) mitochondrial complexes of the C. felis. Still, this treatment can fail due to the high variability of the cytb genotypes, having cytb1 showing correlation between survival and treatment with A&A. And, despite successful treatment, chronic parasitemia becomes present, increasing the risk of infection in naïve domestic felids via transmission through carrier felids and vector ticks. Domestic felids that are carriers have asexual reproduction occurring in their red blood cells (RBCs) where intraerythrocytic piroplasms can be identified. Although some antimalarial drugs, quinolines (such as Chloroquine and Quinine), are safe for cats and target apicomplexan parasites, they target malaria-specific biologic activity or are used for other diseases, and/or have adverse effects. Chloroquine prevents toxic heme polymerization and Quinine used for arterial fibrillation (namely, in dogs and horses) and has adverse effects in cats; they do not target the broad intraerythrocytic or schizogonic stages that can be seen in both C. felis and P. falciparum. Furthermore, multiple studies have shown that Theileria targeting drugs such as Buparvaquone, Parvaquone, Sodium Thiacetarsamide,

Trimethoprim/Sulfadiazine, Diminazene aceturate, and Imidocarb dipropionate have less or no success in treatment. This brings up the use of quinazolines as a potential treatment for both C. felis and/or chronic parasitemia thereafter. Multiple studies have shown that alkaloid quinazolines, specifically Vasicine (its metabolites and modified compounds), excellently inhibit growth off P. falciparum. Due to economic feasibility, safety, accessibility, and versatility, the compound Vasicine and its derivatives and modified compounds have been chosen as the focus of this paper.

Constructed Wetland at the David M. Barton Agriculture Research Center: A 2-Year Ecological Progress Review
Graysen Johnston; Faculty Sponsor: Dr. Michael Aide, Dr. Samantha Siemers

The purpose of this research was to revisit the constructed wetland project at the David M. Barton Agriculture Research Center. This was accomplished by comparing measurements of key polluting nutrients in the upland cattle pasture to those in the wetland area. Also compared were polluting nutrient levels within the wetland waters themselves. The levels between the upland pasture and the wetland soil were remarkably similar to one another. However, the water nutrient levels were lower than would be expected for the runoff present. This may indicate beneficial effects from dilution and nutrient uptake, but further development and study will be necessary in the coming years to verify any beneficial effects.

Preliminary Study of the Synthesis and Electrochemical Properties of Amines and Amides Derivatives of Naphthoquinone with Potential Anti-Parasitic Properties.
Tsunami Briseno-Mora; Faculty Sponsor: Dr Sajan Silwal, Dr Philip Crawford

Many Naphthoquinone derivatives are known to have biological properties. Some of them have been found to carry antiparasitic properties against Leishmania. The antiparasitic nature of these Naphthoquinone are believed to involve inhibition of the electrochemical potential of the mitochondrion of the parasite. A series of naphthoquinone derivatives especially possessing functional groups such as amines, and amides were synthesized, and the redox properties of these derivatives were studied in polar aprotic solvent such as dimethyl sulfoxide (DMSO) using cyclic voltammetry. Electrochemical reduction in the amine derivatives has shown that this reduction occurs in two successive, reversible (or quasi-reversible), one-electron steps. The first step involves formation of a radical anion. The relationships between molecular structure, reduction potential, and biological activity were investigated.

Battery Recycling on Campus
Sierra Brown; Faculty Sponsor: Dr. Rachel Morgan Theall

Recycling batteries helps reduce waste and protects the environment from the harmful chemicals they contain, which can leach into the soil and water as they degrade in landfills. This presentation will focus on the components of batteries and how they can be broken down for reuse, and how the recovered materials can be repurposed for products beyond making new batteries. Additionally, the study includes an analysis of battery usage on campus in collaboration with Facilities Management. Call2Recycle boxes were placed throughout the College of STEM to encourage battery recycling among students and faculty, and data on collected batteries was obtained from Facilities Management to assess the impact SEMO can have on battery recycling.

Implementation of Oral Care Among Long-term Facilities in Various States
Emma Newell, Macee Hoskins; Faculty Sponsor: Misty Tilmon, EdD, CCC-SLP

The United States has over 16,000 regulated nursing homes, providing approximately 1.67 million certified long-term care beds (Foiles & Lapane, 2020). As the aging population continues to grow, particularly among individuals over 80, ensuring proper oral health care in long-term care facilities is essential. Poor oral health has been linked to systemic diseases, pain, and increased agitation, particularly in individuals with dementia (Kistler et al., 2021). Despite its critical role in overall health, oral care in long-term care settings is often inconsistent due to various systemic barriers, including resource limitations and inadequate monitoring. This study examines oral care practices in long-term care facilities, focusing on existing protocols, oversight measures, and challenges to implementation. Researchers recruited facilities across Missouri, Illinois, Kentucky, and Tennessee and administered an anonymous Qualtrics survey to assess oral care protocols and available resources. Participants were also given the option to take part in a follow-up Zoom interview to discuss barriers and potential improvements in oral health care implementation. Findings from this study will provide insight into enhancing oral health practices in long-term care settings, reinforcing their essential role in residents' well-being and quality of life.

Physician Assisted Suicide for Psychiatric Suffering is Morally Permissible
Savannah Greenwood; Faculty Sponsor: Bambi Robinson

Physician assisted suicide (PAS) on the basis of mental health has become a topic of growing popularity in recent years. PAS is a medical procedure which allows for a patient who is suffering from a chronic mental illness to seek assistance from a medical professional in taking their own life. My research aims to assess the arguments both for and against PAS (for the means of mental health), and ultimately finds that the act is morally permissible. This paper explores the role of autonomy in the context of PAS and in relation to the consideration of the effect PAS has on the people who surround its patients (family, friends, etc.). Through assessing autonomy, safety considerations, and the moral right to die, this paper will ultimately answer the following moral question: Is PAS a morally permissible option for people struggling with mental illness?

The Benefits of TimelyCare
Michael Mugan; Faculty Sponsor: Dr. Slavica Kodish

Mental Health has been an ongoing issue for many college students, and even more so for students competing in intercollegiate athletics. In 2017, the TimelyCare app was created with the purpose of making it easier for college students and student athletes to obtain mental health assistance. In my paper, I apply the interpretive method (see LeGreco et al., 2024) with the purpose of researching the potential of the app to help student athletes. I start by analyzing information provided on the TimelyCare website that includes a description of various tools and options and their benefits. I then take a look at primary research about the productivity of the app and take it into consideration when ultimately establishing the connection between the TimelyCare app and the mental well-being of student athletes. My research offers valuable insights into what the app can accomplish and whether it can be a reliable option for studentathletes in the coming years.

Into the Woods Musical Themes
Genevieve Moore; Faculty Sponsor: Dr Josh Harvey

Stephen Sondheim's Into the Woods is widely celebrated as one of his greatest works, blending the lives of beloved Brothers Grimm fairy tale characters with a new narrative centered on a Baker and his wife as they embark on quests to fulfill their wishes. The musical is rich with recurring motifs, each symbolizing key objects, themes, or ideas within the story. While some motifs, such as the "Bean Theme" and the "Learning Motif," have been extensively explored, others remain less defined. This presentation aims to identify and analyze additional motifs, including the Assured Interval, The Prince Charming (v.), Wishes (are children), and Milky White's melody. By linking these motifs to their respective objects or

themes, the presentation provides actors, directors, and other creatives with a deeper understanding of Sondheim's intricate musical storytelling, enhancing the overall production experience.

Visualizing Chaos with Data Acquisition Devices
Nicholas Dietrich; Faculty Sponsor: Dr. Joe Murphy

This project explores the non-linear behavior of a sinusoidally-driven resistor-inductordiode (RLD) circuit. We designed and prototyped the circuit using analog techniques and then developed a digital acquisition (DAQ) system in National Instruments' LabVIEW to collect and analyze voltage levels at various points in the circuit. This circuit is particularly interesting because it can exhibit chaotic behavior due to the binary nature of the diodes' forward and reverse bias states. When the system is driven at low voltage and modulated at specific frequencies, it does not have enough time to return to its reverse bias equilibrium. As a result, each cycle becomes dependent on the previous one. To analyze this behavior, Poincaré sections will be used to show how the phase space evolves as the period doubles. Additionally, a bifurcation diagram will be used to illustrate the points at which period doubling occurs, eventually leading to chaos in the system. While this chaotic behavior may seem artificial, it is found in many real-world systems, such as turbulent fluid flow or the dynamics of aviation, making this investigation relevant beyond the lab.

A New Purview of the Self
Kale Moneyhun; Faculty Sponsor: Dr. Bambi Robinson

The modern world offers avenues to answers for questions to the old question of personal identity – in this paper I will create a synthesis of the metaphysics of the mind vis-à-vis Jerry Fodor's concept of tokenism with the theory of personal identity. Previous research into the topic of personal identity consistently butted up against the issue of surmounting critiques the notion that that there can even be a self that one can be associated with over time. The primary notion that I will respond to is that of David Hume's position that there can be no notion of personal identity which I answer through noting an intricate, unique process of cognition that develops alongside an individual that can steadfastly be identifiable as that individual. Some of the major findings during the unfolding of the argument was the manner in which the definitions of the terms 'mind' and 'self' carry baggage from older views that bear down on how such concepts are disputed despite how the conversation around concepts that have moved through antiquated times have moved beyond their initial uses without a larger understanding moving with them.

Daguerreotyping with Antique Cameras
Matthew Smith; Faculty Sponsor: Dr. Rachel Morgan Theall, Dr. Marcus Bond

Daguerreotypes are the oldest method for capturing an image. This project aims to revive and preserve both the technology and the underlying scientific principles of daguerreotyping. Daguerreotype photography involves exposing a chemically prepared plate of metal to a lighted image using a camera to focus and align the image on the plate and to protect the plate when not in use. Plate preparation involves electrochemical and mechanical techniques to create a smooth surface that will result in a clear image. Presented here will be a narrative of the project, various chemical reactions performed, and images obtained of the work.

Grammar Error Correction Techniques in English Learners' Writing
Nguyen Anh Huy Pham; Faculty Sponsor: Dr Irina Ustinova

This study examines the comparative effectiveness of grammar error correction techniques for English language learners, with a specific focus on repetition and explanation techniques, alongside the translanguaging approach. DeKeyser's (1995) findings show explicit instruction groups significantly outperforming implicit learning groups, while student preference data from Amrhein and Nassaji (2010) and Irwin (2017) indicate strong learner preference for explanatory feedback. The research further establishes that explanation-based correction techniques yield superior outcomes compared to repetition-based methods, and that translanguaging enhances grammar error correction by allowing students to process concepts in both first language (L1) and second language (L2). Translanguaging approach provides a complementary perspective that addresses conceptual understanding of grammatical errors. This secondary research has significant implications for English language teaching in Vietnam, suggesting that explanation-based techniques combined with strategic use of L1 may provide optimal results for Vietnamese learners of English.

The Effectiveness of Teaching Pronunciation Techniques for English Language Learners
Duc Huy Nguyen; Faculty Sponsor: Dr Irina Ustinova

English language learners (ELLs) often face difficulties distinguishing sounds that do not exist in their native language, sounds that are similar but not identical between their native and second languages, or sounds that they tend to overlook due to habitual speech patterns. This study aims to investigate the effectiveness of

four pronunciation teaching techniques: the Imitative Pronunciation technique (IPT), Repetition technique (RT), Minimal Pairs technique (MPT), and Dubbing technique (DT) in helping English language learners (ELLs) improve their pronunciation skills. Among the four techniques reviewed, Khaliatun and Ana (2023) indicated that the IPT is the most suitable technique for improving ELLs' pronunciation skills. Furthermore, ELLs can combine these techniques to improve their pronunciation, addressing the specific challenges they face due to phonological differences between their native language and English. As a result, they can achieve effective communication in English.

Modeling the Force of Mortality in the USA and Japan Using the Gompertz Law: A Comparative Study
Deepshikha Karki; Faculty Sponsor: Dr. Emmanuel Thompson

The present study examines the age pattern of the force of mortality in the United States and Japan. It focuses on age in single years from 25 to 90, using mortality data for males and females in 2022, sourced from the Human Mortality Database. The Gompertz Law of mortality is applied using the method of least squares to model and smooth the crude force of mortality rates. Chi-square goodness-of-fit tests are employed to assess whether the Gompertz-adjusted rates accurately represent the underlying mortality data for both countries and genders. The results reveal striking differences in the age-specific force of mortality between the USA and Japan, offering a deeper understanding of the demographic and health factors shaping mortality patterns in these nations.

The Permissibility of Reproduction Among Individuals with Down Syndrome
Jacquelynn Moungowoolford; Faculty Sponsor: Dr Bambi Robinson

The reproductive rights of people with Down syndrome are very complicated when it comes to medical, ethical, and philosophical considerations. As medical advancements extend the life expectancy and quality of life for individuals with Down syndrome, a lot of questions about their autonomy and capability to parent become more important . This abstract looks at the permissibility of reproduction among these individuals with Down syndrome when we consider certain things like, medical risks, moral codes, and philosophical theories. When we take a look at this medically people with Down syndrome have to face a lot of reproductive challenges that include reduced fertility, heightened risks during pregnancy, and an increased likelihood of passing the condition to offspring. Cognitive impairments are also important because they may also impact their ability to independently parent, strong familial and social support systems. When we look at this ethically

the principle of autonomy supports their reproductive rights, but there are a lot of concerns when it comes to informed consent and the well-being of their future children. Consequentialist question whether the potential burdens on the child, family, and society can outweigh the rights of the individual to reproduce. Also deontological ethics highlights their rights to parenthood, despite of the external consequences. The research examines how these medical and ethical can help shape discussions on the permissibility of reproduction among people with Down syndrome. Debates about this emphasizes the need for individualized assessments that can balance reproductive rights, medical realities, and ethical responsibilities while also ensuring that everyone will receive the necessary support to make informed reproductive decisions.

The Marxist View of "The Cask of Amontillado" Paralleled by New Historicism
Arin Moore; Faculty Sponsor: Jonathan Hayes

"The Cask of Amontillado" by Edgar Allen Poe can be viewed through the lenses of Marxist criticism and New Historicism which provides a deeper understanding of the class relations of the narrative. Looking at the short story through these lenses offers an understanding of class and wealth that would otherwise not be considered. Poe lived his life in the working class, which according to Marxist theory, informed the way he wrote class relations in the narrative. Furthermore, when applying New Historicism one can analyze how the time period in which Poe lived influenced his writing. Both critical lenses offer an insight into Poe's understanding of the socioeconomic relationships of his time period while also showcasing the underlying meanings of the narrative.

Does Comfort Level of Lightning Affect Test Performance?
Joshua Haugh, Maddie Bell, Lilia Rushing; Faculty Sponsor: Dr Jeremy Heider

Our study examined how different types of lighting could affect the way people feel and induce feelings of calmness. Comfort level due to the type of lighting could impact learning and affect test-taking, as a relationship has been found between lighting and alertness (Mu, 2022). We hypothesized that with calmer lighting students would be more relaxed and score better on an academic test compared to a condition of fluorescent lighting. After providing informed consent, participants were randomly assigned to one of two lighting conditions within our computer lab: overhead fluorescent lighting or a dimmer lamplit environment. Participants were assigned to a computer and began the procedure via Qualtrics. Testing began with a 20-minute video lecture about tarantulas, which included

vocabulary terms and definitions. Afterwards, participants completed a memory flush by typing the alphabet backwards twice. Participants then took a 30-question test over the lecture and had 30 minutes to complete it. They were then asked demographic questions and how comfortable they felt in the experimental room. Participants were given a debriefing form and thanked for participating. Results showed no significant difference in scores between lighting conditions, showing that using different types of lighting may have no effect on learning

Persistence and Resilience in New Incoming University Psychology Majors
Veronica Heinen, Laci Tallo, Savannah Baker, Sophie Schupp, Lawayne Sullivan, Brendan Palmisano, Nora Craft, Annika Henson, Sophie Martin; Faculty Sponsor: Dr. Shawn Guiling

Retention of current students is important as it is the University's goal to provide students with skills to support future research and learning as well as address needs in the community. First year college students are often seeking a place where they feel they belong (Cole et al., 2019). However, their level of psychological distress when transitioning into their first year of college may impeded that search for belonging (Jeong et al., 2024). Understanding the emotional and academic needs of these students is invaluable to retaining them. The present study is designed to better identify and understand new incoming psychology major student needs or barriers to learning and to establish better communication between students and faculty. Participants will complete self-esteem, engagement, mental health, and resilience questionnaires at the beginning and end of the semester. Throughout the semester, participants will engage in check-in activities designed to build student-faculty rapport and foster a sense of belonging and genuine care about the student as a person (Gano-Overway et al., 2009). These check-in activities will be conducted at the beginning, middle, and end of the semester. Implications for program development to enhance this process at the departmental level will be discussed.

Music and Concentration for Memory
Cadrian Hutsell; Faculty Sponsor: Dr Nicolas Wilkins

Music has inspired humans for all recorded history. Many people listen to music on a daily basis and might question how music affects their lives. The current research examines one of these life aspects that may be enhanced, learning. Previous research on the subject has led to mixed results (Huang, Shih, 2011). Thus, the current research examines if different genres of music influence learning of a list of words. Participants will be assigned to one of four groups based on the type of

music playing during study (Rock, Pop, Classical, No Music). After the study phase, all students will attempt to recall the list of words without music. Results may hold particular importance to students, who are always looking for ways to improve the efficiency of their studies.

Stock Market Forecasting: Leveraging hybrid LSTM and Machine Learning for Enhanced Prediction Accuracy
Noor Jahan Jedne, Sajol Sheikh, Omi Evance Rozario; Faculty Sponsor: Dr. Ihsan Ali

Stock market prediction is a challenging task due to market volatility and the numerous factors influencing stock prices. This study focuses on predicting stock prices using hybrid deep learning and machine learning frameworks, specifically CNN-LSTM and LSTM-XGBoost models. The research integrates Convolutional Neural Networks (CNNs) with LSTM to capture both short-term price patterns and long-term dependencies, while LSTM-XGBoost leverages LSTM's sequential learning capabilities with XGBoost's ensemble learning for improved predictive performance. By utilizing datasets from sources like Kaggle, Yahoo, and GitHub, and applying techniques such as moving averages and candlestick notations, the study aims to achieve high-accuracy stock price forecasting for companies like Amazon, Google, Microsoft, Facebook, and Apple. The results show that hybrid models outperform standalone LSTM, with CNN-LSTM excelling in time-series trends and LSTM-XGBoost refining prediction robustness through structured data analysis. The study concludes that combining deep learning and machine learning techniques enhances stock price predictions, providing investors with more reliable insights. Future work aims to further optimize accuracy, expand datasets, and explore transformer-based hybrid models for even more precise financial forecasting

Optimizing Seed Yield in C. sativa: Impacts of Photoperiod and Pot Size on Growth Dynamics
Gant Gibson; Faculty Sponsor: Dr Michael Gerau

For millennia the crop Cannabis sativa, has been cultivated as a food, textile, and medicine; however, its prohibition has created significant gaps in cultivation knowledge. This study aims to optimize per-plant and per-square-foot seed yields of C. sativa by investigating effects of photoperiod and pot size on two hemp lines: Golden Redwood and Blue Kross. Four growing tents were used, two for each hemp line. Blue Kross was tested using 4-inch and 6-inch pots. While Golden Redwood was tested with 18-hour and 24-hour photoperiods. Seed yields were

recorded and compared per-plant and per-tent. In pot size trials, the 4-in pots yielded a total of 56.2 g, mean of 3.1 g, and variance of 2.99 g2; 6-in pots yielded a total of 52.3 g, mean of 5.2 g, and variance of 9.71 g2. For photoperiod trials,18-hour yielded a total of 45.9 g, mean of 5.74 g, and variance of 5.02 g2; 24-hour yielded a total of 47.3 g, mean of 6.76 g, and variance of 4.19 g2. Results indicate 4-inch pots, and 24-hour photoperiod provided a higher yield, mean, and lower variance. Providing valuable data for optimizing breeding and seed production efficiency in C. sativa cultivation.

Impacts of Aquatic Subsidies on Upper Levels of Terrestrial Food Webs
Emily Hudgins; Faculty Sponsor: Dr Kelley Fritz

Ecosystems are connected through the transfer of resources known as subsidies. Aquatic-derived long-chain polyunsaturated fatty acids (LC-PUFAs) are essential nutrients produced in aquatic ecosystems that must cross ecosystem boundaries to enter terrestrial food webs. This project investigates how aquatic-derived LC-PUFA subsidies present in terrestrial food webs influence the immune function in upper-level trophic consumers. The species of focus is the trap-nesting wasp Trypoxylon lactitarse, which specializes in paralyzing and provisioning orb-weaving spiders for their larvae. The immune response of T. lactitarse will be measured through encapsulation and phenoloxidase activity to determine if aquatic-derived fatty acids enhance immune function. This study will be the first to examine LC-PUFA subsidies at a trophic level beyond the predators directly consuming aquatic prey and will provide insight into how LC-PUFAs shape terrestrial food webs.

Techniques for Development of Latent Fingerprints
Delaynie Spies; Faculty Sponsor: Dr. Jim McGill

Latent fingerprints are a heavily relied upon form of evidence in many criminal cases. No two fingerprints are identical, however many can look very similar if a print lifted from a crime scene does not have enough distinguishing characteristics, which can be caused by method of xxx or by environmental degradation. Oil Red O is a lipophilic reagent that has been used in some cases to dye latent prints a dark red color to make them more visible. Another method that has been used to some success has been superglue fuming, a process that dusts fingerprints white. Presented will be our attempts to combine both methods in series to create a more visible fingerprint profile on latent prints that have been degraded.

Nurses' Knowledge of Aphasia: Implications for Patient Care and Communication
Sophia Bussard, Savannah Colbert, Regan Kelly; Faculty Sponsor: Dr. Misty Tilmon

This study examined communication strategies used by nurses for patient care and education nurses have regarding aphasia. The goal of this study was to explore nurses' perceived knowledge of aphasia, and the interactions nurses have with aphasic patients when caring for them and managing their health. Participants were recruited on the Facebook platform via dedicated nursing Facebook groups. Participants first consented and confirmed they were eighteen or older then completed an online survey via Qualtrics consisting of 11 questions. Questions included: job title, age, years practiced as a nurse, familiarity with the term aphasia, explaining what the term aphasia means, if they feel they are able to effectively communicate with a person with aphasia, how they discuss care with aphasic patients who are unable to express themselves, how they interacted with aphasic individuals, if they were able to communicate and overall how the interaction went. Participants were also asked if they were interested in a further Zoom interview. Further resources were linked within the survey to provide additional information and education about aphasia. Participants remain anonymous unless self-identified on Zoom. Only the research team received access to stored videos and survey results. Data collection is ongoing.

Feeding the Future
Amariss Mueller, Mia Ogle; Faculty Sponsor: Dr John Kraemer

We partnered with Bootheel Babies and Families, a local non-profit that is currently leading a community-based initiative to address food insecurity Mississippi County and its surrounding areas. A survey was conducted, and our work in this effort was to compile and analyze the raw data. The data collected included demographic information, food availability, dietary habits, and barriers to accessing nutritious food. Analysis was conducted to identify existing efforts to reduce food insecurity, assess levels of community engagement, and determine community needs and perceptions of the current food security landscape. This analysis will be used to identify service gaps, needs for technical assistance, and underserved communities. Ultimately, this research will contribute to the enhancement of community-based interventions and the development of more effective and inclusive food assistance programs.

Is the Gift of Therapy Enough?

Sabrina Stavely, Faculty Sponsor: Dr Shawn Forrest Guiling

As therapists build trust with clients, some may want to express gratitude through gift-giving. While well-intentioned, these gestures can blur professional boundaries, especially when accepted by the mental health counselor, potentially leading to ill-intentioned exchanges. Knox et al. (2003) indicates that such problematic gifts are often given during emotionally vulnerable times and may have ulterior motives behind the gesture. This creates a power imbalance, with clients potentially pressuring therapists to accept gifts by exploiting emotional vulnerabilities. Gerig (2004) highlights that many mental health professionals have mixed emotions when receiving gifts, noting the lack of training on this issue. Given the cultural diversity of clients, the APA ethics code (APA, 2025) emphasizes the importance of cultural competency, as gift-giving may be seen as a sign of respect in certain cultures. Mental health professionals should establish clear boundaries about gift acceptance from the first session with tact. When faced with inappropriate gifts, therapists must handle the situation professionally, holding firm boundaries and seeking support from colleagues. This approach helps navigate the ethical complexities of gift-giving in counseling.

The Influence of Black Trauma on Black College Student Decision-Making
Dekyria Jones; Faculty Sponsor: Dr Shawn Forrest Guiling

Many Black students experience race-related trauma during their pre-college educational years (Johnson et al., 2024). Trauma refers to an emotional reaction to a negative event (American Psychological Association, 2024). Racial Trauma refers to the effect of race related stressors, discrimination, and racism on an individual (U.S. Department of Veterans Affairs, 2024). A working definition of Black Trauma is Racial Trauma applied specifically to those who identify as Black or African American. A total of 26 participants completed surveys. Most participants reported experiencing Black Trauma during their formative years, which influenced their college experiences to varying degrees. Furthermore, there were five trends in the survey (i.e. not feeling comfortable in spaces, bad experiences in school settings, being bullied/made fun of for black features, people touching/playing with hair without permission, and being followed). Future research should consider a more concise definition of Black Trauma and better understanding of views on Black Trauma.

Perception on Speech Development and QOL in Caregivers
Kortney Scoggins, Shea Petrowske, Natalie Sitze; Faculty Sponsor: Dr Susan Fulton

Many children experience acute otitis media (AOM) during the first months and years of life. Otitis media is an infection in the middle ear that occurs when fluid builds behind the eardrum. An impairment in a child's hearing ability could lead to difficulties adequately producing speech sounds. Children with AOM tend to achieve lower scores with various language skills such as reading, rhyming, and comprehension (Klein, n.d.). Additionally, AOM in children negatively impacts caregivers' overall quality of life due to the emotional strain and disruption in daily routines (Meherali et al., 2018). Caregivers of children experiencing AOM may be affected emotionally, physically, and even financially in some cases. This study aims to assess caregiver perceptions of the impact of AOM on speech development in children aged zero to five and its effects on caregivers' quality of life. Data will be collected utilizing an anonymous survey to determine results. Participants will be recruited via Facebook and Instagram posts which contain a flyer with a link to the survey. The survey contains yes/no questions, rating scales, and short-answer questions based on personal experiences. Data collection is ongoing. Results and conclusions will be available at the time of the poster presentation

Threads of Thought: Assessing Cognitive Health of Piercers and Quilters
Gillian Sherp, Karsyn Davis, Mandy Gantner, Emma Ray; Faculty Sponsor: Dr. Samantha Washington

This presentation will explain the possible effects of quilting, piecing or sewing on an individual's cognitive functioning. Participants aged 55+ with at least one year of experience will complete the Montreal Cognitive Assessment (MoCA), along with a survey containing questions regarding quilting/piecing, general health, and their overall lifestyle. Comparisons in cognitive health will be made based on participant demographics and thematic analysis of responses will be completed regarding impact on their quality of life. Participants' cognitive health will also be compared to normal aging expectations. Data collection is ongoing. Results and conclusions will be available at the time of poster presentation.

The Influence of Education and Political Orientation in Mock Juror Verdicts in Fatal Use of Force Cases
Sydney Provo, Danielle Thomas; Faculty Sponsor: Dr Paige Northern

Instances of fatal police use-of-force against civilians remain prevalent (Varney & Degnan, 2024). Understanding factors influencing juror verdicts is crucial for ensuring fair trials. We hypothesized that jurors with lower education would render not guilty verdicts, liberals would render guilty verdicts, and conservatives would

favor not guilty verdicts for officers. To test these hypotheses, 539 mock jurors (Mage=42) read a trial scenario of a police officer charged with first-degree murder for illegal use-of-force. Participants provided verdicts and completed demographic measures.

Hayes' PROCESS macro (Model 4) tested the relationship between education level (X) and guilt ratings (Y), with political orientation (M) as a potential mediator (N=534). Education showed a significant indirect effect on guilt ratings through political orientation (b=0.0923, SE=0.0297, 95% CI [0.0381, 0.1550]). Education level significantly predicted political orientation (b=-0.3050, SE=0.0870, t=-3.5064, p=.0005), with higher education associated with more liberal orientations. Political orientation significantly predicted guilt ratings (b=-0.3027, SE=0.0484, t=-6.2600, p<.0001), with conservative orientations linked to lower guilt ratings.

Findings suggest that while education doesn't directly influence guilt ratings in police use-of-force trials, it indirectly affects them through political orientation. Higher education levels are associated with more liberal political orientations, which in turn are associated with higher guilt ratings.

Does Retrieval Method and Familiarity Significantly Impact Key-Term Definition Recall?

Joshua Haugh, Isabelle Correnti; Faculty Sponsor: Dr Paige Northern

Retrieval practice (self-testing) is a studying strategy that results in superior memory over other methods, such as restudy (re-reading). There are two types of retrieval practice: covert and overt. Overt retrieval involves giving an outward response verbally or through writing; covert retrieval does not. While learning simple materials, covert and overt retrieval are equally effective. With complex materials, overt retrieval is more effective. One factor that may explain the difference is familiarity of information; covert retrieval of familiar terms might be less thorough. Researching influences of familiarity on retrieval was our study's goal. It was hypothesized that recall between familiar and unfamiliar terms would be the same in the overt group and that recall would be higher for unfamiliar terms in the covert group. The students participated in studying different key-term definitions. Each key-term was paired with either restudy, covert, or overt retrieval. Each term was also studied either two or eight times. Two days after practicing they took a test over the terms. Through data analysis, it was found that overt retrieval led to higher accuracy. Higher familiarity also led to more accurate responses. Given these data, it was drawn that overt retrieval should be encouraged among students.

Malicious Node Detection In Blockchain Based P2P Network Using AI Pipelining

Nipesh Pant; Faculty Sponsor: Dr. Reshmi Mitra

There is an increase in the use of blockchain technologies in various fields and access control in the P2P network is one of them. However, its adoption also introduces security concerns, particularly the risk of malicious nodes compromising network integrity. In this paper, we propose a novel machine learning-based mechanism to detect potentially malicious nodes in a blockchain-based P2P network with an incentive-driven access control system. Unlike traditional methods, our approach leverages behavioral patterns and network dynamics to predict malicious behavior before it happens. Data is collected from the network itself using different test cases, and rigorous feature selection is performed to identify the most relevant attributes. After feature selection,we have evaluated multiple machine learning algorithms, including decision trees, random forests, and neural networks, and found decision trees to be best based on metrics like accuracy and F1 score. Experimental results show that our approach successfully detected the malicious node in the network and hence enhancing network security and contributing to more reliable token governance and distribution in decentralized systems

Prompt Pattern Template: A Structured Approach to Leveraging LLMs For Security Challenges

Shruti Bhattarai; Faculty Sponsor: Dr. Reshmi Mitra

The increasing reliance on Large Language Models (LLMs) in cybersecurity necessitates structured prompt engineering to ensure optimal and contextually relevant responses. However, users across various domains and expertise levels often struggle to craft effective prompts that align with cybersecurity threat modeling, risk assessment, and mitigation strategies. This research introduces a Prompt Pattern Template Framework, designed to standardize prompt structures based on threat taxonomy, stakeholder, risk likelihood and adversarial techniques. The framework enables users—ranging from security analysts and penetration testers to IT managers and non-technical stakeholders; to construct domain-specific, structured prompts that yield accurate, actionable insights from LLMs. The research defines a hierarchical categorization of prompt patterns, integrating descriptive, diagnostic, predictive, preventive, and investigative intents alongside a fishbone prompt tree structure. A progressive sequence approach is implemented, allowing iterative refinement of prompts to enhance clarity, precision, and alignment with cybersecurity best practices; to get accurate and meaningful response from LLM. The methodology includes an evaluation of structured prompt template against regular prompting, measuring effectiveness of response across different cybersecurity tasks such as threat intelligence analysis, incident response,

vulnerability assessment, and risk prioritization. Purpose of this research is to demonstrate how structured prompts significantly improve LLM driven cybersecurity decision-making by reducing ambiguity, enhancing response relevance, and adapting dynamically to evolving security threats. This research lays the groundwork for adaptive AI-driven security workflows, bridging the gap between human expertise and AI capabilities in cybersecurity operations.

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