5TH ANNUAL FALL

Symposium of Student Scholars

NOVEMBER 20TH-22ND, 2024

Program

Wednesday, November 20:
Oral Presentations and Performances

9:00am – 9:50am: College of Architecture and Construction Management (CACM)

10:00am – 10:50am: College of the Arts (COTA)

11:00am – 11:50am: Southern Polytechnic College of Engineering and Engineering Technology (SPCEET)

1:00pm – 1:50pm: Health & Sciences Hour: College of Computing and Software Engineering (CCSE), College of Science and Mathematics (CSM), & Wellstar College of Health and Human Services (WCHHS)

2:00pm – 2:50pm: Radow College of Humanities and Social Sciences (RCHSS)

Thursday, November 21:
Poster and Visual Arts Presentations

9:00am – 5:00pm: All Presentations

Friday, November 22:
Virtual Presentations

12:00pm – 5:00pm: All Presentations

Coles College of Business

Information Systems & Security

Training & Curriculum at the Intersection of Cybersecurity & Healthcare
Poster #10 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Graduate Student(s): Maranie Brown
Research Mentor(s): Maria Valero

The threat of cyberattacks continues to drive a sense of urgency across hospital systems and providers. This increase can be attributed to the data infrastructure, lack of protection standards, the increase in telehealth and medical devices, and more. As healthcare continues to rely on technology and information systems, the threat will continue to increase and the consequences will become much more detrimental. The healthcare industry must adopt a more proactive posture versus a reactive one that is mostly on defense and responding to problems that are happened. The abovementioned examples of preventative measures are only one part of the ecosystem that must be developed to keep information and organizations safe. A crucial part of a proactive approach is education. In addition to develop preventative standards, healthcare systems and medical schools can educate physicians, staff, and patients on the risks and empower them to be champions and protectors of their own health information. The research part of the initiative attempts to educate patients on the importance of protecting their health information and not just relying on their physician or hospital. By focusing on high school students, the goal is to make this philosophy a core part of adult life. In the same way that students are taught to brush their teeth, get yearly check-ups, and do well in school for the greatest potential of career success, the message has to be reinforced. By blending a critical topic with the learning delivery mechanism that encourages engagement, we hope to arm students with the tools to make the decisions, when they receive an email that is a clear phishing attempt that can expose their health records, for example, and thus reduce the number of cyberattacks and data breaches across the health industry.

Management, Entrepreneurship & Hospitality

Which Sets of Corporate Governance Factors Lead to High Going-private Returns for the U.S. Restaurant Firms?
Poster #14 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Ngoc Han Duong

Research Mentor(s): Melih Madanoglu

The restaurant industry plays an important role in the U.S. economy that contributes almost 1 billion dollars in sales and generates 12 million jobs. However, in the last two decades, numerous publicly-traded restaurant firms opted to transit to private ownership. Generally, following the going-private announcement, companies tend to enjoy positive abnormal stock returns (i.e., bid premiums). Madanoglu and Karadag (2009) identified four firm characteristics that influence these bid premiums. However, based on the logic of equifinality, there exists a need to understand how bundles of factors lead to high financial performance. Therefore, this research aims at finding which configurations of corporate governance conditions result in high bid premiums. The sample of this study consists of approximately 50 restaurant companies that made going-private announcements between 2005 and 2019. Transactional data from the SEC Annual Filings and the Center for Research in Security Prices (CRSP) are collected. Cumulative Abnormal Returns (CARs) were estimated with EVENTUS software and used as bid premiums. The four conditions in this study are firm age, franchising (vs. non-franchising firms), independent directors (ratio to total directors), and CEO duality (dual vs. not). A crisp-set Qualitative Comparative Analysis (QCA) method is utilized to determine which conditions are sufficient for high bid premiums. Findings indicate two paths that lead to high bid premiums. The first bundle of conditions includes older (established) companies that do not franchise and have non-dual CEOs, and a high ratio of independent directors. The second model consists of established, franchising firms, with a high ratio of independent directors. Thus, the presence of old firms and firms with a high ratio of independent directors appear in both solutions. This research aims to potentially guide restaurant firms in adopting the right combinations of governance provisions that drive financial performance and enhance sustainable business practices.

College of Architecture and Construction Management

Architecture

Alternative Visions to Eurocentric Public Architecture: The Work of Balkrishna Doshi in India and Alejandro Aravena in Chile.
Poster #22 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Kendel Constant
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Since the 19th century, public housing projects have remained a dilemma for architects. From socialist housing projects of the East Bloc during the Communist time to large private developments in the West during the new Liberal era, socially-responsible housing projects have been at the center of architectural debates. This paper focuses on alternative vision beyond either the socialist or privatized housing projects by comparing the work of Balkrishna Doshi (1927-2023) and Alejandro Aravena (1967-Present). Despite different temporal, socio-political, and geographic contexts, the work of these two architects shares the same social responsibility, emphasizing community building and empowering the people. On the surface, these two architects, both Pritzker Prize-winners, were from different regions. However, the problems they both tackled marks the intersection of economic systems, cultural forces, poverty, political systems, and environmental issues. This paper draws on Kenneth Frampton's six principles of "Critical Regionalism" because these principles highlight architecture rooted in local context and possibly engage in global influences. This research also examines the work of Duanfang Lu in Third World Modernism to highlight the global dimension of the practices of these two influential architects. Central to this analysis are the works of Doshi in Aranya Low-Cost Housing (1989) in Indore and Aravena's Quinta Monroy Housing (2004) in Chile. This paper offers new insight onto the alternative approach from Doshi's community-centric planning and Aravena's incremental housing and public empowerment strategies. This paper explores how Alejandro Aravena leaves his architecture open and "incomplete," allowing the community to incrementally adjust the projects to their emerging needs; whereas Balkrishna Doshi creates architecture that fosters a sense of belonging and addresses the needs of his community through planning strategies demonstrating innovative solutions. The paper investigates and compares the philosophy and ideology of Doshi and Aravena, highlighting their trajectory, practices, and different approaches to public housing.

Architecture as Politics: Historicism, National Identity, and Monumentality in the Works of David Chipperfield and Alvar Aalto

Poster #5 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Christopher Dennis
Research Mentor(s): Ehsan Sheikholharam Mashhadi

In examining the works of David Chipperfield and Alvar Aalto, this paper dives into the political dimensions of architecture, focusing on the roles of history, identity, and monumentality in their designs. Architecture, beyond aesthetics, often carries political undertones, shaping and reflecting national identity. This paper investigates Chipperfield's engagement with historicism and the role of monumentality in his work, questioning how his architecture speaks to the past in the present. It also critically assesses Aalto's approach to Critical Regionalism, exploring how his designs negotiate local identity within modernist frameworks. This paper analyzes the ways both architects articulate cultural narratives through built forms by asking: can and how architecture serves as a tool for political expression?

Architecture for the People or by the People? Exploring Agency in the works of Hassan Fathy and Yasmeen Lari
Poster #13 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Ahmed Shaker
Research Mentor(s): Ehsan Sheikholharam Mashhadi

In the struggle of creating affordable housing in today's economy, architecture becomes more than just bricks and mortar, it becomes a question of who holds the power for rebuilding lives and communities. This paper explores the contrasting approaches of agency in some of the projects of Hassan Fathy (1900-1980) in Egypt and Yasmeen Lari (1941) in Pakistan. Lari and Fathy were both recognized for their humanitarian efforts and have been awarded the Aga Khan Award for Architecture for their innovative works in Egypt and Pakistan. The research finds that Lari's design and building methodology using her architectural concept of "Barefoot Social Architecture" gives agency to the people through involving them in the construction process of flood-resistant houses particularly through using sustainable and vernacular materials like mud and bamboo. This empowers the community's self-reliance, sense of ownership, and environmental sustainability in the face of natural disasters. In Contrast, Fathy keeps agency in the hands of the architect through his concept of "Architecture for the poor" and guides the community through his own vision of traditional and vernacular architecture according to the community's needs. This is particularly apparent in his projects like New Gourna Village, where he guides the community through his interpretation of their needs. Through comparing Fathy and Lari's distinct approaches towards agency in architecture, this paper highlights the broader implications for future architectural practice particularly in the context of poverty and natural disasters. It questions whether architecture should be a collaborative process between the

architect and the community, or an assertion to the architect's authority. It also demonstrates how the distribution of agency can influence both the success and the sustainability of the project in today's time.

Architecture for the Poor versus the Desire of the Poor: The Ambivalent Reception of Hassan Fathy's Architectural Legacy
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 9:00 – 9:50 am
Undergraduate Student(s): Hagar Ahmed
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Until the 19th century, architecture was primarily shaped by the collective taste and not the ingenuity of a single architect. Aside from monumental buildings and edifices associated with power, ordinary houses were built by ordinary people. During the 20th century and especially after the destruction of many European cities during the First World War, the social role of architects radically transformed. Le Corbusier, for example, represented the emblematic figure of the architect as a privileged agent of social change. Modernist architecture thus became the global model for development in the post-war era. Architects and politicians alike in North African and South American countries used European Modernism to express their desire for modernity and democracy. Hassan Fathy (1900-1989), however, is one of the early architects who contested white modernist architecture of the 1930s. Some historians have discussed the work of Fathy along Kenneth Frampton's notion of critical regionalism. This paper opens a new window into Fathy's ambivalent relationship with the public he committed to serve. He saw his responsibility to build with considerations for context, whether climatic, cultural, or tectonic. Yet, the public for whom he was building had an entirely conflicting desire for architecture. This is shown through Gourni's refusal to relocate to Fathy's New Gourna village, designed in upper Egypt in the 1940s. Through Jacques Rancière's "The Distribution of the Sensible, between Aesthetics and Politics", this paper compares the design philosophy of Fathy with the reception of his work by the general public, contemporary architects, and political entities in Egypt. It investigates the contradictory prevailing character of Fathy's architecture and his aspirations for an architecture for the poor. It argues that architecture, with the architect as a sociopolitical catalyzer for a new world and way of living, promoting equality, holds a dominant character that persisted in Fathy's practice.

The Architecture of Authority
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 1:15 pm
Undergraduate Student(s): Jonathan Williamson
Research Mentor(s): Jade Yang

This research aims to understand the logics of incarceration in the United States through the lens of architecture and propose a solution by investigating the relationship between spaces of confinement and the incarcerated. The first component of this research aims to reveal how the physical dimensions of spaces of confinement can inflict lasting damage to the mental health and well-being of the incarcerated. The second component of this research examines the psychological impact of architectural elements within prison environments, particularly the presence of light, ventilation, and visual stimuli through windows. It aims to understand how access to these phenomenological elements affects the mental health and well-being of incarcerated individuals. Finally, this research will propose an academic space within a prison facility by analyzing the spatial requirements for various academic disciplines, implementing data gained from the earlier critique of carceral institutions, and quantifying the architectural programmatic requirements of professors who have taught within carceral institutions. This proposal will aim to communicate how the spatial logics of mental health, well-being, and study can challenge the current carceral landscape.

Balancing Act: Retrofitting Office Design for Enhanced Well-Being
Poster #21 (Marietta Event Center)
Thursday, November 21st, 9:00am – 9:45am
Undergraduate Student(s): Luke Griffith
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Urban Downtown landscapes have been around for centuries, creating various living dynamics that we still use today. Since the 1940's, many downtowns have largely become inundated with office buildings that are simple large glass boxes. A problem of this is how the current design of office space is holding itself back from being multiple programs. Since the pandemic in 2020, the world has seen that work can be done as efficiently at home as in the office. There are large portions of office buildings in Atlanta with entire floors vacant that can be used with other programs. This showed businesses the importance of structure and presentation of work environments for their employees. What elements in office spaces need to be restructured to enhance overall office districts? The vacant spaces in office buildings have more potential than to only be filled with cubicles and computer desks. If there were more programs inserted into office high-rises, then there would be more activities and opportunities for the average 9 to 5 office worker. Examples could include daycare centers for children that are close to parents working, athletic centers that encourage physical and mental health benefits, libraries that provide quiet spaces to read, study, and relax, and education centers that give people opportunity to learn a new skill or hobby. These programs can provide office workers opportunities to enhance their lives with other programs within walking distance of where they spend the majority of their weekdays to have a more balanced lifestyle. This can be the beginning of reshaping the primary focus of office complexes to mix use spaces for a different urban environment.

Beyond European Modernism: Post-War Architecture Through the Lens of Kenzo Tang.
Poster (Microsoft Teams)

Friday, November 22nd, 12:15 pm
Undergraduate Student(s): Mari Sadou
Research Mentor(s): Ehsan Sheikholharam Mashhadi

After the war, a new style of architecture emerged, the style focused primarily on monumental formalism, with an interest in sculptural masses, spaces, and the decorative qualities of building materials. That style is called Post-war Nordic architecture and was characterized by social engagement and thoughtful design. Three formal directions emerged within that: one that incorporated English Brutalism, another that built on Mies van der Rohe's work and a third that Frank Lloyd Wright and Japanese architecture influenced. In this paper, I will closely focus on Kenzo Tang's (a Japanese architect) work, because His specific work style includes understanding the landscape and integrating urban contest within that of his time, and post-European modernism, looking at the two styles I will analyze their similarities and differences, brought by both cultures and the time in which the designs were brought about. I will explore this by primarily looking at Tang's work, I will look for key similarities that fear has evoked in the minds of designers at the time freshly coming out of a war, and how it had influenced urban-based architecture. The question: designing for people and time, in what way, and with what effect?

Blurring Boundaries: Conceptual Art Shifting the Pedagogy of Architecture
Poster #21 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Nadirah Ali
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Different architectural pedagogies and emerging styles have shaped the discipline from the 16th to the 19th century. However, modern 20th and 21st-century schools of architecture are presented with different challenges that skew studio traditions to more conceptual ideologies. Global influences become prominently seen through the practice, allowing the pedagogy to grow and mediate between the local and global practices of architecture. This induction of critical regionalism is sought through lessons from European avant-garde movements, Russian constructivism architecture, Latin American Modernity, and Japanese Metabolism. Many architecture schools were adapting newer techniques for the pedagogy, but all stemming from the new era of conceptual art and a global perspective. Architects like Harwell Hamilton Harris (American Architect, 1903-1990), Vladimir Tatlin (Russian Constructivist Architect,1885-1953), and Luis Barragán (Mexican Architect, 1902-1988) all reduced design solutions to simple terms and elements that can then be interpreted as anything. This form of conceptualism allowed students to think about spatial relationships leaving no room for function, structure, and symbolism to relate to the conceptual forms students were encouraged to create. This shift to

make architecture an autonomous language and discipline to create conceptual methods became the new ideologies of architecture schools like the Texas Rangers at the University of Texas School of Architecture. In the American context, the texas rangers were pioneers of contextual regionalism and promoted new techniques for studios nationwide to adopt. Proments texas Rangers figures included Charles Moore (1925-1993) and O'Neil Ford (1905- 1982) who shine importance to global techniques that can be applied to local culture. Universities like the Yale Schools of Architecture, RMIT University, the Architectural Association (London) and more all inherit the practices preached by the Texas Rangers. This paper aims to identify how the skew in the discipline challenges the pedagogy to look beyond local concepts which almost blur the lines of architecture between a functional and conceptual practice.

Challenging Boundaries: Pop Culture, Futurism, Historicism, and Technology
Poster #7 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Ziyear Oyefesobi
Research Mentor(s): Ehsan Sheikholharam Mashhadi

This paper explores the architectural philosophies of Peter Cook and John Hejduk. Both of their methods push the limits of traditional architectural philosophy. Peter Cook, a visionary of futurism, draws heavily from the influences of pop culture, changing architectural spaces into experimental spaces where technology, biology, and play combine. His works accept new experiences, shaped by the crossing modern urban life and the futuristic potentials of morphology. In comparison, John Hejduks architecture spreads within the field of deconstructivism and abstract symbolism, involved in a deep interest with historicism. For Hejduk, architecture becomes broken symbols, with different types of poetry and philosophy created by the interaction of history and abstraction. His work challenges the viewer and those inside to interact with architecture on a more important, thoughtful level by crossing what is real into the abstract field, sometimes removing the work from the present function. Hejduks structures create through their deep density, making a conversation with memory, history, and the human condition, whereas Cooks structures could inspire through their playfulness and life in the city. Both architects are committed to expanding the abstract boundaries of architecture, even though their differences. Each of their works pushes the boundaries of what architecture can show, how it can function and who it can support. This paper will focus on both architects who changed the thought process and feeling that architecture exists in, along with shaping architectural forms through their original processes.

Construction Materials: PPI Metals and Metal Products: Steel Mill Products

Poster (Microsoft Teams)
Friday, November 22nd, 2:45 pm
Graduate Student(s): Arbaaz H. Syed
Research Mentor(s): Minsoo Baek

This research paper provides an analysis of the crucial role played by the Producer Price Index (PPI) in steels and metal products, specifically Steel Mill Product suitable for the construction industry. Commonly regarded as one of the main economic indicators, the PPI has the main purpose of measuring the average change in selling prices paid or received by domestic producers for their goods and services and provides knowledge according to the supplier side. The study focusses on the construction sector where metals and Steel products are abutted to the project. To address this point, the impact of External Factors on PPI in Metals and Steel Mill Products is assessed in addition to the operation of metal in building material, tourism, medical, developmental aspect, economic factors and drivers and finally the considerations of working capital and protective energy supply. The research adopted several types of information sources including scholarly journals, reports issued by government agencies, commercially available trade statistics, and trade business periodicals. It has focused on the Period Time between 1939 and 2024 because it is very useful for researchers looking for fluctuations in the price range. The procedure in this research is the qualitative as well as quantitative technique which includes also using SPSS for further statistical analysis to confirm how accurate the data is. The findings reveal that the PPI for Metals and Metal Products: Steel Mill Products is subject to factors like Use of metal and steel in Construction, Cost Sensitivity, Indicator of Inflation and Market Conditions, Supply Chain Impact, Energy and Environmental Factors. Therefore, correlation affects the construction industry in the sense that more people building homes can translate to higher prices. It is therefore demonstrated in this study that keeping an eye on the PPI is crucial for cost tracking and managing price risks while commissioning development within an existing budget in the general sense of all PA.

Consumer Culture and Alienated Architecture: Capitalism's Role in Junkspace Proliferation
Poster #8 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Maybel Moran
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Consumer culture is a culture with the primary focus on the purchase and consumption of goods and services in society. After World War II there was an economic upturn which allowed for the proliferation of a middle class. As people gained more disposable income, they were encouraged to buy more goods and services. This in turn began to fuel a culture built around spending and put a focus on creating environments to enhance consumer-ability. Junkspace as defined by Dutch

Architect Rem Koolhaus is, " the body double of space, a territory of impaired vision, limited expectation, and reduced earnestness." This paper focuses on how consumer culture fosters junk space by prioritizing short-term profit and mass consumption, while neglecting meaningful and purposeful design. Junk spaces are often superficial and standardized. They tend to be designed for efficiency rather than human connection and interaction. It is through the lens of capitalism that junk space has been able to flourish, and exist flamboyantly yet remains practically unnoticed.

The Embodied Experience: Phenomenology in the Architecture of Barragán and Holl
Poster (Microsoft Teams)
Friday, November 22nd, 1:00 pm
Undergraduate Student(s): Nancy Sanchez
Research Mentor(s): Ehsan Sheikholharam Mashhadi

In the realm of architecture, the interplay of light, color, and materiality can profoundly shape human perception and spatial experience. Phenomenology, as defined by Merleau-Ponty, is the study of structures of consciousness from a first-person point of view, emphasizing the embodied nature of perception. Luis Barragan (1902-1988), a Mexican architect, and Steven Holl (1947-), an American architect, practiced phenomenology into their works to shape human perception and spatial experience. This paper explores the architectural approaches of Luis Barragán and Steven Holl through the framework of Merleau-Ponty's phenomenology. Barragán's work, characterized by its vibrant use of color and light, creates spaces that engage the senses and evoke emotional responses. His work, Casa Gilardi (1976), demonstrates Merleau-Ponty's definition of phenomenology by using light and textured surfaces to create a tranquility and introspection environment that highlights the emotional response and deeply engages the senses. Steven Holl's architectural designs emphasize the embodied experience of space. His phenomenological experience of space focuses on the interplay of light, material, and form to craft a heightened awareness and engaging space. The Chapel of St. Ignatius (1997) is a prime example of how Holl uses dynamic light and shadow to enhance the spiritual experience and emphasize physical interaction with space, aiming for a profound sensory and existential engagement. By analyzing these works from both architects, this paper highlights how their approaches to light, color, and materiality resonate with Merleau-Ponty's phenomenological principles, fostering a deeper connection between the built environment and human perception.

Engaging our Elders: Reprograming the Architecture of Continued Care Facilities to Engage the Community
Poster (Microsoft Teams)
Friday, November 22nd, 2:30 pm
Undergraduate Student(s): Mercy Koehler
Research Mentor(s): Robin Puttock

The elderly are one of the most overlooked groups in our population. The poor attention to the design of their living spaces is a sad testament to this reality. Designed like hospitals and prisons, nursing homes are sterile environments, uninviting to guests and suffocating to residents. The person-centered care of new assisted living communities is an improvement, but often the design of these institutions is governed by economic factors and architectural code requirements that continue to create isolated environments. To create truly inclusive spaces for our growing elderly population, care-centered design must go a step further and find programmatic ways to integrate the less capable into the social fabric of our community. This practice has been lost in our modern, individualistic culture. By looking at alternative methods of elderly care throughout history, this research will propose architectural solutions to combat the isolation and loneliness. The goal of this project is to explore ways to improve the quality of life for people who rely on assisted care. By redesigning care-centered spaces to prioritize human dignity and not efficiency, this thesis will frame a new perspective of aging that is exciting and dignified.

Environmental Technology: Less or More with Kéré and Superstudio
Poster #9 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Joshua Landrum
Research Mentor(s): Ehsan Sheikholharam Mashhadi

When considering the environmental changes that have taken place due to energy consumption, two modes of thought are often the focal arguing points: using more efficient technology and using less technology. In architecture, this is known as the argument of active versus passive systems, and this topic has been debated since the Second Industrial Revolution. Some architects have designed technocratic megastructures for entire communities to be contained while others have thought of engaging with natural resources to make comfortable structures. This paper interrogates whether monumental structures or communal passive designs are best suited for sustaining our environment and will examine the works of the firm Superstudio (1966-1978) as well as architect Diébédo Francis Kéré (1965-Present) to compare the methods they practice environmentalism. The 1966 Italian design collective Superstudio led the Radical Movement in architecture. Their idea of "Total Urbanization", as exemplified by their model The Continuous Monument, creates a massive urban cityscape, and they argued that entire cities could be contained within a grid-based structure. By this process, Superstudio argued that humanity could create and control their entire internal ecosystem on a massive scale, reducing replacement construction and its environmental toll. By contrast, Diebedo Francis Kere, receiver of the Pritzker Architecture Prize, focusses his design on building structures as needed to work within

the context of their surrounding environment. His structures, such as Lycée Schorge, are often designed in locations with little access to outside utilities, and thus must be extremely self-reliant. His work does not cut the internal off from the external to make it comfortable, but instead utilizes nature itself to provide a comfortable environment for his clients. By analyzing these architects' works, as well as the Machine Age theories of Richard Banham, this paper will argue the credibility of design between futuristic and bottom-up technology.

Experiencing Materiality Through the Architecture of Diebedo F . Kere and Mario Botta
Poster #11 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Giancarlo Cartulin
Research Mentor(s): Ehsan Sheikholharam Mashhadi

This paper is exploring how materiality can help create a desired experience, creating a connection to the surrounding culture, social life, and environmental conditions. Diebedo Francis Kere(1965), an African architect, and Mario Botta(1943), a Swiss architect, demonstrate through their work two distinct ways of using materiality to achieve this. Diebedo F . Kere prioritizes sustainability and community engagement, achieving this through the use of locally sourced materials. Kere's work such as the Startup Lions Campus and Gando Primary School, show his prioritization of sustainability and response to climate conditions. Kere focuses on these while still creating community and environmental engagement. On the other hand, Mario Botta, a Swiss architect, focuses on creating spiritual spaces that creates a sense of awe. Botta's work such as San Giovanni Battista Church and the Evry Cathedral, show his achievement of monumental materiality usage to create spiritual space. They consist of materials such as brick, stone, and concrete which help create these long lasting spiritual spaces. Through these two architects, one can understand how materiality shapes a person's experience, whether it is to create a more significant local connection or a place of emotional and spiritual connection.

Foster Grandparents
Poster (Microsoft Teams)
Friday, November 22nd, 1:30 pm
Graduate Student(s): Claire Bunnell
Research Mentor(s): Robin Puttock

A connection between independent living homes and foster care homes will result in an increase of companionship, physical and mental health of the lives of older adults as well the foster care children. Children between the ages of 6-15 make up 44% of the children in the foster care system in the United States. Providing older adults the opportunity to have a mentoring role in the foster children's lives will give them a sense of purpose and give the foster children an advisor. This thesis strives to focus on improving the physical and mental health of older adults

and foster children's lives by creating a home that gives them the opportunity to interact with one another and promote physical activity for a healthier lifestyle.

From European Urban Politics to Islamic Architectural Traditions of Building with Communities: The Work of Marina Tabassum and Yasmeen Lari
Poster #21 (Marietta Event Center)
Thursday, November 21st, 3:00pm – 3:45pm
Undergraduate Student(s): Tala Hajibi
Research Mentor(s): Ehsan Sheikholharam Mashhadi

This paper juxtaposes the work of two South Asian's female architects, Marina Tabassum and Yasmeen Lari. It references how the two architects negotiate the political urban context and the Islamic architecture in the modern world. While Tabassum employs the traditional architecture of Bangladesh and thereby customizes the designs for the climate and conditions of the country, Lari focuses on low-carbon, disaster resilient structures in Pakistan and is highly passionate about social and disaster relief causes. This paper articulated how the work of these two architects are concerned with the categories of gender, race and class. The paper also demonstrates how their practices improving the quality of life of the minority ethnic groups, and women. This research is an attempt to analyze their strategies towards political and urban contexts, and how Tabassum manages policy and religion in her works such as the Bait ur Rouf Mosque. While Lari's work can be related to humanitarian projects for the solution of immediate crises such as post disaster housing and empowering low-income communities. Their design concepts are based on the principles of Islamic architecture, but they rearrange these to meet the needs of today's cities. This paper argues that both Tabassum and Lari show how the main architectural strategies like tectonics, community, and sustainability can be used to suggest new potential solutions that consider the political, cultural, and social contexts of the contemporary city. Also, the paper connects their work among the general discourses on the social function of architecture and how their designs seek to fix social justice issues and promote females and the less privileged.

From Existentialism to Ecological Consciousness: Architectural Philosophies of Chinese Architect Wang Shu
Poster (Microsoft Teams)
Friday, November 22nd, 12:30 pm
Undergraduate Student(s): Tina Wong
Research Mentor(s): Ehsan Sheikholharam Mashhadi

From the 19th century, architects have been grappling with the question of existence in their practices. It was Frank Lloyd Wright who famously opposed the alienation of abstract modernist architecture. Relying on Transcendental philosophy, Wright's prairie style exhibited an architecture that was rooted in respect for the landscape and the sense of the place. Later,

phenomenologists too expressed a new conception of architecture that shifted the focus on the visual and the eye to other senses, especially touch and tacticity. The award winning Chinese architect, Wang Shu offers the third way. Chinese architect Wang Shu's(1963-) work portrayed his perspective in ecological phenomenology and his analysis of human relationships with place and nature, play in materiality and tactility in materials, and integration of traditional thought and modern technology. This paper also mentions German Architect Martin Heidegger's (1889-1976) 1927 famous work, Time and Being, view on fundamental meaning of being that connect us to relationship between past, real time, and everydayness, and French Architect Maurice Merleau -Ponty's(1908-1961) perspective on phenomenology- inevitability aspects of inhabiting leads back to our relationship of embodied present. This paper explores how modernism connects to our denial of culture and cultivation, and it becomes an era where annihilation of the Traditional school of thought contributed to the alienation of our nature. Before analyzing the works of Wang shu, works of Heidegger and Ponty's were first considered, as their work were highly influenced on ecology studies. As modern day creates a fragmentation and barrier to our expression and directedness within the world, the works of three architects all argue that the importance of understanding being, dwelling, relationship to body and material, relationship of a different idea of vision. These fundamental concepts are discussed in hope of creating a more meaningful and enriching culture.

Global Influences and Local Expressions: Comparing Architectural Philosophies of Oscar Niemeyer and Eero Saarinen

Poster #6 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Wendy Montalvan-Ortiz
Research Mentor(s): Ehsan Sheikholharam Mashhadi

How did the Global South architectural practices challenge the Eurocentric modernist architecture? After the wars of national liberation in the late 1950s, architects in the Global South began to express national identity in modernist forms. This paper focuses on the work of Oscar Niemeyer through the lens of critical regionalism. Kenneth Frampton articulates principles that distinguishes practices along the axes of geography and culture. To highlight these differences, this study compares Brazilian Architect, Oscar Niemeyer (1907-2012) architecture with that of Finnish-American Architect, Eero Saarinen (1910-1961) because despite formal similarities, the social and political underpinnings of their work were radically different. This analysis explores how modern architecture evolved beyond conventional designs by focusing on Niemeyer's Contemporary Art Museum and Saarinen's TWA Flight Center within the contexts of modernity, regionalism, and globalization. Niemeyer's approach is characterized by organic, flowing forms that integrate within the natural landscape. His designs reflect a regionalist approach with an emphasis on the significance of local culture and context. The regionalism in his buildings resonate with the Brazilian ethos by utilizing curves and

expressive shapes. In contrast, Saarinen's designs showcase a futuristic and versatile style that adapts to the specific needs of each project. His works embody a more globalized perspective, where the design overcome local boundaries to create universal structures. This comparative study highlights the contributions of Niemeyer and Saarinen. Niemeyer's focus on regionalism and integration within the natural landscape provides a counterpoint to Saarinen's globalized, futuristic designs. Their works illustrate how modern architecture can be both regionally relevant and globally influential. By moving beyond conventional designs, Niemeyer and Saarinen have redefined the possibilities of modern architecture, demonstrating that innovation can be achieved through a localized cultural expression and a broader international outlook.

How Can Suburban Alpharetta, Georgia Be Revamped Along Specific Corridors at the Human Scale to Increase Walkability and Connectivity?
Poster #14 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Annikka Fairfield
Research Mentor(s): Robin Puttock

Many cities in the United States are designed based on suburban sprawl, which contributes to excessive automobile-dependency and unwelcoming streets for pedestrians, and metro Atlanta is no exception. Alpharetta, Georgia is consisted of a downtown hub, commercial corridors, office districts, and suburbs. Many of these areas are disconnected and difficult to traverse on foot, thus encouraging residents to drive rather than walk. Many streets outside of the downtown hub are designed to serve cars, leading to an unwelcoming and unsafe environment for pedestrians. Suburban retrofitting is a design tactic that ranges from the urban scale to the human scale. The human scale focuses street redesign strategies on pedestrian wellbeing, which will be useful to increase walkability and connectivity in Alpharetta. This design thesis aims to take this a step further by devising a pedestrian "loop" that expands upon the existing greenway and connects nodes across the city. Architectural installations will be strategically designed along the loop to create destinations and support the surrounding community. The loop will be implemented on specific corridors to significantly improve pedestrian access on roads that are car oriented. By refocusing suburbia on pedestrians rather than cars, overall pedestrian wellbeing will be improved. Qualitative research will inform the design. Data will be collected through observations, mapping techniques, and case study analyses. Additionally, research of WELL Building Standards and biophilia will inform design decisions to focus on pedestrian wellbeing. Field observations and map analyses will enhance on-site familiarity. Site analysis is crucial to determine what areas the pedestrian loop and architecture will focus on. Precedent analyses will be useful to understand how urban and architectural installations are used to create iconic pedestrian havens within cities, such as The Emerald Necklace in Boston, Massachusetts, the Beltline in Atlanta, Georgia, and La Villette in Paris, France.

A Hybrid Modernity: Architectural Identity and Modernization in Jordan
Poster #8 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Sami Hajbi
Research Mentor(s): Ehsan Sheikholharam Mashhadi

This architectural modernization of Jordan in the 20th century is a unique mixture between tradition and international modernist principles. While the evolution was surely influenced by global trends, tradition found its deep rooting in Jordan's particular cultural identity, climatic conditions, and socio-political development. Modern Jordanian architecture is hybrid modernity; elements from the past and indigenous evolution are seamlessly combined into the Western approaches of modernism. Influential architects such as Rasem Badran and Jafar Tukan played major roles in this transformation by merging Islamic Revivalism and Neo-Vernacular styles with modern international trends like Brutalism and Sustainable Architecture. Although Zaha Hadid's work is rooted in abroad, it remains an important reference in this vibrant architectural discursus. Where modernization in Jordan today has more to do with negotiating the position of global influence versus local traditions, rather than direct adherence to Western standards, themes of cultural adaptation and identity, not to mention nationalism, are heavily intertwined with those of urbanization and economic development. It is through such a balance that Jordan's architectural identity is fully realized. Promotion of frameworks that emphasized Jordanian architectural uniqueness was catalyzed by institutions such as the Royal Scientific Society and the Amman Institute for Urban Development. Focusing and developing a case for Jordan's architectural development following a hybrid model of modernity through detailed case studies in public buildings and social housing projects such as Abu Nuseir. The modernization process in Jordan has been accomplished by very cautiously incorporating Western architectural ideals within a rich socio-cultural landscape, where tension and synergy between indigenous practices and global trends need to be acknowledged. Jordanian modern architecture is the answer to how one nation can preserve its cultural heritage while embracing and assimilating into global modern standards-an ongoing, complex negotiation of identity and progress.

The Influential Architectural Works of Peter Eisenman & Peter Cook
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 12:45 pm
Undergraduate Student(s): Antony Iadevaio
Research Mentor(s): Ehsan Sheikholharam Mashhadi

In this paper, I am going to be looking at the architectural styles of Peter Eisenman and Peter Cook. I'm going to research and discuss the architectural styles that both architects used and figure out why they designed in that style. I'm also gonna be looking at their designs in their times to see how they influenced design going forward and were influential for the times they

were built. When looking at Peter Eisenman he was an American architect who was part of the New York Five and even though it was like is known for his designs in modern architecture. He also designed with deconstructivism from time to time and seemed to love designing buildings with less-than-ordinary shapes. Peter Cook is an English architect who in his own words described his own architecture as lyrical tactical mechanical and even slightly gothic. Also, Peter Cook was the founder of Archigram which is a British architectural group that was designed in the avant-garde style they were also very influential in the 1960s. Having this baseline of these architects I'm going to be looking at buildings from each of them and discussing the designs of the buildings and even comparing a few of the buildings from each architect to each other.

Locally Stranded - Addressing Rural Cases of Domestic Violence
Poster #13 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Owen Phillips
Research Mentor(s): Robin Puttock
Domestic violence is a nationwide crisis affecting millions of women each year and saw an increase in severity during the Covid-19 pandemic (2020-2022). In Georgia, 37.4% of women report experiencing physical violence by an intimate partner. The situation is especially dire in rural areas, where women experience 150% more incidents at a more intense level than their urban counterparts and must travel three times farther to access resources. Rural women are also nearly twice as likely to be turned away from services due to a lack of space, staffing, and resources. Existing shelters often fail to meet victims' needs because of poor architectural design and insufficient security. This thesis aims to reimagine the typology of women's shelters, using qualitative research and surveys to address the specific needs of rural victims. A site in Homerville, Georgia, has been chosen to test this new approach, focusing on providing a sense of protection through secure architectural design, fostering community with social spaces, ensuring access to medical care through examination rooms, and accommodating both women and their children. The construction must be cost-effective and efficient, given the limited financial resources available, but must not compromise on safety and security. Research for this thesis involves surveys and interviews conducted in Georgia's rural shelters during the summer of 2024 with both residents and shelter staff, alongside a literature review comparing new findings with pre-Covid-19 data and an interview with an expert on the subject. Geographic mapping was used to identify the site, targeting areas with the least access to crisis centers. Additionally, precedents of low-cost, remote, and secure shelter designs will inform the architectural strategies employed, ensuring that the project is both functional and protective for its inhabitants, addressing the complex needs of rural women facing domestic violence.

Museum of Anthropocene: A Space to Exhibit Alternative Histories of Life on Earth
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 12:00 pm

Undergraduate Student(s): Eric Newman
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Many scientists have agreed that we're living in an epoch where human activity has profoundly transformed earth processes. They argue that we are no longer a biological entity among others but rather geological forces. Human-induced stresses have altered the chemistry of our atmosphere. The environment can sometimes reach a climax where the Earth, as a recipient of these human actions, changes at a rate that can only end badly for humans. As Alan Weissman ironically asks "If humans were to vanish from the Earth, would the Earth even miss us? Architecture can serve as a medium to induce these radical changes necessary. Whether Germania by Adolf Hitler's head architect Albert Speer or Washington D.C Capitol by William Thornton, Architecture can serve as a medium for public opinion, propaganda, or positive societal change. The idea of the Museum of Anthropocene is to grapple with the entangled histories of humans and geology, while offering a dialogue about the human temporality with the Earth. The Museum of Anthropocene seeks to answer the questions of How can architecture function as a public conscious means in altering the effects of human activity on a planetary scale? How can a museum of history of human ecological intervention on earth processes raise consciousness about the negative effects of our collective lifestyles? This Thesis seeks to educate the audience; while showing the worst of the actions we have done throughout history that leads to our deterioration and the best of our actions that ultimately lead to a prolonged future. The proposed site of Washington D.C. bears significant weight positioning the museum at the intersection of power, culture, and public accountability. Truly a site in the face of power would show that this is a pressing matter not to be ignored.

Non-Material Transparency: Different design philosophies of Frank Lloyd Wright, Shigeru Ban, and Bijoy Jain
Poster #3 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Cesar Ortiz
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Materiality and transparency have been a driving question in architecture since the invention of glass technologies. Yet, the philosophical and ethical connotations of "transparency" are not limited to materiality. In their canonical article, "Transparency: Literal and Phenomenal," Colin Row and Robert Slutzky articulate differences between material and phenomenal transparency. This paper examines different conceptions of transparency in the architectural practices of Frank Lloyd Wright, Shigeru Ban, and Bijoy Jain. This research will depict how transparency in architecture goes beyond simple materiality, utilizing many aspects including spatial composition, structural layering, and light manipulation to achieve transparency. This paper seeks to track the evolution of transparency through the contributions of several movements,

Modernism, Futurism, Post-Modernism, and Minimalism: each broadening the concept of transparency far beyond the use of glass. Through the analysis of these architectural approaches, each with their own historical and cultural backgrounds, this paper argues architectural transparency is more effectively achieved through a coordinated organization of space, structure, and experience. The finds suggest a more complex definition of architectural transparency, one that includes both physical and phenomenological aspects of spatial composition. This broader understanding of common contemporary architectural practices questions many aspects of privacy, sustainability, and the relationship between built form and human experience.

Pathways to Possibilities: Crafting a Montessori School for Economically Disadvantaged Children
Poster (Microsoft Teams)
Friday, November 22nd, 1:45 pm
Undergraduate Student(s): Melanie Nin
Research Mentor(s): Robin Puttock

This thesis analyzes the correlation that exists between Montessori educational methods and low-income students. To answer this question, I researched 15 different sources, which included case studies, surveys, and interviews that gave me detailed information on my topic. The results of my research showed there was a positive correlation on the effects of low-income students in Montessori Education, but a negative correlation to the number of low-income students who attend Montessori schools. There are around 15,000 Montessori schools around the world, but only 570 Of them are public. This creates a lot of barriers for low-income students, denying them access to the benefits of Montessori education. The results of this thesis can be used to create awareness and promote an increase in public Montessori schools.

Phenomenology Shapes 21st-century Architecture through Abstract Ideas: Analyzing Peter Zumthor's Architectural Philosophy
Poster #16 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Miguel Rojas
Research Mentor(s): Eshan Sheikholharam Mashhadi

From early architectural creations to constructs in the 21st century, the idea of phenomenology has grown to the point where physical senses cannot capture a building as a whole.The "five" senses that an average person acquires are only a physical way of experience, the mind simultaneously has to process what is being experienced. A space could make someone feel like they are at home, in an uneasy place, or in a whole other world. Peter Zumthor explores

architecture as an experience and states "A good building has a soul". This "soul" that Zumthor mentions has to be what the occupant experiences. An experience is something personal to an individual, everyone will be unique. This is where the abstract part of it comes into play, a person cannot show the feelings felt in an experience. The person can only communicate their experience through words, signage, or possibly through some kind of art. This is why it is abstract; it cannot be fully described. This goes hand in hand with existentialism as one can only understand these descriptions with what they can recognize, they have to envision these experiences with their knowledge. These experiences can influence architectural designs in many ways, from the materiality to the sizing of spaces, to even the façade. A building does not and will not always be able to be experienced just by looking at it. The way sound, air, light, etc. penetrate through a building, the materiality and how it feels to the touch, and even the way the space smells are all factors in the experience. It is the architect's job to determine what he/she wants the audience to experience. A building without a form is an experience, and the architect has to encapsulate it.

Pruitt-Igoe RE-Imagined
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 12:30 pm
Undergraduate Student(s): Emmanuel Olayisade
Research Mentor(s): Eshan Sheikholharam Mashhadi

My thesis explores the transformation of the Pruitt-Igoe housing project Demolished IN 1972, from a symbol of modernist failure to an Alternative vision for a collective living site. This transformation underscores the complexities of urban design, socio-economic challenges, and the potential for adaptive reuse in addressing contemporary housing needs. The first section of my study will delve into the history of Pruitt-Igoe, analyzing the factors that led to its failure and the issues present at its inception. Secondly, I will explore the intricacies of urban design and the socio-economic challenges that played a role in its downfall. This part of the thesis will illuminate the multifaceted issues that contributed to Pruitt-Igoe's failure, and the obstacles encountered in its redevelopment. Thirdly I will look at how ecology and the elevation of nature as a priority in designing and how that can help foster a better community. Ultimately, the goal is to derive lessons from Pruitt-Igoe's failures to inform the development of more effective housing programs.

Reflecting on Barragán and Kahn: the role of water in 20th century phenomenological architecture
Poster #12 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Rachel Pickert
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Have you ever sat on the shore of a still pond and watched the reflection of the sky on the water? Or have you found peace from the sound of running water? Whether it be a natural creek or the fountain in your city plaza, water has many functions as a design element due to its ability to connect us to nature. Amongst architecture of the 20th century, there emerged a focus on phenomenology in architectural design, shifting the focus of architecture from serving only your vision to providing a multi-sensory experience. This paper will focus on such sensory environments seen in the work of Mexican architect Luis Barragán (1902-1988) and American architect Louis Kahn (1901-1974). Barragán and Kahn are known for their ability to create an environment that honors both man and divinities through the composition of light, color, and earthly materials. In the context of Martin Heidegger's concept of the Fourfold, Luis Barragan and Louis Kahn utilized water to connect man's earthly structure to the heavens. Though Barragán was known for his use of color and Kahn his solid materiality, both designers used water as a multi-functioning element to elevate their environments and connect nature and structure. By analyzing their usage of earthly material and spatial arrangement, we can see how Barragán and Kahn created a multi-sensory experience, developing the design behind phenomenology in regionalist works of architecture.

Reimagining Recovery: Architecture's Role in Sobriety
Poster (Microsoft Teams)
Friday, November 22nd, 2:00 pm
Undergraduate Student(s): Teagan Littleton
Research Mentor(s): Robin Puttock

Alcoholism recovery housing, such as a sober living house, often overlooks the profound impact that architecture and the environment created from the built world can have on the therapeutic process of rehabilitation. The physical space where individuals receive mental health treatment plays a crucial role in their recovery journey, yet many facilities fail to consider how design elements can support or hinder the healing process. A well-designed sober living house should provide a safe, comforting, and inspiring environment that promotes continued recovery and therefore enhances the effectiveness of therapy and other treatments. There is a large gap between the physical and mental space of recovery and transitional housing and the reality of many individuals who are entering into these programs. Many of these types of recovery houses do not provide appropriate means of healing and therapeutic spaces that acknowledge the realities of people's financial support or emotional support outside of that singular environment. By neglecting to address the architectural aspect of recovery spaces, they may be inadvertently hindering the progress of their patients. Through historical research and case study research specifically focused on choice architecture and biophilia in a recovery space, a connection between nature and mental wellness can be established and programed into an architectural design in Atlanta. Choice architecture involves designing the physical environment in which choices are

made to encourage desired outcomes. Biophilic design principles will apply to the design as a way for recovering occupants to have a close connection to nature which has been proven to enhance occupant health and productivity. By leveraging choice architecture and biophilic design, continued rehabilitation, and sobriety for recovering alcoholics can be an inclusive and inspiring place for establishing mental and physical health decision making.

The Return of the Undead: Resurgence of Russian Constructivism of the 1920s in Deconstructivist Architecture of the 1980s
Poster #11 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Arturo Resendiz
Research Mentor(s): Ehsan Sheikholharam Mashhadi

The 1988 Deconstructivism Exhibition in the Museum of Modern Art captured the work of architects who had set themselves to invent a new language for architecture. Inspired by philosophies of post-modernism and linguistic theories of their time, these revolutionary architects translated linguistic plays into their space syntax. The philosopher who inspired this group most was French-Algerian philosopher Jacques Derrida, whose work on deconstructivism swept European philosophy in the 1960s. Prize-winning architects such as Bernard Tschumi and Peter Eisenman generated architectural projects based on their varying interpretations of Derrida's thoughts. The characteristics of their projects were broken forms, fragmentation, disconnections, and ruptures. What is curious, however, is the similarities between these projects and the work of Russian deconstructivist architects of the early 20th century. Abstraction, fragmentation, and distortion echo the revolutionary spirit of Constructivist figures like Chernikov and Rodchenko. Der Saidrida, "deconstructing aesthetics by demonstrating that the constructional possibility of form is precisely its violation by a subversive alien, foreign body that already inhabits the interior and cannot be expelled without destroying its host." Deconstructivism is the movement of deconstruction within a construction, the expelling of possibility. However, this is not exactly the essence of Deconstruction, if we dig deeper into the matter, we see that many of the "constructional possibilities" come from these pure geometric forms, a cube, pyramid, or cylinder broken down into points, lines, and planes are a threat to tradition. Taking these geometries and the infinite number of possibilities of collisions within them cause impurity, alienation, and distortion something new, something that brings the "new spirit".

Reviving Humanity Towards Rehuminizing Prisons
Poster #12 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Ana Sofia Gomez
Research Mentor(s): Robin Puttock

The surge in female incarceration rates in the United States has heightened concerns about the mental health challenges faced by women within correctional facilities. This thesis research explores the intersection of women's incarceration, mental health, and sustainable architectural design aimed at improving outcomes for female inmates. Factors contributing to the increase in female incarceration rates, including changes in sentencing policies and socioeconomic disparities, are discussed. Research indicates a high prevalence of mental health disorders among female inmates, often linked to past trauma and exacerbated by the prison environment. Despite this, the prison system often fails to adequately address the mental health needs of women inmates. Sustainable architectural design principles, such as biophilic elements and prioritization of privacy and social interaction, offer promising solutions to promote mental well-being in women's prisons. By creating transformative environments that prioritize healing and rehabilitation, sustainable design presents an opportunity to enhance the dignity and reintegration of female inmates into the community.

Reviving Neurodivergent Workplace
Poster #15 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Nayeli Gonzalez
Research Mentor(s): Robin Puttock

The post-pandemic era has left the United States with nearly one billion square feet of vacant office space, creating significant economic and social challenges. Alongside this, many employees continue to work from home, often experiencing adverse effects on their physical and mental well-being due to environments that are not conducive to long-term productivity. Addressing these issues, this thesis explores how outdated and underutilized office spaces can be revived, reinvented, and renovated to not only attract employees back to the workplace but also to accommodate the unique needs of neurodivergent individuals. Neurodivergent people, representing millions globally, often encounter sensory overstimulation and heightened anxiety in traditional office environments, reducing their productivity and well-being. This study proposes that inclusive, adaptable design particularly through biophilic design principles, sensory-friendly environments, and ergonomic flexibility can transform office spaces into welcoming, supportive places for all employees. By incorporating natural elements like plants, dynamic lighting, and varied workspaces such as quiet zones and open areas for collaboration, organizations can foster environments that enhance focus, reduce stress, and boost overall well-being. The thesis employs a mixed-methods approach, integrating literature reviews, case studies of companies with successful inclusive office designs, and qualitative research through interviews with neurodivergent employees. These insights will inform practical design guidelines aimed at creating workplaces that support neurodiversity while simultaneously revitalizing office space usage. Ultimately, this research seeks to demonstrate how a thoughtfully

designed office environment can cater to diverse needs, helping organizations retain talent and improve productivity across the board.

Roots of Resilience: Designing Culturally Informed Healing Spaces for Asylum Seekers
Poster (Microsoft Teams)
Friday, November 22nd, 2:15 pm
Undergraduate Student(s): Michelle Guzman
Research Mentor(s): Robin Puttock

This thesis explores the role of culturally sensitive architectural design in immigration asylum centers, focusing on how these spaces can better support the well-being, dignity, and cultural identity of Hispanic/Latino asylum seekers. Current asylum centers often prioritize efficiency and functionality over the emotional and psychological needs of their occupants, resulting in environments that feel institutional, impersonal, and disconnected from the cultural identities of displaced individuals. This lack of consideration for the cultural background and emotional recovery of asylum seekers exacerbates the challenges they face, including isolation, trauma, and disorientation. The research in this thesis seeks to address these issues by integrating culturally sensitive design strategies that reflect the heritage and needs of Hispanic/Latino populations. Drawing from trauma-informed design principles, this study will explore how biophilic elements, adaptable spaces, and communal areas can create environments that foster emotional recovery, provide privacy, and encourage social integration. Additionally, the thesis examines the importance of incorporating architectural forms, materials, and spatial arrangements that resonate with Hispanic/Latino cultural identity to promote a sense of belonging and comfort in asylum centers. Through a combination of case studies, and design exploration, the project will develop a comprehensive architectural proposal for a humane asylum center. This proposal will integrate cultural elements with trauma-informed design principles to create spaces that support both the immediate needs and long-term well-being of asylum seekers. The design will prioritize community-building spaces to promote social interaction with the local population, facilitating integration and reducing isolation. Ultimately, this thesis aims to redefine the architectural approach to asylum centers by demonstrating how culturally sensitive and humane design can transform these spaces into environments that offer dignity, emotional support, and a sense of belonging for Hispanic/Latino asylum seekers.

Shaping Sustainability: Investigating the Structural Efficiency of Fabric Formwork in Concrete Beam Production
Poster #13 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Evan Haller, Greg Sweat, Jesus Vielma, Dan Bululi Nyumpa, Zi Chow, Samiha Hossain, Shoga Oni, Hayaa Uddin, & Brody Daniels
Research Mentor(s): Giovanni Loreto

This poster explores an innovative approach to precast concrete beam fabrication using fabric formwork, diverging from traditional rigid formwork methods. Rigid formworks, while effective, often result in inefficient concrete use, leading to unnecessary material consumption and higher CO2 emissions. Recent literature on fabric formwork suggests its potential to create more organic and structurally efficient shapes, reducing both the amount of material used and the environmental impact. However, research on optimizing these methods for structural performance, ease of fabrication, and industrial applicability remains limited. Addressing this gap, our study employs form-finding techniques to optimize concrete volume in beam fabrication, ensuring ease of production while maintaining or surpassing the structural performance of traditional prismatic concrete beams. The hypothesis driving this research posits that fabric formwork can produce beams that not only match the structural strength of traditional beams but also offer material savings, potentially leading to a reduction in the overall carbon footprint of concrete construction. Results from testing are presented, indicating that fabric-formed beams exhibit comparable strengths relative to conventional prismatic beams. This finding suggests a potential paradigm shift in precast concrete production, where optimizing beam shapes through fabric formwork could become a standard practice. The implications of this research extend to the broader construction industry, offering a pathway to lower emissions and more sustainable building practices.

Thresholds of Healing: Rethinking Inpatient Mental Health Facility Design
Poster #14 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Emily Simms
Research Mentor(s): Robin Puttock

Along Martha Berry Boulevard in the City of Rome, Georgia, is the proposed Tax Allocation District (TAD), which slates redevelopment for blighted areas, including motels that have been a hot spot for criminal activity in the area. Coupled with this blighted area is the need for mental health facilities to serve the needs of the community, specifically long-term facilities for patients with depression and/or self-harm concerns. Suicide is the 2nd leading cause of death for those aged 10-24 in Georgia according to the Department of Behavioral Health and Developmental Disabilities (DBHDD). A new long-term facility is proposed within the Tax Allocation District that blends the community of Rome within the threshold of the facility, as well as designing patient rooms and day rooms to control daylight and artificial light to regulate circadian rhythms, therefore reducing self-harm incidents and improving recovery for patients diagnosed with depression.

Two Visions of Living Architecture: Japanese Metabolism of the 1960s and the Techno-biological experiments of Neri Oxman

Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 9:00 – 9:50 am
Undergraduate Student(s): Corbin Austin
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Architecture shares many qualities of living organisms at its core. It reacts to its environment, evolves over time, and in some cases, grows. Many architects have manifested this connection between architecture and living organisms in practice, as there exists a myriad of examples of biomorphic and biophilic design. However, some revolutionary thinkers and designers have interpreted these biological inspirations in radical ways in response to the eco-sociopolitical contexts of not just their time, but also proposing the next evolutionary step in architecture, and living organisms' coexistence with it. The Japanese metabolism movement served as a response to the Second World War and reflected new ways of thinking about architecture in urban environments in terms of structure, organization, and most notably, growth. The Japanese Metabolists' manifesto titled, "Metabolism 1960: Proposals for New Urbanism" featured innovative architectonic solutions that combined megatructuralism with principles of organic growth. Neri Oxman is a modern-day Israeli-American architectural designer whose work primarily focuses on the research and implementation of biological materials in fabrication, creating works through growth rather than assembly. Through experimentation, she has created revolutionary designs that reinterpret biological processes, reactions, and adaptations into architecture, which serve as an evolutionary approach to how we inhabit a world that has been ecologically impacted due to anthropic intervention in negative ways. These two design outlooks, metabolism and materialism, both look at the natural world's processes as a way to respond to the impacts people have made on the planet and society, but in radically different ways. Metabolism focuses on order, and materialism focuses on physical matter, however, both are rooted in ideas of what it means to have sustainable architecture and the concept of growth and its application. This paper explores and compares diverging concepts of biological architectural inspirations and their impacts on architectural thinking, design, and building.

Understanding the Effect of Intercity Roads on the Evolution of Urban Form
Poster #15 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Fiona Duvall
Research Mentor(s): Ermal Shpuza

Cities are key to sustainability, social cohesion, public health, and energy use. Successful urban planning relies on understanding the effect of the roads that connect the city with the neighboring settlements, which act as a scaffold for urban growth. The project develops representations and analytical tools for understanding urban evolution. The research is based on the following analytical methods: 1) Digitally drawing the arterial roads for twenty Adriatic

coastal cities in Italy based on historical maps surveyed in 1819; 2) Categorizing the cities into two main groups: those whose arterials have remained mostly unchanged and those whose arterials have been fundamentally altered due to the addition of gridiron streets in the 19th century; 3) Investigating the geographical context around the cities, which has affected their overall shape during urban growth. The gridiron accretions are found in Pescara and Brindisi but are missing in a few cases, such as Rodi and Otranto. While in Brindisi, and Rimini, the gridirons entirely replace most of the historical arterials, in Termoli and Barletta, the gridirons are added as patches aligned to the historical arterials. In addition, given the straight configuration of most of Puglia coast and the coastal plain, cities like Bari and Trani, and have grown as half circles covering about 180 degrees. Where the coast bends into capes, the cities have grown as wedges covering 90-110 degrees, while in Brindisi, the town has grown around the bay, covering about 270 degrees. The study shows the evolution of street networks over time is influenced by the physiographic context of the cities coupled with the configuration of inter-city arterial roads over and above the accretion with certain street patterns. The study shows the need for considering both these factors to understand urban evolution and inform the planning and design of cities in the future.

The Universal and The Mystical: Modernist Principles in Le Corbusier and Phenomenological Practices of Luis Barragan on Modern Architecture

Poster #12 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Korine Dorval
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Universal Design in architecture was the idea of deciding on behalf of the people. The Swiss architect Le Corbusier (1887–1965) is recognized for having been one of the pioneers of modernist architecture and for having placed a strong emphasis on function and minimalism. His famous quote, "A house is a machine for living in," perfectly encapsulates his belief that every element of a building should be rationally constructed and stripped of any unnecessary decorations. Mystical design, on the other hand, was an introspective idea – it embraces a spiritual and poetic concept. The Mexican architect Luis Barragan's (1902–1988) approach to design prioritizes creating a space that feels sacred and transcendent. Barragan's architecture aims to foster a sense of harmony and connection with the natural world rather than just fulfilling a utilitarian purpose. This paper features two buildings: La Casa Estudio (1948) and Sainte Marie de la Tourette (1960). Barragan's La Casa Estudio exemplifies modern architecture's emphasis on materiality, bold color, and regionalism, as well as intimacy and ritual. Sainte Marie de la Tourette, designed by Le Corbusier, exemplifies modern architecture's emphasis on functionality and simplicity with its rational layout that prioritizes efficient space use and minimalist design elements. Together, these two buildings illustrate the diverse range of expressions possible within the realm of modern architecture.

Variant Minds - Designing for Neurodiversity in Offices
Poster #16 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Maya Schiltz
Research Mentor(s): Robin Puttock

High-functioning adults with cognitive disorders such as ADHD, Autism, and Anxiety are often overlooked when considering solutions to help neurodiverse individuals thrive. While low-functioning neurodiverse adults often receive support through specialized programs and care facilities, high-functioning neurodiverse individuals are expected to integrate into traditional work environments, which can severely impede their ability to succeed. Despite growing awareness around creating neurodivergent-friendly workplaces, many office designs continue to follow a "one-size-fits-all" approach, typically featuring open desk arrays, a few private offices, and meeting rooms. This setup fails to provide adequate separation from distractions such as noise, smells, visual glare, and other sensory inputs, all of which can be overwhelming for neurodivergent individuals. Additionally, the lack of choice in work location and environment within the office further limits productivity and well-being. For neurodiverse employees, the inability to control their workspace can be not just uncomfortable but debilitating. To better accommodate these needs, workspaces should incorporate more flexible designs, including quiet zones, customizable workstations, private or semi-private spaces, and sensory-friendly areas where individuals can decompress. Providing more options for how and where employees work within the office can significantly improve the work experience for high-functioning neurodivergent individuals. Addressing these needs is essential for fostering inclusivity and enabling neurodiverse adults to succeed in the workplace.

The Various Methods to Deconstructivist Architecture: How Russian Constructivism Influenced Modern Deconstructivism
Poster #4 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Lonniel Gibson
Research Mentor(s): Ehsan Sheikholharam Mashhadi

Architecture is like cooking. Any person can follow the instructions on how to prepare and cook a meal, but it is the personal touch and influence of taste which makes the dish stand out from the rest. Architecture is no different. Architects design within a set of parameters and standards, yet you will typically see diverse design processes and methods as each designer adds his or her own taste and style resulting in no two architects having the same result. When looking at the architectural style of Deconstructivism, each building may have its own individual personalities but still follows a set of distinct principles. This paper will examine the characteristics of

Deconstructivism while relating it to Russian Constructivism to answer the question, how does Deconstructivist architecture create a homogenous style with contrasting philosophies? To answer this question, this paper will draw on the realized and unrealized works from 1920s Russian Constructivist like Iakov Chernikhov (1889-1951) as this movement has heavily influenced the work of modern Deconstructivism which was defined in 1988 by the Museum of Modern Art drawing on the works of architects like Peter Eisenman (1932) and Thom Mayne (1944). Using the 1988 Museum of Modern Art Exhibition; written by Philip Johnson (1906-2005) and Mark Wigley (1956) and The Architecture of Deconstruction *by Jorge Glusberg (1932-2012) as primary resources this paper will identify how the style of Deconstructivist architecture is able to create comparative forms through different means by analyzing differing design philosophies and any comparisons or influence of 1920s Russian constructivism on modern Deconstructivism.*

From Modernist and Expressive Formalism to Sustainable Architecture: Comparing the Architectural Practices of Jorn Utzon and Shigeru Ban

Poster #24 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate student(s): Blessing Madamidola
Research Mentor(s): Ehsan Sheikholharam Ma

Jorn Utzon (1918-2008) and Shigeru Ban (1957~) both have personal influences that impact the material they use and how it is represented in their buildings. Utzon was deeply influenced by nature. He used modern materials: concrete, steel, and glass to create monumental buildings that represented the environment of the site. Jorn Utzon is most famous for the Sydney Opera House. The opera house uses prefabricated concrete in concave shapes to reflect the shells and open ocean along the Sydney Harbour. Shigeru Ban is driven by sustainability and humanitarian problems. Ban uses renewable materials: paper, cardboard, and wood. He demonstrates these materials as structural elements that are usually exposed. Both architects are modernist. Utzon was an expressionist, while Ban is a modern architect that makes modular architecture through a sustainable approach. Along with their own personal influences, both architects had different philosophies and era defined concerns. Utzon was active post World-War II. Post-War modernism focuses on reconstruction through technological advances to create functional designs that reflect modern values. Jorn Utzon's era made use of prefabrication and structural engineering. Shigeru Ban belongs to Sustainable Architecture from the late 20th century. This era became more concerned with technological innovations and environmental issues such as globalization. The role of the architect has shifted; architects began to address social issues. Since Ban is influenced by sustainability in architecture, his work is rooted in renewable resources while also designing shelters for refugees, etc. An example of a technological innovation by Ban would be when he experimented with paper and cardboard to create structural elements like in

the Cardboard Cathedral. The paper focuses on Shigeru Ban and Jorn Utzon personal philosophies as well as how their influences are demonstrated in their designs.

Atlanta Constitution Building Rehabilitation
Poster #23 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Andrew Wilkins
Research Mentor(s): Ameen Farooq

Atlanta has a long history of demolishing its beautiful historic buildings. Known for its rapid growth and modernization, the city has sacrificed much of its architectural heritage in favor of new development. This trend has been ongoing for decades, leading to the erasing of Atlanta's cultural history and the irreversible modification of the city's skyline and built environment. Yet still, the City of Atlanta continues to prioritize "progress" over preservation, despite efforts by preservationists.

With so many of Atlanta's great buildings gone, we must preserve what still remains. Currently, Downtown Atlanta's most dilapidated and historically significant building is the Atlanta Constitution Building. Once a beautiful gem, this neglected old structure sits on the corner of Forsyth St. and Alabama St. and becomes more and more of a ruin each day. Built in 1947 and currently vacant since 1972, the Atlanta Constitution Building has now become quite an eye sore for the Five Points area. Its physical deterioration is very evident, with full-sized trees growing on its roof, every window either missing or boarded up with metal plating, and many other elements missing.

The Atlanta Constitution Building and its immediate surrounding site has the potential to become a destination that breathes vitality into Five Points, the Gulch, and Underground Atlanta. This thesis will focus on adapting the building for reuse, reestablishing it as the renowned feature of the streetscape it once was, and most importantly: preserving the historical integrity of the building.

Construction Management

Analyzing Fluctuations of Fuel Price Index with Economic Conditions
Poster #15 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Graduate Student(s): Mounika Kandukuri
Research Mentor(s): Minsoo Baek

(GDOT) The fuel price index (FPI) is an essential indicator for estimating, monitoring, and managing transportation infrastructure cost. Due to the significant fluctuation of the FPI, cost estimators/engineers encounter critical uncertainty for estimating transportation project costs. Thus, this research aims to analyze the fuel price index with external factors. This study employs a quantitative analysis to analyze fuel price fluctuations in Georgia from January 2007 to December 2014. Monthly data on fuel prices is collected from the Georgia Department of Transportation (GDOT), allowing for a detailed temporal analysis of price trends. This analysis indicates the Visualization of the trends of the fuel price index to measure the shifts of fuel price between the recession and non-recession periods based on established economic indicators. To assess the statistical significance of price variations between these periods, both parametric tests (such as t-tests) and non-parametric tests, (such as Mann-Whitney U test) are utilized. This study also conducted regression analysis to provide better understanding of the relationships between fuel prices and economic conditions. This study found that there are significant changes in the FPI during the recession period. In addition, the several factors, such as gas prices and project expenditure, significantly influenced the FPI. The analysis of the index variable reveals essential trends and fluctuations, especially during recessionary periods, aiding in the prediction of economic cycles. These insights allow policymakers to allocate resources effectively and prioritize strategic investments during downturns to support recovery and growth. Additionally, the data helps forecast demand for the transportation infrastructure, enabling better planning and scheduling of maintenance and upgrades.

A Historical Assessment of How REITs Have Thrived During Previous Economic Recessions, Emphasizing the Sectors Most Affected
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 9:00 – 9:50 am
Graduate Student(s): Narmada Vadlamudi
Research Mentor(s): Minsoo Baek

Real Estate Investment Trusts (REITs) have become an important component of diversified investment portfolios due to their potential for consistent income and capital appreciation. Although real estate investment trusts (REITs) are highly perceived as reliable sources of income, their performance is highly attuned to shift changes in macroeconomic factors like interest rates and monetary policy. However, macroeconomic conditions like inflation, changes in central bank/ government fiscal policies lead to change in interest rates, have a significant impact on their success. Because of differences in their underlying business structures, interest rate swings can have varying effects on equity and mortgage REITs. This Research fosters a better understanding of how monetary policy influences real estate investment, with implications for both institutional and retail sectors. This study conducts an empirical analysis to study the impact of macroeconomic condition factors on the REITs. To achieve this objective, this study analyzes the variation of REIT index, evaluates the long-term performance of REIT

(1971 Dec to 2024 March and identifies the trends in REIT stock prices and total returns in retaliation to Fed (federal reserve) interest rate fluctuations. In addition, Mortgage REITs tend to be more unpredictable than equity REITs during times when there are rising interest rates since their profitability is based on interest rate spreads, which have a direct impact on their earnings. Equity REITs, on the other hand, are less subject to interest rate fluctuations because their revenue is based on property prices and rental income. This study conducted non-parametric tests for REIT to measure the changes of the index during economic crises. Economic crashes during recessions cause consumer spending. Economic downturns during recessions cause a drop in consumer spending. This study discovered that during recession and economic slowdown periods, the REIT index fell dramatically, and market volatility rose, both of which had a major negative impact on REIT performance and concluded that there is a significant impact of recession on the REIT based on data collected from institutional and Retail investment sectors. The study also found that REIT-specific variables, such as interest rates, had a considerable impact on market forecasts. The findings of this study contribute the current state of knowledge to strengthen policy responses, preparedness and economic resilience in terms of external shocks like recissions and natural disasters.

Impact of Crude Oil Prices on Construction Industry
Poster #16 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Graduate Student(s): Arbaaz Hussain Syed
Research Mentor(s): Minsoo Baek

This study provides a comprehensive analysis of West Texas Intermediate (WTI) crude oil prices from 1986 to 2024, highlighting the critical factors influencing price dynamics throughout this period. The research delves into the historical context of the oil market, identifying significant events such as the Gulf War, the 2008 financial crisis, and the COVID-19 pandemic, which have all contributed to marked price fluctuations. Key drivers of WTI prices are examined, including geopolitical tensions, supply chain disruptions, and changes in global demand, particularly from emerging economies. The emergence of shale oil production in the United States and its impact on both domestic and global markets are analyzed, emphasizing how advancements in extraction technologies have reshaped the energy landscape. The study employs quantitative methods to evaluate price volatility, utilizing econometric models to identify correlations between WTI prices and macroeconomic indicators such as GDP growth, inflation rates, and currency fluctuations. The findings reveal distinct price patterns, illustrating how external shocks and policy decisions influence market stability. Additionally, the research addresses the growing importance of renewable energy sources and their implications for future oil demand and prices. The transition towards a more sustainable energy paradigm poses both challenges and opportunities for the crude oil market. Overall, this study offers a nuanced understanding of the intricate factors affecting WTI crude oil prices over nearly four decades. The insights gained

serve as a valuable resource for investors, policymakers, and stakeholders in the energy sector, providing a foundation for informed decision-making in an ever-evolving market landscape.

Weaving of Spaces: "Designing Spaces that Create Opportunities for Communication and Freedom Through Ease of Access"
Poster #10 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Fiona Duvall
Research Mentor(s): Ehsan Sheikholharam Mashhadi

The Kennesaw State University campus has much to offer its students and the community, but it has a periphery, disconnecting it from neighboring communities. Marietta square has amazing opportunities for food and community. The main problem here is that the only way to access the square and Kennesaw State University is by car and that these two locations are isolated. Through the research of the psychological aspects of space, cast studies and psychological research articles. I've found the main problems found in these urban areas are the low walkability, lack traffic safety and lack access to anyone regardless of Finacial constraints such as identity or races. These spaces cause urban anxiety to their patrons, due to the feeling of not being welcome, safe or belonging. Along with feeling or potentially physically not having access, whether that be due to not having a car, not being able to park, not being able to drive due to traffic. Ways i want to combat these problems by proposing opportunities for social life and inclusivity, introducing more walkability and nature. I have come to the conclusion that concocting these major spaces with a loop containing pockets of program such as coffee shops and libraries would help urban wellbeing through special, material and cultural aspects. Improving walkability, access, affordability, community and the environment. The loop provides the neighboring community's access to events in the square such as the Saturday market, better food Oppurtunites, outdoor gym spaces and a better connection to campus Oppurtunites that could bust the community.

The Analysis of the Impact of Economic Market Conditions on the Housing Market Index (HMI): A Study of Forecasting Market Trends
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 9:00 – 9:50 am
Graduate Student(s): Sneha Inavolu
Research Mentor(s): Minsoo Baek

The NAHB/Wells Fargo Housing Market Index (HMI) is a vital tool for measuring builder confidence in the US single-family housing market. This index, derived from a monthly survey of home builders, provides insight into current market circumstances and future predictions. The HMI is critical for stakeholders in the construction sector, influencing policy, lending practices,

and strategic planning. The housing market is currently undergoing significant fluctuations because of economic uncertainty, especially the impact of recent recessions. Understanding these variations is critical for forecasting market trends and making informed decisions. The objective of this analysis is to investigate the variations in the HMI during recession periods and measure the impact of external factors on the HMI using regression analysis and machine learning techniques. This study collected HMI between 1985 and 2024 along with relevant external market conditions to analyze these relationships comprehensively. This study found that interest rates, employment levels, and builder confidence levels have a critical impact on the HMI. In addition, the results showed that there is a significant downward trend of the HMI during the recession. Understanding the relationship between builder sentiment and economic conditions allows stakeholders such as home builders, policymakers, financial institutions, and investors to better foresee market changes and alter their strategies accordingly.

College of Computing and Software Engineering

Data Science & Analytics

Comparing Diabetes and Hypoglycemia Mortality Rates
Poster #6 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Henry Thai
Research Mentor(s): Kevin Gittner

Around the world, hypoglycemia and diabetes morality has been on the rise. This study aims to explore the difference between hypoglycemia and diabetes related morality on a global scale. Knowing the mortality rate of diabetes and hypoglycemia would be useful for countries needing to know what they should be doing differently to tackle this issue. The data was found on Mendeley Data and is called "Global proportions and rates of hypoglycemia-related morality" by Francesco Zaccardi. They focused on proportions of hypoglycemia related deaths (compared to total diabetes deaths) and counts of hypoglycemia and diabetic related mortalities across 109 different countries. Descriptive statistics and frequency tables were generated for the variables of interest. Two data sets were merged to have one file that contained hypoglycemia, diabetes and population counts. Two new variables were then computed to show the incidence rates of hypoglycemia and diabetes. There were higher mortality rates shown in Japan, Latin America and Caribbean countries. And lower mortality rates in Europe, North America, and other high-income regions. We can see which countries with lower mortality rates and follow their practices to help lower countries with higher mortality rates. Some policy suggestions could be to improve diabetes management and monitoring, strengthen healthcare access, and to enhance death certification accuracy. Policy makers should improve death certification is because lower income countries may not have the correct data, which in turn creates a lack of focus on the issue. This is also one of the notable limitations when trying to help diabetics across lower income countries. To summarize, the study shows us geographic differences between hypoglycemia and diabetes related mortality rates across 109 countries.

Exploring the Impact of Age, Sex, and Early Alcohol Initiation on Current Drinking and Binge Drinking Behaviors Among Adolescents and Young Adults
Poster #14 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Jessica Wolwark & Deirriana Rivers
Research Mentor(s): Kevin Gittner

This study explores the impact of early alcohol initiation, age, and sex on current drinking and binge drinking behaviors among adolescents and young adults. Utilizing data from the 2021 National Youth Risk Behavior Survey (YRBS), we analyzed the relationship between age at first alcohol use, sex, and drinking behaviors. Our primary hypothesis suggests that individuals who began drinking at age 13 or younger are more likely to currently consume alcohol and binge drink, with men being more susceptible to binge drink compared to women. The study employs descriptive and inferential statistical methods, including frequency analyses, histograms, and bar charts, to visualize and interpret the data. The results indicate that early initiation of alcohol use is strongly associated with higher rates of current drinking and binge drinking, especially among male respondents. Understanding the role of these factors is critical for developing effective public health interventions. We found that nearly 30% of respondents initiated alcohol use at age 13 or younger, and these early initiators were significantly more likely to engage in current drinking behaviors compared to those who started drinking at an older age. Furthermore, while 21.2% of respondents reported drinking in the past 30 days, only 8.2% engaged in binge drinking, highlighting a disparity between regular and excessive alcohol consumption. Sex differences were notable, as males reported higher frequencies of binge drinking across all age groups. This indicates a pronounced need for gender-specific prevention strategies. The findings highlight the necessity of targeted intervention strategies that delay the onset of alcohol use and address sex-specific differences in binge drinking risk. By identifying age and sex as key determinants of adolescent drinking behavior, this research offers valuable insights that can guide future prevention efforts and promote healthier outcomes among high-risk groups, ultimately contributing to more effective public health policies and programs.

Decoding Twitch: Unraveling the Factors of Streamer Success
Poster #8 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Kanaya Williams & Roman Merletti
Research Mentor(s): Kevin Gittner

The gaming industry has experienced rapid growth, with esports and live-streaming platforms like Twitch becoming prominent forces. Twitch, specializing in gaming content, has witnessed a surge in popularity, particularly during the COVID-19 pandemic. Analyzing the dynamics of the platform and the preferences of its audience is crucial for understanding its success. This study investigates the relationship between follower count and average viewership on Twitch, aiming to identify key factors influencing streamer popularity and inform strategies for both streamers and platform developers. This study employs a quantitative research approach,

analyzing data from a sample of 1,000 top Twitch streamers over the course of a year. Key variables include follower count, average viewership, content type, streaming schedule, audience interaction metrics, and demographic information. We hypothesize a positive relationship between follower count and average viewership, suggesting that streamers with higher average viewership are more likely to attract a more significant following. Additionally, the research anticipates that factors such as content type, audience interaction, and viewer demographics will significantly influence streamer popularity. Descriptive statistics will be used to analyze the distribution of variables and identify trends. Correlation analysis will assess the relationship between follower count and average viewership, while regression analysis may explore the impact of additional factors. We anticipate a positive relationship between follower count and average viewership, supporting our hypothesis. Additionally, we expect to identify significant predictors of streamer popularity. The findings can benefit streamers by informing their content strategy and audience engagement. Platform developers can use these insights to enhance the user experience. Researchers can gain a deeper understanding of the online entertainment landscape. Future research may explore additional factors influencing streamer popularity, such as social media and collaborations. This will contribute to a more comprehensive understanding of the dynamics driving the live-streaming industry.

Impact of Race on Access to Mental Health Programs: Examining and Analyzing the Role of Race in SMHA Programs

Poster #7 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Aminah Carrington & Doryen Jah
Research Mentor(s): Kevin Gittner

This study explores how race influences access to State Mental Health Authority community-based programs across the US. Using data from the 2022 Mental Health-Level Client Data provided by the Substance Abuse and Mental Health Services Administration, we analyzed racial disparities in mental health service use. The dataset includes a total sample size of 6,116,828 participants with demographic information such as race, age, gender, education level, and mental health service use. We hypothesize that the type of mental health service utilized will differ by racial groups across the US. Our primary research question tests this hypothesis by investigating if the type of mental health service used differs between marginalized communities and white populations. An exploratory data analysis will be conducted using IBM SPSS statistical software. Race was recoded into two categories: a "majority" group representing a total of 3,976,917 white individuals observed and a "minority" group consolidating the racial groups American Indian/Alaska Native, Asian, Black or African American, Native Hawaiian/Other Pacific Islander, and biracial/multiracial individuals into one with a total of

2,139,911 observations. In addition to race, variables such as age, gender, and education level will be included in the analysis when assessing the relationships with mental health service utilization. Our data analysis intends to identify trends in mental health service access among different racial groups. Preliminary results indicate that marginalized racial groups may experience different levels of access to SMHA-funded community programs compared to white participants. This relationship will be statistically tested in the future. This study contributes to public health research focused on disparities that occur within the mental health field. By identifying how race and other demographic factors influence access to services, public health professionals can work toward more equitable health outcomes for all communities.

Think You Can Fake It? We'll Make You Verify It: Utilizing Follow-up Surveys to Detect and Prevent Fraud in Online Crowdsourced Data
Poster #8 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Andy Lewis
Research Mentor(s): Kevin Gittner & Lauren Matheny

Online survey platforms enable faster and more cost-effective data collection across public, private, and academic sectors, but they also introduce challenges related to fraud. The ever-looming, evolving nature of fraud requires constant adaptation to preserve data quality. Our prior research examined data quality amongst the three leading pay-for-data collection platforms, where only 10.2% of MTurk respondents provided acceptable-quality data. This study aims to demonstrate how follow-up verification surveys can improve the security and efficiency of incentive payouts by verifying respondent demographic information to reduce fraud. A new survey was disseminated via MTurk with updated quality checks to refine fraud detection, yielding over 5,000 responses. The survey's administrator received emails surrounding survey compensation issues, prompting a standardized follow-up survey designed to verify previously reported demographic information sent in response to email communications. Responses from the original survey were match merged with the follow-up survey data, and descriptive and comparative analyses were conducted to identify inconsistencies. Preliminary findings suggest that follow-up surveys can successfully identify fraud and potentially allow for a more rigorous compensation system. While few discrepancies were found in zip code, birth year, and email among respondents who completed the follow-up survey, significant acts of fraud were found among those who initiated contact but failed to complete the survey. After omitting duplicate emails and survey submissions, 28 emails were received regarding issues with incentives. Of those, only 50% of respondents completed the follow-up survey. Among those who completed, 1 had a zip code discrepancy, 2 had birth year discrepancies, and 1 had an email inconsistency. Of the 14 who did not complete the follow-up survey, nearly half of the distinct MTurk Worker IDs shared the same email in the original survey. These findings have implications for future applications for clinicians and other professionals relying on online surveys for data collection.

Computer Science

An Algorithmic Approach for Optimizing Blood Transactions in Regions with Scarce Donation Rates
Poster #8 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Graduate Student(s): El Arbi Belfarsi
Research Mentor(s): Maria Valero, Lin Li, & Robert Keyser

This poster presents the development of a software solution designed to optimize blood management systems in regions with low donation rates, including areas severely impacted by war, political instability, or economic challenges. Many regions around the world suffer from chronic shortages of blood donations, especially during crises, where conflict and natural disasters further exacerbate the scarcity of resources. In war-torn regions, limited healthcare infrastructure and reduced donor participation lead to critical blood shortages, making the optimization of blood resources more urgent than ever. The project aims to streamline access to blood resources through a user-friendly application, enabling patients and donors to quickly locate and request blood from nearby facilities. The system uses a NoSQL Cassandra database for efficient management of large datasets, allowing real-time updates on blood availability. Key features include tracking blood groups, specific blood components (e.g., red blood cells, plasma, platelets), and their respective expiration dates to ensure proper utilization. A recommender system is incorporated to match donors with appropriate donation centers based on their location and blood type, improving donor participation even in areas with low donation rates. The system also optimizes resource management by prioritizing the use of blood components nearing expiration, minimizing waste. This poster details the technical architecture, including database design, real-time data handling, and the implementation of scenarios where users interact with the system. Challenges encountered during the development process and potential enhancements, such as refining the recommender system and improving resource allocation algorithms, are also discussed.

A Comprehensive Database Collection for Alzheimer's Disease: Organizing Key Research Domains to Enhance Diagnostics and Treatment
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 1:00 – 1:50 pm
Undergraduate Student(s): Johaan Kathilankal Jis
Graduate Student: Lingtao Chen
Research Mentor(s): Chloe Yixin Xie

Alzheimer's disease is a neurological disorder that is progressive and characterized by gradual degeneration of brain cells resulting in decline of cognition, memory, and behavior. According to the National Institute of Aging, Alzheimer's disease is currently ranked 7th leading cause of death in the United States. Our research objective is to build a collection of databases for further Alzheimer's disease research. This comprehensive collection includes various databases from both clinical and scientific perspectives. The diverse collection of databases ranges from the International Alzheimer's and Related Dementias Research portfolio to the National Alzheimer's Coordinating Center among others. These databases are then classified into categories based on their biomarkers, drug development, genetic research, and many other categories. The goal of this research is to aid medical professionals, researchers, and pharmaceutical companies with valuable data to improve Alzheimer's disease treatment, early detections, and integrating deep learning applications using these database holds the key to unlocking patterns, predicting disease progression, and enhancing diagnostics.

The Impact of Adversarial Attacks on Remote Sensing Applications
Poster #22 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Sanjaykrishnan Ravikumar
Research Mentor(s): Kazi Aminul Islam & Ravi Kumar Rogannagari

Remote sensing systems are increasingly utilized in automated surveillance and detection applications. However, the robustness of these systems is challenged by adversarial attacks—deliberate manipulations of input data that lead machine learning models to misclassify or fail to detect critical objects. This research investigates the vulnerability of remote sensing systems to adversarial perturbations, focusing on datasets designed for object classification in remote sensing contexts. We will implement adversarial techniques, such as the Fast Gradient Sign Method (FGSM), to systematically compromise detection accuracy. In parallel, we will develop and evaluate defense mechanisms, including adversarial training, to enhance system resilience. The findings will identify the impact of adversarial attacks on the machine learning model's performance and provide recommendations for strengthening the security and reliability of remote sensing technologies. This work aims to contribute to the development of more secure machine learning systems, with implications for improving both public and private safety infrastructures.

Leveraging a Large Language Model to Empower Informal Caretakers of People with Dementia
Poster #12 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Mercy Olaniran
Research Mentor(s): Xinyue Zhang & Modupe Adewuyi

Behavioral symptoms of Alzheimer's Disease and Related Dementias (ADRD) are detrimental to the quality of life for individuals with ADRD and their caregivers. Symptoms such as wandering, agitation, and confusion can often overwhelm caregivers leading to stress, depression, or burnout which can lead to a decrease in the quality of care. These challenges often result in increased hospitalizations and care costs, creating a need for a solution to support informal caregivers. This project proposes the development of an AI-based Dementia Care Voice Assistant application to meet the needs of caregivers. Using large language models, the application will provide real-time and personalized guidance to help caregivers manage complex behavioral symptoms. The LLMs will be designed to adapt responses to the user based on how they are prompted. To ensure that the output aligns with the best medical practices, we will establish a dataset based on evidence-based interventions from extensive literature reviews and interviews with informal caregivers. In addition to providing tailored responses, the application will offer assistance during emergency situations. The voice assistant will feature intuitive features such as recognizing signs of medical emergencies and prompting the user to contact 911 when necessary. Through the development of this application, informal caregivers will have access to accurate information and personalized assistance, alleviating caregiver stress, enhancing their confidence, and ultimately improving the quality of the care they deliver.

Nutrinalyzer: Leveraging Multimodal LLMs for Enhanced Food Recognition and Dietary Analysis in Type 2 Diabetes Management

Poster #19 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Graduate Student(s): Afnan Ahmed Crystal
Research Mentor(s): Maria Valero de Clemente, Valentina Nino, & Katherine Ingram

This research project aims to benchmark the performance of various large language models (LLMs) such as GPT-4 and Claude 3 Opus in accurately analyzing nutritional content from food images to support blood sugar management in type 2 diabetes patients. The central question explores whether LLMs can match or surpass expert nutritionists in providing comprehensive dietary analysis from visual data, and how additional contextual information can refine these assessments. After initial nutritional estimation by the LLMs, we provide them with comprehensive multimodal data — such as food age, storage conditions, genetic modification status, preparation/cooking methods, refrigeration period, and user dietary restrictions — to determine if there is any improvement in nutritional analysis. Our methodology involves capturing a diverse dataset of food images under various conditions, prompting LLMs with different techniques (e.g., one-shot, zero-shot, instructional), and comparing their outputs against expert nutritionist and endocrinologist evaluations. We also conduct error analysis to identify systematic biases and assess confidence scoring to evaluate the correlation between LLM confidence and accuracy. Expected results include a robust understanding of LLM capabilities in

nutritional estimation and a prototype application that allows users to manually input corrections for personalized dietary recommendations. The project will culminate in a small-scale trial with diabetes patients to evaluate the real-world applicability of an LLM-powered smartphone app for diabetic diet management. The research will also explore future applications, including the estimation of micronutrients, glycemic indices, and integration of other health data, such as physical activity levels and medication adherence to create a comprehensive dietary management tool that not only personalizes meal recommendations but also supports holistic health management for diabetes patients. Ethical considerations regarding biases and privacy will be critically examined. Ultimately, this study seeks to advance the usability of AI technologies in dietary management and improve health outcomes for individuals managing diabetes.

Real-Time Water Quality Assessment and Prediction using AI/ML Algorithms
Poster #1 (Marietta Event Center)
Thursday, November 21st, 9:00 - 9:45 am
Graduate Student(s): Bhavana Reddy Tadimarri
Research Mentor(s): Ahyoung Lee

Water quality is extremely important for humans, animals, plants, industries, and the environment. Water quality has been affected in recent decades due to contamination and pollution. Water quality indices (WQIs) are used to summarize large amounts of water quality data into a single number or score to help evaluate water quality. We used dataset from USGS which includes Temperature, pH, Turbidity and Dissolved oxygen to find WQI using AI/ML algorithms. The dataset has been preprocessed and we handled missing values using K-Nearest Neighbors(KNN). Classification is done using WQI, based on the Water Quality Classification(WQC) which can be notified to the users. The prediction results are verified using Brown's method to find Weighted Arithmetic Water Quality Index (WAWQI). The resulting based on AI/ML model improves water resource management decision-making processes by giving users access to real-time water quality predictions.

TimeSformer-Based Federated Domain Adaptation for Multi-Site Automatic Left Ventricular Segmentation and Quantification on Gated Myocardial Perfusion SPECT Images
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 1:30 pm
Undergraduate Student(s): Yehong Huang
Research Mentor(s): Chen Zhao

Cardiovascular disease (CVD) is a leading cause of morbidity and mortality worldwide, responsible for millions of deaths annually and placing immense pressure on healthcare systems. Early diagnosis and effective management of conditions like coronary artery disease (CAD) are crucial for preventing severe outcomes such as heart failure and myocardial infarction. One key diagnostic tool for CAD is gated myocardial perfusion single-photon emission computed tomography (MPS), which provides detailed, phase-specific images of the heart throughout the cardiac cycle, making it essential for assessing left ventricular (LV) function. Despite its effectiveness, multi-center studies using MPS face challenges due to the manual segmentation of LV contours, which is labor-intensive and time-consuming. Additionally, sharing patient data between institutions raises privacy concerns. To address these issues, this study proposes a deep learning-based algorithm for automated LV contour extraction from MPS images, with a focus on data privacy through federated learning. Our method utilizes a TimeSformer model combined with FedDAvT. The modified TimeSformer model processes 3D volumetric data and learns temporal sequences within the volumes, capturing temporal correlations between cardiac phases. FedDAvT, a federated learning approach, offers superior domain adaptation and ensures patient privacy, as no raw data is shared between institutions. Our model was trained using 150 fully deidentified MPS datasets collected from three hospitals: 73 from the First Affiliated Hospital of Nanjing Medical University, 28 from Chang Bing Show Chwan Memorial Hospital, Taiwan, and 49 from Xiangya Hospital, Central South University. Our FedDA-TSformer model achieved a Dice Similarity Coefficient (DSC) of 0.842 for the endocardium and 0.907 for the epicardium in left ventricle segmentation, demonstrating the effectiveness of our model in accurately segmenting the left ventricle.

Information Technology

The Impact of Virtual Reality in Healthcare
Poster #18 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Sabura Khanam & Anh Duong
Research Mentor(s): Maria Valero, Rifatul Islam

Virtual Reality (VR) redefines healthcare, offering immersive, interactive, and multisensory experiences across various fields. This review examines the core uses of VR in pain management, rehabilitation, mental health, and medical education, highlighting its advantages. VR has proven to be a powerful non-drug alternative, alleviating both acute and chronic pain. VR boosts patient engagement and motor restoration through personalized and immersive therapies in rehabilitation. Like pain management and rehabilitation, VR is used for anxiety reduction, addressing PTSD, phobias, and stress, with interactive tools enhancing traditional cognitive-

behavioral techniques. VR also has the potential to enhance medical training by simulating complex procedures, improving learning effectiveness, and reshaping clinical skills. However, the technology's high expense, limited accessibility, and usability concerns, such as motion sickness and discomfort with VR devices, create hurdles; these are barriers to VR in the health sector. In medical education, challenges such as the authenticity of patient interactions and the difficulty in tracking learner performance limit broader acceptance. Additionally, research is limited by small participant samples and the necessity for more extensive validation studies. VR demonstrates significant potential in revolutionizing healthcare by providing engaging, patient-centered solutions that enhance both educational and therapeutic results despite these obstacles. Ongoing research and developments in VR technology are essential for the complete combination of these innovations in clinical and educational settings.

Promoting Inclusion in Cybersecurity and Empowering the Next Generation: Lessons from KSU's GenCyber Camp
Poster #11 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Anh Duong & John Oakley
Research Mentor(s): Maria Valero & Mia Plachkinova

In 2023, Kennesaw State University hosted its first GenCyber student camp. It is a cybersecurity educational program sponsored by the National Security Agency and the National Science Foundation. The program aims to promote diversity, equity, and inclusion in the cybersecurity workforce and help underrepresented young students get early exposure to cybersecurity and cyber-related degree programs and KSU and other schools. The program included 65 participants, with over 72% identifying as minorities. Overall, students showed an increase in cybersecurity knowledge and a high interest in cybersecurity after completing the camp. After the program, we conducted an in-depth analysis of the program curriculum, engagement rate, and outcomes aiming to provide a teaching tip as a proof of concept and encourage others to seek NSA funding for GenCyber grants to benefit their local communities. This study provides valuable insights into designing a GenCyber curriculum for high school students and shares effective practices for recruiting diverse participants to help address the global shortage in the cybersecurity workforce.

Stability of Proteins Iinvolved in Major DNA Repair Mechanisms Using Computational Power
Poster #6 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Toni Kamau
Research Mentor(s): Chloe Yixin Xie

DNA repair mechanisms are critical in maintaining genetic stability, with spontaneous mutations occurring between 10^5 and 10^8 times daily due to endogenous and exogenous factors. This research focuses on three primary DNA repair pathways: Mismatch Repair (MMR), Base Excision Repair (BER), and Double-Strand Break Repair (DSBR), each involving various enzymes that recognize and correct DNA damage. The study investigates the stability of seven DNA repair enzymes through molecular dynamics simulations to calculate their potential and kinetic energies, using Python-based tools and PDB models. Enzyme models were categorized by their DNA repair function, and simulations were run using the OpenMM platform to compute energy profiles over a total of 4 nanoseconds. The binding affinities of five enzyme models were also calculated using PyDockDNA, further assessing the attraction forces between enzymes and DNA. Results show that thymine DNA glycosylase (PDB ID: 3UO7) had the highest stability based on potential energy, while polymerase Mu (PDB ID: 2HTF) exhibited the lowest energy totals, indicating greater flexibility. Additionally, a trend was observed between the number of atoms in the enzyme models and the total energy output, with an exception noted for endonuclease-8 (PDB ID: 2OPF). These findings provide insight into the structural stability and DNA interaction strength of repair enzymes, offering potential applications in cancer treatment strategies by better understanding enzyme behavior during DNA repair.

Towards a Resilient Federated Edge Intelligence: A Testbed for Design, Analysis, and Validation of Federated Learning

Poster #3 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Leo Janse van Rensburg
Research Mentor(s): Liang Zhao

Federated learning (FL) is an efficient, privacy-preserving distributed learning paradigm that enables massive edge devices to train machine learning models collaboratively. Although various communication schemes have been proposed to expedite the FL process in resource-limited wireless networks, the unreliable nature of wireless channels was less explored. In addition, current research on the evaluation of FL is mainly based on the simulation of multi-clients/processes on a single machine/device. However, there needs to be more understanding of the performance of FL under unreliable communication in real-world distributed low-power IoT devices. This research aims to develop a testbed for evaluating FL under unreliable communication. The core of the proposed testbed will constitute Heterogeneous physical devices (e.g., IoT devices) that can be configured to mimic the operation of real FL operations with application software that can be set up to test communications between the devices. The testbed will allow performing effects of different network conditions, such as latency, jitter, packet loss,

and bandwidth. The testbed being developed by this project will provide researchers and practitioners with an open and adaptive environment for measurement and experimentation in the FL context. It will also enable opportunities to design and test effective techniques that provide robust FL solutions. In addition, this project can help analyze and validate issues related to FL security.

Software Engineering and Game Development

Effect of Bodily Gestures on Engagement within a VR Classroom Experience
Poster #20 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Seth Brice
Research Mentor(s): Sungchul Jung

As immersive technology continues to advance, immersive learning through Virtual Reality (VR) has emerged as an effective tool to enhance the online learning experience by providing high immersion and rich interactivity. However, creating a motivational online learning experience and maintaining the learner's optimal cognitive efficacy in the immersive learning platform remains challenging. The main goal of this study is to address to what extent body gestures on virtual avatars affect the user experience within the VR classroom environment. To investigate the group of avatar impact, we developed a VR classroom system based on our prototyped system in the Immersive Empathic Interface (IEI) lab. Based on the system, we designed the number of emotional body gestures in a classroom context, using our off-the-shelf software such as Realusion, Autodesk Maya, and Unity Game Engine. The classroom is populated with 45 NPC avatars, who are programmed to perform specific body gestures based on specific conditions. After finishing the design and development, we collected 30 student volunteers to give mock presentations to the NPC students. In this context, our system modulates the group of virtual classmates' behavior from negative to positive continuum. We collected the participant's tracked behavior (eye gaze, head movement, hand, and body movement), physiological signals (heart rate and galvanic skin response), and subjective responses using a pre-validated questionnaire to compare our designs to their interpretations. According to our pre-questionnaire data, students are confident in judging the emotional state of avatars, however as the gestures became less aroused, the interpretations varied more from our original interpretations. During presentations, students appeared consistently confident in their interpretations, and were able to confidently proceed in their speeches. Observing these behaviors will be crucial to creating a virtual classroom environment that implements features shown to be effective in making the online classroom environment more engaging.

Radow College of Humanities and Social Sciences

English

The Equality Fantasy: Exploring Gender through the Fanfiction Literary Movement
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 2:00 – 2:50 pm
Undergraduate Student(s): Haley Hunt
Research Mentor(s): Miriam Brown Spiers

At its core, fiction helps us explore parts of ourselves and make sense of the world we live in. It looks at the chaos of human existence and says, "I see you." What happens, then, when the majority of popular media centralizes around one particular identity? When you search through movies on a theater's roster and cannot find yourself on a poster? When popular media fails to represent the diverse spectrum of human experience, counter-culture emerges. One of the primary modes of this is fanfiction. In this presentation, I explore the development of fanfiction, from 19th-century women's clubs to the modern Organization for Transformative Works, and investigate how women created a space where they could engage in the same self-exploration traditionally offered to their male counterparts. Using this research, I argue that, despite popular belief, women are the primary curators of fandom culture, and that transformative fanworks have a place in academics. When denied egalitarian access to higher education, women's clubs evolved into an informal academic collective, where dismissed groups could come together to develop writing and literary analysis skills. These clubs became the early prototypes of modern fandom, where women not only practiced literary criticism and creative writing, but also re-imagined fiction, creating a new branch of literary creativity. Since then, fanfiction has continued to evolve into an introspective, explorative medium unshackled by societal shaming, publishing regulations, and cultural expectations of normalcy, founding a largely unstudied literary movement that explores gender roles, gender identity, and sexuality in safety and secrecy while such introspection and representation has been traditionally condemned by society at large. With this presentation, I highlight research from my senior thesis of the same name, arguing for the inclusion of this silent counter-culture in academics, marking fanfiction as a distinct literary movement worthy of study.

Extra-Terrestrial: A Television Pilot Script
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 3:30 pm
Undergraduate Student(s): Landon Adams
Research Mentor(s): Anna Weinstein

How do you make a home out of a place you don't feel welcomed? This is the plight of Beatrix Ivy, a passionate fashionista, humanoid-martian who dreams of opening her own fashion business. The only issue: fashion does not exist on Mars. She impulsively decides to ditch her hypercritical mother in pursuit of Planet Earth. Destination? Paris, France. However, a GPS malfunction lands her in the unknown town of Paris, Georgia. Mistaken for a drag queen, Beatrix is met with hostility from the bigoted locals, including local darling SunRay, an equally talented fashion designer. Beatrix eventually finds companionship in a group of drag queens, including the unapologetic Emerald Greene and sophisticated Lemon Pepper. The script follows Beatrix as she struggles to raise the money for a one-way ticket to France. For now, this town, whether she likes it or not, is her home.

Foreign Languages

Transformative Pedagogy in Prison: Exploring the Impact of Humanities-Based Education on System-Impacted Individuals
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 2:00 – 2:50 pm
Undergraduate Student(s): Mattie Frascella
Research Mentor(s): Abigail Alexander

Examining the transformative potential of humanities-based education for incarcerated individuals draws on interdisciplinary perspectives from pedagogy, digital literacy, and higher education. Through an intensive literature review and a critical analysis of existing educational programs within carceral environments, this study identifies key challenges and opportunities associated with offering humanities courses in prison settings. The research argues that education within these settings should extend beyond traditional metrics like recidivism and tax reduction to foster personal development, critical thinking, and identity reconstruction. This work delves into diverse pedagogical schemas, such as Paul Ricœur's philosophy of narrative identity and adult education principles, which emphasizes the importance of autonomy and vulnerability in crafting a responsive and humane educational approach. To complement pedagogy, this work also explores the role of digital literacy and cultural rhetoric in empowering incarcerated students to create and share their stories. Through a qualitative assessment of programs like the Inside-Out pedagogy and the Boston University Prison Education Program, this research project highlights the impact of inclusive, community-driven educational experiences that prioritize self-reflection, mutual respect, and non-coercive learning environments. The findings suggest that when implemented thoughtfully, humanities-based prison education can serve as a powerful tool for cognitive liberation, enabling incarcerated individuals to reconceptualize their identities as scholars and active participants in society.

Underscoring the ethical complexities of educational initiatives within prisons allows for more careful consideration of the impacts on both students and educators. This enables a nuanced advocacy for a shift in prison education policy and practice toward more holistic and humanizing approaches, ultimately contributing to broader systemic changes and more universal social justice.

Geography and Anthropology

The Ball Game, Sacrifice, and Skull Racks in Prehistoric Mesoamerica
Poster #21 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Roger Leonard
Research Mentor(s): Terry Powis

The Postclassic period (AD 900-1519) in ancient Mesoamerica was dominated by three distinct cultures: the Toltec, the Maya, and the Aztec. These three cultures were interconnected by numerous aspects of both the physical and cosmological worlds. The creation myths associated with all three of these prehistoric civilizations place heavy emphasis on sacred animals such as the jaguar, the playing of the ball game, and the practice of human sacrifice. In fact, the ball game was so important in ancient Mesoamerica, that it became a central point of focus in the creation myths of all three cultures. While there is a plethora of academic information regarding the Mesoamerican ball game, there is a significant lack of information regarding the practices of human sacrifice that coincided with the game itself – specifically, the displaying of the loser's decapitated head on architectural structures called tzompantli, or "skull racks." The intention of this study is to gain a better understanding as to the significance of skull racks, why they were so important to Mesoamerican cultures, and why these mysterious structures continue to be an architectural enigma within the study of pre-Columbian civilizations.

Dental Wear Variation of Individuals Buried Within Same Tomb in Roman Crete
Poster #22 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Brook Reavis
Research Mentor(s): Susan Kirkpatrick Smith

In both 2006 and 2021 there were excavations done on a single tomb, Tomb 31, in Ierapetra, Crete. The tomb is from the time period of Roman Crete, 69 BCE-297 AD. It contained seven burials. It consisted of a larger chamber in which four individuals were found (2006), and a smaller cist grave underneath containing three individuals (2021). The goal of this study is to

analyze the dentition of these individuals in order to determine a possible reasoning behind these 2 different burial methods. Specifically looking for linear enamel hypoplasias (LEH), evidence of periods of malnutrition, and irregular dental wear. Within this data set there were very few large differences. There were very few LEHs present between the individuals in both graves, but there were instances of irregular wear on the individuals found within the cist grave. This tells us that the individuals buried in this grave may have been using their teeth for something other than chewing, possibly for industrial use such as spinning thread, or that they had a different diet with foods that were more difficult to chew.

Exploring Roman Health and Social Status in Crete: Dental Evidence from Ierapetra's Graveyards
Poster #15 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Ian J. Foster
Research Mentor(s): Susan K. Smith

This research project aims to compare dental pathologies between excavations of Roman graves from Ierapetra, Crete in Greece. This study is part of a larger project led by Dr. Susan Kirkpatrick Smith. I compared the data from a newer excavation to previous results from nearby graves. The goal was to see if there was any difference in the rate of dental caries and linear enamel hypoplasia (LEH) to determine if there was potentially a difference in economic status or dietary health. Much work has been done on the Minoan civilization in Crete, but little is known about the Roman occupation of the territory besides the major battles and what Roman governor handled the area. The day-to-day life of the Cretan people is unknown, as many common folks throughout history sadly are; this research will create new insights into their lives. This collection was from a rescue excavation of a Roman-era graveyard. All of the teeth in the collection were identified by myself, besides a group that was associated with a singular known individual. After identification, the teeth were rated for wear and the presence of caries or linear enamel hypoplasias. Following this, the data was then compared to the previously studied teeth via the chi-square test to determine if that was a statistical difference between the two populations. Results will allow us to see if variation in grave type might have been a signal of social status.

Grogue: The Cape Verdean Way of Life
Poster #6 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Will Spurlin
Research Mentor(s): Brandon Lundy

This research aims to understand the economic and cultural value and importance of grogue, a sugarcane-based craft spirit produced in Cabo Verde, West Africa, for more than four centuries. Interviews were conducted on the main grogue producing islands of Santiago and Santo Antão in January and May 2024, respectively. This poster uses a subset of the interview data to answer the questions: What is grogue, and why is it important to the people of Cabo Verde? According to the 2015 grogue law, grogue is the typical and exclusive name given to sugarcane spirit produced in Cabo Verde obtained from the distillation of naturally fermented must from sugarcane, which contains peculiar sensory characteristics. But beyond this legal definition, what does it mean to the people who produce and consume it? Through a thematic analysis of a subset of responses to 4 questions from 10 interviews (5 from each island), themes of economic importance, individual interests, national pride, and cultural heritage appeared from the data. Locally produced spirits are easily integrated into community celebrations and significant life events, provide livelihood opportunities, and shorten commodity chains that lessen environmental impacts. In resource poor countries such as Cabo Verde, local production enhances self-reliance and promotes human security.

A Reanalysis of Seasonal Chacma Baboon (Papio hamadryas ursinus) Dyadic Grooming

Poster #8 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Ian Cheesman
Research Mentor(s): Nicholas Ellwanger

In this research we seek to determine the impact of baboon behavioral sampling procedures on patterns of baboon grooming. Grooming is a cooperative behavior that solidifies social bonding and serves as a measure of sociality among group-living non-human primates. Time spent grooming is limited by time spent in other behaviors and daylight available. Furthermore, grooming partnerships are limited to a few individuals within the group. How individuals choose to spend this time, and with which individuals, can help explain sociality among human's close relatives. Chacma baboons (Papio hamadryas ursinus) live in large groups composed of matrilines, and at its southernmost range experience fewer daylight hours to groom during the winter. Using whole and fractional dyadic grooming bouts, Ellwanger (2020) demonstrated that female baboons modified their grooming behavior between seasons due to fewer daylight hours during the winter. However, fractional grooming bouts could skew analysis of grooming behavior by incorporating partially observed bouts. In this project we reevaluate patterns of female grooming behavior by removing fractional grooming bouts to determine if this procedure impacts the final analytical result. We compare reanalyzed data to the original dataset and compare seasonal grooming patterns within the modified dataset. 597 fractional grooming bouts

were removed, which accounted for over 60% of the total time of the original grooming bouts. Preliminary results show that by removing fractional grooming bouts, total average time spent grooming and grooming bond strength decreased. Further results will also determine the degree of change in average grooming bout length and grooming bout length between seasons and if the number of partners and strength of partnerships changed between seasons.

Spatial and Temporal Associations of Human Lyme Disease Rates with Environmental Factors in Vermont
Poster (Microsoft Teams)
Friday, November 22nd, 3:15 pm
Undergraduate Student(s): Alyssa Lugo
Research Mentor(s): Jun Tu

In 2022, the CDC Lyme Disease Surveillance Data ranked Vermont as the second state, with a rate of 202.8 cases per 100,000 people. In comparison, according to Vermont officials, reports of human Lyme disease cases in the 1990's were rare. In the United States, the bacteria that causes Lyme disease, Borrelia burgdorferi, is transmitted to humans through the bite of infected ticks. According to the Vermont Department of Health, infected blacklegged ticks (Ixodes scapularis), commonly known as deer ticks, are the primary vectors of Lyme disease in Vermont. While the transmission of Lyme disease is well documented on a nationwide level, the relationships between the rates of human Lyme disease and environmental factors in Vermont are not well studied. The objective of this project is to analyze the spatial and temporal associations of both county-level human Lyme disease cases and incidence rates with environmental factors, including temperature, precipitation, and deer populations in the state of Vermont from 2003 to 2022 using GIS (Geographic Information System) and statistical analyses. GIS is used to map and compare spatial and temporal associations in human Lyme disease rates by county in response to changes in environmental factors. Statistical analysis, especially correlation analysis, is used to quantify and compare the associations of human Lyme disease rates with these environmental factors. This study is expected to reveal the spatial and temporal patterns in Lyme disease cases and rates and their associations with environmental factors in Vermont. It will contribute to a better understanding of the associations of Lyme disease with environmental conditions and provide useful information for public health policy making.

Struggle in Dreams: "Good Life" and Work Ethics in Indigenous Guatemalan Migrants in Georgia, US.
Poster #3 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Sebastian Gossmann Torres

Research Mentor(s): Brandon D. Lundy

Approximately 10% of the Guatemalan population lives in the United States, which makes up 3% of the Hispanic immigrant population since 2021. Between 2000 and 2021, there has been a 336% increase in the Guatemalan-origin population In the United States from 410,000 to 1.8 million (Noe-Bustamante, Flores, and Barroso 2022). This qualitative research explores the factors driving this migration and aims to humanize perceptions of Indigenous Guatemalan immigrants by examining their pursuit of el buen vivir (the good life) and economic opportunities. This research considers what the ''good life" entail for the Indigenous Guatemalan communities in Georgia, and how work facilitates these aspirations. I use semi-structured interviews and the Photovoice technique, a community-based participatory research approach that gathers participant-taken photographs and narratives to translate experience into knowledge, with Indigenous Guatemalan migrants in Georgia. The Photovoice technique allows for triangulation with the semi-structured interviews to facilitate deeper insights into aspirations and lived experiences. Data from the interviews and photographs will be qualitatively coded to identify recurring themes related to aspirations, economic opportunities, and perceptions of the good life. Expected results include conceptualizing the good life for the Indigenous Guatemalan community members as a sense of purpose contributing to socio-economic advances such as sending remittances to family members back in Guatemala or contributing to local development within their native communities. (Nezahualcoyotl, 2015, 42) Identified economic opportunities contribute to conceptions of el buen vivir from afar. The findings highlight a paradox: economic opportunities in the US, and the lack of them in Guatemala means that immigrants must leave in order to provide the good life for themselves and their extended family back home, which is also what the emigration statistics out of Guatemala demonstrate.

History & Philosophy

Indeterminate Politics: U.S. Interventionism within Nicaragua
Poster #10 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Alexandria Currier
Research Mentor(s): Lauren Thompson

This research accumulates various historical viewpoints, ranging from 1986 to 2023, and constructs a greater holistic work detailing justifications and complexities surrounding U.S. foreign policy towards Central America during the 1980s. It highlights the initiatives and goals

of the Reagan administration which dictated U.S. interaction with the nation of Nicaragua and seeks to clarify ongoing historiographical debate surrounding the justification for these projects. This study utilizes documents, testimonies, and speeches from the United States Congress and former President Ronald Reagan to contextualize official statements relating to the role of the United States within Nicaragua. It then places them in comparison with later interpretations of 1980s U.S. foreign policy from authors such Jeff Bass, Robert Kagen, Roy Gutman, Thomas Carthers, William Schmidli, and several others. In addition to this, notable publications from The Heritage Foundation, The Permanent People's Tribunal, and The Washington Post are used to observe larger media interpretations of U.S. intervention during the time period. Individual publications of political authors such as Andrew Kimmens, William Leogrande, Peter Kornbluh, and Christopher Dickey are also included for the role of observing political opinion of foreign policy initiatives within the time period.

State and Syncretism: Sufism in Mughal India through the Lens of Akbar's State-Building Project
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 4:00pm
Undergraduate Student(s): Samantha Smith
Research Mentor(s): Yoshina Hurgobin

Ever since Islam's arrival on the Indian subcontinent, Sufi orders were on the front end of contact between it and local Dharmic religions, often blending them with the more mystical strains of Islam. Despite this, the single most studied figure in the field of Muslim-Hindu syncretism is not a Sufi Mystic, but a Mughal Emperor: Akbar. Infamously, Akbar created a court religion (which some scholars have doubted the existence of) named Din-i-llahi, *mixing philosophical concepts from multiple religious traditions of the subcontinent. While many authors have explored how Akbar's religious policy served a pragmatic political purpose in his state-building and centralizing project, this research attempts to extend that analysis to the role which Sufi Orders played in this process, both as inspiration for Akbar's efforts, and as opposition against his rule which his efforts were attempted to circumvent. This paper finds that Akbar co-opted the Sufi syncretic tendency and the strict hierarchy of a Sufi order, to maneuver around conservative Sufi power-blocs who impeded his larger pan-religious nation-building project, essentially creating a pseudo-Sufi order centered around himself as the ultimate Master.*

Interdisciplinary Studies

Undergraduate Human Subjects Research Lab Experiences in Humanities
Oral Presentation (J.M. Wilson Students Center - Ballrooms)
Wednesday, November 20th, 2:00 – 2:50 pm
Undergraduate Student(s): Gvantsa Kiknavelidze
Research Mentor(s): Sabine Smith & Jennifer Hoosier

Amid concerns for the coming enrollment cliff as well as enrollment attrition in humanities programs, one sector of higher education that continues to grow is international students. In view of growing concerns about enrollment attrition and shrinking resources for sustainable international learning experiences, short-term programs grounded in institutional partnerships may offer opportunities of mutual benefit to international participants and domestic stakeholders. This exploratory case study examines the effects of a six-weeks English language learning program in which seventeen German adults participated in Spring semester 2024. This project investigates the program's impact on participants' language proficiency and intercultural competence development and on classmates' attitudinal dispositions and behaviors. Employing a mixed-methods approach, this study triangulates data from pre- and post-intervention tests, learners' and instructors' attitudinal survey responses, and focus-group interviews with two participant groups and instructors. Preliminary findings indicate a positive impact of short-term intensive English learning programs on learners' proficiency, regardless of cohort, as demonstrated by pre- and post-test scores. Both learners and instructors highlighted the program's effectiveness while also identifying challenges and areas for improvement, including language development, shifts in attitudes and behaviors, and an increase in intercultural competence. This session will focus on the latter, exploring the growth of IC among participants with results presented by an undergraduate student of International Relations and the research assistant who completed IRB training and submitted the study to IRB review. While the findings cannot be generalized, they may have implications for program and instructional design; student success and learner support strategies; and sustainable efforts to facilitate international and cross-disciplinary partnerships in diverse educational settings. Research findings will be shared with session participants to allow for further review.

Psychological Science

Cross-Cultural Differences on Perceptions of Aging
Poster #21 (Marietta Event Center)
Thursday, November 21st, 12:00pm – 12:45pm
Undergraduate Student(s): Aieyan Saeed
Research Mentor(s): Ginny Zhan

Aging is an inevitable human experience. The way an individual perceives aging may vary considerably. Factors such as culture, gender, and socioeconomic status may influence an

individual's perceptions of aging. This study examined whether there were cross-cultural differences in perceptions of aging between New Zealanders and Americans. Participants were asked to complete a short, online, and anonymous survey where they answered questions that assessed their perceived viewsabout getting older. Participants were also asked questions regarding their demographics to better understand the relationship between cultural background and perceptions of aging. This study hypothesized that individuals' perceptions of aging will vary across cultures, and that individuals who held stronger familial relationships would exhibit a more positive perception of aging. The findings from this study will help expand the cultural diversity that is represented in previous literature to gain a better understanding of cross-cultural differences. We are currently analyzing the data.

Directional Preference Based on Hand Dominance
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 4:15 pm
Undergraduate Student(s): Annmichelle Mulamba, Olivia Holdcroft & Alletse Denton-Colquitt
Research Mentor(s): Kyung Hun Jung

An Autonomous Vehicle's (AV) job is to steer and direct the car. Our study examined whether people would steer an AV to the left or right when it malfunctions after a T–intersection during a simulation. We hypothesized that when faced with a T–intersection where the self– driving vehicle goes straight, participants are more likely to turn in the direction of their dominant hand. Previous research suggests that people would turn to their dominant hand's direction due to cognitive bias. Individuals exhibit a natural bias toward movement aligned with dominant hands, often it is their right-hand that plays a steady and adjusting role. This preference can be explained by muscle memory as well as motor control. Individuals develop both in their dominant hand through repeated use, which can create a sense of familiarity and confidence when moving in that direction. To test this hypothesis, participants will be asked to hold the wheel with both hands during the simulation, while having the AV car stay straight in a T–intersection, participants will be asked to either turn left or right to avoid a crash. We are currently collecting the data.

Directional Preferences During Silent Failures in Automated Driving
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 1:00pm – 1:45pm
Undergraduate Student(s): Shanhua Bao, Shawon Tyla-dough, & Morgan Ebert
Research Mentor(s): Kyung Hun Jung

Automated driving technology has evolved significantly, promising easier navigation in the future. However, silent failures may go unnoticed due to the driver's inattention. While there is

research on situational awareness, cognitive effects, and take-over performance in self-driving, there is less emphasis on drivers' turning preferences and handedness during silent failures at T-intersections, especially when they are not actively grasping the wheel. In this study, researchers recorded the direction that participants steered to avoid a collision at a T-intersection during the silent failure. Participants watched six driving scenarios demonstrating a silent failure and indicated their steering direction using hand gestures. It was hypothesized that participants would turn right and use both hands during the emergency maneuver. This hypothesis was based on the assumption that drivers would choose a direction and hand usage during emergency maneuvers based on their immediate perception of control and safety in a high-stress situation. Previous study also showed that using both hands on the wheel is a typical response in high-stress situations, as it provides greater control during sudden maneuvers. We are currently collecting data.

Dominant Hand Steering Preferences: Analyzing Steering Direction
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 4:30 pm
Undergraduate Student(s): Keaton Cowgill, Anna Shoup & Diksha Ghimirey
Research Mentor(s): Kyung Jung

This study focuses on the behavior of self–driving–vehicle drivers upon encountering a simulated accident at a T-shaped intersection when steering with their dominant hand. We hypothesized that drivers are more likely to turn in the direction of their dominant hand due to the influence of handedness and because they perceive less effort when steering with gravity. That is, right-handed people would favor turning right, while left-handed people would favor turning left. Considering there are more right-handed people in the United States, we predict the results will yield more drivers turning to the right. To test this hypothesis, we had participants watch video clips of driving scenes of a self–driving car and avoid a crash (e.g., the vehicle went straight towards a T-shaped intersection) while the participants were holding an imaginary steering wheel with their dominant hand. We are currently collecting the data.

Effect of Emotion on Cognitive Speed
Poster #3 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Sarah Atsu
Research Mentor(s): Christina Salnaitis

Emotion has been shown to affect cognitive processing in several ways; scope of thinking, memory, and mental processing speeds. Previous research tends to suggest that 'positive' emotions broaden thought-action repertoire, resulting in the ability to make faster decisions. 'Negative' emotions have been shown to result in the opposite, dulling reaction speeds and

thought processes. Research has also shown that colors can affect emotion, with bright colors like yellow being linked to more 'positive' emotions, and duller colors like black or brown being linked to more 'negative' emotions. In this investigation I used the color red to signify anger, blue to represent sadness, and yellow to symbolize happiness. These three colors were coupled with angry, sad, and happily charged words to see if they affected the speed with which participants could verify the color of the words. The words were shown to participants in Dr. Christina Salnaitis' Cognitive Psychology class via a computerized Stroop Task. There was a significant statistical difference in the speeds with which participants could identify the word colors. Basic words with no emotional connections were identified the fastest. Words with emotional connotations paired with colors that matched those emotions were the second fastest. Emotional words paired with colors that had opposing emotional connections were the slowest. This shows that both colors and emotional words can impact cognitive speeds and sets the stage for further research on the impact of colors on emotion and cognition.

The Effects of Perceived Stress on Emotional Response to Video Stimuli
Poster #10 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Mary Katherine Kerlin
Research Mentor(s): Ebony Glover & Tim Martin

The aim of the present research is to understand how stress affects physiological response to emotional stimuli. Stress can affect the way we respond to the videos/media we are increasingly exposed to as a result of social media. This relationship highlights the need for new ways of stress management. This study examines how the effects of perceived stress to emotional videos impacts emotional responses. Stress is known to influence emotional reactivity. Understanding this relationship can provide insights into managing stress and improving emotional well-being. In this experiment, participants were given a perceived stress scale questionnaire (PSS) to measure current stress levels. Electrodermal activity of the palms was also collected to measure physiological levels of stress. Participants were then presented with a series of videos and shapes during which they rated their level of emotional distress. We then analyzed the relationship between PSS scores, subjective measures of emotional responses, and skin conductance response during video exposure. We found that ratings were higher for negative videos, and lowest for positive videos. Skin conductance response (SCR) was found to be highest for negative videos and lowest for neutral videos. Data indicates that PSS scores predict SCR levels. A relationship was also found between PSS scores and emotional responses to videos.

The Effects of Substance Abuse on Brain Activity in Resting State Prior to a Task
Poster #18 (Marietta Event Center)

Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Armon Khoshneviszadeh, Graham Owenby, Alexis Newman & MK Kerlin
Graduate Student(s): Aidan McColligan
Research Mentor(s): Tim Martin & Erica Holliday

From previous experiments, it was found that there were abnormalities in brain responses in subjects with alcohol use disorder (AUD) acquired with MRI. However, these findings were isolated to a population of participants with an average age of 49.6, and limited to AUD. This experiment observed college students in recovery from AUD or other drugs. This study utilized the resting state electroencephalogram (rsEEG) before a visual oddball task to compare two groups: the Center for Young Adult Addiction and Recovery (CYAAR) participants with a history of substance abuse, and the control. The motive for this comparison was to investigate the effects of substance use on brain activity. Using low-resolution electromagnetic tomography software (LORETA), rsEEG was used to visualize differences in activity of the different regions of the brain between CYAAR and control participants. Results had a stark contrast between both groups. For participants from CYAAR, there was higher activity in the inferior and lateral frontal lobe, and part of the temporal lobe. These areas are linked with reasoning, voluntary movement, personality, learning and memory. The control participants had higher activity in the left occipital, superior frontal lobe and the parietal lobe. These areas are linked with vision, spatial processing, and sensory processing. These findings highlight that even at a resting state before a task there is still variation in brain activity that distinguishes both groups. With rsEEG and LORETA, these conditions of the brain were quantified and visualized to expand upon previous research.

Electroencephalography: Comparability of Current Source Density Transformed and Non-Transformed Spectral Measures
Poster #20 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Aidan McColligan, Alexis Newman, MK Kerlin & Shanhua Bao
Research Mentor(s): Tim Martin

The current study assesses the correspondence between electroencephalographic (EEG) data which has undergone surface Laplacian, or current source density (CSD), transformation and data which has not. Previous literature has suggested that the transformation does not alter spectral components of EEG data to a significant degree and thus can be compared to data which has not undergone CSD transformation. In the present analysis, data was processed via CSD and was subsequently compared to the non-CSD data for a single electrode utilizing bivariate correlation as well as comparing the average amplitude in alpha, beta, delta, and theta

frequencies using t tests. The results indicate that while the correlation between CSD and non-CSD data is high, (>.75) across frequencies, there remain significant differences between the two groups.

Evaluating the Reporting of Clinical Significance and Efficacy in Psychology Clinical Trials: A Systematic Review.
Poster #1 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Kianan Carr
Research Mentor(s): Alexander Crenshaw

To develop and refine mental health interventions, it's critical that we assess their significance in clinical trials and allow comparisons between various studies and methods. Consistency in reporting clinical significance and efficacy ensures that we can determine if the intervention makes a meaningful impact on participants' lives and facilitates progress in the field. This study aimed to determine how many clinical trials for psychology evaluate and apply both of these in a quantifiable way, specifically focusing on standardized mean difference (SMD) for standardized units and reliable change index (RCI) for clinical significance. Our systematic review included 4 prominent journals that published clinical trials in 2020-2023 and recorded whether they reported these measures. We found that studies were inconsistent in reporting clinical significance and, when reported, methods varied greatly. Results from 225 published clinical trials in psychology revealed that 55.6% of the studies included an SMD method and just 12.9% included RCI. There were 7 distinct methods used to determine SMD and 10 methods used for RCI. Our goal was to evaluate current practices and provide recommendations to guide future mental health research. This study highlights the need for more consistency in clinical trials to measure and report standardized effect size and clinical significance. Standardizing these practices would provide a more accurate and detailed look at how well interventions work in studies and improve comparability between clinical trials.

Comparing Perspectives on Sustainability: German and American Undergraduate students
Poster #3 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Jenna Myers, Ronald Hernandez, Jenna Price, Ariana Hardy, Nana Yeboah, Miguel Cuervo, & Mariana Quiroz-Llano
Research Mentor(s): Amy Buddie

The United States has approximately 20.3 million undergraduate students with different perspectives and ways of viewing life. In Germany, we learned that sustainable practices are a norm in their culture as they have been implemented through strict environmental policies,

causing the country to have more than 40% of their energy coming from renewable resources. Meanwhile in the United States, although recycling programs are available, they lack participation due to inconsistent environmental policies and a high reliance on fossil fuels. This qualitative research aims to compare and contrast the sustainability practices between American and German college students. The participants in the study consisted of nine American students enrolled at Kennesaw State University, and six German students aged 21 to 26. Data was collected by interviewing the students on sustainable living, energy sources, resource management, and recycling practices. Participants were also asked about their knowledge of sustainability issues in their country, such as the presence of government aid towards living more sustainably, the main causes of pollution in their country, and how they participated in reducing pollution. Last, participants answered questions about food and food choices. The results showed that sustainability practices are not widely used by American students compared to German students. German students presented more knowledge and active practices of sustainability. For example, they conserve electricity in public restrooms with the use of motion sensor lights, they consume all or most of the food on their plates and scrape the rest into a compost bin, they have recycling bins everywhere you go, and they have second-hand shops. The contrast in sustainability habits between American and German college students demonstrates the impact of governmental policies and societal norms on environmental behaviors and emphasizes the need for more sustainable practices in the United States.

Analyzing Contrasts Between US and German Students: Intercultural Competence
Poster #1 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Yulisa Flores, Emily Espinoza, Emily Brown, Rami Elmostafa, Daniel de los Santos, Jennifer Perez-Castellanos, & Dani Hubbard
Research Mentor(s): Amy Buddie

Intercultural competence is the idea of being able to communicate and interact with various groups and backgrounds of people and having the ability to understand and respect their culture and values. The aim of this study is to compare the perspectives of American and German students on intercultural interaction and communication. There were 15 students interviewed, 9 from Kennesaw State University and 6 from different universities throughout Germany. Questions focused on education, language, stereotypes, and customs were developed by a group of Kennesaw State University students. Each interview took an hour, with 15 minutes in each section (human rights, sustainability, and intercultural competence). We are focused on the intercultural competence responses for this study. The U.S. students were interviewed virtually on Microsoft Teams, and the German students were interviewed in person. In the research study, it was found that German students provided significantly more detailed and thorough responses than their American counterparts. While both groups emphasized the importance of understanding and respecting other cultures, the German students demonstrated a greater

interest in getting to know about different cultures in depth, while the American students focused more on the appreciation of cultural differences. Both the U.S. and Germany are making strides toward positive reinforcement of cultural diversity. However, the participants indicated that in the U.S., more students are expected to formally learn about different cultures, while in Germany, many students primarily gain cultural knowledge through personal experiences. Despite these differences, both cultures are open to meeting new people and embracing diverse perspectives.

Cross Cultural Differences on Human Rights between Germans and Americans
Poster #1 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Amy Zheng, Siam Sarower, Sheila Beas, Van Par, Leslie Guzman, Rory Jones, & Colisea Causey
Research Mentor(s): Amy Buddie

This project examines the similarities and differences in cultural perspectives on human rights issues between the United States and Germany, focusing on qualitative data from college students. While both American and European cultures are often considered part of the Western world, they exhibit distinct cultural and moral traits. This study aims to identify those distinctions and areas of agreement. By conducting a cross-cultural analysis, we interviewed American and German college students using identical interview questions that addressed various aspects of human rights. The interviews were administered in person in Germany and virtually in the United States. The responses were analyzed to uncover commonalities and differences in how human rights are perceived across the two cultures. The findings reveal that American and German students hold divergent views on issues such as technology, the death penalty, and gun control. German students generally expressed more progressive opinions, while American students showed more divided perspectives. In conclusion, this project highlights the nuanced differences in a human rights perspective between American and German college students, revealing how cultural, political, and social influences shape their view on key issues such as technology, the death penalty, and gun control.

Examining the interactions between symptom masking, quality of life, mental health and other lived experiences in adults with Autism Spectrum Disorder
Poster #17 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Emily Hutson
Research Mentor(s): Sidni Justus

This study investigated the relationship between symptom masking, overall quality of life, mental health (i.e., stress, anxiety, and depression) and other lived experiences in adults with

Autism Spectrum Disorder (ASD). The World Health Organization describes ASD as a group of conditions that are characterized by having difficulty in social interactions and communication as well as restricted or repetitive behaviors. Masking (also referred to as camouflaging) is when a person tries to hide or mask their symptoms or personality to fit in to societal norms. Camouflaging is common in ASD. Further, recent research revealed a negative relationship between camouflaging and quality of life in individuals with ASD. However, the effects of symptom camouflaging on mental health have been understudied in ASD as have the relationships between age of diagnoses and these variables. Continued research is therefore needed to unpack these nuanced relationships. In this study, 150 participants with ASD were recruited through an online platform, Prolific, to complete a battery of self-report questionnaires regarding ASD symptomatology, symptom masking habits, mental health, quality of life and other demographic questions. Regression analyses evaluating the relationships amongst variables will be discussed. This project adds to the scientific literature on ASD by illustrating how camouflaging may affect not only mental health but also broader lived experiences.

Exploring the Effects of Priming on Logical Reasoning
Poster #1 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Audrey Beilharz
Research Mentor(s): Christina Salnaitis

The relationship between priming and cognitive problem-solving has been an area of growing interest in psychological research, with implications for understanding how subtle cues influence task performance. This study seeks to answer the central question of how priming through word unscrambling influences participants' ability to solve logical grid puzzles, examining the cognitive processes that underlie this interaction. Previous research has demonstrated that priming can influence social behaviors, decision-making, and cognitive processes, yet little attention has been given to its role in enhancing analytical reasoning. This study addresses that gap by exploring how priming through word unscrambling impacts participants' ability to solve logical grid puzzles, aiming to assess the cognitive mechanisms involved in this process. The experiment divides participants into groups where one group received scrambled word tasks and the other did not. measuring their subsequent performance on puzzle-solving tasks. Independent-samples t-tests revealed no statistically significant differences between the control and experimental groups in total puzzle completion times ($p > 0.3$). Effect sizes were consistently small (Cohen's d ranging from -0.033 to -0.392), suggesting that the priming manipulation did not significantly influence overall problem-solving performance. However, greater variability was observed in the control group, as evidenced by larger standard deviations, indicating more inconsistent performance compared to the experimental group. This pattern of reduced variability in the experimental group suggests that priming may have contributed to more standardized cognitive processing, even if it did not enhance the speed of puzzle-solving. These

findings highlight the complexity of priming effects on cognitive tasks, with potential implications for understanding how priming can influence task consistency rather than task speed.

Exploring the Influence of Organizational Culture, Benefits, and Diversity Statements on Talent Attraction in Startups
Poster #11 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Jimena Lopez Flores & Trinity Vuu
Research Mentor(s): Dianhan Zheng

Startups can face significant challenges when attracting new talent due to their less established reputation and job seekers' perceived uncertainty regarding their career prospects. Recruitment webpages are a key tool for startups to project an appealing organizational image to potential candidates, typically by showcasing the company's culture, employee benefits, and commitment to diversity and inclusion. The study aims to explore the impact of organizational culture (masculine vs. feminine), types of employee benefits (family-friendly vs. financial wellness), and diversity cues (surface-level vs. deep-level) on job seekers' attraction to startups. Drawing on signaling theory, our main research questions are: (1) how do organizational culture attributes (masculine vs. feminine), types of employee benefits (family-friendly vs. financial wellness benefits), and diversity cues (surface-level vs. deep-level diversity) on recruitment webpages affect job seekers' attraction to and evaluation of startup companies? (2) how do individual differences (e.g., demographics, personality traits) among job seekers moderate such effects? To address these questions, we propose a 2 x 2 x 2 between-subject online experiment using Qualtrics, with approximately 350 job seekers recruited via Prolific. Participants will provide information about their demographics and personality traits before reviewing a fictional startup's "Careers" page, which will present different combinations of culture, benefits, and diversity statements. The participants will then complete a survey measuring person-organization fit, organizational attraction, perceived legitimacy of the company, etc. Data collection is set to conclude in October 2024. We will analyze the data using MANCOVA and multiple regression analyses to assess both main (e.g., greater attraction to startups with a feminine culture) and moderating effects, (e.g., surface-level diversity attracting more minority job seekers; family-friendly benefits appealing more to women). The insights gained will offer practical guidance for startups in designing effective recruitment strategies, ultimately helping them become employers of choice.

Exploring the Theta/Beta Ratio in Elderly Populations with Mild Cognitive Impairments
Poster #16 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm

Undergraduate Student(s): Alexis Newman, MK Kerlin, Aidan McColligan, Graham Owenby & Armon Khoshneviszadeh
Research Mentor(s): Tim Martin

This study is a continuation of research aiming to investigate the differences in the Theta/Beta Ratio between elderly individuals (aged 67-91) with mild cognitive impairments (MCI) and those without cognitive impairments (Control). MCI is regarded as an early stage of Alzheimer's Disease. A total of 218 participants' brain activity was recorded using an electroencephalograph (EEG) for both the MCI group and the Control group during an interactive task. The ratio of theta band activity (4-7 Hz) to beta band activity (13-35 Hz), known as the Theta/Beta Ratio (TBR), was calculated from a frontal electrode location (Fz). This ratio has been linked to cognitive deficits, especially in attention. Previous results have shown a significant difference in TBR between the MCI and Control groups, with the MCI participants exhibiting a significantly higher TBR than Control participants. This finding reinforces previous findings from our lab in a new sample and further establishes TBR as a correlate of MCI.

Inclination of Direction Preference during Silent Failure: Drivers' Response at a Three-Way Junction while using Non-Dominant Hand
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 4:00 pm
Undergraduate Student(s): Rachel Smith, Kaylea Best & Jamie Aguilar
Research Mentor(s): Kyung Jung

This study explores the steering direction of drivers using their non-dominant hand when they encounter a silent failure at a T-shaped intersection. Building on previous research that highlights the low probability of participants making false alarms or breaking unexpectedly as well as the belief that left turns allow more time for the individual to steer compared to right turns, we hypothesized drivers would prefer to turn left. Data collection consisted of showing video simulation of a self-driving vehicle to the participant via Microsoft Teams virtual meeting application. We are currently collecting the data.

Mindfulness and Working Memory
Poster #2 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Chadwick Benefield
Research Mentor(s): Christina Salnaitis

As millions of students enter academic institutions, there is a greater need to find habits that benefit them in their studies. We hypothesized that by entering a mindful state students would be in a better position to absorb the material that they would soon after memorize. Twenty-five

students participated in an online test to determine this effect, with roughly half (N = 11) listening to a video instructing them to induce mindfulness. The control group (N = 14) experienced no intervention. All participants watched a video that showed them a series of 9 low-affect, 3-syllable words with a 2 second interval between each. Affect was measured by the Affective Norms for English Words list (Bradley & Lang, 1999). An independent samples t-test found no significant difference between those who experienced the mindfulness intervention (M = 5.18) and those who did not (M = 4.64). The lack of significance could be due to the low sample size and the lack of a controlled environment, but the results indicate that meditating before a working memory task does not have a significant impact on its success.

Post-Pandemic Mental Health: Common Diagnoses and the Long-Term Impact of COVID-19
Poster #12 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Kirsten Burrow
Research Mentor(s): Ginny Zhan

This research investigates the long-term mental health effects of the COVID-19 pandemic on college students, four years after the health crisis began. While immediate impacts of the pandemic on mental health have been widely documented, there is a lack of research examining the long-term effects as students transition through post-pandemic life. Using a survey, this study assesses students' perceptions of how their mental health may have been affected since the pandemic, with attention to anxiety, depression, and stress levels. The survey was distributed to current college students, asking them to reflect on their mental health before, during, and after the pandemic. Data collection is currently in progress, and responses will be analyzed prior to the Symposium of Student Scholars meeting. The data will be used to identify patterns in mental health experiences, focusing on whether students self-report symptoms of mental illness or heightened mental health challenges related to the pandemic. Additionally, the study seeks to explore demographic variables such as age, gender, and academic standing to assess if certain groups were disproportionately impacted. This research aims to contribute original insights into the mental health outcomes of college students post-pandemic, offering potential guidance for university mental health services and policy development.

Problem Solving Patterns
Poster #10 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Dariana Waters & Shania Berry
Research Mentor(s): Christina Salnaitis

Choosing a college major is an important decision that impacts the trajectory of a student's career. Previous research has indicated that decision-making and problem-solving skills are critical for navigating new and complex environments. These studies suggest that individuals who demonstrate higher problem-solving skills are often more efficient at analyzing and interpreting information, leading to better decision-making outcomes. In contrast, poor problem-solving and decision-making skills may result in dissatisfaction with the chosen path. This study will examine the relationship between problem-solving and decision-making skills and how these skills influence the college major selection process. Researchers predicted that there is a positive correlation between decision-making and problem-solving skills. We also hypothesized that those who score higher in problem-solving skills are more likely to make confident decisions regarding their major. To test this hypothesis, data was collected through a survey administered to a sample of undergraduate Kennesaw State University students. Participants were asked to complete a self-reported questionnaire about their personal problem solving skills, decision-making processes, and other factors that may influence major selection. Results indicated that students who have greater problem-solving skills also yield greater decision making skills in respect to choosing their career paths. These results shown in SPSS showed that there was a positive correlation between problem-solving and career decision-making. There was also a positive correlation between career decision-making and confidence. Lastly, results also showed that students who have a major along with a minor yield even higher correlations of problem-solving and decision making. We can find this study to be very significant because of the many difficulties students encounter when choosing a life-long career. Getting a clear understanding of how these decisions are made can help future students feel more comfortable making decisions within their careers choices along with increasing their confidence in making these decisions as well.

Racial Code-Switching in Higher Education and the Impact on Stereotype Threat & Mental Health: A Qualitative Analysis

Poster #9 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Yohanny Skipper
Research Mentor(s): Mackenzie Cato

The concept of code-switching has been studied across academic disciplines, including linguistics, sociology, psychology, communication, and education. This study redefines code-switching in the context of racial concerns and navigates the benefits and issues that arise when this defense mechanism is used by PoC college students. Through focus groups, this study explores the intersection between racial code-switching and education, focusing on cultural adaptation, identity negotiation, mental health, and academic performance. The relationship between racial code-switching and racial impostor syndrome is explored to see how it affects behaviors, feelings of fraudulence, and student success for current students. Through this study,

it was found that most PoC students had developed racial code-switching through generational teachings from their parents and perceived racial code-switching as a necessity for survival. Participants experienced significant mental strain fearing that as they are, they could never compare to the majority group and as a result, masked themselves as to not be seen as fraudulent in their attempts to conform. Findings supported that through self-authenticity, the negative impact that accompanied racial impostor syndrome and stereotype threat could be mitigated. Essentially, the more immersed a PoC is with their own ethnic and cultural background, the higher their self-esteem. Participants who had acquired a knowledgeable sense of self were not as affected by stereotype threat and did not feel the pressure to conceal themselves to be accepted. Regarding the impact on mental health and student success, participants found the limits they were implementing on themselves to fit in to be exhausting and in their worry of being outclassed, most participants developed an obsession to succeed to prove themselves worthy in the academic environment. For future studies, there is an increased risk of academic burnout in their later years of education if this trend continues.

Short-Term Memory Difference on New Language Memorization
Poster #2 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Brianna Mollica, Joanna Aparicio, & Deedee Otranto
Research Mentor(s): Christina Salnaitis

Baddeley's model describes working memory (WM) as a system for maintaining information in conscious awareness through a central executive system housing two buffers. The effects of short-term memorization techniques on word recall for the Swedish language were examined. Data collection involved presenting a novel language, Swedish, to student participants who then completed a questionnaire based on group assignment through Qualtrics. Three individuals were removed from the data set since participants did not watch the assigned video. Our findings suggested no significant difference among the groups, indicating that memorization techniques do not affect word recall for Swedish words.

Spatial Localization of Cognitive Impairments in Addiction Recovery: ERP and LORETA Findings in College Students
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 2:00 – 2:50 pm
Undergraduate Student(s): Graham Owenby
Research Mentor(s): Tim Martin & Erica Holliday

Previous findings regarding adult in-patient addiction recovery have revealed impairments in their responses to relevant stimuli while inhibiting irrelevant stimuli, represented by reduced P3 amplitudes quantified by event-related potentials (ERP). However, these findings are confined to

adults & lack spatial localization due to the limitations of evoked response potentials. This study investigated differences in ERP among college students in addiction recovery relative to control participants who report no addiction. ERPs were measured during a cognitive task requiring distinction between irrelevant and relevant stimuli (the common oddball task). Using low-resolution electromagnetic tomography software (LORETA), we addressed EEG's common pitfall, the inverse problem, by localizing electric current sources in the brain. Independent t-test analyses for each stimulus group (common foil, rare foil, and target) revealed significant ERP differences between the control and recovery groups, primarily in Brodmann areas 6 (common foil and target) and 39 (rare foil), associated with the frontal and parietal lobes. fMRI studies often link these regions with motor control, attention allocation, and decision assessments during response inhibition tasks. Our findings highlight that the control group displays higher activity in these regions, suggesting that the recovery group exhibits lower activity in Brodmann areas 6 and 39. These findings indicate diminished cognitive control and stimulus inhibition in individuals recovering from addiction, represented by their responses to relevant and irrelevant stimuli. By localizing these impairments in time (ERP) and space (LORETA), the findings expand on previous addiction recovery research, revealing attention and inhibition disruptions among college students in addiction recovery.

Total Worker Health for First Responders Needs Assessment
Poster #9 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Adrian Alicea
Research Mentor(s): Kristin Horan

What are the effects of integrating Total Worker Health® (TWH) initiatives into the first responder workplace? Previous research indicates general success in the integration of Total Worker Health initiatives in the general population's workforce. Research shows that there is a positive relationship between proper integration of Total Worker Health and the reduction of health and safety hazards in the workplace. This needs assessment found that TWH interventions require front-line employee input and leadership commitment. A needs assessment was conducted to understand attitudes toward TWH interventions and implementation into the First Responder setting, respondents consisted of 133 public safety employees from across the United States geographic regions, participants included both people in leadership positions as well as those in a general working position. Qualitative and quantitative data was analyzed using an appreciative inquiry approach. Participants felt that a TWH approach would be effective in public safety when the interventions are personally relatable, reliably produce long-term change, are relevant to the industry, use limited resources wisely, and manage conflict or "run-ins" that could occur across organizational levels.

Weaker Instantaneous Connectivity, But Greater Lagged Connectivity, between Brain Regions in Mild Cognitive Impairment
Poster #12 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Shanhua Bao, Aidan McColligan, MK Kerlin, Alexis Newman, & Graham Owenby
Research Mentor(s): Tim Martin

Mild Cognitive Impairment (MCI) is the earlier stage of dementia, with much higher rates of transition to Alzheimer's Disease than the non-MCI population. MCI may involve subtle damage to memory-related brain regions. Current research presumes that MCI patients have higher levels of connectivity than those with non-impaired brains, as a compensatory mechanism consistent with wider activation seen in healthy aging. Contradicting this hypothesis, data shows that the connectivity between the left and the right hippocampus, and between the left and the right dorsal lateral prefrontal cortex of MCI participants have significantly higher instantaneous connectivity in the control group. The findings further show that there exists a narrow and nonsignificant difference in the coherence and phase synchronization. The data are not consistent with our hypothesis. On the contrary, the overall information transmission of MCI between left and right brains areas lagged that of age-matched healthy controls each time.

Sociology & Criminal Justice

College Students View of GenAI
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 3:00 pm
Undergraduate Student(s): Jeb Kehres
Research Mentor(s): Daniel Farr

There was a time when calculators were considered cheating in math classes, however now they are a common and important tool. Since different forms of Generative Artificial Intelligence (GAI) are becoming more prevalent in our society and are being used to perform more diverse and complex tasks, it is my aim to explore how the technology is used by students in the college setting. While the topic of "cheating" is often referenced when speaking of GAI use in the college setting, it is not the sole purpose of the technology. Through an anonymous questionnaire, I would like to examine not only how the technology is used by college students, but what the students deem to be acceptable uses. The end goal is to not only evaluate in what ways students are using GAI, but also to understand if students consider using the tool a violation of academic integrity standards. With this data, it could be possible to predict how GAI may be used in education in the future, not only by students, but by educators as well.

Gender Stereotypes: A Comparative Analysis of the Intersection Between Gendered Toys, Race, and Income
Poster #6 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Hannah Rowe
Research Mentor(s): Daniel Farr

This research project engages systematic field observations of toy sections at a large-scale box store. I engaged qualitative observations of toy sections to explore cultural messages conveyed to populations across varied demographic census tracts. While a relatively small-scale project, I have sought to examine messages to and about children as found among toy types, toy packaging, and observed themes. In an effort to engage diversity of the local region, I used Census data to locate three distinct census tracts in the Atlanta metro area which demonstrated variation in average household incomes and racial-ethnic composition. From these tracts I then visited a Walmart in each tract and engaged systematic qualitative observations of the unique toy sections to explore issues of gender, race and ethnicity, and class. While I am still working upon the analysis of this research, preliminary findings indicate interesting aspects about how Walmart has modified the toy section structure and contents across these three locations. For example, the greatest diversity of dolls was observed in Marietta and the least diversity of dolls was found in Holly Springs, and these locations had the greatest variation in average household income of all three tracts chosen. Across all stores, there were some common themes observed that do not necessarily speak to marketing variation based on location, but speak to larger cultural themes and messages about childhood gender socialization, which is also explored in this project.

How Far Can the Apple Fall from the Tree: An Examination of Inept Parenting and the Generational Passage of Crime
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 3:45 pm
Undergraduate Student(s): Olivia Franklin
Research Mentor(s): Beverly Reece Churchwell

This presentation focuses on inept parenting and the generational passage of crime. Research has shown that exposure to inept parenting practices—including the encouragement and reinforcement of moral codes that lead to deviance—increases the risk of childhood conduct problems, adolescent delinquency, and adult antisocial behavior. While some mediating factors have been identified, research has shown that exposure to inept parenting often leads to antisocial

characteristics that decrease the likelihood of an individual acquiring or accessing these moderators. These concepts are examined using two critically acclaimed books and peer-reviewed journal articles that provide supporting information.

Reparations, Social Justice, and the Global War on Terror
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 12:00 pm
Undergraduate Student(s): Mariam Shafik
Research Mentor(s): Jason Mueller

The US began their 'Global War on Terror' (GWOT) more than twenty years ago. In the US, the political and scholarly reference-point for the GWOT comes from the perspective of how US national/human security interests can be protected, or how they were harmed. Rarely are the political, social, and economic costs inflicted on the people of the global South considered in studies of the GWOT. This research project empirically and theoretically interrogates the actions taken by the US in Somalia, and their consequences on the civilians of Somalia. It suggests this single case might be thought of in a larger scope of social scientific investigations into wartime harm repair, and conflict resolution. We analyze new interview data from Non-Governmental Organizations (NGOs), journalistic reporting on the US war in Somalia, and databases that aggregate information on the number and outcomes of US strikes in the region. We also place these data in dialogue with social theories on reparations. Specifically, we find that sociologist John Torpey (2017) offers theoretical insights into how reparations might become "anti-systemic," when their cultural and economic impacts allow the harmed communities to begin repairing at local and national levels, of their own accords, and with the intent to build a new system that is altogether more equitable and just. Ultimately, this research project might improve our understanding of the consequences of two decades of global war, by investigating legal, diplomatic, and transitional justice frameworks that have worked in prior conflict scenarios, but heretofore unexplored with regards to the case of US-Somali relations.

Study Habits and Engagement among Students in a Large General Education Hybrid Course
Poster #5 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Laura Lounsbury
Research Mentor(s): Daniel Farr

The purpose of this project is to assess the study habits and learning behaviors of students in a large enrollment hybrid gen ed social science class. This course enrolls high numbers of first-year students, which also helps identify shifts among new college students as they transition to college-level learning. As a hybrid course, technology and online learning tools are essential to

student success, so this project explores not only students' in-class behaviors (i.e., attendance and seat choice), but also engagement with the course Learning Management System and additional digital tools. Employing an anonymous quantitative survey, this project surveys the students enrolled in the class in which I am an undergraduate teaching assistant and explores student-reported data relevant to their academic effort tied to this course. The survey for this project will be submitted for IRB approval and is planned to be administered after the third-course exam (early November). This is a convenience sample and participation is voluntary and anonymous. Findings will not be known until closer to the Symposium data, but basic statistics and correlates in the data will be explored to query student-reported information about their behaviors and perceptions of likely course grade outcomes. This project will help identify trends among newer KSU students and provide insight into effective strategies to maximize student success and mentorship.

College of Science and Mathematics

Chemistry and Biochemistry

Basic Amino Acids as Charged State Reducing Agents for Native Mass Spectrometry
Poster #15 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Marlayna Macking
Graduate Student(s): Abdul Hannan
Research Mentor(s): Mohammad A. Halim

Native Mass Spectrometry (MS) allows for the characterization of biomolecules in their native state, preserving their structure. The electrospray ionization of the native mass spectrometry transfers samples from the liquid phase to the gas phase by introducing a high voltage to the sample. The electrostatic charge of the sample causes proteins to unfold, leading to a more complex mixture of ions, complicating data analysis, identification efforts, and quantificational efforts. To prevent the unfolding of proteins charged state reducers can be used to lower the electrostatic repulsion between highly charged groups on the protein which maximizes the maintenance of the native conformation of proteins. In previous studies, it has been found that high concentrations of imidazole derivatives are effective in lowering the charge state that is acquired during the ionization process resulting in lowered repulsion between charged groups of a protein as well as dissociation. In this research, the charge reducing capacity of various basic amino acids such as histidine, lysine, and arginine are tested for a model protein lysozyme. The mass spectrum of lysozyme obtained in water showed the charge states from 8+ to 11+ where 10+ charge state was more dominant. Various concentrations of amino acids were tested from 0.1 mM to 1 mM. In the presence of Histidine, Lysozyme showed the charge states from 4+ to 10+ where 7+ was more intense. Similar features were obtained for Arginine and Lysine. This study showed that basic amino acids have potential to be very effective charge reducing agents and particularly significant charge reducing capacity was noticed for Histidine compared to all other amino acids and imidazole.

Biochemical and Biophysical Analysis of Phosphoethanolamine N-methyltransferase in the Protozoan Parasites
Poster #20 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Graduate Student(s): Kaniz Fatama Khan, Walter Mcready, & MD Tanjil Islam Shovon
Undergraduate Student(s): Oliver Buckley, Bailey Johnson, & Aaron Walker
Research Mentor(s): Soon Goo Lee

Phosphatidylcholine (PtdCho) is one of the essential lipids present in the cell membranes of plants, animals, and prokaryotes. The biosynthesis of phosphatidylcholine involves the methylation of Phosphoethanolamine (pEA) to phosphocholine (pCho). This methylation process is mediated by the enzyme called Phosphoethanolamine N-methyltransferase (PMT). PMT is available in plants, nematodes, and some protozoan parasites, including Plasmodium and Eimeria species. Among them, Eimeria parasites are abundant in the world and responsible for parasitic infection. Eimeria parasites cause coccidiosis in chickens and other birds, leading to severe economic loss for the poultry industry. The treatment is expensive, and the price of poultry-based protein is getting high and ultimately humans are suffering. Only a few drugs are available to treat this disease, but resistance and allergic reactions are reported. Thus, the identification of biochemical targets and the development of antiparasitic drugs have great importance. PMT plays a vital role in their cell growth and development. In this study, a series of biochemical and biophysical analyses, including enzyme kinetics, protein-ligand binding, and X-ray crystallography, provides a foundation for drug development. Specifically, we determined the three-dimensional structures of EtPMT at a 2.9 Å resolution. Additionally, functional characterization was performed using enzyme and binding assays, which revealed valuable properties of EtPMT, such as its Km and Kd values. The QuikChange site-directed mutagenesis kit was employed to gain detailed insights into the reaction mechanism of PMT. The next step involves fragment-based screening and molecular docking, which will aid in developing novel compounds targeting PMT as potential antiparasitic drugs.

Bis-NHCs: Building Blocks for Novel Architectures
Poster #3 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Aidan Gerdis & Krish Patel
Research Mentor(s): Daniela Tapu

In 2020, the Department of Energy highlighted the need for advancements in catalyst and energy-storage materials as a critical challenge for future innovation. Carbene chemistry, particularly involving N-heterocyclic carbenes (NHCs), has gained prominence due to the wide range of synthetic and functional possibilities they offer. While research has predominantly focused on neutral NHC structures, limited attention has been given to their anionic counterparts. Most existing studies explore monofunctional or difunctional NHCs, capable of chelation to a single metal center with less focus on multitopic NHCs capable of coordinating multiple metal centers. This project aims to address this gap by designing and synthesizing novel rigid anionic multitopic nonchelating N-heterocyclic carbene structures. These new compounds are intended to support bimetallic complexes and supramolecular cages, with the expectation of enhanced catalytic performance. Building on previous research, this project employs established synthetic techniques to create zwitterionic NHCs attached to rigid frameworks, preventing chelation and expanding their potential applications in catalysis.

Chemical Synthesis and Characterization of Skin Care Peptides
Poster #18 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Sophia Rodriguez
Graduate Student(s): Abdul Hannan
Research Mentor(s): Mohammad A. Halim

Peptides have gained a lot of attention in skin care products because of their beneficial properties and cost efficiency. Overall, peptides are known for their multifaceted properties to help with anti-aging properties. Although most of the natural peptides are extracted from various biological sources, the purity and quality of these peptides are questionable. Besides extracting these peptides, the specific skin care peptide can also be synthesized by traditional solid phase peptide synthesis protocols, however, very few studies are reported. The goal of this research is to synthesize skin-care peptide using solid phase peptide synthesis and characterize them by mass spectrometry to confirm the synthesis and purity. Two peptides were synthesized using the Blue Liberty microwave peptide synthesizer with the help of Rink amide resin. In the first step, the 9-fluorenylmethoxycarbonyl (Fmoc) group was removed from amino acids using piperidine, and then coupling was performed by activator (diisopropylcarbodiimide) and activator bases (oxyma). The couplings and deprotection steps are repeated for each amino acid. Subsequently, the peptide-resin was dried using DCM. The peptide was cleaved from the resin using a cleavage cocktail containing 95% TFA, 2.5% TIPS and 2.5% water. This helps separate the peptide chain from the resin. Then, Nitrogen gas assisted to remove any remaining TFA. Afterwards, the cold ether was added to precipitate the peptide, and 10% acetic acid was mixed to dissolve the peptide and subsequently froze and lyophilize overnight. This study shows that the peptide was successfully synthesized as evident of two peaks observed at m/z 564.3 and 282.67 which correspond to [M+H]+ and [M+2H]2+ charge states matched with the theoretical mass of the peptide. The second peptide was also synthesized but the mass spectrum showed that one arginine residue is missing from the intact peptide. In future, the toxicity of these peptides will be investigated.

Computational Analysis of Vibrational Frequencies of Linear and Cyclic Carbon Clusters, C_n
Poster #9 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Imran Dabdoub
Research Mentor(s): Martina Kaledin

Carbon clusters are organic molecules consisting exclusively of carbon atoms typically bonded to each other in a sp^2 hybridized manner. These carbon clusters can exist in both linear and cyclic

forms starting from four carbon atoms and up. However, typically even-numbered carbon clusters prefer to be in their cyclic form, while odd-numbered carbon clusters prefer to be in their linear form. Likewise, the multiplicity of these molecules can also affect their stability. Carbon clusters are the basic building blocks of carbon nanotubes, which are highly versatile nanomaterials with use cases ranging from industry, where they are being considered as composite materials, to medicine, where they could be used for biomolecule transport and tumor imaging. The purpose of this comparative study is to analyze the vibrational frequencies of carbon clusters in their linear and cyclic forms as well as their singlet and triplet multiplicities, respectively. Additionally, we report IR and Raman intensities for C_n clusters using the normal mode analysis (harmonic approximation) to collect data for assignment of molecular vibrations. Many C_n clusters are highly symmetric, therefore both IR and Raman spectra provide valuable information on their structure, properties, and stability. Such analysis has the potential to shed light on their preferred arrangement in space and give insights into the likelihood of their experimental synthesis. Most notably, that cyclic C_5 in its triplet multiplicity is a potential building block for larger carbon clusters.

Deposition of Metal-Organic Framework and Silver Nanoparticles on Cotton Fabric for Effective Adsorption and Fixation of Radioactive Iodine
Poster #2 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Rohan Bhatia
Research Mentor(s): Bharat Baruah

The purpose of this project is to create highly adsorbent porous composite materials. Commercially available cotton fabric (CF) with a hierarchical structure contains micro and macropores. We hypothesize that incorporating a metal-organic framework (MOF) can create highly adsorbent porous material, MOF@CF. Subsequent addition of silver nanoparticles (AgNPs) will create AgNP@MOF@CF composite material. In addition, we created AgNP@CF. Such composite material will adsorb and fix radioactive iodine (based on the following reaction, 2Ag + I2 à 2AgI2). We will compare the adsorption and fixation capacity of AgNP@MOF@CF and AgNP@CF. SEM, EDX, FTIR, and XRD techniques will be used to characterize the composite materials. The iodine adsorption experiment will be monitored by UV-visible spectroscopy.

Design and Development of Substrate-based Peptide Inhibitors Targeting the Chymotrypsin Like Protease of SARS-CoV-2
Poster (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Heidi Woods
Research Mentor(s): Mohammad A. Halim

With COVID-19 numbers on the rise yet again, recent drug development and research has supported the use of peptide therapeutics as an alternative to current treatments. In many commercial pharmacies, small-molecule drugs, such as Paxlovid, are a common mode of treatment against the SARS-CoV-2 virus. These small-molecule drugs, though, often induce harmful and off-target effects that lead to therapy resistance upon prolonged use. In this study, we investigated the substrate-based peptide inhibitors targeting the Chymotrypsin Like Protease (3CLpro). Identifying probable antiviral agents targeting the 3CLpro of SARS-CoV-2 can effectively inhibit the active site on the main protease and hinder its cleaving potential, therefore decreasing the rate of viral replication. A substrate-based peptide inhibitor was synthesized using CEM Liberty Blue peptide synthesizer with automated Fmoc solid phase synthesis protocols. The Rink-amide resin with a loading capacity of 0.58 mmol/g was used under a high-swelling condition. The peptide was synthesized by employing repeated deprotection and coupling reactions. The resulting peptide-resin complex was cleaved using a 95% trifluoracetic acid (TFA) mixture. The peptide was then precipitated and purified using diethyl ester. The synthesis of the peptide was authenticated by mass spectrometry. The peptide showed a strong peak at m/z 1393.75 corresponded to $[M+H]^+$ ions which matched with the theoretical mass. A LCMS (liquid chromatography coupled with mass spectrometry) based selected ion monitoring assay was conducted to test the inhibition efficiency of the peptide. The peptide displayed an IC50 value of 6.38 micromolar for the first run and 5.04 micromolar for the second.

Developing Peptide Based Inhibitors Targeting Amyloid-Beta for Alzheimer's Disease
Poster #6 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Graduate Student(s): Lyric Gordon
Research Mentor(s): Mohammad A. Halim

Alzheimer's Disease is widely known as the most common precursor of dementia, cited as a progressive neurological disease that negatively impacts one's cognitive functions over time. It's identified as the seventh leading cause of death by the CDC, seeing an 145% increase in deaths since its discovery by Alois Alzheimer in 1906. Throughout the years of various potential treatment options for this disorder, scientists have been unsuccessful in both curing the disease and eradicating its merciless symptoms. One promising avenue is the use of targeted therapeutics via amyloid-beta, a peptide that is placed at the forefront of Alzheimer's disease causes due to its accumulation that results in neurofibrillary tangles and senile plaques. In this research, various peptides are developed, synthesized, and investigated to analyze their impact on binding affinity to Amyloid-beta. The aim is to improve potent analogues by modifying previously tested peptide sequences, display superior binding affinities in developed peptides to amyloid-beta and showcase a decrease in fibril formation through fluorescence testing. Solid phase peptide synthesis protocol was employed to synthesize the peptide and mass spectrometry

experiment was conducted to verify the mass of these peptides. Cyclic peptide was synthesized by adding 10% DMSO and stirring for one or two days. Selected ion monitoring (SIM) assay was performed by liquid chartography and mass spectrometry by monitoring the intensity of related peaks of amyloid beta once peptide inhibitors were added at various concentrations. Dissociation constant (K_d) is used to measure the binding affinity between amyloid-beta and peptide inhibitors. The linear peptide (LP1) has shown excellent binding affinity with a K_d value of 0.037 micromolar (μM). Its cyclic counterpart (CP-1) also displayed similar binding affinity with a K_d value of 0.049 micromolar (μM).

Developing Spectroscopic and Mass Spectrometry Based Database of Tattoo Ink for Forensic Investigation

Poster #10 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Adrian Felix
Research Mentor(s): Mohammad A. Halim

About 20% of the global population has some form of tattoos on some parts of their body. About 32% of the US population has at least one tattoo, meaning almost one third of the entire national population has a tattoo. Moreover, 75-85% of criminals also have tattoos. Though many departments around the nation have used tattoo markings and inks, found in many places such as ink on the floor or on an object, part of a victim or under a victim's nails, and identification of a suspect or offender, as key evidence in cases. The identification of the compound present in tattoo inks and how these compounds would degrade with buried skin are not known. This research has two goals: i) to build spectroscopic and mass spectrometry-based database for tattoo ink compounds with and without skin; ii) how ink compounds are decomposed when skin is buried. For a pilot project, IR spectroscopy was used to analyze the functional groups contained in various ink samples. In addition, Direct analysis in real time mass spectroscopy (DART-MS) was used to determine the compounds present in ink samples. It is found that all samples showed strong and broad peaks at around 3300 cm^{-1} for O-H stretching and a strong and sharp peak at around 1650 cm^{-1} for C=C stretching. The data obtained from the IR were used to run a Principal Components Analysis (PCA). Based on the PCA, Light Purple and Fuchsia are surprisingly not similar to Baby Blue and Mario's Blue, as one would think they would be since their colors are very similar. Expectedly, Orange, Lime Green, and Yellow are all extremely similar according to the PCA. These ink samples were also investigated by DART-MS, however, identification of the mass of the related compounds is still in progress.

Electron-Rich Polyclinic Aromatic Compounds Containing a Boron-Nitrogen Bond: Synthesis and Optical Properties

Poster #9 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am

Undergraduate Student(s): Jacob Erasmus
Research Mentor(s): Carl J Saint-Louis

Dyes that absorb in the visible and fluoresce in the red- and near-infrared (NIR) regions of the electromagnetic spectrum are gaining popularity in materials science. These dyes have been proven to be effective in photodynamic and photothermal therapy. Because of the undeniable biological benefits of red and NIR light, such as deep tissue penetration and little interference from background autofluorescence, these dyes are commonly utilized for high contrast bioimaging and detection in biological systems. However, majority of these dyes have limited solubility and/or fluorescence, making them unsuitable for use in a variety of biological applications. To address low fluorescence, we synthesized, characterized, and investigated new fluorescent dyes with a boron-nitrogen bond, known as polycyclic 1,2-BN-heteroarene. These dyes have a flat and rigid scaffold with a highly conjugated π-system to optimize optical properties and allow for absorption and emission at long wavelengths and high fluorescence. To increase solubility, we added a diphenyl propeller-shaped moiety to the scaffold's left hemisphere. This decreases π-π stacking interactions, improves solubility, and enables multifunctional fluorescent materials. The diphenyl propeller shape is also an efficient electron donor, generating intramolecular charge transfer (ICT) and red/NIR emission. These discoveries will help to design future electron-rich polycyclic heteroarene dyes containing a Boron-Nitrogen bond for bioimaging and detection in living organisms with low interference from background autofluorescence.

Histone methyltransferases, SET-2 and MES-4, contribute to sterility in C. elegans that inappropriately inherit histone methylation
Poster #2 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Jazmin Dozier
Research Mentor(s): Brandon Carpenter

At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in the nematode, C. elegans, H3K4me is removed by the H3K4 demethylase, SPR-5, and H3K9me is subsequently added by the histone methyltransferase, MET-2. Maternal loss of SPR-5 and MET-2 results in inherited phenotypes such as developmental delay and sterility in the progeny. We recently demonstrated that knocking down the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of germline genes between generations, or the H3K4me1/2 methyltransferase, SET-2, a member of the COMPASS complex rescues developmental delay in spr-5; met-2 mutant progeny. However, whether knocking down MES-4 or SET-2 rescues sterility in spr-5; met-2 double mutants has yet to be explored. Here, we test this possibility by feeding spr-5; met-2 mutant hermaphrodites

either set-2 or mes-4 RNAi and examining germlines of their synchronized progeny at the young adult stage using DIC microscopy, DAPI staining, and by quantifying the total number of oocytes across both gonad arms. Excitingly, we find that knocking down either SET-2 or MES-4 significantly rescues germline health in spr-5; met-2 progeny, with some spr-5; met-2 progeny germlines from hermaphrodites fed set-2 RNAi containing viable embryos. Together, our data suggest that the inherited sterility in the absence of SPR-5 and MET-2 maternal reprograming may be caused by inherited H3K4 methylation and altered germline transcription. While the mechanisms underlying sterility in spr-5; met-2 mutants remain to be determined, our results provide further evidence that C. elegans utilizes a combination of inherited histone modifications to achieve the correct levels of transcription to properly specify tissues. This project is supported by NIH R15 1R15GM148887-01A1 (PI: Carpenter) and NIH U-RISE 1T34GM140948-01A1 (PIs: Hudson and Griffin).

Inhibition Efficiency of Cyclic and Bi-cyclic Temporin L Analogues against the Main Protease of SARS-CoV-2

Poster #18 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Graduate Student(s): Md Taimuzzaman Sharif
Research Mentor(s): Mohammad A. Halim

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and its variants are responsible for the devastating coronavirus disease 2019 (COVID-19) with more than seven million deaths since 2019. SARS-CoV-2 is a single stranded RNA virus which encodes two nonstructural polyproteins and several structural & accessory proteins. Non-structural proteins are initially divided into two polypeptides and these need to be cleaved into single functional units to assemble into new viruses. SARS CoV-2 contains two enzymes responsible for the viral replication such as Papain-like protease (PLpro) and Main protease (Mpro). Since Mpro cleaves more sites in the polyproteins than PLpro, the inhibition of this viral protease enzyme effectively interrupts the replication of the virus. Although small-molecule drugs have showed promising results against Mpro, peptide therapeutics are more target specific and show lesser adverse effects. Cyclization of side chains or backbones can reduce proteolytic instability. Previous studies from our group showed that Temporin L could effectively inhibit the main protease, however, this peptide showed a shorter half-life. The overall goal is to develop cyclic analogues of Temporin L and investigate their inhibition efficiency and improve the serum half-life. Initially, linear Temporin L analogue containing two (2CTLP) and three cysteines (3CTLP1 and 3CTLP2) were synthesized by solid phase peptide synthesis. Cyclic peptides from 2CTLP were conducted by using Dimethyl Sulfoxide (DMSO), Hexafluorobenzene (C6F6), α,α'-Dibromo-P-Xylene and α,α'-Dichloro-P-Xylene. Bicyclic peptides were synthesized by incorporating 1,3,5-

Triacryloylhexahydro-1,3,5-Triazine (TATA) and 1,3,5-Tris (Bromomethyl) Benzene (TBMB). Synthesis of cyclic peptides was confirmed by mass spectrometer. Bi-cyclic analogues of 3CTLP2 using TATA showed inhibition efficiency (IC50 4.00 μM) which was lower and better than other cyclic and bicyclic peptides. Future studies will be directed to further investigation of their serum stability, enzymatic stability, cell viability and binding efficacy.

Investigating the Impact of Glucose, Sucrose and Glycerol on Protein Structure and Dynamics using Electrospray Ionization-Mass Spectrometry
Poster #17 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Taylor Evans
Graduate Student(s): Abdul Hannan
Research Mentor(s): Mohammad A. Halim

Protein, antibody, peptide and enzyme-based medications remarkably increased in the pharmaceutical industry, but long-term storage and stability issues arise with newer and more complex medications. In the last two decades, the FDA approved 894 therapeutic proteins, including 354 monoclonal antibodies and 85 peptides or polypeptides. A critical aspect of this is the preservation of these protein-based therapeutics, which require various stabilizers that can maintain their stability. Various stabilizers such as sucrose, glucose and glycerol are frequently used to storge and preserve these medications. The goal of this research is to investigate how these stabilizing agents' impact on the folding and unfolding of a model protein. Various concentrations of these stabilizing agents were prepared and mixed with Lysozyme and incubated and analyzed by electrospray ionization coupled with mass spectrometry techniques. Unfolded lysozyme, which is less stable, leads to substantially higher charge states than the folded one. All mass spectrums were obtained using an LTQ XL mass spectrometer. In this experiment, the control sample, Lysozyme in water, exhibited m/z peaks ranging from 8+ to 11+, with the strongest peak at 10+. When Lysozyme was incubated with various concentrations (1 mM to 50 mM) of glucose, Lysozyme exhibited m/z peaks ranging from 8+ to 13+, with the strongest peak at 12+ which indicates that the protein is unfolded in presence of glucose. Similar features were noticed when Lysozyme was incubated with sucrose, however, various adduct peaks emerged which confirm that sucrose is not only unfolding the protein but also glycosylating the lysozyme significantly. While comparing the results with glucose and sucrose, this is evident that glycerol showed m/z peaks ranging from 8+ to 12+ with the strongest peak at 10+ which showed that glycerol was the most effective on stabilizing the protein.

Investigating the isoform specific differences of MKNK2 a/b
Poster #5 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm

Undergraduate Student(s): Hifza Rana & Ridham Raval
Research Mentor(s): Carol Chrestensen

Mitogen-activated protein kinase-interacting kinases (MKNK 1/2s) are important modulators of the MAPK pathways, which control cellular responses such as cell survival, proliferation and oncogenesis for ERK and stress signals for p38. MKNKs are encoded by two genes, presumably via a gene duplication event. Alternative splicing of MKNK2 results in 2 isoforms which can both phosphorylate eIF4E, a key translation initiation factor. The impact of this phosphorylation on translation is still poorly understood. These isoforms vary in their activity, regulation, and subcellular localization. MKNK proteins together can play a role in tumor development, cell migration, cell invasion, and energy metabolism. Understanding the function of MNK would take us one step closer to discovering ways to inhibit it. For this study, we successfully transformed GST-tagged MKNK2 isoforms, long and short, and then produced protein in the presence and absence of Zinc (II) ion. The isoforms were purified using glutathione agarose and then thrombin cleaved to remove the GST-tag. The isoforms were tested for kinase activity and will be tested for zinc content.

Mass Spectrometry Based Untargeted Lipidomics Analysis of Shellfish
Poster #15 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Nellie Abdul-Rahman
Graduate Student(s): Airin Akhter
Research Mentor(s): Mohammad A. Halim

Advanced mass spectrometry and powerful data handling system have led to discovery of all detectable lipids in a sample including unknows. Although classical targeted lipidomics approach focuses for accurate detection and quantification of very selected lipids, the goal of the untargeted lipidomics is to find increased coverage of lipids, often leading to discover new lipids. From this data, a greater understanding of why lipids are present in certain organisms can be used to track the lack, excess, or complexing of expected lipids. Shellfish have been widely known as a source of natural and essential lipids. The aim of this work is to detect and identify lipids present in various shellfish samples including lobster, crab, shrimp, and oysters. The samples were prepared using a floch extraction method, combining the desired sample with chloroform and methanol. The sample is placed on a shaker, incubated with water, and centrifuged. This creates a bottom chloroform layer that is collected, vacuum dried and resuspended with 9:1 methanol and toluene. The extracted samples are then placed in a well-plate in the sampler and lipids are separated by reverse phase liquid chromatography using C18 column in Vanquish Flex HPLC with a 12 min gradient. An Orbitrap Exploris 240 Mass Spectrometer was used to identify the lipids. Compound Discovery Software was used to search the LC-MS/MS data against the lipid database. After removing duplicates from the raw data and considering the named, there were 99

lipids in crab, 118 in lobster, 515 in shrimp, and 605 in oyster detected. Unsaturated fatty acids were the most prevalent lipid groups with fatty amides, sphingolipids, and fatty alcohols present in smaller percentages. Unsaturated fatty acids are crucial to many aspects of human health, including cardiovascular stability.

Potential for Alpha-Conotoxins Peptides as Inhibitors of Main Protease in SARS-CoV-2

Poster #16 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Gabe Raber & Julia Franz
Research Mentor(s): Mohammad A. Halim

Main protease (Mpro) is an enzyme crucial for replication in SARS-CoV-2, so designing and developing inhibitors targeting this enzyme are of great medical interest for treatment of COVID-19. Peptide therapies have an advantage over other treatment options because they have little to no side effects and can therefore be administered to a wider range of patients. Peptides derived from alpha-conotoxins, a type of venom present in cone snails, have shown potential in the past as treatments for various diseases including neurological, bacterial and viral diseases. However, no studies are conducted using these peptides targeting Mpro of SAS-CoV-2. The aims of these studies are to chemically synthesize alpha-conotoxins peptides and test their inhibition efficiency against the Mpro of SAS-CoV-2. These peptides were synthesized using the standard solid phase peptide synthesis (SPPS) protocol employing a Liberty Blue Microwave Peptide Synthesizer. After synthesizing the peptide on the resin, the peptide-resin was dried using a vacuum filter and cleaved using a cleavage cocktail consisting of 5% phenol, 5% water, 5% thioanisole, 2.5% 1,2-ethanediol, and 82.5% TFA. Excess TFA was evaporated off using N_2 gas. The peptide solution was then mixed with ice-cold ether and centrifuged at 7000 rpm for 10 minutes at 4°C. The ether was decanted off and the remaining peptide was dissolved in acetic acid and water. This solution was then frozen at -80°C and lyophilized overnight. The mass of the peptides was confirmed by electrospray ionization coupled with mass spectrometry. The linear peptide showed two strong peaks at m/z *677.33 and 1315.41 corresponded to* $[M+2H]^{2+}$ *and* $[M+H]^{+}$ *ions, respectively which matched theoretical values. Cyclic peptide was synthesized by adding 10% DMSO and stirred for 24-48 hours. Cyclization was confirmed by mass spectrometry which showed the removal of four hydrogen from four cysteine residues and forming disulfide bonds between* Cys^{2}*-*Cys^{8} *and* Cys^{3}*-*Cys^{13}*.*

Purification and Analysis of the Three isoforms of Mitogen Activated Protein Kinase-Interacting Serine/Threonine-Protein Kinase 1 (MKNK1)

Poster #4 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm

Undergraduate Student(s): Trinity Bell-Atkinson, Kayla Maeger & Alaina Westee
Research Mentor(s): Carol Chrestensen

Cellular responses to stimuli are essential to the proper functioning of all organisms. The specific protein interactions that pass along a message that induce cellular changes are numerus and include the extensive p38 MAPK pathway known to be activated by environmental stressors such as inflammatory cytokines, DNA damage, or oxidative stress. Dysregulation and improper responses to these conditions have been linked to various cancers and immune disorders, making members of the pathway highly desirable drug targets. We are focused on Mitogen Activated Protein Kinase-Interacting Serine/Threonine-Protein Kinase 1 (MKNK1) which has three isoforms, long, primary and short; long has never been studied but primary and short are known to be involved in translational regulation (via binding to eIF4G and phosphorylation of eIF4E), though the overall function and role of MKNK 1 is not entirely known. Thus far, we have successfully expressed and purified all isoforms using plasmids that enabled creation of gst-tagged fusion proteins. Further purification via tag removal was conducted to prepare the proteins for metal analysis, predicted in the cysteine containing loop of MKNK1s. Kinase assay was also performed to detect MKNK1 phosphorylation by p38, using a coupled assay with kemptide as the final substrate. Further analysis is underway to explore the functional differences of the isoforms.

Screening of MK2 Interacting Proteins in Human cDNA Libraries Using a Yeast Two-Hybrid Assay
Poster #13 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Christina Ambat
Research Mentor(s): Rajnish Singh

Mitogen-activated-protein-kinase-activated-protein-kinase 2 (MK2) is a kinase that phosphorylates substrates. This project seeks to better understand the function of MK2's short isoform by finding its interacting/binding partners. The Matchmaker Gold Yeast Two-Hybrid Assay was used since it depends on the reconstitution of a transcriptional activator through "bait" and "prey" proteins. The "bait" protein, MK2, was cloned into a binding vector to express a protein tagged with the binding domain. It was screened against a library of "prey" proteins tagged with an activation domain. If these proteins interact, the binding and activation domains come together and activate the Gal4 transcription factor resulting in the transcription of reporter genes AURI-C, HIS3, ADE1, and MEL1. By screening for the expression of these genes, experiments confirmed that the MK2-binding domain fusion protein doesn't autoactivate the transcription factor as evidenced by no growth on aureobasidin-containing plates and no blue colonies on X-alpha gal-containing plates. A positive control experiment used p53 with the

binding domain, and T-antigen with the activation domain, resulting in blue colonies on -leu-trp/X-alpha-GAL/AbA plates. Negative controls were performed with laminin with the binding domain, and T-antigen with the activation domain, resulting in no growth/blue colonies on the aureobasidin and double dropout plates respectively. Y190 yeast cells were transformed with MK2-binding domain plasmid and mated with Y187 yeast cells containing a cDNA library of human proteins to screen for potential binding partners. Approximately 200 positives were obtained and stored in a solution of glycerol and YPDA. Ten positives were analyzed. PCR amplification of cDNA inserts from positive colonies revealed that the "prey" plasmids were non-identical. The plasmids were isolated from yeast cells, transformed into DH5α E. coli, and plated on LB-amp plates to select the ampicillin-resistant "prey" plasmids from which it was isolated. The next steps involve characterizing the cDNA inserts by sequencing.

Synthesis and Characterization of Amino Acid Based Deep Eutectic Solvents by IR Spectroscopy and Principal Component Analysis

Poster #17 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Chad Foy
Graduate Student(s): Abdul Hannan
Research Mentor(s): Mohammad A. Halim

Deep Eutectic Solvents (DES) are emerging environmentally friendly solvents having applications towards various sectors including electrochemistry, biocatalysis, organic synthesis, pharmaceutical industries etc. The attractive properties of DESs, i.e. renewable, biodegradable, inexpensive, nontoxic etc. make them appealing to researchers as alternative to traditional hazardous solvents. DESs are prepared by mixing two or more components including a hydrogen bond donor (HBD) and a hydrogen bond acceptor (HBA), at a certain ratio with continuous stirring and constant temperature. The various nonbonding interactions, such as dipole-dipole, hydrogen bond, hydrophobic interactions and Van der Waals forces etc. among the HBA and HBD are key factors for depression of melting temperature and hence the DES formation. Among different types of DESs i.e. metal halide, nonionic, therapeutic etc., amino acid-based DESs have become popular due to their impact on protein structure and charge reducing capabilities in native mass spectrometry. The focus of this study was to synthesize different amino acid based DESs by mixing Arginine, Histidine etc. as HBA with glycerol, ethylene glycol, lactic acid etc. as HBD at certain ratio. The mixing was conducted in a glass beaker with continuous stirring at a rate of 500-700 rpm maintaining temperature about 40 °C-100 °C. After preparation the DESs were characterized by ATR-FTIR spectrophotometer to compare the presence and shift of major functional groups in individual components and prepared DES. The origin pro (2024) was used for graphical representation and Principal

component Analysis (PCA) of IR data of DESs. Among 9 prepared DESs, Histidine and Lactic acid DES (1:9) and methyl-triphenyl-phosphonium bromide and ethylene glycol (1:5) found more homogenous, clear liquid at room temperature. The functional groups were well distinguished in IR spectra and PCA graph. However, some DESs were very viscous, yellowish color whereas some did not mix at all and were not suitable for IR analysis.

Synthesis and Characterization of Cationic and Cell-penetrating Peptide-based Inhibitors Targeting the NMDA Receptor
Poster #23 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Vahreena Kong
Research Mentor(s): Mohammad A. Halim

Alzheimer's disease (AD) is currently an incurable disease that affects nearly 7 million people in the United States as of 2024, and typically, age groups 65 years and older comprise the majority of those afflicted. This number increases by the year, and the need for treatment options increases with it. Associated with AD are N-methyl-D-aspartate (NMDA) receptors that enable the release of Ca^{2+} ions from transmembrane ion channels once activated, and the continuous overactivation results in cell death (i.e., neurodegeneration) caused by Ca^{2+} influx. Memantine is a notable drug treatment option for AD, as it acts as an uncompetitive inhibitor toward NMDA receptors at the GluN1a and GluN2B subunits, blocking from within the transmembrane ion channel. Although memantine reduces Ca^{2+} influx, neurodegeneration does not completely cease. On the other hand, increasing studies on peptides for therapeutic use against AD have shown that cationic arginine-rich peptides (CARPs) have neuroprotective properties and can even act as antagonists against Ca^{2+} influx. Cell-penetrating peptides (CPPs) have also been shown to hold some effect over NMDAR inhibition, albeit indirectly through amyloid beta (Aβ) inhibition. With all this taken into consideration, the following peptides were computationally studied for their binding affinities with NMDARs: CN105-CARP (VSRRR), L5a-CPP (RRWQW), R5-CARP (RRRRR), and T2-CPP (LVGVFH). These were synthesized through solid-phase peptide synthesis (SPPS) and cleaved using various cocktails (e.g., Reagent R) depending on the residues present within the peptide. Characterization of these peptides was accomplished through electrospray ionization mass spectroscopy (ESI-MS) to confirm their mass, and in future, the inhibition efficiency of each peptide will be determined using biological assay.

Synthesis and Characterization of Choline Chloride: Amide Based Deep Eutectic Solvents
Poster #13 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Matthew Berg
Research Mentor(s): Mohammad Halim

Deep Eutectic Solvents are establishing themselves as a relatively new development in the field of green chemistry as they have only been around for just over two decades. Moreover, these solvents propose an environmentally friendly solution to toxic solvents that are commonly used for industrial purposes. Deep Eutectic Solvents are comprised of two principal components, a hydrogen bond donor and a hydrogen bond acceptor. These combinations are highly tunable as their parent components can be combined to create a DES solvent that has a melting point much lower than its parent components. The main application for these solvents is to integrate them within industrial processes as non-toxic, nonflammable, green solvents that are inert to the environment. In the research, various DESs were prepared by using a 1:2 molar ratio, stirring at 600 RPM at 80 for about one hour or until a colorless liquid was achieved. Choline chloride was used as the main hydrogen bond acceptor while urea, acetamide, benzamide, and L-glutamine were used as hydrogen bond donors. Choline chloride was shown to be the most successful with urea as the FTIR showed a significant shift between the N-H stretch of urea at 3430 and the O-H stretch of choline chloride at 3212 with the DES showing an O-H stretch around 3313 and a C=O stretch at 1664 . Based on the FTIR of the DES, it is conclusive that the desired DES was created between the two parent components, choline chloride and urea, acetamide and benzamide. Similar IR features were also noticed when acetamide and benzamide were used, however, ChCl:Glutamine DES was remained as very viscous and quickly solidified around 22° C. Principal Component Analysis (PCA) was utilized to determine identify the patterns and relationships that the hydrogen bond donor and the hydrogen bond acceptors had with each other. PCA results confirm and adhere to the same results that the FTIR experiments produced as it indicated that a DES solution was successfully synthesized from the parent components.

Synthesis and Characterization of Natural Deep Eutectic Solvents by IR Spectroscopy and Principal Component Analysis

Poster #19 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Sanaa Edole
Graduate Student(s): Abdul Hannan
Research Mentor(s): Mohammad A. Halim

Deep eutectic solvents (DES), a recently discovered type of solvent, have become an innovative solution to the negative aspects of typical solvents, such as organic. Some of these traditional solvents are often volatile, toxic, or flammable. Consequently, many of these solvents can be harmful to the environment or expensive to synthesize. DESs, however, are non-volatile, biodegradable, inexpensive as well as easy to synthesize, non-flammable and less toxic. As a result, DES are diverse and have a wide variety of applications in research, manufacturing, and pharmaceutical industry. DES are synthesized using a mixture of a hydrogen bond acceptor (HBA) and a hydrogen bond donor (HBD). Usually, both compounds are solid at room

temperature, but the formation of hydrogen bonds between them causes a depression of the melting point and DES becomes liquid. Among different types of DESs, natural DES (NADES) have significant applications in biological systems, environmental protection, extraction and the pharmaceutical industry. The hydrogen bond acceptors mainly include quaternary ammonium or phosphonium salts, whereas the most common hydrogen bond donors are amides, alcohols, carboxylic acids, amino acids, sugar, polyols etc. The primary focus of this investigation was to synthesize NADESs containing choline chloride and glucose/sucrose in different ratio and characterized by IR spectroscopy. For Des preparation thermal process was followed maintaining temperature from 60 °C to 130 °C and stirring rpm at 400 to 700. It was observed that ChCl: Glucose (2:1), ChCl: Sucrose (1:1), Betaine: Glucose (5:2) DESs were synthesized successfully. The IR data confirms the presence of major functional groups in DES samples from individual components. The PCA results also support the DES formation. However, ChCl: Sucrose (1:2), ChCl: Sucrose (2:1), ChBr: Glucose (2:1) DESs were not mixed completely and remained very viscous or solid in room temperature; not favorable for further characterization.

Transcription Factor Binding and Discovery of Novel Gene in the Opportunistic Human Pathogen, Pseudomonas aeruginosa
Poster (Microsoft Teams)
Friday, November 22nd, 2:15 pm
Undergraduate Student(s): Alaina Westee
Research Mentor(s): Michael Van Dyke

Pseudomonas aeruginosa *(PA) is a gram-negative, ubiquitously-found bacterium that primarily causes nosocomial, or hospital-borne, infections within immunocompromised patients. Therefore, it has been deemed a critical priority pathogen by the World Health Organization (WHO) and the Center for Disease Control (CDC), generating a need for research on its fundamental biology. The Van Dyke laboratory focuses on proteins called transcription factors, which promote or repress gene expression to regulate an organism's functioning. We are specifically studying the cadmium-responsive transcription factor, CadR, due to the importance of metals in virulence and the lack of information on PA's response to metal fluctuations. We intend to validate the binding of CadR to its preferred DNA sequence and determine the genes it controls, with a possible novel gene being discovered in the PAO1 strain. This will be conducted via* in vitro *and* in vivo *techniques, including Electromobility Shift Assay (EMSA) and Chromatin Immunoprecipitation (ChIP).*

Untargeted Animal and Plant Milk Lipidomics using Liquid Chromatography-Mass spectrometry
Poster #14 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Layth Al-Sibai & Airin Akhter

Research Mentor(s): Mohammad Halim

Dairy is a large source of lipids necessary for most mammalian organisms to grow exponentially and a cornerstone of the human diet. These lipids are necessary for energy storage, vitamin absorption, and even brain development. The lipids in animal milks such as bovine and goat are vital as the main source of energy for growth, however, plant-based milk consumption, as part of a healthy diet, is continuously increasing. The objective of this research is to perform a comparative lipidomics study on the bovine, goat, coconut and almond milks and elucidate relationships between the lipid profile among them. The lipids were extracted from the milk sample employing Folch extraction protocol and were separated and dectected using Vanquish Flex HPLC coupled with Orbitrap Exploris 240 Mass Spectrometer. LC-MS data were proceeded through LIPID MAPS and ChemSpider databases for comprehensive analysis. Our current hypothesis is that mammalian milk will contain more fatty lipids, like fatty aldehydes, hydroxy fatty acids and saturated fats, associated with development and growth, while milks made from nuts may experience a larger variety of lipids and a higher concentration of unsaturated fats. However, the data has shown that while mammalian milk did correlate with the hypothesis of containing more saturated fats and much bulkier lipids like sterols and isoprenoids, it also contains a very similar variety of unsaturated fats compared to plant milks. Goat milk's unsaturated fats make up 21.6% of its lipid variety, which is very close to coconut milk's 21.4% and almond milk's 24%, contradicting what is established by convention of plant-based milks being healthier due to containing more unsaturated fats. Some data even implying coconut milk contains a higher variety of lipids, like containing branched fatty acids and carboxylic fatty acids while no other milk did, while at the same time contained the lowest number of total lipids present in the sample.

Volatile and Non-volatile Buffers as Charge Reducing Agents in Native Mass Spectrometry

Poster #12 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Michelle Mba
Graduate Student(s): Abdul Hannan
Research Mentor(s): Mohammad A. Halim

Native mass spectrometry (MS) is an advanced technique that enables the analysis of the structure, stoichiometry, and masses of large protein complexes. By transferring weakly associated complexes from solution into the gas phase of a mass spectrometer, this method provides valuable insights into complex stoichiometry and protein structure. Utilizing buffers as charge-reducing agents in native mass spectrometry (MS) is crucial for maintaining the native structure of proteins and protein complexes. The main objective of this research is to perform a comparative analysis of charge reducing capacity of various volatile ammonium and non-volatile

sodium-based buffers on a model protein employing native mass spectrometry. Different concentrations of various buffers were prepared and combined with a lysozyme solution. These solutions were then analyzed using a mass spectrometer and differentiated with respect to mass-to-charge (m/z) ratio. The control, lysozyme in water, exhibited m/z peaks ranging from 8+ to 11+, with the strongest peak at 10+. Upon incubation of different concentration of volatile ammonium-based buffers (1.0 mM to 50.0 mM), m/z peaks ranging from 5+ to 12+ were observed, with a dominant peak at 7+. The spectra data indicated that the model protein remain folded at all concentration of the ammonium buffer. Similarly, various concentrations of non-volatile sodium-based buffers demonstrated m/z peaks ranging from 6+ to 13+, with a dominant peak at 8+. Lower concentrations (0.1 mM – 1.0 mM) of non-volatile sodium-based buffers allowed the model protein to remain folded. At higher concentrations (5.0-10.0 mM), lysozyme began to unfold, and the mass spectra showed elevated spectral noise and adducts.

What are the Allergens in our Body Spray and Perfume Bottles?
Poster #20 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Ciara Bell & Angel Arnold
Research Mentor(s): Wei Zhou

The cosmetic and beauty industry thrives off the allocation of products like makeup, fragrances, and skin care. As the development of new and more beauty products expand, the study of possible unknown or hidden compounds in those products intensifies. Many manufacturers claim that certain chemicals are present or some other are absent in their products, the validation or assessment of their claims is necessary. Chromatographic separation followed by mass spectroscopic analysis can be used for identification and quantification of interested compounds in beauty products. Gas chromatograph mass spectrometer (GC-MS) is useful for volatile samples and unknown detection. We are interested in testing allergen compounds possibly present in body sprays such as benzyl alcohol, which is reported as a common allergen among fragrance products. Our elution procedure was developed using Shimadzu QP2010 Plus GCMS system and bromobenzene was selected as the internal standard. Method validation resulted in good linearity for quantification of benzyl alcohol with the coefficient of determination values (R2) close to 1. However, it is found that no detectable amounts of benzyl alcohol were present among the body spray samples in our experiments, while coumarin and linalool, two other common allergens, were identified. Our current research focuses on the quantification of coumarin and linalool in a variety of body spray, parfum, and cosmetic products, and our findings will be summarized and presented. The exploration of allergens in cosmetic products can widen the understanding of personal and societal health in the beauty and cosmetic world.

Design, Synthesis and Inhibition Efficiency of Cation-Pi Peptide Targeting Main Protease of SARS-CoV-2

Poster #24 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Ngoc Diep Dong
Research Mentor(s): Mohammad A. Halim

The SARS-CoV-2 main protease (Mpro) has been identified as a critical enzyme for viral replication and transcription, making it a key target for therapeutic intervention in COVID-19 treatment. In this study, three peptides: SLFWQWKSKFLGR, SLFWQWHSKFLGR, and SLFWQWRSKFLGR were designed by incorporating phenylamine and basic amino acids maintaining one helical turn and synthesized to inhibit Mpro activity through cation- interactions The attractive force between the positive charge of a cation (the side chain of lysine (K), histidine (H), and arginine (R) and the electron-rich -system of an aromatic ring, such as phenylalanine (F). This cation-pi interaction plays a key role in stabilizing molecular structures, particularly in biological systems, and can be critical for enzyme inhibition. The peptides were engineered based on their ability to form stable non-covalent interactions with Cys145 and His41 residues present in the active site of Mpro, with the aim of blocking the proteolytic activity necessary for viral polyprotein processing. The three peptides were synthesized using solid-phase peptide synthesis (SPPS) and characterized by mass spectrometry, which confirmed its expected molecular weight and purity. Once synthesized and validated, all three peptides were evaluated in biological assays to determine their inhibitory potential against SARS-CoV-2 Mpro. Each assay was repeated three times to ensure reproducibility, consistency, and statistical significance. Through this research, the potential of cation- interaction-based peptides as inhibitors of viral proteases was explored, with a focus on targeting Mpro as a therapeutic strategy. The successful inhibition of Mpro could provide a promising approach for developing antiviral therapies against SARS-CoV-2 and other coronaviruses.

Ecology, Evolution, and Organismal Biology

Analysis of Mosquito Gut Microbial DNA Within Lab-Grown Aedes albopictus
Poster #19 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Sofia Cuenca Rojas, Evan Johnson, Julio Peña, & Layne Buttram
Research Mentor(s): Thomas McElroy

This study aimed to document the midgut microbial communities of a common mosquito species, Aedes albopictus. Some microbes in the guts of mosquitoes have been found to act in a way that

influences mosquito biting behavior, and fitness, and can affect how they acquire and transmit pathogens and viruses to their hosts. Among different rearing conditions, different microbial communities have been found residing within the gastrointestinal environment. Considering the microbiota in laboratory-raised mosquitoes so it can be compared to wild mosquitoes is important when future experiments attempt to apply the data found in a laboratory to wild populations. This study looks into Ae. albopictus, raised in one of Kennesaw State University's laboratories, reared from fourth-generation eggs and fed a larval slurry mix of brewer's yeast and liver powder. As adults, they only had a sucrose and DI water solution to drink. All sampled specimens were females that had never been blood-fed. Individual mosquitoes were collected from the laboratory colony whose midguts were dissected out into a sterile solution. They had their DNA processed using 16S Gene Sequencing of the v3 and v4 region. We analyzed similarities and differences in midgut microbial communities within the Ae. albopictus species.

Analyzing Temporal Variations in Trash Collection in Tobacco Caye, Belize: A Comprehensive Yearly and Monthly Comparison to Uncover Underlying Mechanisms
Poster #14 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Benjamin Schirner, Adamina Bilbrey, & Emmy Perras
Research Mentor(s): Troy Mutchler

This study investigates the temporal variations in trash accumulation on Tobacco Caye, Belize, focusing on the impacts of tourism and seasonal weather. The Caribbean Sea, a year-round hotspot for tourism, contributes large amounts of anthropogenic litter to the reef crest, especially during the rainy season, which exacerbates the issue through hurricanes, open-ocean current patterns, and other large water movements. The objective of this research is to assess the volume of trash collected over a four-year period (2019-2023) and determine if the variability in trash deposition aligns with seasonal tourism and severe weather. Data collection involved students conducting litter surveys across two defined zones on the reef crest, with waste trends analyzed by year and by month in 2023. The results show a notable increase in trash accumulation, and a notable correlation between peak trash accumulation and seasons of adverse weather was also found. March yielded the highest total collection, while August had the highest average trash per trip, likely reflecting the influence of both tourism and seasonal currents. This study highlights the urgent need for improved waste management strategies in high-traffic tourist destinations like Belize and the Caribbean Sea. The findings suggest that increased tourism and seasonal weather patterns may contribute to the accumulation of trash, calling for collaborative efforts in waste removal and environmental protection to mitigate the impacts on coral reef ecosystems.

Change in Seagrass and Algae Coverage off the Coast of Tobacco Caye, Belize in Relation to COVID-19 Pandemic-Associated Overfishing of Reef Fishes
Poster #18 (Marietta Event Center)

Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Devin Vu Koonjbearry & Julio Gabriel Peña
Research Mentor(s): Troy Mutchler

Seagrass meadows are some of the most productive marine ecosystems globally, recognized for having high primary and secondary productivity. They are also one of the most efficient carbon sinks in the world and serve as a nursery habitat for many marine animals, including herbivorous fish. Herbivorous fish play a vital role in maintaining coral health, as they prevent algae from outcompeting reef-forming corals. Anecdotal reports from staff at the Tobacco Caye Marine Station suggest that overfishing during the COVID-19 pandemic has negatively impacted local herbivorous fish populations, many of which also forage in nearby seagrass meadows. The abundance and distribution of seagrass and benthic algae may exhibit changes in response to reductions in herbivory. We conducted a study to test the hypothesis that the flora composition of seagrass meadows around Tobacco Caye has changed since the COVID-19 pandemic, possibly in response to a decline in the herbivorous fish populations. Three replicate 0.5m x 0.5m quadrats were taken at 25m intervals over a 100m transect in May 2024 and compared to similar data collected in 2017. The results suggest there was a change in the flora of the seagrass meadows from 2017 to 2024, with the average percent cover of seagrass decreasing and the average percent cover of algae increasing from 2017 to 2024. These findings are consistent with potential reductions in the herbivorous fish populations, as reported by staff at Tobacco Caye Marine Station.

Consumption Habitats of Male and Female Lionfish Regarding the Production of Eggs
Poster #17 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Zalyn Baker, Natalie Tipsword, & Sam Fisher
Research Mentor(s): Troy Mutchler

The lionfish, scientifically known as Pterois, belongs to the Scorpaenidae family, which is native to the Indo-Pacific Ocean, but has become an invasive species in the Caribbean Sea. First observed in Belize in 2008, lionfish have since become established in the Belize Barrier Reefs. Known for their ability to consume a wide range of species, lionfish compete with native fish for food resources. This invasive species poses a significant threat to the ecosystem due to their venomous spines, aggressive predatory behavior, lack of predators, and high reproductive rate, with lifespans extending up to 30 years. Our study aimed to investigate the feeding habits of both male and female lionfish in relation to their egg production. With the joint effort of personnel from the Tobacco Caye Marine Station and local fishermen, we were able to collect lionfish data to determine their sexual maturity based on size, stomach contents, and the presence or absence of egg sacs. We then analyzed the data to identify patterns in size and feeding behavior between males and females, especially to determine if diet influenced overall

size. We hypothesized that reproductive-age female lionfish would consume more or larger prey than males of the same age to acquire the energy needed for frequent egg production. However, after analyzing the data, our results did not support this hypothesis. It may instead be that female lionfish have developed strategies to conserve energy rather than relying on increased food intake to power egg production.

Effects of Bacterial Community Diversity on Beehive Health
Poster #21 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Kathryn Shortell, Bethany Ebwe, & Samari Simmons
Research Mentor(s): Thomas McElroy

Bee pollination massively supports our food supply, economy, and overall biodiversity. With beekeepers seeing an increase in colony losses over the last few years, finding better ways to support hive health is crucial. A beehive's health can be assessed by observing how much honey it produces, and it is well known that factors such as climate change and pesticide use impact hive health. Bacterial diversity is another potential factor impacting hive health that can be analyzed to create ways to optimize maintenance and growth of hives. DNA metabarcoding is a method that evaluates standardized sections of the genome that are unique to certain species in order to identify all species within a sample. We used DNA metabarcoding to determine the species of bacteria present in samples taken from three different beehives of varying ages and degrees of health. Bacterial diversity between the hives will be compared, and it is expected that the hives with greater bacterial diversity will be older and healthier. Methods to increase or diversify the microbiome could be developed to promote hive health.

Exploring Plant Diversity in Pre and Post Burned Agricultural Plots in Central Appalachia
Poster #5 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Andres Lee
Research Mentor(s): Merri Collins & Kristen de Graauw

Prescribed burns are a type of habitat restoration technique used to help restore land to a more ecologically diverse state, by increasing area for native plant growth. Fields that regularly get burned allow native species that are adapted to disturbances to establish healthier habitats. Appalachian Headwaters' Wood Thrush Park, in Lewisburg, West Virginia, is a landscape that was previously used for cattle grazing. It is being actively managed to restore native habitat. In the summer of 2024, sampling was done on two different fields; one that was burned in 2019 and 2022 and the other that had not been burned prior to the study. On each field four transect lines were used to sample the species present by ten one-meter by one-meter quadrats across four

sampling transects per site. Plant species were recorded and to find the diversity of native species a Shannon diversity index was used. After using the Shannon diversity index for each transect it was found that there was not a significant difference in the diversity from each transect, the next step is to look at the diversity of each field. A comparison of plant community diversity between burned and unburned fields will help us understand whether prescribed burns are an appropriate restoration technique for the fields in this study system. This will allow us to create an effective management plan to use moving forward.

Parasites of Native Georgia Snake Species
Poster #20 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Illy Weinzetl
Research Mentor(s): Whitney Preisser

Parasites are prevalent in all groups of organisms, though they are less well documented in reptiles. Specifically, parasites of native Georgian snakes, such as the DeKay's brown snake, Storeria dekayi, and the banded water snake, Nerodia fasciata, have been historically understudied both across the US and within Georgia. In this study, we aimed to describe the parasites of multiple species of snakes through parasitological dissections of fresh and fluid-preserved snake specimens. Across seven species and 48 individual snakes sampled, one species of pentastomid, two species of trematode, two species of cestode, and 14 species of nematode were identified. Describing the biodiversity of parasites helps us better understand and conserve these species in the future, as well as gain a further understanding of the parasitological biodiversity within Georgia.

Sipping Science: Unraveling Kombucha's Microbial Mysteries Through DNA Barcoding
Poster #10 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Katy Sullivan, Sheridan Hildreth, Scarlett Bittle, Brandon Mitchell, Cari Eason, & Patrick Kinsella
Research Mentor(s): Thomas McElroy

Kombucha is a fermented tea beverage that boasts many gut health benefits. It is a large business with many brands consumed worldwide. Each different brand claims to use their own starter cultures, all with slightly different microbial species listed on the labels. Our purpose is to determine the accuracy of these claims and if they contain bacteria that's not listed. The main questions are what is the difference in bacterial community between brands and are the bacterial communities listed completely accurate? Previous research has not covered the microbial communities in all brands that were surveyed. The brands selected (based on availability) for DNA isolation were GT's Synergy, KEVITA, and GreenWise. The DNA extraction protocol

followed was PureLink Microbiome DNA Purification kit protocol. The isolated genomic DNA was 16S DNA barcode sequenced by LC Sciences on an Illumina NovaSeq platform according to the manufacturer's recommendations. The results will identify the microbial communities present and their relative abundance within our samples. The data will be compared within and among the sampled brands. We expect to find similarities and differences in microbial diversity among brands. We do not expect to find significant levels of foreign bacteria present.

Survey of Mosquito Larval Habitats at the KSU Field Station
Poster #2 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Rose Sofia, Eli Lovvorn, Aura Valter-Franco, Brian Hartman, Christopher Fish, Devin Koonjbearry, Faith Arends, Ferguson Iruka, Illyana Weinzetl, Jaden Means, Joshua Gattis, Magdalene Boadu, & Sofia Cuenca-Roja
Graduate Student(s): Christina Roth
Research Mentor(s): Andrew Haddow

The greater Atlanta metropolitan area hosts numerous mosquito species that are nuisance biters and can transmit arthropod-borne diseases to humans. We surveyed the Kennesaw State University (KSU) Field Station – an incredibly biodiverse location – where student, staff, and faculty-led groups engage in outdoor research and teaching activities. The KSU Field Station located in Cobb County, GA is a heavily trafficked 25-acre property that may attract various mosquito species capable of transmitting pathogens to humans and animals alike. On August 27th, 2024, our team investigated the KSU Field Station to quantify and record potential water-holding containers that serve as mosquito breeding sites, and the presence or absence of mosquito larvae and pupae. The survey was conducted to identify and possibly reduce future sources of mosquito reproduction and microhabitats. Following World Health Organization (WHO) guidelines, we calculated a Container Index (CI) of 12.24%, compared to 29% from a similar survey at the KSU Field Station on August 25th, 2023. The decrease in the CI from 2023 to 2024 is likely due to increased vigilance among KSU field station personnel to reduce the number of water-holding containers, thereby minimizing mosquito breeding habitats, following public health education efforts made in 2023.

Understanding the soil microbiome of a montane longleaf pine ecosystem: does choice of soil DNA extraction method matter?
Poster #17 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Olivia Walker
Research Mentor(s): Paula Jackson

The longleaf pine (Pinus palustris Mill) is an ecologically diverse and resilient ecosystem. However, its range in the southeastern United States has significantly declined due to anthropogenic changes. Understory herbaceous plants play a significant role in maintaining its diversity and providing fuel for surface fires necessary for this pyrophytic ecosystem. Soil microbes are crucial to plant functions such as nutrient acquisition, plant health, and growth. Our long-term ecological study of the soil microbiome of a longleaf pine restoration site aims to understand factors that may influence the soil microbial community, such as seasonal changes, soil chemistry, restoration practices, and forest age. For this, in our analysis, it is necessary to consider the methodology and its potential role in influencing the characterization of the microbiome. Hence, the soil DNA extraction kits used are critical. Between 2021 and 2023, we used the DNeasy PowerSoil kit (original) for our soil DNA extractions. Then, after its discontinuation, starting in March 2023 we used the DNeasy PowerSoil Pro kit (new). We aim to answer the question: how do the two kits compare in terms of purity of DNA extracted and bacterial community representation? DNA was extracted from frozen soil samples collected at Sheffield Wildlife Management Area (WMA) in March, July, and November 2023 using the original kit. Extracted DNA concentrations were measured using a NanoDrop spectrophotometer to test for purity and DNA was sent to LC Sciences for 16S rRNA sequencing to identify bacterial composition. Results obtained from both kits will be compared. Investigating differences in DNA extraction kits used for our study is crucial for scientific rigor and replicability. Ultimately, our efforts will contribute to the understanding of soil DNA extraction methodology and the scarce knowledge base of the soil microbiome of the longleaf pine ecosystem.

What's in a Fish? The Relationship Between Fish Size and Parasite Abundance in Freshwater Fish in Georgia

Poster #18 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Cassie Ellenberger
Research Mentor(s): Whitney Preisser

Georgia is a hotspot for freshwater fish diversity. Despite the high levels of aquatic biodiversity within the state, little is known about their parasitic diseases and how they might affect their hosts. Understanding what parasites infect fish will allow researchers to better understand interactions within Georgia's ecosystems. To fill in this gap, we studied the various parasites which can be found within native fish species to better understand the potential relationship between host body length and parasite burden in freshwater fish in Georgia. Our hypothesis was that larger fish will tend to have a higher parasite burden than smaller fish due to them having more area for accumulation. To do this, we collected data by first dissecting the fish and removing their organs, right eye, and right gills. Then, we examined them underneath a microscope and extracted the parasites within. Each of the fish specimens have been taken from

Kennesaw State University's Mountains to Metro Biodiversity collection. Parasites were morphologically identified, and the data were analyzed using linear models. Preliminary results will be discussed. By completing this study, we aim to better understand how these parasites are affected by host traits so that we may better understand external factors on parasite accumulation.

Mathematics

Classification of Internet Memes with Geographic Support and Machine Learning
Poster #17 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): William Little
Research Mentor(s): Pengcheng Xiao

Internet memes are ubiquitous in today's social media dominated world, offering quick online entertainment. Utilizing Google Trends time-series data, we dissect dynamic meme popularity trends. Previous studies discerned four popularity patterns using differential equations and machine learning to both identify and classify them. Our recent expansion of the dataset to 2000 elements prompts us to collect additional trend data, centering on geography and categorical connections. Statistical analysis can then unveil new insights in meme popularity, in tandem with graph-theoretic metrics.

Variational Characterization of Fractal Neumann Eigenvalues
Poster #14 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Elizabeth Iaryguine
Research Mentor(s): Eric Stachura

A fractal is a self-similar, infinitely repeating geometric object. These exhibit many counterintuitive mathematical properties. One such property is a fractal dimension, where the dimension of an object does not necessarily need to be an integer. A method called dimensional regularization can be used to transform fractional integrals into integrals in the more intuitive Euclidean space. We have shown that in this fractal space, many properties of solutions to partial differential equations continue to hold. In particular, we have shown that in the Neumann problem for a fractal version of the Laplace equation, there is a variational characterization of the Neumann eigenvalues via a corresponding notion of the Rayleigh quotient. This enables easier computation of eigenvalues, either by numerical methods or by hand.

Molecular and Cellular Biology

Analysis of Binding Pocket Variants of p38 to Understand the Binding of p38 and NOS3

Poster #4 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Bethany Daniels, Jensen Boyette, & Ieza Fatima
Graduate Student(s): Gillyan Jewett
Research Mentor(s): Carol Chrestensen

The p38 mitogen-activated protein kinase (MAPK) pathway is a significant player in cellular reactions to stress and inflammation. Our lab is interested in understanding the binding of p38 alpha with nitric oxide synthase 3 (NOS3, aka eNOS). NOS3 and p38 alpha bind with nM affinity and using peptides we have previously shown that p38 binds similarly with portions of the N-terminus (NT) and the autoinhibitory (AI) loop. There are currently two known binding areas on p38 the CD groove and the hydrophobic patch; it is unknown which of these is used to bind the two regions of NOS3 (NT, AI). Two variants of p38 were created previously to demonstrate when p38 MAPK uses the CD groove vs the hydrophobic patch, the first is D316N, which sits within a section commonly used for CD groove interactions and significantly impacts substrate binding. The second is Y258A which disrupts substrates and proteins that use the hydrophobic patch. Previous research showed that the D316 mutation lowers binding interaction with MAPK-activated protein kinase 2 (MK2), which binds to the CD groove to be phosphorylated p38. We hypothesize that the Y258A mutation would not impact binding to MK2 and that activation would be similar to wild type active p38, while in contrast D316 which alters the CD groove is predicted to have lowered ability to bind and activate MK2. We have purified wild type, D316N and Y258A in active phosphorylated forms and are testing how all of them activate MK2, ultimately to test how they differentially bind and phosphorylate NOS3. These insights are important for exploring how p38 binds NOS3.

Analysis of Secreted Metabolites During Predation of **Myxococcus xanthus** *on* **Pseudomonas aeruginosa** *and* **Escherichia coli**

Poster #11 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Tayla Clark & Chisom Nwaedozie
Research Mentor(s): Ramya Rajagopalan

Myxococcus xanthus *is a Gram-negative facultatively predatory bacterium that exhibits collective social behavior.* M. xanthus *feeds on organic nutrients as well as on susceptible prey bacteria. The bacteria swarms over prey cells, lysing and consuming the nutrients released.*

Interestingly, some bacteria have evolved strategies to evade myxococcal predation. One such bacterium is Pseudomonas aeruginosa PAO1, which is an opportunistic human pathogen that uses quorum sensing to communicate to grow, which can be detrimental to humans with compromised immune systems. Strains of PAO1 are multi-drug resistant, and thereby pose a significant therapeutic challenge. We first performed side-by-side spot predation assay on partial starvation media with M. xanthus *and P. aeruginosa PAO1 on bilayer agar plates, with a porous cellophane layer separating the two layers. After a 48-hr. predation, the samples were extracted and placed into a 60:40 ratio of methanol and water mixture to be analyzed using Liquid Chromatography Mass Spectrometry (LCMS) to determine the role of secreted metabolites in the predation evasion response of PAO1. A second side-by-side spot predation assay was performed using* M. xanthus *and P. aeruginosa on partial starvation media as well. Circular agar blocks containing the spots were transferred to a special insert-cup porous base, containing sterile partial starvation liquid medium. Metabolites secreted will diffused through the agar into the porous base of the insert, excluding any bacteria traveling through. After 48-hr. of predation, the liquid medium containing the metabolites were labeled "cell free extracts" and used for analytical experiments. With use of these research approaches, we expect to see different expression of metabolites during predation of* M. xanthus *on either* P. aeruginosa *or* E. coli *and compare them to our predatory and prey controls. Determining the evasion strategies of this bacterium could lead to the development of alternative methods to combat this pathogen*

***Conditions that Determine the Induction of the Predation Resistance in* Pseudomonas aeruginosa**

Poster #10 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Klaudya Hernandez
Research Mentor(s): Ramya Rajagopalan

Pseudomonas aeruginosa *is categorized by the World Health Organization as one of the most multidrug-resistant pathogens in need of control. Myxobacteria is a single-celled predatory soil bacterium and a potential source of novel antibiotics. They are social and seen to hunt in "wolf" packs cooperatively. Under starvation conditions they will aggregate in compact structures filled with spores known as fruiting bodies; only germinating when nutrients become available. In our research group we have shown that* Myxococcus xanthus *(predator) is able to predate on isolated* Pseudomonas aeruginosa *(prey) cells. This is supported by our observations in microscopic mixed cell assays using fluorescent tags to track prey cell death. However, a unique resistance response to predation is observed in a population of* P. aeruginosa *cells when the predator and prey are spotted side-by-side.* P. aeruginosa *blocks Myxococcal advancement and resists predation. To determine the spatial conditions where the resistance response is induced, we performed assays where predator and prey cells were spotted on agar surface in different orientations. A 10-fold reduction was observed in prey cell counts when spatial constraints*

prevented prey cells from mounting a resistance response, suggesting coordinated behavior. Previous data collected observed that mutated strains of certain Quorum Sensing pathways are unable to mount a similar resistance response, suggesting a key role for Quorum Sensing in predation resistance. To verify this hypothesis, we will perform differential gene expression analysis using qRT-PCR under predation and solitary conditions. This information could potentially lead to alternative ways to counter the infectious Pseudomonas aeruginosa.

Conservation and Function of Human Oncogene* FYN *in Drosophila melanogaster
Poster #9 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Megan McCabe
Research Mentor(s): Dongyu Jia

Many cancers are initiated by the activation of oncogenes, which promote cancer development through a variety of disruptive mechanisms, including excessive proliferation, loss of cell differentiation, and inappropriate cell migration. The mechanisms can be summarized in an organizational system known as the hallmarks of cancer. FYN *is a human oncogene implicated in many cancers, especially those of the central nervous system and ovary.* FYN *encodes a non-receptor tyrosine kinase from the Src tyrosine kinase family, and has been shown in literature to promote proliferation and metastasis. Data from Jia Lab previously demonstrated that human* FYN *expression in the* Drosophila *eye resulted in a deleterious effect on eye structure, suggesting potentially conserved functions across species. This project utilized the Gal4-UAS system to express* FYN *and its closest* Drosophila *homolog, Src64B, in the eye and ovary of* Drosophila *melanogaster, to further explore and characterize the mechanisms of* FYN*. Eye tissue was imaged via light microscopy and scanning electron microscopy. Classic immunostaining was performed on ovarian tissue to determine protein expression, and slides were imaged via confocal microscopy. Our findings suggest that* FYN *and Src64B exhibit conserved phenotypes when expressed in the eye and ovary.* FYN *and Src64B expression in the eye demonstrated a conserved rough eye phenotype, including disruption of ommatidia organization and lost or shortened bristles, indicating developmental defects.* FYN *expression in the* Drosophila *ovary demonstrated inappropriate accumulation of anterior egg chamber squamous cells without evidence of excessive proliferation. These accumulated squamous cells also exhibited altered expressions of apical, basolateral, and Par-complex polarity factors. Overexpression of Src64B showed similar phenotypes, suggesting that FYN and Src64B function through similar cellular pathways. These results indicate that the conserved oncogenic potential of* FYN *may be linked to changes in cell polarity signaling, which are considered a hallmark of cancer.*

Control of Foodborne Pathogen Shigella dysenteriae with Bacteriophage
Poster #12 (Marietta Event Center)

Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Georgia McDuffie & Devin Koonjbearry
Research Mentor(s): Jean Lu

Shigella dysenteriae *is an important foodborne bacterial pathogen. It can cause a severe illness known as dysentery, a type of shigellosis with high mortality (up to 20%). The symptoms include diarrhea (often bloody and mucoid), stomach cramps, fever, and hemolytic-uremic syndrome which can be fatal.* S. dysenteriae *has a low infectious dose. It is easily transmitted through contaminated food and from person to anoperson. Despite numerous efforts for prevention and control, shigellosis continues to be an important cause of acute diarrhea and dysentery worldwide, particularly in Asia and Africa. The development of an effective control is urgently needed to decrease its global impact. Recently, bacteriophages (phages) have emerged as safe and promising biocontrol agents against bacterial pathogens. Phages are viruses that infect only bacteria. They do not replicate in foods unless their bacterial hosts are present. In addition, phages do not alter food properties and nutritional value. A novel Shigella phage has been isolated. The phage is genus-specific. It is able to infect* S. dysenteriae *and a few other Shigella species. The objective of this study was to evaluate the effectiveness of the phage infection at 37°C against* S. dysenteriae *in beef broth as a model food system (representing meats) at 3 different multiplicity of infections (MOIs). The results from this study showed that regardless of the initial MOI (1, 10, or 100), the phage infection killed off the host cells within 3 hr, resulting in 5-log (99.999%) reduction in cell concentration, compared to the control. These results clearly showed that the phage infection is highly effective to control* S. dysenteriae *in the model food system, suggesting that the phage has high potential to be used as a biocontrol agent against* Shigella dysenteriae *in foods.*

Drosophila Growth Disruption by Ecdysone Receptor Transcriptional Repression
Poster #14 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Michelle Galanti & Kameryn Kimbrough
Research Mentor(s): Joanna Wardwell-Ozgo

Ecdysone is a Drosophila *hormone responsible for growth and development of various aspects of the fly anatomy, including their 19 imaginal discs that grow to become important structures like antenna, legs, and wings. When Ecdysone binds the Ecdysone Receptor (EcR), this complex inhibits or activates transcription of genes based on what coregulator proteins are bound. EcR is a nuclear hormone receptor with an N-terminal activation domain, a DNA binding domain, and a ligand binding domain (LBD) at the C-terminal. The LBD binds ecdysone and proteins that direct EcR activity. To study the role of EcR during development, our lab developed a genetic tool, UAS-EcR^{LBD} (Sponge), to disrupt the interaction of EcR and coregulators that bind the LBD. A point mutation in our genetic tool, UAS-EcR$^{LBD\text{-}A483T}$ (Dumbr), prevents Sponge from*

interacting with a key corepressor called Smrter. Here we used these tools to measure EcR regulation of the growth of an organ, the adult wing. We forced the expression of our tools with Nubbin-Gal4, a wing-specific Gal4 driver, and measured the size of the adult wing to determine the effects of disrupting EcR coregulator interactions on wing growth. One-way ANOVAs showed that wing areas and vein distances of Sponge and Dumbr were significantly smaller than the controls, with Sponge showing a more severe phenotype than Dumbr. These results indicate that EcR repression is important for wing growth. Future work will focus on identifying the developmental window when EcR signaling is important for wing growth.

The Effects of Inappropriate Inheritance of Histone Methylation on Muscle Structure and Function

Poster #5 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Mattie Villhauer
Research Mentor(s): Brandon Carpenter

At fertilization, maternally deposited histone modifying enzymes establish germline versus somatic transcriptional states by adding and removing histone methylation. To do this in C. elegans, the H3K4 demethylase, SPR-5, removes active H3K4 methylation, while the H3K9 methyltransferase, MET-2, adds repressive H3K9 methylation to prevent germline gene expression in the soma. Recent studies show that SPR-5; MET-2 maternal reprogramming is antagonized by the H3K36 methyltransferase, MES-4, which maintains H3K36 methylation at germline genes to ensure proper germline gene expression in germ cells. Maternal loss of SPR-5 and MET-2 allows MES-4 to maintain H3K36 methylation at germline genes in the soma leading to ectopic expression of germline genes and developmental phenotypes including muscle defects. Here, we show that muscle morphology and function are compromised in spr-5, met-2 mutants, but can be rescued by knocking down MES-4. We also show that late generation spr-5 and met-2 single mutants display increased muscle disorganization that does not correlate with decreased motility. Together, our data provide insights into how mis inherited histone methylation affects muscle function.

The Effect of Mutagenesis on the MCE4 Permease, in Cholesterol-Based Mycobacterial Growth

Poster #5 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Matthew Frias
Research Mentor(s): Damian Ekiert & Gira Bhabha

MCE4, a protein complex found in Mycobacterium tuberculosis*, is hypothesized to transport cholesterol into the pathogenic bacterium. This project's goal is to understand how a part of the*

MCE4 complex, the permease proteins YrbE4A and YrbE4B, binds substrate and transports cholesterol across the cell envelope. The genome of M. tuberculosis *encodes 4 distinct MCE transporters dedicated to the uptake of nutrients from outside the M. tuberculosis cell for energy acquisition and cell envelope biogenesis. For this experiment, based on our current model of MCE4, we introduced 11 strategic point mutations into the YrbE4AB permease to assess whether these mutants can rescue the yrbE4AB knockout strain. We then monitored how these mutations affect cholesterol uptake in* Mycobacterium smegmatis *by monitoring the cell growth over the course of 4-5 days. Relative to the yrbE4AB strain complemented with a plasmid expressing WT YrbE4AB, two point mutants showed a significant decrease in cell growth (I73N and L106N). One mutation (L114N), showed no cell growth, indicating almost no cholesterol uptake. These reductions/inhibitions, suggest that these residues may play a key role in cholesterol binding and/or transport.*

An in-vitro model to assess effectiveness of carbazoles for treating human African Trypanosomiasis in a mouse model of disease

Poster #7 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Auriana Hogg
Graduate Student(s): Benjamin Hoffman
Research Mentor(s): Kojo Mensa-Wilmot

Human African Trypanosomiasis (HAT) is a neglected tropical disease caused by the microbial eukaryote Trypanosoma brucei. If left untreated, HAT is fatal. Current medications for T.brucei infection are difficult to administer or can cause undesirable side effects. It is important to develop new drugs to treat HAT because over time T.brucei can become resistant to chemotherapy. Our laboratory is optimizing new leads for anti-trypanosomiasis chemotherapy. We showed earlier that the carbazole CBL0137 cures HAT in a mouse model of disease, and in modes of action studies, inhibits mitosis and endocytosis of transferrin in T. brucei. Here we evaluated structurally similar compounds, CBL0174 and CBL0187, against T. brucei. Mitochondrial DNA is found in a single nucleoid termed the kinetoplast in T. brucei. At different stages of the cell cycle, T. brucei have different numbers of nuclei and kinetoplasts. Mitosis is indicated by the presence of two nuclei and two kinetoplasts per trypanosome. We established previously that in vitro proliferation inhibition studies do not accurately predict how compounds would affect T. brucei in a mouse infection. So, we are developing a pharmacodynamic/pharmacokinetic model to predict the effectiveness of drugs in mice. A pharmacokinetics study was performed in mice to obtain AUC and Cmax values. When cells were treated with that AUC0-6h concentration of CBL0137, CBL0174, and CBL0187 mitosis in trypanosomes was inhibited by all three carbazoles. However, only CBL0137 blocked endocytosis of transferrin. We intend to continue using this methodology to discover new lead drugs for HAT.

A Major Regulator of Germline Transcription, LSL-1, Contributes to Developmental Defects When Histone Methylation is Inappropriately Inherited
Poster #4 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45am
Undergraduate Student(s): Benjamin Nguyen
Research Mentor(s): Brandon Carpenter

Histone methylation is a post-transcriptional modification to the N-terminal tails of histone core proteins that regulates DNA accessibility, and consequently, gene expression. Like DNA, histone methylation can be inherited between generations, and is highly regulated during embryonic development. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in the nematode, C. elegans, H3K4me (a modification associated with active transcription) is removed by the H3K4 demethylase, SPR-5, and H3K9me (a modification associated with transcriptional repression) is subsequently added by the histone methyltransferase, MET-2. Maternal loss of SPR-5 and MET-2 results in ectopic expression of germline genes in somatic tissues and a range of developmental phenotypes, including a severe developmental delay. Using a combination of RNA-seq and ChIP-seq experiments, a recent study identified a major regulator of germline transcription, LSL-1, that binds and turns on germline genes in the germline during development. From our own transcriptional analysis performed on C. elegans lacking SPR-5 and MET-2, we find that lsl-1 is significantly upregulated in somatic tissues. Together these data suggest that LSL-1 may be turning on germline genes aberrantly in somatic tissue and contributing to developmental delay. To test this hypothesis, we knocked down lsl-1 using RNA interference (RNAi) and found that the developmental delay in spr-5; met-2 mutants is significantly rescued. Using RNA-seq, we further demonstrate that knocking down LSL-1 in spr-5; met-2 mutant rescues ectopic expression of MES-4 germline genes. Together, our findings provide mechanistic insight into how inappropriate inheritance of epigenetic states perturb germline versus somatic cell fates specification during development and how this perturbation contributes to developmental phenotypes.

Microbial Source Tracking Protocols for Differentiation of Fecal Bacteria from Cow, Deer, and Horse
Poster #11 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Nika Shams
Research Mentor(s): Michael Beach

Microbial source tracking (MST) attempts to identify specific animal sources of fecal contamination in the environment. While traditional fecal coliform enumeration can give a general measure of contamination, the specificity imparted by modern MST provides a more informative assessment of contaminants and their likelihood to affect human health outcomes. We have been developing an MST system that detects DNA biomarkers from the gram-negative bacterial genus Bacteroides and the family Lachnospiraceae. They are strict anaerobes found in large quantities in the intestines of animals. Unlike E. coli or Enterococci, host-specific strains of Bacteroides and Lachnospiraceae exist. To this end, we have been developing species-specific assays that identify the presence of gene sequences uniquely found in these bacteria that are associated with their corresponding host species. We have previously implemented developed five MST tests: human, dog, bird, horse, and general animal. We can also test for SARS-CoV-2 in wastewater using similar methods. Here, we have attempted to develop bovine-specific and ruminant-specific tests. Our experiments confirmed the ability of each new test to detect their target genes, and at a level of detection and quantification similar to that of previously published results. This new combination of tests will also be useful for indirectly assessing the presence of deer DNA biomarkers. Deer are non-bovine ruminants. We can now quantitatively assess the level of species-specific contamination in the environment using seven MST tests: human, dog, bird, horse, total animal, cattle, and non-cattle ruminants (deer).

Molecular Visualization Laboratory (BIOL4450): Biosynthetic Pathway of Flavonoid 3'-O-methyltransferase

Poster #20 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Sarra Leila Ben Hassen, Megha Dalwadi, & Jaela Curtis
Research Mentor(s): Soon Goo Lee

Flavonoids are diverse plant metabolites essential for plant defense, pigmentation, and UV protection. These compounds, including flavanol's, flavones, and isoflavonoids, offer various health benefits in human health due to their antimicrobial, anti-inflammatory, and antioxidant properties. O-methylation is an essential modification in flavonoid biosynthesis, mediated by methyltransferases such as flavonoid 3'-O-methyltransferase (FOMT). This post-synthetic modification enhances the compounds' lipophilicity and bioactivity. S-adenosylmethionine (SAM or AdoMet) is the methyl donor in these reactions, contributing to the structural diversity of flavonoids and their specialized metabolic roles. These biosynthetic processes are crucial for plant adaptability, defense mechanisms, and potential healthcare applications, particularly in developing plant-based therapeutics. The flavonoid biosynthetic pathway involves the enzymatic activity of methyltransferases, which modify flavonoids, enhancing their role in plant-specialized metabolism. These phytochemicals, such as erythritol and caffeic acid, are critical for the plant's response to environmental stressors. Understanding these processes provides insights into molecular evolution and the structural basis of flavonoid modification. To further investigate the

structural mechanisms, we employed methods such as gene expression in Escherichia coli, protein purification, and 2D gel electrophoresis to further investigate the structural mechanism of FOMT. Utilizing augmented reality (AR) and virtual reality (VR) technologies to visualize enzyme-substrate interactions enhances the understanding of catalytic processes. X-ray crystallography further supports this by revealing the 3D structure of these enzymes. This innovative approach, combining STEAM (Science, Technology, Engineering, Arts, and Mathematics), fosters creativity in exploring biological processes. By integrating molecular biology techniques, bioinformatics, and visualization technologies, it highlights the potential of flavonoid biosynthesis for advancements in agricultural biotechnology and holistic health science, enhancing both biomolecular discovery and educational experiences.

Molecular Visualization Laboratory (BIOL4450): Molecular Visualization of Phosphoethanolamine Methyltransferase from Plasmodium falciparum
Poster #19 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Natsue Aylin Jo Huakay, Essix Apollo Moser, & Cara Reed Erickson
Research Mentor(s): Soon Goo Lee

Malaria is a major worldwide health threat as this disease, caused by different species of Plasmodium *parasites, results in over 1 million deaths and 300 million clinical cases each year. Due to the large negative impacts which Malaria has on humanity, it is important to research and identify novel biochemical pathways that avoid drug resistance. One such pathway that has potential to highlight specific drug targets is the phosphobase methylation pathway which synthesizes phosphocholine, a precursor of phosphatidylcholine. A key enzyme of this pathway, specific to* Plasmodium falciparum*, is the phosphoethanolamine methyltransferase (PfPMT) enzyme which is responsible for sequential methylation reactions. PfPMT holds a unique 3D structure when compared to its other forms found in plants and protists making it a novel target for drug development. Specifically, the conformation of PfPMT in complexed with phosphoethanolamine (pEA) and S-adenosylhomocysteine (SAH) provides insights into the structure and function of its active site. In the Molecular Visualization Laboratory (BIOL4450) class at KSU, to gain a better understanding of the PfPMT 3D structure, biochemical methods such as site-directed mutagenesis and protein purification were used to perform X-ray crystallography. Additionally, X-ray crystallography experiments were conducted as a vital source to collect information on the 3D structures of PMT and interactions with ligands. Finally, the 3D structure of PfPMT was visualized and analyzed using a series of tools, including virtual reality (VR), augmented reality (AR), and 3D printing, to contribute to the field of STEAM (science, technology, engineering, art, and math) and improve academic understanding of protein biochemistry. Through use of biochemical techniques and direct analysis of 3D visualization methods of PMT will contribute to a greater understanding of its*

active site function and structure. With new insights on PMT 3D structure and function, novel drug approaches may be developed in the future.

Molecular Visualization Laboratory (BIOL4450): The Study of Auxin Production and its Biosynthetic Pathways
Poster #21 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Taylor Clay, Ayyan Paracha, & Samantha Benson
Research Mentor(s): Soon Goo Lee

Auxin is an important hormone in plants, regulating numerous processes related to plant growth and development. Interestingly, it is also produced by some microorganisms, including Pseudomonas syringae strain DC3000, a common pathogen that infects plants such as Arabidopsis thaliana. P. syringae strain DC3000 shows evidence of inhibiting salicylic acid-mediated defenses of A. thaliana as well as increasing its virulence by synthesizing phytohormone auxin indole-3-acetic acid (IAA) via an indole-3-acetaldehyde (IAAld)-dependent biosynthetic pathway. These microorganisms utilize tryptophan as a precursor for five biosynthetic pathways that produce IAA. Many of these pathways involve different enzymes to catalyze the reaction, such as aldehyde dehydrogenase A (AldA), B (AldB), and C (AldC). We aim to learn about these enzymes and their purpose in the IAA biosynthetic pathway by utilizing advanced technologies to gain a better understanding of their biochemical and structural properties. We seek to display models, like auxin, in a more inclusive way to spread more information on these proteins, their significance, their structures, and much more. In the "Molecular Visualization Laboratory (BIOL4450)" class at KSU, we have explored the uses of 3D molecular models to visualize protein structures using recent technology. The technologies that will be utilized are virtual reality (VR), augmented reality (AR), 3D printing, and X-ray crystallography. These 3D models and biochemical techniques have helped us, as students, to better understand the structures of molecules. Most importantly, these technologies have enhanced our academic grasp of biochemistry topics, enabling us to effectively communicate this knowledge to others. Such topics include the relationships between macromolecules and small molecules. By understanding the IAA biosynthetic pathways and the 3D structures of aldehyde dehydrogenases, we can uncover the molecular basis for potentially reducing the virulence and replication of pathogens.

Molecular Visualization Laboratory (BIOL4450): Unveiling the Sweet Secret - UGT Proteins, the Unsung Heroes Behind Sweetening Your Coffee
Poster #18 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Nicholas Severino, Sydney Morris, & Jasmin Thies
Research Mentor(s): Soon Goo Lee

As the increasing sugar consumption threatens human health through cardiovascular diseases and diabetes, finding an natural alternative to artificially added sugars is of significant interest. Stevia is a staple in grocery stores because it is 50-400 times sweeter than sucrose and contains virtually no calories. Stevia rebaudiana is a plant native to Paraguay and Brazil that has become a prime interest for research due to its natural sweetening properties. These factors have made it a crucial aide in the fight against obesity and type II diabetes. Plants that are considered natural sweeteners undergo a biosynthetic pathway in order to become sweet. The biosynthesis of steviol glycosides, the natural sweeteners present in Stevia rebaudiana, involves key uridine diphosphate (UDP)-dependent glycosyltransferases (UGTs), with UGT76G1 being crucial in producing rebaudioside A (Reb A). Reb A, a glucoside comprising about 5% of stevia leaf extracts, lacks the bitter aftertaste and is synthesized from the alcohol steviol by four glycosylation steps, catalyzed by UGTs. In stevia, four key UGTs (i.e., UGT85C2, UGT74G1, UGT91D2, and UGT76G1) catalyze the glycosylation of Stevia's metabolites, improving their solubility and bioactivity. In the Molecular Visualization Laboratory (BIOL4450), through the use of 3D modeling, 3D printing, virtual reality (VR), and augmented reality (AR), the structure of UGT76G1 can be better understood, particularly in how this key enzyme interacts with its ligands, UDP and Reb A. Understanding the 3D structure and function of SrUGTs has broader implications for plant-based pharmaceuticals, potentially enabling the engineering of steviol biosynthesis pathways to produce tailored stevia sweetener variants and the identification of other branched chain-forming glycosyltransferases. This knowledge could lead to new Stevia products with enhanced bioavailability and activity, improving the production of high-intensity sweeteners for commercial use.

Multifunctional Electron-Rich Polycyclic 1,2-BN-Heteroarenes: Synthesis, Optical Properties, and Applications

Poster #7 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Ra'Nya Malone & Alexandrus Tapu
Research Mentor(s): Carl J. Saint-Louis

Dyes that absorb long wavelength light and emit in the red and near-infrared (NIR) region of the electromagnetic spectrum are gaining popularity in materials technology for use in optical recording and laser filters, as well as cell imaging markets such as photodynamic and photothermal therapy, all of which use reactive oxygen species or heat to kill tumor cells. The dye's molecular structure is critical for long-wavelength absorption and NIR emission. The scaffold should be planar and rigid, with a highly conjugated π-surface, to allow dyes to absorb and emit at longer wavelengths and improving optical properties. In this study, we introduce strong electron-donating groups (EDGs) into the left hemisphere of a planar boron-nitrogen (BN) doped polycyclic aromatic compound, polycyclic 1,2-BN-heteroarene scaffold, to create an

intramolecular charge transfer process and investigate the effect of strong EDGs on the photophysical properties. We hypothesize that adding strong EDGs, such as aryl amino derivatives, to the left hemisphere of the scaffold of polycyclic 1,2-BN-heteroarene will increase the energy of the highest occupied molecular orbital (HOMO), reducing the HOMO-LUMO gap and resulting in absorption in the visible region of the electromagnetic spectrum and emission in the red and NIR regions. This investigation will advance meritorious research in the field of polycyclic BN-heteroarenes, as well as our understanding of the photophysical properties of electron-rich substituted polycyclic aromatic compounds containing a B-N bond and the impact of EDGs on multifunctional materials. These findings will help to develop future electron-rich polycyclic BN-heteroarene dyes for bioimaging, in which red and NIR light can safely penetrate human tissue without causing apoptosis or cell damage, as well as detection in living organisms with minimal interference from background autofluorescence.

Pre-Twisted Molecular Geometry's Effect on the Optical Properties of Nitrophenyl Substituted Polycyclic 1,2-BN-Heteroarenes

Poster #8 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Lilianna Kocai
Research Mentor(s): Carl J. Saint-Louis

Incorporating a three-coordinate boron center into the structure of polycyclic aromatic hydrocarbons by replacing one of the C=C bonds with a B-N bond creates a more planar scaffold. These flat-structured heterocycles partially substituted with a boron-nitrogen bond known as aromatic azaborines, are highly regarded for their unique optoelectronic properties such as photochemical stability, high molar absorption coefficient, and high fluorescent quantum yields, as well as large Stokes shifts and tunable absorption/emission spectra, making them excellent candidates for a variety of applications such organic light-emitting diodes (OLEDs). Adding a -NO_2 group as a strong electron-accepting group to the scaffold of aromatic azaborines, particularly pyrrolinone-fused-1,2-azaborines (PFAs), in an effort to redshift their absorbance and emission and create electron-deficient n-type organic conjugates, results in significant emission quenching due to intersystem crossing. Another issue with -NO_2-substituted PFAs is that they aggregate at high concentrations due to strong intermolecular π-π stacking interactions. In turn, aggregate formation causes emission quenching, also known as Aggregation-Caused Quenching (ACQ). This practical limitation poses significant challenges for -NO_2-substituted PFAs' use in many applications. We hypothesized that increasing the steric interactions through the PFA scaffold and creating a larger twist in the molecular geometry by including bulkier moieties such as methyl group will result in -NO_2-phenyl substituted PFAs with aggregation-induced emission (AIE), solvatochromism and thermochromism properties. These findings will aid in the development of more improved future AIE-active PFAs, as well as

the understanding of how molecular geometry influences these compounds' optoelectronic properties.

Search for Novel Arsenic-Containing Antibiotics
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 1:00 – 1:50 pm
Undergraduate Student(s): Shifa Jiwani
Research Mentor(s): Masafumi Yoshinaga

Arsenic (As), the "king of poisons", surprisingly shows promise in medicine. With the increasing threat of antibiotic-resistant bacteria, there is an urgent need for new antibiotics. Notably, some bacteria utilize environmental As to produce unique antibiotics, as represented by arsinothricin (AST). AST effectively controls various pathogens while spare human cells, demonstrating the potential of As-containing antibiotics. Our objective is to build upon and delve into this unique connection and discover further As-containing antibiotics. To this end, we mined bacterial genome databases using the AST biosynthetic gene cluster (BGC), which led to discovery of novel BGCs in two Actynomyces *strains* Microbispora rosea *and* Amycolatopsis tolypomycin*a. Gene analyses suggest that these BGCs encode As-containing ribosomally synthesized and post-translationally modified peptides (RiPPs), which we named AsRiPP, where one gene encodes a precursor peptide with the remaining genes involved in post-translational modifications. From the* M. rosea *AsRiPP BGC, we selected four genes, which we hypothesize are the minimum required gene set to produce an As-containing precursor of the encoded AsRiPP. These genes were heterologously expressed in* Escherichia coli *in the presence of As and the AsRiPP production was analyzed, yet it has not been successful. In contrast, when* A. tolypomycina *was cultured with As, an organic arsenic species was produced. The organic As species, which was crudely purified from a large culture by anion exchange column chromatography, exhibited antibiotic activity, supporting our hypothesis that the strain produces an As-containing antibiotic, presumably the AsRiPP. Our results suggest further existence of As-containing antibiotics in nature, demonstrating the potential to broaden the spectrum of resources for antibiotic development. We will continue both approaches to verify the association of the AsRiPP BGCs and the discovered As organic species.*

Studying the Function of cnd-1 in the Development of RME Motor Neurons and Normal Movement of Worms
Poster #13 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Emily Jemison & Andres Muradas Esquivel
Research Mentor(s): Martin Hudson & Karunambigai Kalichamy

CND-1 is a basic helix loop helix transcription factor found in the nematode C. elegans. cnd-1 *gene is homolog of the human neuroD1 gene. In early embryogenesis,* cnd-1 *is required for regulating gene expression in nervous system development, specifically in motor neuron fate specification.* cnd-1 *mutant shows several abnormal behaviors compared to wildtype worms, and one of the abnormal behaviors is frequent head lift. Our meticulous observation on head movement revealed that frequency of head lift is high in* cnd-1*(gk718) mutant both qualitatively and quantitatively compared to wildtype. RME neuron is set of four motor neurons necessary for normal head movement of the worms. RME neurons are located at the head region which innervate head muscles with neuromuscular junctions (NMJs) in the nerve ring. Imaging analysis of RME neurons tagged to Green fluorescent protein marker showed that some of the RME cells are missing.*

The Role of Homeobox Transcription Factor ceh-27/Nkx2.1 in Nervous System Development
Poster #4 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Lindsey Knight
Research Mentor(s): Martin L. Hudson

Transcription factors are proteins that activate or repress gene expression. Nkx2.1 and neurogenin are both transcription factors required for normal neural development and function. Mutations in these genes have been associated with autism and attention deficit/hyperactivity disorder, prompting a need for further research to understand the transcriptional regulation of these genes and their functions in nervous system development. Both genes are strongly conserved across phyla, which allows us to examine Nkx2.1 and neurogenin function using genetics approaches in a simple invertebrate system such as the nematode Caenorhabditis elegans. The C. elegans orthologs of Nkx2.1 and neurogenin are ceh-27 and ngn-1, respectively. The purpose of this project is to use C. elegans to investigate if ceh-27/Nkx2.1 controls ngn-1/neurogenin gene expression to specify AIY interneuron cell fate. 4D time-lapse microscopy revealed that embryonic expression of ngn-1 is downregulated in four midbody cells in embryos containing a homozygous ceh-27 deletion allele. These four cells, the AIYL/R and SMDDL/R neurons, express ngn-1 in wildtype organisms and fail to express ngn-1 in homozygous mutants, indicating that ceh-27 is required for ngn-1 expression in these cells. Future work will investigate the transcriptional regulation of ceh-27 during embryonic development and identify other downstream targets under ceh-27 transcriptional control.

Understanding EcR Transcriptional Control of Glial Cell Development
Poster #17 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Juan Sebastian Gamboa

Research Mentor(s): Joanna Wardwell-Ozgo

Ecdysone signaling plays a crucial role in fly development. During the early stages of Drosophila development, the steroid hormone ecdysone ensures tissues develop correctly and synchronously allowing the organism to transition from an embryo to a healthy adult. During development, ecdysone binds to its receptor, Ecdysone Receptor (EcR), a transcription factor that can activate or repress its transcriptional targets. Previous data suggest that EcR regulates the development of glial cells, which are structural brain cells, however, it is still unknown if this is through EcR transcriptional activation or repression. The goal of this project was to understand the role of EcR transcriptional control on glial development during the third instar larvae stage where the brain grows rapidly. To ask this question, we developed tools that allow us to disrupt ecdysone signaling by disrupting the binding partners of EcR. Specifically, we designed tools that force the expression of the ligand binding domain (LBD) of EcR which binds proteins and ecdysone (UAS-EcR-LBD). These interactions instruct EcR to repress or activate its targets. A point mutation A483T in the EcR-LBD, UAS-EcR-LBD-A483T, prevents UAS-EcR-LBD from bind to a critical repressor Smrter. We expressed our tools in glial cells using the repo-GAL4 driver, third instar larval brains were dissected, and brain tissue volume was analyzed. The analysis of brain volume and survival shows that EcR transcriptional repression is important for glial cell development. Together this work demonstrates that EcR transcriptional repression is important for glial cell development. cial Ecdysone Receptor transcriptional regulation is for glial cell development.

Physics

Time-Dependent Nucleation Rate in Undoped Silicate Glass
Poster #6 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Emily Manqueros
Research Mentor(s): Kisa S. Ranasinghe

Undoped Lithium disilicate was employed to investigate the time-dependent nucleation rate. The total number of nuclei was determined using the differential thermal analysis (DTA) method. During heat treatment for shorter durations, ranging from 1 to 10 hours, the number of nuclei rapidly increased, reaching what was previously perceived as a steady state nucleation rate. However, upon extending the heat treatment to longer durations, data suggests steady-state nucleation is achieved at a much longer time than previously believed.

College of the Arts

Art & Design

Discovering Sequential Art
Visual Art #16 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Aria Leinberger
Research Mentor(s): N/A

This project focuses on an in-depth study of Stephan Franc's graphic novel, with a particular emphasis on the creation process. My work began with writing pages and creating thumbnails to establish the visual layout and pacing of the narrative. Following this, I initiated the penciling phase, where detailed drawings were developed. After completing a round of revisions on the pencils to refine the artwork, I proceeded to finalize the penciling stage, ensuring the visuals aligned with the storytelling. This process deepened my understanding of graphic novel creation and allowed for significant artistic growth in visual storytelling techniques.

Thor: An Evolution
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 10:00 – 10:50 am
Undergraduate Student(s): Regan Cerlanek
Research Mentor(s): Rachael Vause

Mythology today serves as a vehicle for storytelling, just as it did for ancient societies. These sacred tales continue to provide role models, express the core values of their respective cultures, answer timeless questions and serve as a moral guide for each generation. Myths are rewritten and retold time and time again, evolving to encapsulate modern beliefs, but often still staying true to their core. Many myths have made their way into popular culture and the heroes in these tales of old become icons, fan-favorites, and household names; namely, Thor the God of Thunder. This study explores and compares the original descriptions of the Old Norse god Thor versus how and why these descriptions have changed throughout history; as portrayed in art and media. Information will be collected by synthesizing data from multiple sources in the form of a literature review. Findings suggest that Thor's physical appearance and some of his main personality traits have been altered as the narrative changes. Some of the most popular and recent retellings that have contributed to modern views of Thor now include comic books, movies and video games.

Music

Analysis of Visayan/Bisayan/Cebuano Philippine Traditional Vocal Repertoire
Poster #15 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Mikkel Cullen
Research Mentor(s): Peter Fielding

This poster will share in-progress analytic work assessing the scales, modes, and pitch collections of Visayan/Bisayan/Cebuano folk song repertoire of the Philippines. As a pilot study, this work will focus on a portion of the repertoire collected by Priscilla Magdamo; materials collected under the auspices of Silliman and Indiana University. Through use of Kodály-style pitch maps and post-tonal mappings, a preliminary baseline of the repertoire is presented. In addition to establishing normative scalar patterns for this repertoire, preliminary pedagogical merits of the repertoire will be identified for potential use in Aural Skills I&II curriculum. Research outputs are of value to broad ethnomusicological and traditional music academic communities of the Philippines, as well as the broader Filipino diaspora stakeholders, including those residing in Georgia, the United States, and abroad.

L'Amore Infranto: The Sustainability of Opera in America Past 2024
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 10:00 – 10:50 am
Undergraduate Student(s): Simon Kawasaki
Research Mentor(s): Edward Eanes

In our lifetime, we may witness the death of an art form in America. Opera is difficult to sustain if sufficient rewards are not earned after thousands of dollars are spent on one production. Many regional opera houses in America have found it difficult to fill seats after COVID-19, and they struggle to set up a system of alternative entertainment (and alternative funds), as San Francisco and the Met have done. Even then, are those funds sustainable? My research project will address the lives of the thousands of people who have dedicated their lives to the opera industry but face an uncertain and seemingly bleak future. By analyzing attendance statistics for opera houses, conducting interviews with artists, and exploring historical context, I aim to uncover whether or not this expensive form of art can survive in the changing cultural landscape of America. The research and presentation will cover several areas of focus, including how social media, COVID-19, and the lack of government funding have affected the industry. My project references multiple pieces of scholarly writing, credible articles, and comprehensive data, some of which I have acquired through the Atlanta History Center. The project's goal is to produce a valuable resource for struggling opera houses looking for industry insights that will improve

their way forward. Ideally, the project will aid in reinforcing the longevity of opera in the United States. Opera students, patrons, and nearly all community members in the American operatic industry will be able to benefit from the information and insights presented in the project, and the transmission of this project in presentation form may bring a wider attention to career-jeopardizing issues within the operatic realm.

Sinner, Please Don't Let Dis Harves' Pass: Exploring Performance Practices in Solo Repertoire to Lessen Trepidation in the Study of Negro Spirituals
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 3:00 pm
Undergraduate Student(s): Dairee Moreno
Research Mentor(s): Ryan Fellman & Todd Wedge

Negro Spirituals were first performed on stage and made famous by the Fisk Jubilee Singers. However, Negro spirituals were historically sung by singers of many different ethnicities. The academic study of the American Negro Spiritual as it relates to diction and text-music relationships must be approached with the same respect and care as someone studying Beethoven, Barber, and Brahms. Respected scholars compare our process of learning grammar and pronunciation in foreign languages and urge us to mirror the process to spirituals in order to understand the dialect. The hesitation to study spirituals then, perhaps stems from cultural appropriation and fear of exaggerating or mocking the dialect when singing the spiritual. According to multiple scholars like Lourin Plant, we currently see fewer spirituals sung by non-black singers than in previous years. The conversation of "Who should sing spirituals?" is becoming more common. My goal is to curate resources to aid in the understanding of the etymology of American Negro Spirituals and provide historical context to illustrate the idea that people of all backgrounds have performed these songs on the stage. This brings us to now, where we can continue performing these songs on the stage. Negro spirituals are songs whose history and style should be studied by anyone. Through the power of education, we can overcome our fear of appropriation and preserve this important art form as an integral part of the American Classical Art Song canon.

Theatre and Performance Studies

Elizabethan Protestants, Catholic Persecution, and the Popularity of Hamlet
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 10:00 – 10:50 am
Undergraduate Student(s): Grace Young
Research Mentor(s): Thomas Fish

Queen Elizabeth reigned in the late sixteenth century during a period when Catholicism was outlawed, and Protestantism was enforced. Today's modern perception and academic teachings of Elizabeth's reign promote the stereotype that the common Elizabethan Protestant society shunned people who ascribed to the Catholic religion. Scholars like Hervé Picton write that England had successfully stomped out religious minorities and become a Protestant nation by the end of the century; 250 Catholics were executed during Elizabeth's reign. Despite these perceptions, teachings, and executions, the Elizabethan society did not necessarily ascribe to the laws of the monarchy or agree with the monarchy's actions. This paper explores historical accounts of Elizabethan London society, specifically applying these studies to William Shakespeare's Hamlet*. It ultimately suggests that despite the monarchy's influence, the Protestant society did not necessarily shun people who ascribed to the Catholic religion. Shakespeare wrote plays for wide audiences, and admission to a Shakespeare play only cost patrons a penny.* Hamlet *was considered his most popular play despite several Catholic remnants, such as Hamlet's father appearing as a ghost. Scholars like Isabelle Gatt and Peter Zhang discuss the kind of community that theatre creates where audiences believe the actors, formulating a theatrical agreement, a point of connection grounded in a mutual understanding of societal truths. Even though Catholicism was outlawed, even though Protestants were told by their monarchy to despise Catholics, and even though Protestants denounced ghosts and other Catholic beliefs, they had no issue accepting the Catholic representation within the theatrical performances of their beloved* Hamlet*. For the common Elizabethan Protestant society to love* Hamlet *as much as they did, they had to go against the monarchy's influence and be at least civil with Catholics in their society.*

Jouvay Women: Rejuvenating Classical Theatre in the Caribbean
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 3:15 pm
Undergraduate Student(s): Ebony Golden
Research Mentor(s): Thomas Fish

Classical Western productions, from Greek theatre to Shakespeare, play a role in the political suppression of non-white audiences, in part, through the typical casting of white actors for white audiences (Wetmore 2012) However, recent scholarship explores "Black Classicism," contemporary research on race and 'blackness' in classical antiquity (Greenwood 2009). My project is an exploration of "Black Classicism" and Caribbean theatre artist Tony Hall's performance practice, Jouvay Popular Theatre Process (JPTP)-a theatre workshop that utilizes traditional characters from Trinidad Carnival. Jouvay, from the French j'ouvert, is defined as "daybreak"; the ritual of the sunrise or morning of carnival, also meaning the festive spirit of its celebrations. JPTP incorporates traditional Trinidad Carnival characters, music, and folk practices in dramatic performance. The project focuses on Dr. Shirlene Holmes and Rhoma

Spencer's Caribbean adaptation of Euripides' Medea (Carnival Medea), to investigate how the play utilizes JPTP as a mode of Black Classicism that incorporates emancipation strategies through performance. Holmes and Spencer's Trinidad inspired Medea adaptation foregrounds an antiracist reinterpretation of the Euripides' classic. In doing so, it responds to Pulitzer Prize-winning playwright August Wilson 1996 speech, "The Ground on Which I Stand," which argues for African American theatre to shift in diverse casting and production employment opportunities for improved representation of audiences (Wilson 1996). More recently, it also responds to #WESEEYOU, the BIPOC activist group, and their demand to install a more equitable, anti-racist theatre system. Carnival Medea, with its use of JPTP techniques, expands the canon of the "classic" often "reserved for [privileged]white cultures and institutions" to invest and celebrate underrepresented communities of color.

Southern Polytechnic College of Engineering & Engineering Technology

Electrical and Computer Engineering

Battery State of Charge Estimation using Neural Network Aided Kalman Filter
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 11:00 – 11:50 am
Graduate Student(s): Islam Ahmed Ali Sayed
Research Mentor(s): Yousef Mahmoud

Precise estimation of Battery state of charge (SOC) poses a major challenge in managing and operating electric vehicles (EVs). This is mainly due to its complex behaviour that has a nonlinear dependency on parameters like temperature and SOC. Despite numerous SOC estimation approaches, their accuracy can be enhanced which is crucial for ensuring an optimized energy consumption. This research aims to increase the SOC estimation accuracy by investigating a neural network aided Kalman filter (KalmanNet), for the first time, to estimate battery SOC in EVs. The results demonstrate lower estimation error compared to well-known conventional filters used for SOC estimation. Specifically, the proposed approach is compared to the extended Kalman filter (EKF) and sigma-point Kalman filter (SPKF).

Development of RF system and Dual Feed Patch Array Antenna for Beam Steering and Polarization Control for Monitoring Bacterial Contamination in Waters
Poster #19 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Junia Nguyen & Matthew Lanum
Research Mentor(s): Walter Thain, Hoseon Lee, & Ahyoung Lee

Bacterial contamination monitoring is challenging because it requires manual sampling of the water to accurately analyze the level of bacterial contamination at a certain point in time. However, algorithms exist that use water temperature, pH, turbidity, and dissolved oxygen information, instead of manual sampling, to ascertain the bacterial contamination level with high accuracy. Most water quality monitoring sites use the cellular network to wirelessly send water quality data to a central system. However, due to limitations of cellular coverage, not all bodies of water cannot be monitored. Cellular networks also require a SIM card and subscription, and the energy consumption is very high. We investigate an RF system and array antenna for LoRaWAN for energy efficiency and long-range data transmission in remote locations where there is limited cellular coverage as well as a low-energy, low-cost alternative to

cellular networks. In this work, we developed an RF system and patch array antenna for the gateway antenna that can steer the beam to the target water quality monitoring sites to improve the signal-to-noise ratio and received signal strength intensity to minimize packet drops and ensure data transmission. A 1x2 dual feed patch array antenna is designed at 2.4 GHz in CST software, board layout completed in KiCAD, fabricated, then tested in our Starlab antenna measurement chamber. The RF attenuator, RF power splitters, and phase shifters are measured and characterized using vector network analyzers (VNA) for the beam steering and polarization control. This modular system can be scaled to larger arrays with higher gain and narrower beamwidth for increased range of coverage and resolution to monitor many monitoring sites at low cost and high energy efficiency. Ultimately, the aim is to provide real-time bacterial contamination data to the public efficiently and effectively, to provide equitable water quality information to all local communities.

Development of Soft Robotic Hand Data Glove for Rehabilitation and Gesture Recognition

Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 11:00 – 11:50 am
Undergraduate Student(s): Britt Walker
Research Mentor(s): Coskun Tekes

Hand rehabilitation is a critical component in the recovery process for individuals who suffer from stroke, traumatic injuries, or neurological disorders that can impair hand function and dexterity. Traditional rehabilitation methods often involve repetitive exercises and protocols that can be tedious and discouraging for patients, potentially preventing their progress and engagement to the rehabilitation program. The integration of soft robotic technology with 3D printing offers a promising solution to enhance hand rehabilitation as well as gesture recognition for prosthetic control. A soft robotic based hand glove, which is a wearable device made from compliant and flexible materials, can provide dynamic assistance and support to the hand during rehabilitation exercises, while also enabling accurate tracking of hand and finger movements for gesture recognition applications. Utilizing 3D printing technology, soft robotic hand gloves can be customized to fit individual hand sizes and shapes, ensuring a comfortable and personalized fit. In addition, the flexibility of 3D printing allows for the incorporation of various sensors and actuators within the glove's structure, enabling precise monitoring of hand and finger motions as well as assistance during rehabilitation exercises. For this purpose, we manufactured a soft robotic hand glove using both flexible and rigid materials as well as a compliant structure for ease of motion and for sensor accuracy. The glove consists of 10 integrated flex sensors equipped to measure simultaneous angle position data from each finger. A microcontroller-based data acquisition system is developed to collect sensor data and compute finger positions. This data is used to control a Matlab Simscape based hand model animation. The developed 3D printed hand

glove can be used to collect ground truth together with EMG/Ultrasound sensor data in deep learning-based model development for hand/finger motion prediction.

Impact of Al2O3 Buffer Layers on the Properties of GaN/Si for LED Applications
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 1:15 pm
Graduate Student(s): Manika Tun Nafisa & S M Atiqur Rahman
Research Mentor(s): Benjamin Klein, Ian T. Ferguson, & Zhe Chuan Feng

The growth of GaN on Si substrates using Metal-Organic Chemical Vapor Deposition (MOCVD) and Atomic Layer Deposition (ALD)-grown Al2O3 buffer layers was analyzed for its impact on crystal quality and LED application. Two samples with 10nm and 20nm Al2O3 buffer layers were evaluated through Raman spectroscopy and fitting data of the E2(High) and A1(LO) modes. The sample with 20nm buffer layer demonstrated superior crystalline quality with higher Raman intensities, narrower Full Width at Half Maximum (FWHM), and more stable peak positions across temperature ranges, indicating lower strain and better thermal stability compared to the sample with 10nm buffer layer. The sample with 20nm buffer layer exhibited enhanced phonon lifetimes, lower plasmon damping, and higher carrier concentrations, which are crucial for LED efficiency. Spectroscopic Ellipsometry confirmed the sample with 20nm buffer layer has smoother surface and higher bandgap, providing further advantages for light extraction and energy efficiency. These findings suggest that the sample with 20nm Al2O3 buffer layer offers superior performance for GaN-based LEDs, particularly in terms of improved crystal quality, thermal stability, and reduced defect density. Consequently, the 20nm buffer layer offers a promising pathway for developing high-efficiency GaN-based optoelectronic devices on Si substrates.

Increasing Guard Band Size to Decrease Interference in V2X Communication
Poster #3 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Undergraduate Student(s): Nakira Ogleby & Mackenzie Prescott
Research Mentor(s): Billy Kihei

As technologies evolve and new devices are introduced, the demand for fast and reliable vehicle-to-everything (V2X) communication increases. As this demand increases, the interference level in the 5.9GHz Dedicated Short Range Communications (DSRC) band will inevitably increase. And thus, the task of somehow minimizing this interference becomes increasingly important as time passes. This report investigates the effects of increasing the guard band size of the lower 5.9 GHz DSRC band on the adjacent channel interference from Unlicensed National Information Infrastructure 4 band (U-NII-4) devices and to try and see if there is a significant decrease in the interference level. The changes in the interference levels are being measured through packet

reception rate (PRR) in vehicle-to-infrastructure (V2I) communication and infrastructure-to-vehicle communication (I2V). Experimental observations in lab using 25 low-cost U-NII-4 devices have shown a significant increase in PRR when shifting the central frequency of these devices for both V2I and I2V communications.

Monte Carlo Damage Simulation of DNA Damage based on Feasibility of High Density I-125 Production to Enable 10 Gy/min High Dose Rate for Improved Relative Biological Effectiveness

Poster #6 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): David Roque, Junia Nguyen, Cassidy Moreau, Adi Turlapati, Batool Batool, Robert Herdman, & Sally Jeong
High School Student(s): Rhea Jani
Research Mentor(s): Hoseon Lee

In our previous work, we used TOPAS Monte Carlo nuclear radiation simulations to show thefeasibility of a new type of controlled radiation capsule to enable a high dose rate of 10 Gy/min with low energy Iodine-125 sources. It has been shown that lower energy is more effective in DNA double strand breaks, and a higher dose rate of this low energy radiation has a greater relative biological effectiveness (RBE) due to the sustained double strand damage with fewer recombination. In this work, we delve further into the actual DNA damage including single strand and double strand breaks based on different combinations of radiation energy levels and dose rates. This analysis is conducted using Monte Carlo Damage Simulation (MCDS) software. The second part of this work is the feasibility of producing the required amount of I-125 and handling of it, in order to transfer the I-125 into our proposed capsule. This work shows the calculation of the nuclear reactor time required to convert Xe-124 to Xe-125 and then to I-125. The third part of this work is the optimization of the electromagnet inside the capsule to control the opening and closing of the radiation capsule to release or block the radiation from outside the body. For this optimization, COMSOL Multiphysics software was used to optimize the number of turns, magnetic core, dimensions and properties of the permanent magnet. The inductive coupling from outside the body to the electromagnet inside the body was then calculated based on the current needed, which was obtained from the COMSOL simulations. The results of this work show the feasibility of producing a very high density of I-125 for implantable brachytherapy for the first time. MCDS simulations show that this amount of I-125 indeed improves the RBE compared to conventional LDR and HDR brachytherapy methods.

Industrial and Systems Engineering

Design and Development of Bat-Inspired Unmanned Aerial System for Mapping and Navigation

Poster #1 (Marietta Event Center)
Thursday, November 21st, 1:00 - 1:45 pm
Undergraduate Student(s): Elijah Jones & Lauren Nunez
Research Mentor(s): Adeel Khalid

This project aims to develop a sonar-based Unmanned Aerial System (UAS) that mimics bat behavior using ultrasonic sound to form a map around the aircraft to navigate through spaces and avoid obstacles. Utilizing a quadcopter design, two stacked carbon fiber plates form the central frame with each of the four booms extending from its corners. Its foremost compartment resembles the head of a long-eared bat, and a speaker that sits inside the mouth to project ultra-sonic frequencies that are received by microphones that sit in the ears. By incorporating speakers and microphones, a more cost-effective method to navigating and mapping is employed as opposed to using more common and expensive equipment integrated into UAVs such as cameras and sensors. The aircraft uses custom 3D-printed parts fabricated using a Stratasys F170 Fused Deposition Modeling (FDM) 3D printer such as the Electronic-Speed-Controller (ESC) housings, the battery box, the sliding door, and the bat head. Each part is designed inside SOLIDWORKS to meet mission requirements by incorporating modularity, accommodating for electronics, minimizing weight, and accounting for clearances and aerodynamics. A Finite Element Analysis (FEA) was conducted to verify structural integrity.

Investigating the Impact of Programmers' Emotions on Code Quality
Poster #17 (Marietta Event Center)
Thursday, November 21st, 9:00 – 9:45 am
Graduate Student(s): Aquib Irteza Reshad
Research Mentor(s): Luisa Valentina Nino de Valladares, María Valero de Clemente, & Adriane Randolph

This study explores the relationship between programmers' emotional states and the quality of the code they produce. In an experimental setting, ten volunteers were tasked with coding while their brain activity was measured using non-invasive EEG technology, focusing on the left and right prefrontal cortex, regions often linked to emotional processing. The Frontal Asymmetry Index (FAI) was employed to assess emotional states, complemented by self-reported data from the SPANE questionnaires, which captured both positive and negative emotions. Code quality was assessed using a rubric designed to identify task failures. Preliminary results suggest that positive emotions may correlate with poorer code quality. However, the small sample size (n=10) resulted in inconclusive findings regarding the connection between self-reported emotions and code quality. Expanding this research with a larger sample is essential to better understand the potential link between emotional states and programmers' performance.

Machine Learning Approaches for Predicting Dental Caries in Permanent Molars of Children and Adolescents Using NHANES 2011-16 Data
Poster #4 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Graduate Student(s): Pritam Deb
Research Mentor(s): Christina Scherrer & Lin Li

Dental caries remains a prevalent chronic disease among children, significantly affecting their quality of life, educational outcomes, and school attendance. Between 2011 and 2016, caries affected 17.4% of children aged 6-11 and 56.8% of adolescents aged 12-19, with higher incidences among non-Hispanic Black and Mexican American youth, and those from lower-income families. This study aims to develop a robust machine learning model to predict the presence of decayed, missing, or filled permanent molars (DMFT) in children and adolescents using demographic, dietary, and oral health examination data from the National Health and Nutrition Examination Survey (NHANES) for the years 2011 to 2014. Our study utilized merged NHANES data from two cycles (2011-2012 and 2013-2014) for training purpose and NHANES 2015-16 for testing, including demographic data, detailed oral examinations, dietary behavior records, and health insurance information for individuals aged 6 to 19. To develop the binary target variable, DMFT ("0"= no caries; ">0" = presence of caries) was constructed from the analysis of eight individual permanent molars. We employed a diverse array of machine learning algorithms—logistic regression, deep learning, XGBoost, support vector machines, and random forests—to enhance predictive accuracy and interpretability. Preliminary analysis identified significant predictors of dental caries, including income-to-poverty ratio, age, dietary sugar and carbohydrate intake, parental education levels, and race/ethnicity. The model's efficacy was assessed through metrics such as accuracy and area under the ROC curve. Detailed comparisons of the model performances will be presented to highlight the most effective models for DMFT predictions. Machine learning models have proven effective for early detection of dental caries risks among children and adolescents using NHANES data. The results can inform healthcare providers in implementing targeted preventive measures to reduce caries prevalence and improve public health outcomes. Future work will enhance the model by incorporating additional questionnaire data from NHANES and behavioral factors to improve prediction accuracy.

Mechanical Engineering

BLOOM: Behavioral Learning and Outcome Observation in Microbes
Oral Presentation (J.M. Wilson Student Center - Ballrooms)

Wednesday, November 20th, 11:00 – 11:50 am
Undergraduate Student(s): Sean Sarwar Haque, Luke Compton Wharton, & Ming Lin
Research Mentor(s): Razvan Cristian Voicu

Understanding how pathogens respond to physical changes in their environment is crucial for developing effective treatments and preventative measures. Current research often relies on static models or experimental data that either fail to capture the dynamic interactions within cellular environments or are not generalizable to other types of pathogens. This project aims to address this gap by creating a comprehensive cell simulation that models pathogens and their response to chemical, physical, and physiological changes. The proposed solution is a simulation that integrates biological data and computational modeling to replicate the behavior of pathogens in real time as they are affected by various changes in their surroundings. By utilizing advanced algorithms and databases, the simulation will enable users to observe the effects of different vaccines on the cellular structure and signaling pathways of pathogens. This approach not only enhances our understanding of cellular dynamics but also provides a valuable educational tool for students and researchers alike. Expected results include the successful demonstration of the simulation's ability to accurately represent cellular responses under various conditions. By validating the model against experimental data, we anticipate identifying critical thresholds at which these single-celled organisms initiate defensive mechanisms. Furthermore, this project aims to reveal novel insights into the relationship between types of invaders and host cells, potentially guiding future research into targeted therapies. Overall, this innovative cell simulation has the potential to significantly advance the field of cellular biology and enhance our ability to combat infectious diseases.

Design and Analysis of Wind Speeds and Pressure on the Inlet of the CFM56
Poster #2 (Marietta Event Center)
Thursday, November 21st, 1:00 - 1:45 pm
Undergraduate Student(s): Mouhamadou Diop
Research Mentor(s): Adeel Khalid

The CFM56-7B, a high-bypass turbofan engine developed by CFM International in collaboration with General Electric and Safran Aircraft Engines, represents a cornerstone in modern aviation propulsion, extensively powering aircraft models like the Airbus A320, Boeing 737 NG, and Embraer E-Jet families. The objective of the research is to identify opportunities to enhance the performance and efficiency of the CFM56-7B engine. With the intention of modifying the nacelle's profile to increase pressure inside the inlet, an examination of wind speeds and pressure on the CFM56-7B engine's inlet is presented. The efficiency and performance of the engine can be increased by optimizing the airflow through the nacelle, which can result in less fuel being used and fewer pollutants expelled. The size and shape of the nacelle are modified in this research. The goal is to determine the optimal combination of these parameters that will help

optimize the air pressure before the compressor. This will help increase inlet and compressor efficiency and overall engine performance.

Experimental Analysis of Vibration Mitigation in a Composite Building Prototype Using Fluid Viscous Dampers, Phase I
Poster #18 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Sebastian Garay, David Amaya, & Kevin Chong
Graduate Student(s): Salim Kortobi
Research Mentor(s): Simin Nasseri & Mohammad Jonaidi

This experimental analysis investigates the vibration characteristics of a 3-story building model, both with and without fluid viscous dampers, to enhance the integrity and stability of the structure. The composite model, constructed from steel frames and 3D-printed polymeric floors, is scaled at 1:10, with dimensions of 30 cm x 40 cm x 90 cm (approximately 11 6/8 in x 15 6/8 in x 35 3/8 in). A custom shake table has been designed to facilitate testing by allowing only reciprocating motion parallel to the ground, effectively restricting five other degrees of freedom. Two designs are considered for the dynamic motion of the shake table: one based on using slide-in wedge structures and ball bearings, and the other on the cylinder-piston function. The pros and cons of each design will be evaluated. For the model lacking fluid viscous dampers, brackets are employed to provide support, while the experimental model is designed to form a moment-resistant structure. To capture vibration data, a waveform generator, accelerometer, and vibrometer have been integrated into a data acquisition system. The scaling equations for frequency range and acceleration range for the building model are presented. The shake table will be engineered for optimal efficiency, accommodating various sizes of building models while minimizing its footprint. This research aims to establish a specialized arrangement of dampers and a new viscoelastic model, ultimately contributing to improved building design and resilience against vibrational forces. The findings from this study will have significant implications for enhancing the safety and stability of structures in seismically active regions, providing valuable insights into the application of advanced damping technologies in structural engineering.

Finite Element Analysis of Seismic Response in Structural Models with and without Fluid Viscous Dampers, Using a New Viscoelastic Model, Phase I
Poster #19 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Graduate Student(s): Salim Kortobi & Brent Pruitt
Undergraduate Student(s): Urban Micheals
Research Mentor(s): Simin Nasseri & Mohammad Jonaidi

This research employs finite element analysis (FEA) to explore the dynamic response of a composite building structure under seismic loading, with a focus on the effectiveness of fluid viscous dampers (FVDs). The study models various structural configurations, analyzing how FVDs mitigate stress and displacement during dynamic events. Through frequency and response spectrum analyses, the simulations compare the performance of buildings with rigid and deformable floor assumptions under base excitation. The addition of FVDs shows a significant reduction in vibrations, enhancing the building's resilience and reducing structural fatigue. The study includes an extensive review of existing viscoelastic models for viscous dampers, such as the Generalized Maxwell, Kelvin-Voigt, and Rayleigh models, assessing their effectiveness in simulating structural behavior. Using SolidWorks©, FEA is conducted to test these viscoelastic models, aiming to identify one that closely approximates the non-linear response of real buildings. The results from this analysis will contribute to the development of a new viscoelastic model tailored for enhanced accuracy in predicting structural performance under seismic loads. This novel model will facilitate a deeper understanding of the dynamic interactions within the building framework and the role of dampers in mitigating vibrations. The outcomes of this investigation aim to bridge the gap between theoretical modeling and practical applications in structural engineering. The insights from the FEA simulations will guide the design and construction of an experimental building model for real-world testing of vibration control strategies, with input values identified for a valid experimental study. Ultimately, this research seeks to offer innovative solutions for improving the safety and stability of structures in seismically active regions, contributing to advancements in structural and mechanical engineering.

High Strain Rate Fracture of Shear Wrinkled Graphene
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 2:00 pm
Undergraduate Student(s): Fahim Dorsey
Research Mentor(s): Jungkyu Park

This study explores the mechanical responses of shear wrinkled graphene to high strain rate impacts, employing molecular dynamics simulations to model the high-speed fracturing of this material. Initially, we induce shear in a graphene layer to naturally create wrinkles, following which a silver particle is propelled at the wrinkled graphene at predetermined velocities. The interaction between silver and carbon atoms is modeled using the Lennard-Jones potential, while silver atoms themselves are simulated via the embedded atom method (EAM) potential, with the second-generation REBO potential governing the carbon atoms with a cutoff distance of 2.0 Ångström. Our results reveal that shear-wrinkled graphene demonstrates greater stiffness compared to its unwrinkled counterpart, absorbing less impact energy. Notably, all graphene layers, regardless of wrinkling or shear deformation, fracture upon impact at velocities of 5 km/s, suggesting that fracture is primarily influenced by C-C bond breakage rather than pre-existing

deformations. This investigation marks a significant step towards the development of robust, lightweight materials designed for military applications, significantly enriching the defense technology sector.

In-situ Thermal Measurement of Polymers
Poster #2 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Carson Powers, Fahim Dorsey, Peter Bearden, Simon Bratescu, & Jessica Trinh
Research Mentor(s): Justin Park & Dal Hyung Kim

In this research, we conducted a detailed experimental investigation into how strain affects the thermal conductivity of Ecoflex elastomer, utilizing a newly developed method for measuring thermal conductivity under mechanical strain for the first time. In situ thermal conductivity measurement apparatus was developed by combining the KLA T150 nanoscale tensile tester and a custom-fabricated thermal measurement sensor. The development of an experimental method for measuring the thermal conductivity of nanomaterials under mechanical testing simultaneously will contribute to the development of novelmaterials for flexible electronics by helping us to better understand the strain effect on their thermal performance. Interestingly, the thermal conductivity of Ecoflex elastomer is shown to increase with an increase in tensile strain until the engineering strain reaches 20%. This is understood to be due to the straightened polymer chains, which makes the phonon transport to be more efficient through the stiffened polymer chains. At very high degrees of mechanical strain, the thermal conductivity may decrease due to the disruption of filler-to-filler connections and increased phonon-boundary scattering between polymer chains and magnetic powders. This is caused by the reduced spacing resulting from the increased mechanical strain. The findings from this study are expected to propel the advancement of future flexible electronics by facilitating the creation of a foundational elastomer.

All Spun Up: Using Cyclonic Swirls to Enhance Nuclear Rockets
Poster #1 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Kenneth W. Kubiak
Research Mentor(s): Gaurav Sharma

The human pursuit of deep-space exploration, commercialization, and colonization demands faster, more efficient propulsion systems. Achieving speeds of at least 20% of the speed of light is essential, but current chemical propulsion technologies only reach $3.7x10^{-5}$ percent of this velocity. Nuclear Thermal Propulsion (NTP) systems offer a promising alternative, potentially cutting Mars transit times in half (four months instead of nine) and enabling immediate return-

to-Earth options—something chemical rockets cannot provide. However, historical data from the Rover and NERVA (Nuclear Engine for Rocket Vehicle Applications) programs (1955-1972) show that NTP systems face challenges, including structural degradation at 2700 K and transient delays of 30 to 60 seconds during startup and shutdown, which extend burn duration. Introducing Toroidal Vortex Engines (TVE) may alleviate these issues by diverting hot exhaust gases from the reactor exit, reducing thermal stress. Vortex Combustion Cold-Wall (VCCW) chamber studies in chemical rockets suggest that TVE could mitigate thermal radiation impacts and shorten startup/shutdown times in NTP systems. We are developing computer-based models to compare with historical Rover/NERVA data, serving as a baseline for future compressible flow Computational Fluid Dynamics (CFD) simulations using the Reynolds Stress Model (RSM) on TVE-enhanced NTP systems. This research has the potential to revolutionize space travel, reducing mission times to the outer Solar System or beyond, and paving the way for future technologies in propulsion and energy, including fusion-based rockets.

Numerical Analysis of Transonic Performance of a Compound Delta Wing
Poster #4 (Marietta Event Center)
Thursday, November 21st, 11:00 – 11:45 am
Undergraduate Student(s): Andrew Marion
Research Mentor(s): Gaurav Sharma

Transonic flight holds paramount significance in the domain of global air forces. The efficacy of delta wings in supersonic flow conditions has been widely acknowledged. This success is primarily attributed to their low wing thickness, which serves to mitigate wave drag. But fighter aircraft mainly operate and maneuver at transonic speeds. Additionally, delta wings exhibit a vortex lift phenomenon, stemming from the generation of leading-edge vortices at elevated angles of attack. Consequently, since the 1950s, military aircraft have extensively employed delta wing configurations. While maneuvering at transonic speeds delta wings encounter a phenomenon termed vortex breakdown at heightened angles of attack. Vortex breakdown manifests as the rupture of leading-edge vortices, resulting in diminished lift and altered aerodynamic behavior. This research endeavors to deepen our comprehension of vortex breakdown evolution over a compound delta wing configuration. Numerical simulations were employed to scrutinize the flow dynamics over the wing. These simulations encompassed a Mach number range spanning from 0.6 to 1.0, coupled with angles of attack varying from 0° to 15°. The simulations were executed utilizing Reynolds-Averaged Navier–Stokes transient computations due to the flows unsteady nature, supplemented by the Spalart-Allmaras turbulence model. The findings reveal that compound delta wings exhibit vortex breakdown, particularly at elevated angles of attack. This investigation contributes essential insights into the mechanisms underlying vortex breakdown over compound delta wings, laying the groundwork for future investigations aimed at devising strategies to delay vortex breakdown and control its formation.

Production of Bio-sustainable Nanocomposites for Food Packaging
Poster #8 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Alec Whitaker & Abigail Begashaw
Research Mentor(s): David Veazie & Eric Mintz

In 2018, the World Wildlife Fund reported that China, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam contributed around 60% of the estimated 8 million tons of plastic that enter the world's oceans every year. The wide usage of plastic packaging has caused serious plastic waste disposal problems, which, in turn, create massive environmental pollution. This threat to the environment is due to the significant level of highly toxic emissions, composting management issues, and alteration in the carbon dioxide cycle. Furthermore, disposed packaging plastics in many countries are rarely recycled due to technical problems and socio-economic constraints. To make matters worse, Statia.com reported that food packaging consumption has increased during the COVID19 pandemic due to most people having to resort to buying bulk stocks of groceries and people doing take-out instead of dining out. Buying bulk stocks of food has also led to the discussion of one of the most important safety aspects of food packaging, which is its influence on the microbial shelf-life of food. Therefore, biodegradable antimicrobial packaging was introduced to combat this problem so that the shelf-life storing of the food can be extended, reducing toxic plastic waste. Although biopolymers are environmentally friendly, industrial applications are restricted due to several factors such as their oxygen/water vapor barriers, thermal resistance, and other mechanical properties. For these reasons, the researchers in this Vertically Integrated Project will focus on analyzing the antimicrobial properties of lignin by incorporating lignin and high lignin-coated cellulose nanocrystals in polymers to develop materials to meet this need.

Robotics and Mechatronics Engineering

CAG*-EDP: Chaos-enhanced Ant-Genetic, A* Algorithm hybrid with Error Detection and Patching
Poster #9 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Arielle Charles, Rohan Ahmed, & Jonathan Ridley
Graduate Student(s): Carrington Chun
Research Mentor(s): Muhammad Hassan Tanveer

The works within this project aim to introduce a fine navigation system that accounts for both path planning and gait efficiency for quadrupedal robots. A chaotic ant-genetic-A algorithm*

(CAG) is developed to enrich the will-be-combined individual benefits of the A* Algorithm, Ant Colony Optimization (ACO), and a chaos-enhanced Genetic Algorithm (GA) whilst minimizing their detriments, a process to be done through an overhead monocular camera and motion capture which serve as stand-ins for UAVs and GPS data, respectively. Error Detection and Patching (EDP) will call for the correction of the Unitree Go1 Dog's (the main unit of experimentation) gait sequence in the event it goes astray and/or adopts an inefficient walk cycle when moving autonomously, in tandem with enforcing an efficient, minimalist approach for path planning by only using CAG* to develop routes as needed rather than continuously.*

Design and engineering of high efficiency ironless axial flux BLDC motors.
Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 11:00 – 11:50 am
Undergraduate Student(s): Benjamin Goldberg, Jordan Bailey, Colin Haskins, & Connor Hawkins
Graduate Student: Fernando Martinez
Research Mentor(s): Razvan Voicu

Axial flux motors are well-known for their superior power density and efficiency but remain difficult and costly to manufacture, limiting their widespread adoption in cost-sensitive applications. Traditional radial flux stator manufacturing techniques are incompatible with the unique constraints of axial flux motors, presenting a significant challenge. This research seeks to address this limitation by designing, manufacturing, and optimizing a low-cost axial flux permanent magnet direct current (DC) motor that simplifies production while maintaining high performance. The motor utilizes two innovative stator designs: an air-core stator made from high-temperature engineering polymers and a composite iron 3D-printed filament functioning as an iron core. To mitigate the heat dissipation issues typically associated with non-iron core stators, a dielectric ferrofluid cooling system is introduced. This system efficiently transfers heat from the electromagnets to the rotor, allowing for sustained operation under load and enhancing the motor's maximum power output. A key novelty of this research lies in the integration of composite metallic polymer filaments into the stator construction, which, together with the advanced cooling system, enables high efficiency without the need for costly materials. The findings offer valuable insights into how innovative materials and cooling strategies can overcome traditional manufacturing and performance barriers, thereby advancing the practical use of axial flux motor technology in both research and industrial applications.

Exhibiting Object Identification Through SLAM with Simultaneous Applications of ROS, YOLO, LIDAR, and Unitree GO1 Camera
Poster #19 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Andrea Martinez Angulo, Micah Charles, & Gurbir Singh

Graduate Student(s): Cary Chun
Research Mentor(s): Muhammad Hassan Tanveer & Razvan Voicu

This research enhances the Unitree Go1 quadruped's capabilities by integrating Simultaneous Localization and Mapping (SLAM) with You Only Look Once (YOLO) object detection. SLAM provides environmental mapping but lacks object recognition, while YOLO enables real-time detection of objects within the robot's camera view. By combining SLAM, YOLO, Robot Operating System (ROS), and Light Detection and Ranging (LIDAR) with a Raspberry Pi 4, we aim to create a system that not only maps the robot's surroundings but also accurately identifies and labels key objects. This integrated approach will be tested in a controlled environment to improve the Go1's potential for diverse applications such as security, tracking, and delivery tasks.

An Intuitive Mechanism for Position Control of the Medical Robotic Systems
Oral Presentation (Microsoft Teams)
Friday, November 22nd, 4:45 pm
Undergraduate Student(s): Kyra S Magee, Mingxuan Yu, Praneeth Rayapudi, Jacob Riad, Sama Abbadi, & Stephan Sellers
Research Mentor(s): Amir Ali Amiri Moghadam & Turaj Ashuri

The control and manipulation of medical robotic systems present significant challenges. They often require a steep learning curve due to the need for more intuitive control mechanisms, particularly in existing joystick designs. This project develops a novel approach to address these challenges by creating a master/slave system utilizing a twin Stewart mechanism configured as a specialized joystick with six degrees of freedom (DOF). This design enhances the intuitiveness of robot motion, enabling surgeons to control the robot's end-effector with one hand. The design objectives for the joystick emphasize six DOF, complete one-handed control, and intuitive usability within a compact workspace. A Stewart mechanism was chosen for its inherent six DOF and suitability as the master system for a soft robot. Advanced 3D printing techniques were used to manufacture the mechanism, with linear potentiometers mounted on each leg to sense displacement. An inverse kinematic model of the joystick was developed using modeling techniques. This inverse kinematic model gave the joystick position for the displacement from the potentiometers. Using this position data, a feedforward neural network was trained to obtain the joystick's position solely from the displacement data from the potentiometer. An electromagnetic tracker was used to validate the data from the neural network. Preliminary results show that the neural network can accurately calculate the joystick's position. Future work involves implementing communication between the soft robot and the joystick. The joystick's position will be monitored using an electromagnetic tracker and mapped to its bending deformation, providing feedback to the controller.

Non-Invasive Ripeness Monitoring of Produce
Poster #7 (Marietta Event Center)
Thursday, November 21st, 3:00 – 3:45 pm
Undergraduate Student(s): Arlan Gibson, Drew Langston, & Abdul Diallo
Research Mentor(s): Muhammad Hassan Tanveer

This project is developing a module that can be appended to an autonomous ground robot capable of wireless, non-invasive ripeness monitoring of fruits and vegetables. This module, named "Triton," leverages the impermeable nature of 5GHz radio frequencies (RF), and water to determine the ripeness of produce. To achieve this, a focused broadcast of empty data packets are directed at a fruit or vegetable. From this, the reflected radio waves are intercepted and compared to the initial amplitudes of the broadcast; determining changes in the peak amplitude and phase angles. By utilizing MATLAB and comparing the results to the mean data collected across all cataloged fruits and vegetables, a reasonable estimate of the produce's percentage water content can be deduced. Using the measured water content applied to approximate the ripeness of the produce.

Optimizing Object Manipulation and Grasp Point Detection Using Stereo Camera
Poster #16 (Marietta Event Center)
Thursday, November 21st, 12:00 – 12:45 pm
Undergraduate Student(s): Shrey Patel, Aiden Kovarovics, & Aaditya More
Research Mentor(s): Muhammad Hassan Tanveer

Existing robotic arm systems often rely on pre-trained models or operate within controlled environments using known positions or fiducial markers for object manipulation. Although these methods guarantee a considerable level of accuracy, they are limited by lengthy training processes and the need of proper controlled setups. This research explores a methodology that leverages Stereo cameras to develop a generalized algorithm, aiming to overcome these limitations to enable more versatile robotic object manipulation in uncontrolled environments. This research's proposed solution uses a Intel Realsense Stereo camera with YOLO models for initial object identification and combines its segmentation meshes along with camera's depth values to construct a detailed 3D point cloud around the detected object. By analyzing this point cloud through various feature extraction techniques such as RANSAC and passing it through our proposed filters, it predicts a mostly complete stable shape of the object. The grasp point is then calculated by identifying surfaces within the shape that can provide high stability and minimize potential slippage, followed by calculating an optimal approach angle and position for the robotic gripper. This approach enables robotic arm systems to autonomously adapt to a variety of objects in uncontrolled environments, significantly expanding their practical applications beyond traditional setups. For example, it could support modular robotic systems

designed for sample gathering on extraterrestrial missions, where adaptability and autonomous operations are crucial.

Robotic Drone Navigation in Complex Terrains for NASA's Space Exploration
Poster #19 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Thomas Brown
Research Mentor(s): Turaj Ashuri & Amir Ali Amiri Moghadam

Over the past decades, Unmanned Aerial Vehicles (UAVs), also called drones, have seen an uptick in popularity in both civilian and governmental sectors. In more recent years, the use of UAVs for space exploration has garnered significant interest, culminating in NASA's Ingenuity helicopter on Mars. Concurrently, soft robotic technologies have developed significantly. Characterized by soft, elastic materials and sequential inflation-driven, or tendon-driven actuation, soft robots offer many degrees of freedom for intricate motion. Soft robotic technologies are promising for navigation in complex terrains, as their almost organic movement and characteristics allow them to be more adaptable than their typical mechanical counterparts. This study aims to develop a novel quadruped, tendon-driven, soft robotic walker in conjunction with a drone for navigation of complex terrain on the surface of Mars. The promising union of drone and walker technologies allows greater range of exploration of Mars' surface, proven in the limited cooperation between NASA's Ingenuity helicopter and Perseverance rover. The usage of soft robotic technology will expand this range further yet. First, a preliminary literature review was conducted to find common issues with current rover designs, concluding that soft robotic legs may mitigate the limited mobility provided by wheels. Using SolidWorks for 3D design and an Arduino MEGA for C++ coding, a limited prototype of a soft robotic walker was created. In addition, MATLAB Simulink was utilized to conduct simulations testing drone flight characteristics in a Mars-like environment. A secondary aim of this study was to conduct a more comprehensive literature review. With these findings, a review paper on the terrestrial and extraterrestrial applications of drones was created, with plans to be published externally. Future work on this project will allow for more advanced maneuvering with the walker, a fully functional drone prototype, and communication between these two systems to allow efficient exploration.

Advancing Cancer Diagnostics and Patient Care: Harnessing Safe AI for Accurate Multimodal Healthcare Solutions
Poster #22 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm

Undergraduate Student(s): Preston Brantley
Research Mentor(s): Razvan Voicu & Muhammad Hassan Tanveer

With the rapid evolution of Artificial Intelligence (AI) models like ChatGPT-4, healthcare is witnessing a transformative shift through diverse applications that enhance patient care, diagnostics, and operational efficiency. These models can support various healthcare needs. For instance, AI systems can assist in patient triage by analyzing symptoms and offering preliminary advice when immediate medical staff are unavailable. In diagnostics, AI can be trained to recognize patterns in cancer cells, identifying irregularities like deformed cell membranes or nuclei, thus improving diagnostic speed and accuracy. They also streamline medical documentation, summarizing and organizing information from clinical notes to save physicians time and ensure accessibility to crucial data. In risk assessment, AI analyzes patient histories and current data to help predict potential health issues, supporting preventative care. Additionally, patient engagement tools powered by AI improve interaction via virtual assistants that answer health questions, schedule appointments, and assist with medication reminders. AI also enhances remote monitoring, processing data from wearables or home-monitoring devices to alert providers to real-time anomalies. As AI models become more sophisticated, their applications continue to expand, offering solutions for improved healthcare access, diagnostic accuracy, and operational support. This research focuses on leveraging multimodal AI capabilities to support cancer diagnosis and patient interaction, specifically developing an AI assistant capable of accurately interpreting microscopy images of cancer cells. However, significant discrepancies in safe AI remain, as these systems are still prone to inaccuracies, occasionally generating incorrect and fake information. This underscores the critical importance of AI safety and the need for stringent development practices to ensure AI systems provide reliable, fact-based support without introducing false data.

Wellstar College of Health and Human Services

Exercise Science and Sport Management

Acute Effects of Contraction Speed during Motor Imagery on Corticospinal and Muscle Function Responses
Poster #11 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Kayla Anderson, Kaden Buford, Rachel Carlstrom & Caleb Offutt
Graduate Student(s): Anna Acosta & Lacey Harper
Research Mentor(s): Garrett Hester

BACKGROUND: Motor Imagery (MI) is the imagination of a movement without physical muscle contraction. Acute MI has been shown to increase strength and corticospinal excitability, but few studies have placed emphasis on the rate of torque development (RTD) during MI or as an outcome following MI. RTD refers to how quickly skeletal muscle generates torque and is associated with mobility in aging and clinical populations. MI has implications for these populations where traditional strength training is not possible, so it is important to determine its effect on RTD. Corticospinal responses to MI are muscle and task specific, but it is unclear if the speed of imagined muscle contractions affects neural responses. This study aims to determine the acute effects of fast and slow imagined contractions on corticospinal responses and RTD. METHODS: Eighteen young (18-30 yrs), healthy subjects will complete 4 laboratory visits in randomized order, including a familiarization session, control, and 2 MI conditions. During MI conditions, subjects will imagine 2 sets of 25 repetitions of either fast (i.e., increase torque as fast as possible) or slow (i.e., 3 seconds to peak torque) isometric elbow flexions. Before and after each condition, single pulses will be delivered over the primary motor cortex using transcranial magnetic stimulation to measure motor-evoked potential amplitude and the resulting silent period duration for the bicep brachii to quantify changes in corticospinal excitability and inhibition, respectively. Rapid, maximal voluntary isometric contractions will be used to measure changes in peak torque, RTD, and rate of electromyography rise. Two-way repeated measures ANOVAs will be used to analyze outcomes. ANTICIPATED RESULTS: Compared to control, we expect both MI conditions to acutely increase corticospinal excitability, peak torque, and RTD while reducing corticospinal inhibition, but we expect greater changes in these outcomes following fast MI.

Does Mental Effort Augment Physical Function Adaptations to Elastic Band Training in Older Women?

Poster #1 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Kayla Anderson, Kaden Buford, & Rachel Carlstrom
Graduate Student(s): Lacey Harper & Anna Acosta
Recently Graduated: William Reed
High School Student: Elizabeth Aluko
Research Mentor(s): Garrett Hester

The dramatic age-related decline in muscle power negatively affects physical function. Neuromuscular function, a critical determinant of power, declines with age but may be mitigated by mental effort (ME), imagined maximal muscle effort combined with exercise. Elastic band training (EBT) is a form of strength training that may be a good model to apply ME since practical strategies that target neural deficits are needed to enhance training adaptations in older adults. This study aimed to establish if maximal mental effort during elastic band training augments power and physical function adaptations in older women. Community-dwelling older women aged 65-79 yrs were randomly placed into an EBT group (n=11), an EBT+ME group (n=13), or a control group (n=10). Within the 6-week training program, training groups exercised three times weekly while the control group maintained their typical diet and physical activity routine. The EBT subjects performed moderate-intensity strength training consisting of multi- and single-joint exercises. EBT+ME subjects utilized the same training but were instructed to "imagine maximal muscle during each exercise." Physical function indices included preferred walking speed (PWS), maximal walking speed (MWS), number of chair rises completed in 30 seconds, and the time taken for five chair rises. Peak power was obtained from the five chair rises. A two-way repeated measures ANOVA was used to evaluate power and physical function changes. MWS ($p < 0.001$) and 30-sec chair rise ($p = 0.004$) were only improved in EBT+ME. All groups increased PWS and chair rise power, and no changes were found for five chair rise time ($p > 0.05$). These findings indicate that using maximal mental effort during practical, moderate-intensity exercise enhances some physical function adaptations in older women. More research is needed to determine if a heightened mental effort can consistently complement strength training to enhance adaptations in older populations.

Measuring Abdominal Adiposity in Pregnancy: Protocol Considerations
Poster #16 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Graduate Student(s): Isabelle Boughadou & Bre McDonald
Research Mentor(s): Katherine Ingram, Janeen Amaso, & Brian Kliszczewicz

Background: Abdominal adiposity is tightly associated with metabolic health. The use of ultrasound to measure abdominal adiposity is gaining popularity as a safer and more accessible tool than CT scanning, and it has potential applications for use in maternal metabolic health

assessments. However, standard protocols use a flat exam table, while maternal health clinics typically perform ultrasound exams using angled tables. Objectives: This study tests the impact of different table angles on abdominal adipose tissue thicknesses during pregnancy. Methods: Twenty-two participants (BMI= 30.85 ± 7.4, age= 27.2± 5.1) visited the lab during their first and second trimesters of pregnancy. Four distinct abdominal fat thickness measures were taken at differing table angles (0, 10, 20 degrees). Each visit was separated by several weeks of gestation and considered a separate data profile (N=36). Intra-abdominal fat thickness (IAAT) and the overlying subcutaneous fat (SAT1) were measured one centimeter above the umbilicus. Preperitoneal adipose tissue (PPAT) and its overlying subcutaneous adipose tissue (SAT2) were collected just below the xiphoid process. Paired t-tests were used to determine differences in mean ultrasound thicknesses. Results: Elevating table angles from flat to 20 degrees resulted in higher measures of IAAT (6.04± 1.58 cm versus 7.07± 1.83 cm, respectively, p
Conclusion: The angle of the exam table influences abdominal fat thickness measured by ultrasound. It is critical consider the angle when using ultrasound measures of abdominal adiposity as indicators of metabolic health.

Health Promotion and Physical Education

BMI vs Diabetes
Poster #22 (Marietta Event Center)
Thursday, November 21st, 4:00 – 4:45 pm
Undergraduate Student(s): Angel Fortmann & Allisa George
Research Mentor(s): Kevin Gittner

One of the most pressing public health concerns in the U.S. has been how "obesity has been associated with an increased risk of several chronic diseases, including type 2 diabetes." Obesity can cause diabetes often linked to chronic conditions such as high blood pressure and heart disease. The study conducted utilizes data from the CDC's 2015 Behavioral Risk Factor Surveillance Survey (BRFSS), to explore the relationship between Body Mass Index (BMI) and diabetes rate. The primary goal of the CDC's data is to determine whether the Body Mass Index has a significantly relevant relationship with the probability of developing diabetes. The study hypothesizes that individuals with diabetes have a higher BMI. Additionally, it will be evaluated that secondary variables—such as high blood pressure, high cholesterol, age, heart disease, and physical activity, will either contribute to or modify this association. Specifically, individuals with diabetes and conditions like high blood pressure or heart disease, are predicted to show a higher BMI. The BRFSS contained over 70,000 observations on variables such as age, BMI, physical activity, high blood pressure, and diabetes status. Both continuous and categorical data were analyzed using statistical methods to assess the relationship between these variables.

Following the hypothesis, it's anticipated that the results will show a positive association between higher BMI, diabetes, and the secondary variables diagnosis, aligning with previous research linking obesity to diseases such as hypertension, and cancers. The results of the study could lead to valuable conclusions about strategies targeting obesity and lowering BMIs to reduce the risk of diabetes. With this study, it could address methods to reduce BMI to lower the risk of other chronic conditions as well.

Exploring Health Disparities and Socioeconomic Factors: Insights into Modern Health Outcomes Using BRFSS 2023 Data

Poster #7 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Simon Woede & Javier Haro
Research Mentor(s): Kevin Gittner

The Centers for Disease Control's Behavioral Risk Factor Surveillance System (BRFSS) 2023 data collection provides a major insight into the health status of the United States and its diverse population. Understanding the current position of the population in the realm of public health in terms of health status is crucial for needs assessment objectives and effective implementations to be made to enhance the overall health of an individual. The BRFSS allows for a large grasp of understanding into health risk behaviors, health trends/issues for reflection. The accompanying codebook for this data set gives an extensive set of variables which reflect various aspects of public health in the country with 433,323 respondents participating in the survey. The research hypothesis proposes that socioeconomic factors influence an individual's self-reported status of health from a physical and mental perspective. This project uses statistical analysis methods within SPSS to look over the data and support the research hypothesis mentioned. Quantitative variables were also used for the analysis such as the number of individuals who needed medical attention but were not able to afford it. Preliminary analysis shows 37,198 individuals reporting not being able to afford to be seen by a doctor. Furthermore, within the BRFSS data set there is a ninety percent response rate reporting at least one to twenty days of self-reported negative health in the past thirty days. A Pearson correlation analysis also saw a moderate positive relationship between participants' self-reported physical health and overall quantity of health interfered with normal activities. The preliminary analysis done so far indicates that socioeconomic factors affect individuals' ability to report positive health status. The findings from this research have potential to inform initiatives in public health aimed at increasing access to medical care and improving overall health status, ultimately addressing health disparities.

Integrated Treatment and Suicide Prevention in Healthcare Facilities

Poster #13 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Julianne Lentz & Edith Akue-Moevi
Research Mentor(s): Kevin Gittner

This study examines the relationship between the provision of integrated mental health and substance use treatment, and suicide prevention services in healthcare facilities. The key research question asks, "Is there a connection between offering integrated mental health and substance use treatment and the likelihood of a facility providing suicide prevention services?" The hypothesis suggests that facilities offering integrated care are more likely to provide suicide prevention services due to the increased vulnerability of clients with dual diagnoses. Data from the National Substance Use and Mental Health Services Survey (N-SUMHSS) is used to analyze this relationship. The primary variables are whether a facility offers integrated mental health and substance use treatment, and whether it provides suicide prevention services. Additional factors include the percentage of clients with dual diagnoses, the provision of mental health treatment to both substance use, and non-substance use clients, and whether the facility offers case management services. This research addresses an urgent public health issue—the intersection of mental health, substance use, and suicide prevention. By identifying service provision patterns, the study aims to inform more effective interventions for vulnerable populations. It is expected that facilities offering integrated care will also provide suicide prevention services, highlighting the importance of such models in addressing complex healthcare needs. The study's findings could inform future research on how integrated care models impact client outcomes, such as reduced substance use and suicide risk. Further exploration of facility characteristics, like staff training and resource availability, may enhance the effectiveness of these interventions. This research contributes to public health strategies by suggesting that integrated care models may improve long-term outcomes for at-risk groups through more comprehensive service provision.

Investigating the Relationship between HIV and Depression
Poster #4 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Diane Nguyen & Victor Rodriguez
Research Mentor(s): Kevin Gittner

Depression is a comorbidity for many chronic illnesses, yet its presence in people living with AIDS/HIV is often overlooked. With the many complications that come with an HIV diagnosis, it is important for medical providers to recognize signs of depression in their HIV patients so that they receive the necessary care. Factors such as substance abuse and access to HIV treatment may make an individual more vulnerable to depression. The purpose of this study is to investigate the relationship between the level of depression and how long an individual has been

infected with HIV. This study aims to answer the research question, "How does the HIV infected duration influence the level of depression in individuals living with HIV/AIDS?" The data used for this study was collected from a group of individuals with HIV in Bangladesh. The hypothesis behind this study is that individuals who have been infected with HIV for a longer duration will have a higher level of depression. To investigate the relationship between the two variables of HIV infected duration and level of depression further, the data collected from the 150 participants was input into SPSS. The study's research method included graphical investigation to better visualize the data, and the use of ANOVA and Pearson correlation tests were used to decide on the relationship between variables. In conclusion, regardless of the relationship between the variables, physicians should regularly screen HIV patients for depression. The integration of mental health treatments for patients living with HIV can be beneficial in diagnosing the condition to improve the patient's health and quality of life.

Relationship Between Prevalence of Disability and Receiving the COVID-19 Vaccine
Poster #5 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Michael Treichler & Brady Beard
Research Mentor(s): Kevin Gittner

COVID-19 vaccines were developed to reduce the spread and severity of the virus, particularly among vulnerable populations. People with disabilities are at higher risk of severe outcomes from COVID-19 due to underlying health conditions, limited access to healthcare, and potential barriers to preventive measures like social distancing. Despite their vulnerability, disabled individuals may face challenges in accessing vaccines, such as physical barriers, transportation issues, or a lack of tailored information. Additionally, vaccine hesitancy may be influenced by concerns about potential side effects harming existing disabilities. This study investigates the research question: "Is there a relationship between receiving the COVID-19 vaccine and being disabled?" The primary aim is to assess whether individuals with disabilities are more or less likely to have been vaccinated, and whether those with multiple disabilities exhibit different vaccination patterns compared to those with a single disability. Our expected hypothesis is that people who are disabled are less likely to have the COVID-19 vaccine. We used a dataset that includes information on vaccination status and disability, where all values were labeled according to a predefined codebook. To ensure data integrity, we corrected for missing values before conducting further analysis. The next step involved recoding the relevant variables into nominal data categories to classify individuals as either disabled or not disabled. Additionally, we explored the potential relationship between having more than one disability and the likelihood of being vaccinated. By categorizing individuals based on the number of disabilities reported, we aim to understand if the complexity of health conditions influences vaccine uptake. The processes we will be taking to study these relationships are interpreting histograms, bar charts,

significancy tables, and probability tables. The expected conclusions are that people that have a disability are less likely to receive the COVID-19 vaccine.

Relationship Between Prevalence of Disability and Receiving the COVID-19 Vaccine Abstract

Poster #2 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Brady Beard & Michael Treichler
Research Mentor(s): Kevin Gittner

COVID-19 vaccines were developed to reduce the spread and severity of the virus, particularly among vulnerable populations. People with disabilities are at higher risk of severe outcomes from COVID-19 due to underlying health conditions, limited access to healthcare, and potential barriers to preventive measures like social distancing. Despite their vulnerability, disabled individuals may face challenges in accessing vaccines, such as physical barriers, transportation issues, or a lack of tailored information. Additionally, vaccine hesitancy may be influenced by concerns about potential side effects harming existing disabilities. This study investigates the research question: "Is there a relationship between receiving the COVID-19 vaccine and being disabled?" The primary aim is to assess whether individuals with disabilities are more or less likely to have been vaccinated, and whether those with multiple disabilities exhibit different vaccination patterns compared to those with a single disability. The expected hypothesis is that people who are disabled are less likely to have the COVID-19 vaccine. Using a dataset that included information on vaccination status and disability, where all values were labeled according to a predefined codebook. To ensure data integrity, there was correction for missing values before conducting further analysis. The next step involved recoding the relevant variables into nominal data categories to classify individuals as either disabled or not disabled. Additionally, exploring the potential relationship between having more than one disability and the likelihood of being vaccinated. By categorizing individuals based on the number of disabilities reported, the aim is to understand if the complexity of health conditions influences vaccine uptake. The processes that will be taking to study these relationships is interpreting histograms, bar charts, significancy tables, and probability tables. The expected conclusions are that people that have a disability are less likely to receive the COVID-19 vaccine.

Statistical Analysis of Sex and Adolescent E-Vapor Product Use

Poster #3 (Marietta Event Center)
Thursday, November 21st, 2:00 – 2:45 pm
Undergraduate Student(s): Madison Weeks & Anna Kate Lane
Research Mentor(s): Kevin Gittner

This study aims to examine the relationship between sex and electronic vapor product use among adolescent high school students aged 12 to 17. As the use of electronic vapor products, commonly known as e-cigarettes or vapes, continues to rise among youth, understanding demographic trends is crucial for the creation of public health interventions. A quantitative approach was utilized to create appropriate visuals and analyze the data, providing a clear representation of the patterns observed. This study utilizes the Centers for Disease Control and Prevention's (CDC) Youth Risk Behavior Surveillance System (YRBSS). The sample size of the dataset being used in this analysis is 16,111 cases. The YRBSS is used to monitor six key areas of health amongst the younger population: injury-related behaviors, tobacco use, substance use, sexual behaviors, unhealthy diets, and physical inactivity. This surveillance system is essential for identifying emerging health threats among young people. Research suggests that demographic factors, such as sex, influence use of tobacco in adolescents. Therefore, our proposal is that sex could also influence the use of e-cigarettes or other electronic vapor products in this group. Our hypothesis is that adolescent males are more likely to engage in higher rates of electronic vapor use compared to their female counterparts. This may be attributed to males' higher overall participation in risk-taking behaviors like those that the YRBSS tracks. The expected findings of this study aim to shed light on demographic patterns in vaping behaviors and inform public health interventions more effectively. By understanding these patterns, public health professionals can better tailor prevention programs and interventions to target the at-risk population. These findings will have implications not only for immediate public health strategies but also for future research aimed at understanding the broader social and psychological factors influencing youth vaping.

Nursing

Immersive Virtual Reality Program for Parent Home Safety Education to Prevent Child Injury

Poster #15 (Marietta Event Center)
Thursday, November 21st, 1:00 – 1:45 pm
Undergraduate Student(s): Javier Haro & Reece Freeman
Research Mentor(s): Melissa Osborne, Lei Zhang, & Allison Garefino

Injury is the leading cause of death in children under the age of six in the U.S., creating a large public health challenge and a call to action to reduce rates of injury deaths. In 2021, >1 million emergency room visits and >2800 deaths occurred among children under 6 due to unintentional injuries. With most incidents taking place at home, evidence-based parenting programs (EBPP) are a key opportunity to reach parents with injury prevention education, and ultimately to

improve outcomes. Parent home safety education has been largely driven by written materials, such as pamphlets, which lack engagement and application. To introduce behavior change, and apply learning concepts in real-world contexts, novel approaches are needed. Using immersive virtual reality (IVR), our team is developing a home safety program for parents of young children aiming to simulate a home environment, allowing parents to learn and practice their home safety and supervision skills without introducing real risk. Behavior change requires skill practice; IVR lends itself to this type of practice, making behavior change more likely. The IVR program can increase parent engagement and can be disseminated to the network of EBPPs in the U.S., many of which have federal funding allotted for them. In line with Human-Centered Design, two phases will be conducted: (1) Design/Ideate, (2) Prototype. Phase 1consists of interviews and focus groups with EBPP providers and parents to obtain feedback on the program. Phase 2consists of beta testing (n=5) and a pilot trial (n=10) of the prototype. We will collect data on parents' home safety knowledge, ability to identify hazards in a physical space, and user experience. We will assess sustained program impacts by collecting data three months post-baseline. This pilot study will aid in preparation for larger studies and broader program development to ultimately reduce child injury.

Perceived Spousal Support and Quality of Life of Nigerian Women with Breast or Gynecological Cancer

Oral Presentation (J.M. Wilson Student Center - Ballrooms)
Wednesday, November 20th, 1:00 – 1:50 pm
Undergraduate Student(s): Elizabeth Maciejewski
Research Mentor(s): Chinomso Nwozichi

Perceived spousal support is crucial in influencing the quality of life (QoL) of women with cancer. Despite its importance, limited studies have explored the impact of spousal support on the QoL of Nigerian women with breast and gynecologic cancers. This study aimed to examine the effects of perceived spousal support on the QoL among Nigerian women diagnosed with breast and gynecologic cancers. A cross-sectional survey was conducted online using Google Forms, involving 254 Nigerian women with breast and gynecologic cancers. Participants were recruited through cancer support groups, social media platforms, and hospital referrals. The Perceived Spousal Support Scale (PSSS) was used to measure perceived spousal support, while the City of Hope Quality of Life (QoL) Instrument assessed the QoL of participants. Data were analyzed using descriptive statistics, Pearson correlation, and multiple regression analyses to determine the relationship between perceived spousal support and QoL. The mean age of participants was 47.8 ± 10.6 years, with 58% diagnosed with breast cancer and 42% with gynecologic cancers. The findings revealed a significant positive correlation between perceived spousal support and overall QoL ($r = 0.49$, $p < 0.01$). High levels of perceived spousal support

were associated with better QoL scores in the physical, psychological, social, and spiritual domains of the City of Hope QoL Instrument. Multiple regression analysis showed that perceived spousal support was a significant predictor of QoL ($\beta = 0.38$, $p < 0.01$), accounting for 31% of the variance in QoL scores after controlling for age, cancer type, and treatment status. Perceived spousal support significantly enhances the QoL of Nigerian women with breast and gynecologic cancers. These findings underscore the need for interventions that strengthen spousal support systems to improve the QoL of women coping with cancer. Future studies should explore tailored approaches to engage spouses in the supportive care of cancer patients.

Social Work & Human Services

Boundary Spanning and Community Engagement in Higher Education
Poster #7 (Marietta Event Center)
Thursday, November 21st, 10:00 – 10:45 am
Undergraduate Student(s): Rosland Szechenyi, Savannah Blanco, & Ansley Cole
Research Mentor(s): Darlene Xiomara Rodriguez & Jennifer W. Purcell

This thematic analysis examines the impact of leadership and institutional culture on higher education institutions (HEIs) and their professionals, particularly those engaging with communities. Drawing from over eighty journal articles, dissertations, and the 2024 Engagement Scholar Consortium Alumni Survey, the study focuses on job satisfaction, retention, burnout, and value congruence among community-engaged faculty and staff, known as boundary spanners. The qualitative research identified a need for future research on interventions to reduce burnout and emotional stress among these professionals. It also addresses opportunities for professional associations and universities to create supportive communities and enhance faculty and staff well-being. Using an in-depth review of existing literature, this study highlights the sustained negative effects of the COVID-19 pandemic on the higher education workforce. Some of those negative effects presented as job dissatisfaction, role strain, well-being, and retention within HEIs as reported by survey participants The recommendations include Ensuring manageable workloads and compensation packages that commiserate with position and experience, Supporting workplace-based mental health interventions such as green spaces and focused communities of practice, and Prioritizing well-being in the higher education workforce to improve job satisfaction and reduce burnout.