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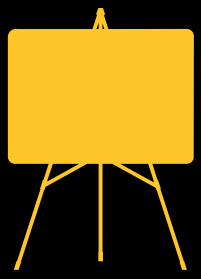

SYMPOSIUM OF STUDENT SCHOLARS

NOVEMBER 15TH-17TH

Program

Wednesday November 15, 2023

9:00am – 9:50am:	**Oral Presentations in the College of Computing and Software Engineering** (J.M. Wilson Student Center – Ballrooms)
10:00am – 10:50am:	**Oral Presentations in the College of Architecture and Construction Management** (J.M. Wilson Student Center – Ballrooms)
11:00am – 11:50am:	**Oral Presentations in the Southern Polytechnic College of Engineering and Engineering Technology** (J.M. Wilson Student Center – Ballrooms)
12:00pm – 12:50pm:	**Oral Presentations in the College of Science and Mathematics** (J.M. Wilson Student Center – Ballrooms)
1:00pm – 1:45pm:	**Poster Presentations** (Gymnasium/Marietta Event Center)
2:00pm – 2:45pm:	**Poster Presentations** (Gymnasium/Marietta Event Center)
3:00pm – 3:45pm:	**Poster Presentations** (Gymnasium/Marietta Event Center)
4:00pm – 4:45pm	**Poster Presentations** (Gymnasium/Marietta Event Center)

Thursday November 16, 2023

9:00am – 9:45am:	**Poster Presentations** (Gymnasium/Marietta Event Center)
10:00am – 10:45am:	**Poster Presentations** (Gymnasium/Marietta Event Center)
11:00am – 11:45am:	**Poster Presentations** (Gymnasium/Marietta Event Center)
1:00pm – 1:50pm:	**Oral Presentations in Wellstar College of Health and Human Services** (J.M. Wilson Student Center – Ballrooms)
2:00pm – 2:50pm:	**Oral Presentations in Radow College of Humanities and Social Sciences** (J.M. Wilson Student Center – Ballrooms)
3:00pm – 3:50pm:	**Oral Presentations in the College of the Arts** (J.M. Wilson Student Center – Ballrooms)

Friday November 17, 2023

12:00pm – 5:00pm:	**Virtual Presentations** (Microsoft Teams)

Bagwell College of Education

Elementary & Early Childhood Education

Pre-Columbian Art and Symmetry: An Experiment with Culturally Relevant Lessons
Poster #6 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Brenda Villa and Betsy Barron
Research Mentor(s): Paula Guerra

This study focuses on the understanding about symmetry young Latinx children develop using pre-Columbian art. The authors introduced Incan, Mayan, and Aztec art (as well as other cultural aspects), as an avenue to teach geometry and support the children's mathematical discourse. Authors explored how seven and eight-year-old Latinx children who were participating in a literacy summer program can demonstrate a deeper mathematical understanding of the topic, using Latinx culture to support the development of that knowledge. The questions guiding this study are: What are the early understandings about symmetry that Latinx children demonstrate before receiving any instruction on the topic? How do culturally relevant lessons revolving around Aztec, Inca, and Mayan art support the development of understanding of symmetry by those students? Data from 20 Latinx children was analyzed. The authors found that 85% of them created an almost symmetric design by the end of the intervention (up from 60% mid-intervention). But only 71% of those kept symmetric "halves" the same size (up from 67%). 65% of the children who created the almost symmetric design did discuss the need for there to be 2 parts that had to be "the same" or "equal". Finally, 53% of those children could also identify corresponding symmetric points on their designs. In addition to that, anecdotal data showed that children enjoyed learning about pre-Columbian cultures. They continued to mention them throughout the interviews, especially Mayan culture when they described their designs. They claimed it was important for them and others to learn about these Incans, Mayas, and Aztecs and demonstrated pride in their connection to those pre-Columbian cultures. Classroom observation data is still being analyzed.

Coles College of Business

Economics, Finance & Quantitative Analysis

Implications of the American Rescue Plan Act on Healthcare Equity for African Americans
Oral Presentation (Microsoft Teams)

Friday, November 17th
2:00pm – 2:15pm
Undergraduate Student(s): Naomi Ayoade, Pyper Sims, and Endurance Ninayor
Research Mentor(s): Weiwei Chen

As a result of the COVID-19 pandemic, millions of people, including the marginalized group of African Americans suffered equitably, in terms of healthcare. African Americans reached their highest level of unemployment, at 16.8 percent, as of May 2020. Due to the immense need for government assistance from the American people, Joe Biden signed the American Rescue Plan Act into law. This was a timely bill that provided stimulus checks, continuous payments for households earning less than $90,000 annually, and tax cuts. Three hundred and sixty billion dollars were allocated to states to compensate those on the frontlines of the pandemic. In total, about $1 trillion was utilized to alleviate the economic hardships caused by the COVID-19 pandemic. The problem of healthcare accessibility and affordability for African Americans in the United States is deeply rooted in history. African Americans often face higher levels of poverty which makes it difficult to afford healthcare costs, even with insurance. This can result in delayed or foregone medical care. This study will investigate whether the American Rescue Plan Act was able to effectively reduce healthcare disparities and improve the accessibility of insurance coverage for African Americans. Using rapid review methods, we researched the potential implications of the American Rescue Plan Act in relation to healthcare accessibility and affordability for African Americans. The rapid review assessed the policies of ARPA by using systematic review methods to search for and critically appraise existing research. Statistically, ARPA has led to an upward trajectory in the number of insured African Americans, increasing from 9 percent in 2019 to 15 percent as of 2021. The American Rescue Plan Act has effectively improved health insurance coverage and care accessibility for African Americans.

College of Architecture and Construction Management

Architecture

Architecture as a Form of Care
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
10:00am – 10:50am
Undergraduate Student(s): Sara Clement
Research Mentor(s): Pegah Zamani

The emergency department (ED) is often internalized, cut off from the natural world, and structured around efficiency, despite its effect on patient health. It's a critical healthcare setting where patients seek immediate medical attention for a wide range of conditions, often under circumstances of extreme stress and urgency. Efficient patient care within the ED is paramount to ensuring positive outcomes, yet the question remains: Can clinical efficiency prioritize the solicitude of people within an emergency department? With an increasing number of patients seeking care, the need for a hospital that responds to change without sacrificing patient and staff experience is at an all-time high. This thesis explores the complex relationship between clinical efficiency and patient/staff centered design. The primary objective is to understand how clinical efficiency and architectural design can work in tandem to create the emergency department of the future. This will be achieved through a series of semi-structured interviews, touring emergency departments in the Atlanta area and observing how they function from a clinical and architectural perspective, and literature and case studies to aid in a better understanding of today's emergency department trends. At the end, a toolkit will be created for ways emergency departments in the U.S. can implement clinical efficiency techniques and architectural design for better patient and staff experience. This toolkit will be tested on the ED at Grady Memorial Hospital, the 5th largest public hospital in the United States and Atlanta's only level 1 trauma center.

Capturing the Atmosphere through the use of Fog Harvesters
Poster #5 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Graduate Student(s): Jan Wachenfeld
Research Mentor(s): Selen Okcu

Water scarcity is currently a prominent global challenge. The primary objective of my proposal is to address this issue by implementing alternative methods for the preservation and distribution of water in order to benefit the residents of Peru across residential, industrial, and agricultural domains. Presently, there are worldwide initiatives dedicated to the extraction of moisture from fog through moisture-capturing systems. However, there exists a significant deficit in public awareness regarding these technologies. A secondary goal of my proposal is to raise awareness regarding the deployment of passive systems, which possess the potential to inspire architects and influence the architectural morphology of new urban areas and landscapes. This can be achieved by designing architectural elements that both enhance the local environment and facilitate water harvesting techniques for the community. The design I created involves a series of interconnected network of fog collectors situated on the slopes of a mountain side. This facility will serve as an artistic display, featuring performative fog catcher panels inspired by Peru's traditional weaving techniques and patterns. These performative panels will operate as passive systems, capturing atmospheric moisture from the sky. The collected water will be made available

to the public for their use, and any surplus water will be utilized to transform the arid mountain terrain into a lush, vegetated landscape.

Chaos and Order
Poster #16 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Falak Alam
Research Mentor(s): Arief Setiawan

Wars and occupations happened all over the world throughout history. As Eyal Weizman has demonstrated in "Hollow Land," architecture actually partakes in wars and occupations. Architecture facilitates the occupation's goals of control and dispossession through spatial and formal means. Weizman breaks architecture's effects on the political environment down into six main categories: anchor point settlements, vertical architecture, uniform design, the dynamic battlefield, the spatial arrangements of settlements, and threshold spaces. These strategies exemplify the way design has been used in an effort to instill fear and erase identities of cultures. Weizman's book, along with Lebbeus Woods' writings and drawings, has investigated the effects of war, and corresponds to the key ideas of isolation and fear as contributive emotions that relate to the elements of the sublime. Further, architectural work of Woods, Piranesi, Bachelard, and John Hedjuk explore the way design can instill fear and create the feeling of the sublime, where suspense, curiosity, horror, and pleasure are all joined into one. By analyzing the formal and spatial organizations of these precedents and relating them to relevant literature, my research aims to inquire about design strategies used to create these feelings and to ask how the narrative can be flipped, bringing awareness to the techniques of how architecture oppresses a population.

Daylighting in Buildings: Investigating the Relationship between Daylight Levels and Building Compactness in Various Contemporary Architectural Types
Poster #3 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Andrew Günay Welch
Research Mentor(s): Ermal Shpuza

Among the most substantial ways to improve the energy efficiency of a building is to manipulate the floorplate in ways that lets more natural light in while reducing the energy loss or gain through the envelope area. However, creating buildings that have more natural light comes with a greater construction cost due to larger envelope areas. The goal of this research is to determine what aspects of floorplate design maximize the natural light entering a building and minimize the construction costs associated with the building. In the first phase of research last year, we

analyzed a sample of floorplates from Richard Weston's, Key Buildings of the 20th Century from which we determined that the scaling of the building has the greatest impact on the natural lighting entering a given building. In the current phase of research this year, we inquire about the effect of building size on the complex relationship between natural lighting and building compactness linked to cost. First, all the buildings are scaled and brought to the same floorplate size in order to evaluate the effect of building typology on daylighting, while the plot between daylighting and compactness is studied according to body condition index, which is translated from comparative studies in life sciences. The residual of each case to the trendline in the plot is quantified as an index of daylighting, similar to the body condition. In addition, we test the effect of floorplate shape (compactness and fragmentation) on building's daylighting and efficiency.

Enabling the Intellectually Disabled Mind through Architecture
Poster #5 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Graduate Student(s): James Voorhees
Research Mentor(s): Selen Okcu

Mental disabilities create internal obstacles for the affected individual that can prevent them from functioning properly in a given setting. The architectural design solution presented will allow them to not only address, but overcome, these obstacles. This solution will serve to remediate sensory overload and similar symptoms, while simultaneously providing their incremental exposure so that they can better handle their presence in everyday life. This creates a functional paradox, requiring careful compositional considerations in order to create a controlled, but flexible, environmental setting.

Enhancing Adobe Housing in Oaxaca, Mexico
Oral Presentation (Microsoft Teams)
Friday, November 17th
4:15 – 4:30pm
Undergraduate Student(s): Alexis Fernandez
Research Mentor(s): Arief Setiawan

Oaxaca is a state located in southern Mexico that is best known for its indigenous people and cultures. In the past, housing in Oaxaca was also influenced by its native traditions and were built using adobe bricks. Unfortunately, in present day, most of adobe homes have been replaced by concrete, and the tradition of building with adobe is being forgotten. Adobe, which is a dried mud brick, is traditionally made by mixing sand, clay, straw, and water before being baked in the sun. The importance of this material ties into the culture and traditions of the Zapotec and Mixtec who are Oaxaca's pre-columbian indigenous civilizations. In addition, adobe is an ideal

building material due to its heat absorption ability during hot days and ability to reflect this stored heat during cold nights. Adobe is currently being replaced by concrete due to the inexpensiveness of the material cost. Concrete, although uncomfortable to live in with Oaxaca's hot climate, is faster and easier to build with compared to adobe. In addition, people residing in Oaxaca prefer to build with concrete because they believe that a concrete house is more luxurious than a house made of "dirt". I want to reverse the stereotypical idea and bring back adobe housing to Oaxaca's villages by using a different adobe building technique. What will be the most ideal method of building with adobe in order to design an adobe house that conserves Oaxaca's culture, customs, and traditions?

Fabric Forms Systems for Reinforced Concrete Beams
Poster #10 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Jocelon Smith, Greg Sweat, Jesus Vielma, Kevin Lopez, Matt Reddik, Evan Haller, Sean Sadler, Daniel Bocanegra, and Blair Cunningham
Research Mentor(s): Giovanni Loreto and Oguzmert Metin

This study delved into the application of flexible formwork in the casting of reinforced concrete beams. Conventionally, formworks have been constructed from rigid materials such as steel or wood. This has led to the creation of prismatic members that prioritize simplicity in construction over efficient material usage. By employing flexible forms, it becomes possible to fashion more optimized shapes. Beams cast using flexible formwork have demonstrated the potential to reduce material consumption by up to 30 percent, all while maintaining equivalent strength. The process involved testing various fabrics in conjunction with the formwork rigging, which exerted pressure on the concrete to assume the desired shape. Additionally, 3D-printed components were introduced into the fabric to aid in shape optimization. The casting of the beam utilized self-consolidating concrete to minimize vibrations during operations and engage the fabric under hydrostatic pressure. The beams underwent testing in a four-point bending configuration, from which data were gathered to compare the strength and failure modes of the fabric beam with that of a conventional prismatic control beam. The findings revealed that conventional reinforcement poses challenges when dealing with the intricate shapes produced by flexible formwork, resulting in alterations to the failure mode. This study provides valuable insights into the mechanical behavior of reinforcement and outlines the necessary adjustments to achieve ductile behavior.

From Silence to Thriving: Architecture as a Voice for the Wayuu Tribe
Poster #9 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Angie Son Pulido

Research Mentor(s): Arief Setiawan

This architectural research addresses a profound humanitarian crisis faced by the Wayuu Tribe, an ancient indigenous community in Colombia that is gradually disappearing and threatened with extinction. The Wayuu people have endured centuries of adversity, including colonialism, exploitation, violence, drug trafficking, and marginalization, resulting in profound damage. At the heart of this crisis lies the loss of the tribe's history, ancient knowledge, and cultural manifestations. This research aims to translate the Wayuu Tribe's architectural traditions, spatial wisdom, and design philosophies into tangible designs. The basis of this research draws from Kenneth Frampton's critical regionalism and Sibyl Moholy-Nagy's humanist approach. Furthermore, it analyzes architectural works of Jane Drew, Francis Kere, Gregory Burgess, and Balkrishna Doshi, architects who advocated for participatory design and incorporated indigenous techniques, motifs, symbols, meanings, and artwork. It also studies psychological aspects of design related to social sustainability, cultural resilience, empowerment, and the preservation of Wayuu heritage. Beyond architecture, this study will explore Colombian artistic work that integrates indigenous elements into contemporary forms, including the magical realism of Gabriel García Márquez's literature and traditional music capable of connecting people and transmitting cultural legacy. These elements form a comprehensive framework for a design approach that seeks not only to learn from the Wayuu culture but also to address a fundamental question: What design strategies, derived from the collective memories of the Wayuu people, can be developed to effectively raise awareness about the plight and to empower this community?

Memory in Architecture
Poster #20 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm - 1:45pm
Undergraduate Student(s): Megan Eaton
Research Mentor(s): Christopher Welty

People forget things every day. For most of us, this includes forgetting where we put our keys or what time we're supposed to meet a friend, but for some people, memory is a much more serious issue. For them, forgetting is much more like forgetting who family members are, where they are, or what year it is. These individuals struggle with afflictions or mental disabilities like Alzheimer's, Dementia, or Traumatic Brain Injuries. Architecture has the power to help us remember and this can be seen through memorials and worship spaces. So, the question raised is: Can architecture help us remember? The thesis aims to investigate memorials and worship spaces as a case study and develop a space where individuals struggling with memory-affecting afflictions can come to remember. The case studies will be analyzed and diagrammed to determine which architectural elements are used and how they are used within the spaces. A synthesis will then be developed to see which of these elements are most frequently used in

worship spaces and memorials and which methods are most successful. This synthesis will then be paired with research of memory-affecting afflictions to see which architectural elements and methods would be the most beneficial in memory recall for these individuals. The space created with these elements aims to significantly aid in memory recall for those struggling with memory-affecting afflictions.

Multisensory Realm: Architecture for the Visually Impaired
Poster #15 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Jennifer Perez
Research Mentor(s): Selen Ocku

According to the World Health Organization, there are approximately 2.2 billion people who have a near or distance vision impairment. Vision has historically been considered the most important of the senses; therefore, when this sense becomes obstructed, an individual's lifestyle can be harshly impacted. Because their vision becomes obstructed, visually impaired individuals run into various daily life challenges such as having difficulty navigating around independently, stigma in society, leisure, accessibility, and isolation. This can be due to the issue that the built environment has tended to neglect building for all senses. For this reason, an architectural goal has been to design with equity. Where the built environment should be designed with sensory translation to guarantee that all elements are vivid for every sensory realm. While certain parameters such as lighting, color, contrast, olfactory, haptics, auditory, materiality, and spatial layout have made progress for a visually impaired individual to navigate throughout a space, we tend to neglect that for an individual to be fully immersed in a space, we must also enhance the experience impaired individuals tend to miss out on. To address this issue, I want to develop extensive research on experience orientation, positioning awareness and navigation [wayfinding] that can be achieved through different tactile materials, acoustic treatments, and lighting implementations. I would like to further investigate the elements of light and shadow and their phenomenology aspect that they can have on an environment by giving emphasis to geometry and the evolution of contrast through an area. This thesis will focus on phenomenological investigation and explore how a visually impaired person perceives an individual element and links them together in its entirety to tell them where they are in a space to regain independence of navigation and safety in the built environment.

Stitching Spaces: Exploring the Interplay of Fashion and Architecture Through Form, Technique, and Story
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
10:00am – 10:50am

Undergraduate Student(s): Michael Toache
Research Mentor(s): Arief Setiawan

Within the realm of design, there lies a relationship between fashion and architecture. When humans formed the earliest spatial boundaries by weaving plant fibers between posts, as we created fences before we clothed ourselves, weaving textiles was instituted in some of the earliest forms of architecture still used today. the process of design that drives the creation of the spaces we inhabit and the textiles we craft to inhabit as a secondary layer starts from the same mind. (High) Fashion has developed into an incredible display of expression and is exhibited as a wearable art form, a decoration of the second skin. Only the most architectural minds of fashion have been able to see what fashion truly is. "dress design as a form of engineering, rather than a mere synthesis of existing elements" (Chris Breward 34). How can the process of fashion design as an expression be replicated in the architectural design process? This research will analyze precedents of some fashion designers, such as Balenciaga and Issey Miyake, in terms of forms, technique of production, materials, and story. It will also explore the process of making dresses, in terms of techniques, design, and structure. Further, this research will analyze architectural precedents related to fashion, for example, Gehry's Louis Vuitton. The findings from these analyses will form explorations of design strategies to relate fashion design and architecture.
Breward, Chris. "The Rise of the Designer." Essay. In Fashion, 34. Oxford, UK: Oxford History of Art, 2003.

The Art of Experience: Redefining Architectural Experiences through Design
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
10:00am – 10:50am
Graduate Student(s): Brett Hembree
Research Mentor(s): Christopher Welty

We are constantly surrounded by and inhabiting the built environment. Architecture has the ability to affect someone's mood in the most subtle of ways. The spaces we inhabit have an impact whether you are aware of it or not. Peter Zumthor said, "Architecture is a service, a process, a way of building and leaving the world a little better for our presence." The question becomes, "How can we use architectural designs to create impactful experiences for those who are in the space?" My thesis is an exploration of how we design spaces and what strategies can be implemented to influence the viewers' perception. Humans are shaped by experience therefor; architecture should seek to create an experience that will leave a lasting impact on its population. Through literature review and readings, I have begun to identify three major criteria. These specific aspects are lighting, materials, and the shape of space. Taking these different criteria aspects, case studies and precedent analysis have been diagrammed and broken down in order to determine how to use each of the methods. From each of these precedents, I have been collecting

data and creating a catalog of the experiential qualities of space. This catalog forms the basis for conducting a series of experiments where I will develop a test that can be applied to any space. To explore these ideas of perception and experience in space, this test will be conducted on a set of boxes that will each show one aspect of the aforementioned criteria to get feedback on the perception. Spring will consist of a series of projects where I will implement my findings to create spaces that are more than just buildings, but experiential spaces.

The Crucian Cultural Experience
Poster #3 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Ashlee Martinez
Research Mentor(s): Ameen Farooq

Welcome to St. Croix USVI, an island of beauty and wonder, filled with rich history and splendor. The question posed throughout the thesis is – how can Architecture be used to preserve the history and culture of St. Croix? This thesis proposes the development of a cultural theme park based on the culture of St. Croix, USVI. The park's primary goal is to preserve the island's cultural heritage while providing an immersive and educational experience for tourists and locals alike. Using interactive exhibits (VR), performances, and hands-on activities, visitors will gain the opportunity to learn about the island's history, music, dance, and food. Topics explored throughout the thesis are Critical Regionalism, place-based Architecture, and preserving the identity of place. The thesis argues that the park can catalyze cultural tourism on the island. The park's impact on the local community is also a significant factor – with a focus on economic development. Attracting visitors can impact revenue and aid in supporting local businesses. My thesis begins by examining the cultural significance of St. Croix and its heritage. It analyzes successful cultural theme parks and exhibits worldwide, drawing inspiration from their program and design. The proposed park's layout and attractions are outlined, including a -centralized courtyard for live performances and events. There will be (4) themed areas dedicated to (history, music, dance, and food) being brought to life at the park, along with educational exhibits and a historical walkthrough (exhibition), which would utilize interactive maps, photographs, and artifacts, which aids in bringing the history of St. Croix to life. The thesis proposes an innovative approach to cultural preservation and tourism development in St. Croix. By creating an engaging piece of Architecture, the island can showcase its history while providing memorable experiences for visitors and locals. Moreover, this will promote economic growth and community development, a life cycle that the people of St. Croix deserve.

The Impact of Sustainable Design on Students' Mental Health
Oral Presentation (Microsoft Teams)
Friday, November 17th

2:45pm – 3:00pm
Undergraduate Student(s): Tiffany Chen, Kaden Johnson, Ashley Gentles, and Dominic Nixon
Research Mentor(s): Pegah Zamani

This research project aims to study the correlation between mental health, academic performance, and sustainable design in the Gwinnett School of Mathematics, Science, and Technology (GSMST) in Lawrenceville, Gwinnett County. GSMST is the highest-achieving high school in Georgia, ranked 19th nationally in 2023 and declared as The National Blue Ribbon School of Excellence in 2016. The school prioritizes high academic achievement and brings out the potential of all students that attend with their boasted 100% graduation rate for the 2021 - 2022 academic school year. This public school is precisely designed to enhance the abilities of students by including spatial features of universities such as collaborative learning environments, focused study areas, and lecture halls. Despite the high-quality sustainable spaces, according to GADOE (Georgia Department of Education), in the 2023 Georgia Student Health Survey while the performances are high, there's a lack of correlation between sustainable schools and student's mental health.

The Rebuild Project
Poster #19 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Graduate Student(s): Maria Del Valle
Research Mentor(s): Ameen Farooq

The Rebuild Island Project is meant to create relief for the islands that experienced hurricane damage. The project will be on the site of a city that has abandoned homes, unfiltered water, spoiled agriculture, and a damaged electrical grid. The city will be a self-sustaining city that focuses on cleaning up uninhabitable properties, building educational institutions, and creating community support for local Puerto Ricans. The project will not only be exclusive to Puerto Ricans, but this model will also be replicated for islands that go through natural disasters and neglectful government. This urban development will be seen through a 10-year plan or even phases. In the first phase, urban development will study the art and culture of a place through a festival. This can lead to more job opportunities, especially for local artists and vendors, which can create a ripple effect of economic benefits. Festivals are a rich part of Puerto Rican culture, which attains a long history of celebrating music, dance, food, and other forms of artistic expression. Festivals serve as an important opportunity for Puerto Ricans to come together and celebrate their shared cultural identity. They also provide an important economic boost to local communities. While festivals alone may not be enough to address the complex challenges faced by Puerto Ricans, they are an important part of the cultural fabric of the island and can serve as a

source of inspiration and pride for the community. The second phase focuses on sustainable agriculture practices and providing resources for the local community. The third phase provides community classrooms where people can have access to education and training to build the skills and knowledge necessary to thrive in a corrupt government. The fourth phase focuses on creating protected hurricane homes which can reduce the vulnerability of going through hurricane loss. Each phase addresses a critical aspect of sustainable development from promoting economic growth and preserving cultural heritage to protecting natural disasters.

Reconnecting to the Site
Oral Presentation (Microsoft Teams)
Friday, November 17th
3:15pm – 3:30pm
Graduate Student(s): Caleb Willis
Research Mentor(s): Ameen Farooq

As much as technology has advanced in the past couple of centuries, it appears that the relationship between the architect and the site has only grown thinner. Working from home and technological advancements have created an environment that loosens the grasp that architects have of the site. Documents are sent directly to contractors over email, buildings are standardized and plotted unto any landscape desired, and buildings are demolished at the touch of a button. With this loss in connectivity, this project aims to reconnect the architect to their site, as they shall be issued land for development, not a building. An environmental and urbanistic approach to developing land will allow new developments to integrate into their current landscape, as well as remain there for many cycles of programs. While considering the site during the process, Connection to the Site hopes to create a project that blends in with its current surroundings and establishes it as a keystone that will last for generations to come. Connection to the Site aims well past the physical media however, as socially the architect must be interwoven with the local inhabitants and the site's developers, for the sake of efficiency, and sensitivity. This communication with the important people of the project will ground the Architect as responsible for their project and not just an overseer. Through this project, a site will be chosen to renovate and develop both new and old buildings to show both methods of making structures last. This approach will solidify the ways new buildings can be constructed while also showcasing how old ones can be redone, comparing technologies between these techniques.

The Restoration of the Machine: An Analysis of the Resilience and Revival of Modernist Architecture.
Oral Presentation (Microsoft Teams)
Friday, November 17th
1:15pm – 1:30pm

Undergraduate Student(s): Will Traylor
Research Mentor(s): Ehsan Sheikholharam Mashhadi

The Modernist movements of the early to mid 1900's provided a radical architectural narrative that guided architecture that still exists today. Two major proselytizers of this movement are the firms Skidmore, Owings, and Merrill (SOM) and Richard Meier & Partners. At its height, the movement was the icon for all that was innovative and Avante-Garde. Those who subscribed to the principles of modern architecture pushed for the rejection of tradition and the expansion of unfettered expression in design. To expand on the two subjects, S.O.M., founded in 1936, was one of the earliest firms that sought to expand modernist language onto high rise buildings. Their passion for such design can be found in their work on large-scale office buildings today. One of their founding principles became a signature of their early buildings; Architecture that is both economic and pleasing. Richard Meier and Partners began in 1963, after Meier worked for S.O.M. for several years. Meier's early success in the Modernist style earned him a spot as one the leading thinkers in modernist philosophy as well as one of the esteemed "New York Five". What is unique about both of these firms in particular, is that both survived the Modernist "purge". In this paper, I will analyze the two firms' resilience to the fall of Modernism, the new architectural strategies they developed the help avoid rejection during the Post-Modern movement, and finally how well these new strategies operate in a contemporary scene. The ultimate goal is to better understand how and why these firms used to survive the death of modernism, and then to determine if they altered their design strategies to learn from the mistakes of the Modernist, or if they are doomed to repeat themselves.

Construction Management

3D Printing in Construction
Poster #7 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Graduate Student(s): Adeshola Bankole
Research Mentor(s): Amaal Al Shenawa & Jeffrey Collins

In recent years, three-dimensional 3D printing technology has become widely used in the construction industry due to its numerous advantages over traditional construction methods. It is an innovative construction technology using large-scale 3D printers to create full-scale building components or entire structures. 3D printing is revolutionizing building construction, offering greater design flexibility, faster construction times, sustainability, reducing costs, and reducing safety risks. This technology allows construction companies to create complex structures and components with high accuracy, reducing waste and cost of materials. One of the most crucial factors in the success of 3D printing in construction is the development of suitable

materials. This study explores the various materials used in 3D printing for structure, such as concrete, clay, and composite materials. This research also discusses the properties of these materials, including their strength, durability, and ability to withstand environmental factors. Finally, the challenges of 3D printing materials for construction and the potential impact of this technology on the construction industry in the coming years.

College of Computing and Software Engineering

Data Science & Analytics

Data Quality Checks: Implementation With Popular Data Collection Crowdsourcing Platforms
Poster #15 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Graduate Student(s): James Down, Gregory Balkcom, & Kristine Duncan
Undergraduate Student(s): Ngan (An) Truong and Andrew Lewis
Research Mentor(s): Kevin Gittner & Lauren Matheny

The utilization of online crowdsourcing platforms for data collection has increased over the past two decades in the field of public health due to the ease of use, the cost-saving benefits, the speed of the data collection process, and the accessibility of a potentially true representative population. Although these platforms offer many advantages to researchers, significant drawbacks exist, such as poor data quality, that threaten the reliability and validity of the study. Previous studies have examined data quality concerns, but differences in results arise due to variations in study designs, disciplinary contexts, and the platforms being investigated. Therefore, this study was conducted to concentrate on data quality for Patient-Reported Outcomes in orthopedic and sports medicine research using Qualtrics, Survey Monkey, and Amazon Mechanical Turk (MTurk). Multiple rounds of data collection were executed across the three platforms to assess data quality. Four primary data quality assessment categories were determined: demographic (State vs. Zip code, State vs. Region, etc.), attention, honesty, and logic. Data were collected in Qualtrics (n=500), SurveyMonkey (n=400), and MTurk (n=400) and descriptive analyses were conducted to assess data quality. Pearson correlation coefficient was performed to compare Relevant ID Score provided by pay-for-data services to the total number of flags assessed by the research team. Chi-square tests were performed to compare the proportions of good quality data across services. Based on the statistical analyses, we observe that Qualtrics provided the best data quality among the three platforms, SurveyMonkey produced reasonable data quality, and MTurk was the worst of the three services.

Understating Military Trauma: Investigating the Connection Between Military Service Experiences and PTSD Diagnoses Among Incarcerated Veterans
Poster #7 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Rachel Werts and Ryann Williams
Research Mentor(s): Kevin Gittner

Post-traumatic stress disorder (PTSD) is a mental health condition that can develop after exposure to a traumatic event, such as war. Veterans who served in the war are at an increased risk of developing PTSD because of the severity of their experiences. These experiences may include witnessing or experiencing death, violence, and destruction. There are several effective treatments for PTSD; many veterans in prison do not have access to these treatments. PTSD can have a significant impact on the lives of veterans in prison, making it difficult to function and reintegrate into society. It is important to provide veterans in prison with access to mental health care so that they can receive treatment for PTSD and other mental health conditions. This study aims to explore the association between veterans serving in the armed forces and the probability of these individuals receiving a PTSD diagnosis and whether there are specific factors of military service that impact this relationship. This data was collected from the Bureau of Justice Statistics (BJS) sampling a total of 364 prisons were selected, involving 24,848 prisoners at both state and federal levels. The primary variables for this study are veteran status and PTSD diagnosis. The secondary variables include combat service, exposure to environmental hazards, type of discharge, and arrest for a violent offense. We cleaned the data, identified missing values, coded them accordingly, and utilized the codebook to find missing data. This study intends to analyze the data set to identify patterns and relationships related to PTSD diagnoses among veterans, predicting veterans are more likely to be diagnosed with PTSD than non-veterans and that specific aspects of military service will further increase their risk.

Computer Science

Implementation of Natural Language Processing Language Models to Generate Executable Code
Oral Presentation (Microsoft Teams)
Friday, November 17th
1:30pm – 1:45pm
Graduate Student(s): Jaskirat Sohal and Ariel Vidal
Research Mentor(s): Md Abdullah Al Hafiz Khan

Our scientific literature is abundant with mathematical concepts firmly based on proofs. The Curry-Howard correspondence establishes a connection between mathematical proofs and computer programs, suggesting that we can extract computer programs from mathematical literature and vice versa. While mathematical rigor varies among fields and authors, those seeking to tackle the problem may be daunted by the layers of jargon and innumerable notations they may encounter. By analyzing Mathematics and physics-based academic literature through various natural language processing techniques, the analysis will generate an executable code required to test the provided equations and precisely describe the code.

AI-Driven Natural Language Processing: Context Prediction
Oral Presentation (Microsoft Teams)
Friday, November 17th
3:00pm – 3:15pm
Undergraduate Student(s): Melike Ozcelik and Blanca Prats
Research Mentor(s): Md Abdullah Al Hafiz Khan

This report explores Natural Language Processing (NLP) with a specific focus on improving word prediction in conversations by detecting changes in context. The main goal of our research is to make existing word prediction models more accurate and user-friendly by addressing the challenge of recognizing when the topic of conversation shifts. We aim to enhance word prediction to reduce user frustration and improve the overall user experience. To achieve this, we introduce a new model that can effectively detect and adapt to changes in the conversation context, making the conversation flow more smoothly and enhancing the user's experience. Our research is based on a carefully curated dataset, which is crucial for developing a system that can better understand and predict words in context-aware conversations.

Aspect-Based Sentiment Analysis and Summarization of Online Product Reviews
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
9:00am – 9:50am
Undergraduate Student(s): Christopher Dymanus, Adam Borowski, and Luke Zeches
Research Mentor(s): Md Abdullah Al Hafiz Khan

Online shopping has grown more popular and accessible over the past decades, with countless products being available to consumers at the click of a button; however the sheer volume of similar products available can complicate the shopping experience. User-submitted reviews offer some insight into the quality of a product, but reading through several reviews to compare similar products can be time-consuming and frustrating for the consumer. This project looks to

reduce the time spent comparing products through the implementation of natural language processing techniques. We developed a system to generate a user-friendly report of the pros and cons of a given product, using information extracted from user-submitted reviews, to avoid the need for the consumer to read through the reviews themself. An entity tagger was built to identify and extract frequently mentioned aspects and the associated sentiment phrases from reviews for laptops on Amazon.com. By training a classifier to perform aspect-based sentiment analysis on the extracted data, we are able to determine the overall customer sentiment towards each aspect. The identity of each aspect, the context in which it appears, and the determined sentiment were provided to a summarizer model to create a short report of the positive and negative attributes of the product. We found that this generated text was a much more consumer-friendly way to learn about the pros and cons of a specific product, which should make deciding between similar products much simpler for potential buyers. Alongside the increased convenience for consumers, this system has business applications for gauging general customer opinion towards a specific product, or for comparing multiple available products in the same market.

Blockchain and Ethereum Vulnerabilities
Poster #20 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Daniel Chen
Research Mentor(s): Yong Shi

Blockchain and Ethereum (ETH) technology stands poised to revolutionize the digital world, offering unprecedented decentralization, transparency, and immutability of data across various industries; however, new technologies raise new security concerns. By overcoming key vulnerabilities in ETH, it allows a multitude of groundbreaking technologies such as Web3, Decentralized Finance (DeFi), Decentralized Apps (dApps), Non-Fungible Tokens (NFTs), and cryptocurrency wallets to become commonplace. This revolutionary crypto-dependent future of the internet relies on finding solutions to security vulnerabilities. We aim to pinpoint key security flaws and develop robust smart contract solutions within the Ethereum blockchain to enable the widespread adoption of Blockchain technology.

Cloud-Enabled Mobile App with Machine Learning for Smart IoT Application
Oral Presentation (Microsoft Teams)
Friday, November 17th
3:45pm – 4:00pm
Graduate Student(s): Samhitha Challagundla Subbarao
Research Mentor(s): Ahyoung Lee

Smart IoT applications such as smart meters, smart streetlights, smart bins and asset tracking all require sensors to gather data for real-time data analysis. We propose to develop a cloud-based mobile application, where sensors transmit real-time data to a cloud-based platform through a central gateway. The data is stored in a dynamic, real-time database and accessible through a dedicated mobile application. Furthermore, our system integrates cutting-edge machine-learning algorithms that analyze the collected data to predict accurate results. By leveraging historical data and real-time measurements, our system offers proactive insights into the data collected. This application can be made available to the users for ease of use.

Convolutional Autoencoder for Email Spam Detection
Poster (Microsoft Teams)
Friday, November 17th
1:15pm – 1:30pm
Undergraduate Student(s): Jonathan Tarrant
Research Mentor(s): Md Abdullah Al Hafiz Khan

In this paper, I will talk about a novel technique for email spam detection. Using the extremely adept pattern recognition abilities of Autoencoders, I designed a Convolutional Autoencoder network to analyze and classify emails as either ham (legitimate) or spam (illegitimate/scam) emails. With promising results, this type of model could help revolutionize email spam detection and tagging, making everyone's inbox less crowded with emails they don't want to read.

DarBERT: A Moroccan Arabic Language Model
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
9:00am – 9:50am
Undergraduate Student(s): Fatima Zahra Iguenfer, Nicholas Luchuk, and Sepehr Eshaghian
Research Mentor(s): Md Abdullah Al Hafiz Khan

The rise of unstructured text data in various languages presents both challenges and opportunities in the field of natural language processing. However, underrepresented languages, such as the Moroccan Arabic dialect (Darija), often lack comprehensive tools and resources for efficient information extraction, preventing the utilization of valuable textual data sources. This project is motivated by the need to bridge this gap, enhancing the accessibility of textual data in Darija, contributing to the diversification and inclusivity in the global digital information landscape. The objective of this study is to develop a Named Entity Recognition (NER) model tailored for the Moroccan dialect. Given the non-existence of standardized NER models for Darija, extracting meaningful information such as names, locations, and organizations from unstructured text remains a significant challenge. This project uses DarNERcorp, a manually

annotated corpus containing over 65K tokens, with named entities tagged according to the BIO tagging scheme and aims to solve the problem of entity recognition and classification in Darija texts, enabling efficient information extraction and text analytics. Using its ability to learn and represent sequential data well, a Bi-directional Long Short-Term Memory (BiLSTM) model is used to capture the contextual dependencies prevalent in natural language. An 80-20 split of the DarNERcorp dataset is used to train the model, guaranteeing a thorough learning phase and a reliable assessment to determine the model's generalizability and performance.

Data Collection of GlucoCheck and the Usability of the Mobile App
Poster #10 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Graduate Student(s): Afnan Ahmed Crystal and Breanna McDonald
Research Mentor(s): Maria Valero de Clemente and Katherine Ingram

There is a need for a non-invasive method for monitoring blood glucose concentration. In seniors, infection and tissue damage risks increase with reduced skin elasticity. Thus, we are working on a prototype called GlucoCheck. The GlucoCheck model enables needle-free blood glucose estimation. The device analyzes the light that passes through the skin. Upon participants' arrival, height, weight, and demographic data such as race, gender, and age are collected. Skin tone, temperature, and humidity are all collected using sensors. Certified phlebotomists insert a flexible catheter into the participant's arm to obtain comparable blood samples. GlucoCheck camera is placed on the finger to collect 12 pictures of the extremity. The Raspberry Pi processes these images using machine learning to determine the blood sugar level. Images from fingers are gathered at the same time points using the camera. Blood from a finger prick will also be collected. The participant then ingests a 75-gram glucose beverage. The mobile app aids diabetic users in logging pre- and post-meal glucose values, providing an accurate graphical representation of their blood sugar levels. Pictures of their meal(s) can be taken to log the type of food consumed and their caloric intake. A periodically retrained Convolutional Neural Network (CNN), based on transfer learning for Machine Learning (ML), ensures consistent optimal accuracy. Currently, the focus is on an American diet. We plan to include cuisines ranging from neighboring countries and eventually worldwide. The GlucoCheck is still in the prototyping phase of the study and more machine learning is necessary. We expect to observe a positive impact on the well-being of individuals in society living with diabetes and metabolic syndrome by enabling them to manage their condition without the pain of finger pricks.

Designing Intelligent Energy Efficient Scheduling Algorithm to support Massive IoT Communication in LoRa Networks
Oral Presentation (Microsoft Teams)
Friday, November 17th

2:45pm – 3:00pm
Graduate Student(s): Jui Mhatre
Research Mentor(s): Ahyoung Lee

We are about to enter a new world with sixth sense ability – "Network as a sensor -6G". The driving force behind digital sensing abilities is IoT. Due to their capacity to work in high frequency, 6G devices would have voracious energy demand. Hence, there is a growing need to work on green solutions to support the underlying 6G network by making it more energy efficient. Low cost, low energy, and long-range communication capability make LoRa the most adopted and promising network for IoT devices. Since LoRaWAN uses ALOHA for multi-access channels, collision management is essential. Moreover, in massive IoT, collision becomes a concern due to the increased number of devices and their ad hoc transmissions. Due to ALOHA-based transmissions, we see that scalability in LoRaWAN is challenging to achieve. Also, increased collisions and retransmissions eventually drain the batteries of IoT devices. Furthermore, in long-range communication, such as in forests, agriculture, and remote locations, the IoT devices must be powered using a battery. They cannot be attached to an energy grid. Frequently replacing their batteries is complex, motivating us to work on improving energy efficiency in massive IoT. To address Massive IoT collision and gateway load handling issues, we propose an intelligent scheduling algorithm to optimize the energy efficiency of LoRaWAN with cross-layer architecture in massive IoT with star topology. In our solution, we exploit the interdependence and interaction among PHY and MAC layers in an integrated manner. Also, we propose improving the existing multi-access strategy, channel activity detection (CAD), in LoRaWAN to reduce collisions and improve energy efficiency. We have designed a reinforcement learning-based scheduling strategy for the selection of transmission parameters and CAD improvement. We have also designed a LoRaWAN simulator for evaluating CAD-based algorithms.

Developing a Machine Learning Model to Categorize Mental Health Forums Using Scraping and Crawling in Python
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
9:00am – 9:50am
Graduate Student(s): Rohith Sundar Jonnalagadda
Research Mentor(s): Md Abdullah Al Hafiz Khan

Mental health forums serve as invaluable online communities where individuals struggling with mental health problems find solace, support, and valuable resources. These platforms offer a unique space where young people can openly discuss their struggles, seek guidance from moderators and fellow users, and receive vital assistance. Within these forums, it is not uncommon to encounter posts that contain severe content, indicating that the user is in acute

distress and may be at risk of self-harm. Research conducted through inductive thematic analysis highlights that while forums cannot replace the role of a trained counselor or therapist, they fulfill a critical role in providing young people with essential, lower-level support requirements. Participants in these forums have consistently reported them to be supportive environments where they feel comfortable sharing their experiences, offering advice, and asking questions. This sense of community makes individuals feel less isolated and more connected to others who understand their struggles. Our current project uses the power of machine learning to enhance the functionality of these mental health forums. We aim to develop a sophisticated model capable of automatically categorizing posts and discussions enabling more efficient navigation and targeted assistance. To accomplish this, we used web scraping and crawling techniques to gather data from diverse mental health forums. This collected data will serve as the foundation for training our machine-learning model to categorize forum posts into relevant mental health topics. This project promises to provide a valuable tool for both forum users seeking specific information and mental health professionals looking to offer precise and targeted support. Ultimately, our project strives to bolster the effectiveness of these forums as vital resources in the journey toward better mental well-being.

Email Summarizer and Action Item Extractor
Poster (Microsoft Teams)
Friday, November 17th
12:15pm – 12:30pm
Graduate Student(s): Ryan Deem and Eric Weese
Research Mentor(s): Md Abdullah Al Hafiz Khan

Countless emails are sent and received every day, and a lot of time is spent reading through and understanding the content of these emails. This project aims to increase the efficiency of reading and gathering relevant information from emails. Our solution includes two parts: abstractive text summarization and action item extraction. Currently, these two items are common in different domains, however, they have not been combined and used with email understanding. Abstractive text summarization is the process of outputting the ideas of the emails using different words without giving direct sentences from the document. We do this by taking an input of at most 6000 words from the chain of emails, and then we output 700 words for the summarization. In this way, a person would be able to tell if the email is something they will need to look at, and if not, then the Action Item Extractor tells what actions need to be performed Action item extraction involves finding all instances in a piece of text that are instructions, dates, or require something from the recipient. For example, "Please give me a list of names who are attending the party", "Send the signed document to me by Friday '', and "Don't forget to sign-up for the costume contest". Dates and deadlines are also extracted from the text. These two solutions hope to improve the efficiency of parsing through emails.

Importance of Food Recognition on Blood Glucose Monitoring
Poster (Microsoft Teams)
Friday, November 17th
2:15pm – 2:30pm
Graduate Student(s): Afnan Ahmed Crystal
Research Mentor(s): Maria Valero de Clemente and Luisa Valentina Nino de Valladares

Diabetes has emerged as a worldwide health issue even when over 50% of type 2 diabetes cases are preventable. Maintaining blood sugar under control requires eating a healthy and balanced diet, exercising, and adhering to medications. Dietary consumption must be under strict control for diabetic patients' general health. Traditional techniques for monitoring dietary consumption include recollection and manual record-keeping, but they can be tedious and prone to mistakes when used repeatedly. However, automated technologies for maintaining records that make use of computer vision and mobile cameras, such as food image recognition systems (FIRS), can streamline the process and help diabetes patients better manage their chronic health condition by automating their diet tracking. These solutions seek to efficiently track daily food intake and then offer nutritional suggestions to facilitate and encourage lifestyle improvements. Thus, in this work, we are designing and implementing a Machine Learning model that can recognize/classify food categories and estimate the corresponding volume and calorific content from picture(s) of an upcoming meal, which would help users assess the effect of the intake on their blood sugar levels. This is part of a larger project that involves an application to help GlucoCheck — a non-invasive blood glucose monitoring device — users keep track of their blood glucose levels and possible spikes. The majority of research exclusively concentrates on calorie estimation without making any direct connection to diabetic patients' blood sugar levels. The main difference between our model and other similar ones is its direct application to diabetes management.

Interview Q&A System using Natural Language Processing
Oral Presentation (Microsoft Teams)
Friday, November 17th
12:45pm – 1:00pm
Graduate Student(s): Benedicta Dadson, Catherine Lennon, and Kevin Anthony
Research Mentor(s): Md Abdullah Al Hafiz Khan

Recent advancements in Question-Answering (QA) systems have exploited natural language processing models to create human-like machine interaction across diverse domains. This paper delves into the persistent challenges of constructing domain-specific QA systems, with a keen focus on one application: the job interview. We introduce a refined model tailored to grasp the nuances of our interview-centric dataset. We focus on the improvement of existing models—Distilled Bidirectional Encoder Representations from Transformers (DistilBERT) and Bidirectional Encoder Representations from Transformers (BERT)—and our objective is to tailor

these architectures to the specificities of interview-based QA queries. Through rigorous evaluation metrics, we will present the merits of our optimized model, underscoring its potential in revolutionizing interview preparation methodologies.

Machine Learning in Minecraft: Proof of Concept for Object Detection Oriented Autonomous Bots in Minecraft
Poster #3 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): John Merkin, Casey Hampson, Jonathan Holloway, and Nicholi Moore Caron
Research Mentor(s): Min Wang

Machine learning provides new methods of problem solving through applied pattern recognition. An interesting challenge is to utilize machine learning in the automation of tasks and behaviors in virtual environments. Minecraft is an open-world, sandbox style game giving players nearly limitless freedom to alter a procedurally generated world. In the survival game mode, the player must collect resources to craft tools and build structures. The collection of resources can be tedious, so this project seeks to automate the standard initial task of collecting wood. By combining a convolutional neural network with API, a bot can collect resources while remaining scalable to procedural environments. This project utilizes the API Mineflayer for movement, and the Yolov8 neural network architecture from the Ultralytics package in Python for object detection. Data was initially collected in the form of 512x288 pixel images, uniformly sampled from the student researchers' Minecraft gameplay. The data were then scaled and manually labeled into 7 distinct classes for each type of tree. After training the neural network for 15 epochs, the network could detect trees with an average precision of 88.5% at a recall threshold of 50%. This project has several limitations. Currently, the project is designed only to work on locally hosted servers. Furthermore, the bot's point of view is generated by a simplified render of the Minecraft environment without dynamic lighting. Lastly, the difficulty is restricted so that the bot only encounters environmental threats. Future researchers may take interest in addressing any of these limitations or may create new datasets and scripts for collecting different resources. This project can also be expanded to include a state machine that switches between neural networks and scripts to carry out more complex behaviors as a sequence of discrete tasks.

Passage Re-Ranking in Live QA NLP Pipelines with BERT
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
9:00am – 9:50am
Undergraduate Student(s): Michael Ehme, Mason Chester,and Kenneth Molinari
Research Mentor(s): Md Abdullah Al Hafiz Khan

Passage ranking and document ranking are two common tasks in NLP. Many state of the art pipelines use BM25 to retrieve passages. The top results of this ranking are then re-ranked using a BERT transformer trained on the MS MARCO Passage data set. This system and variations have proved highly effective. In addition, questions and answers using BERT are also well explored topics. However, these systems are fundamentally limited by speed and resource consumption requirements. Given an arbitrary corpus and a collection of pre-trained models, we would like to prove that it is possible to create a live Question Answering machine without fine tuning for a particular topic. In particular, we employ a BERT re-ranker to find the first acceptable fit to pass to our QA transformer. This approach is fundamentally different from past research in that it is focused on first fit and not best fit. The goal of this research is to allow anyone to employ off the shelf components to create an effective, interactive question answering system.

Revolutionizing Healthcare Data Analysis: Semi-Supervised EHR Classification with Transfer Learning
Poster #12 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Cesar Lucena and Noah Clark
Research Mentor(s): Md Abdullah Al Hafiz Khan

Electronic Health Records are a vital tool in combating the increasing suicide rate among young adults in the United States through providing an insight into the patient's current mental state. However, given the limited resources available in the mental health industry, there is a need for robust algorithms which can detect and predict suicidal behaviors. Therefore, our research plans are to develop an NLP algorithm which can traverse the dataset, detect instances of suicide attempts or ideation, and provide information regarding the type of suicide.

Revolutionizing Vehicle Autonomous Control: NLP-Powered Voice Command System
Poster #13 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Graduate Student(s): Indu Palanisamy and Jude Ogene
Research Mentor(s): Md Abdullah Al Hafiz Khan

The fusion of Natural Language Processing (NLP) and voice control systems has revolutionized human-machine interactions. This project focuses on the system interpretation of the commands from drivers and passengers, enhancing safety and convenience. The process begins with a diverse voice dataset of vehicular commands. Data preprocessing, noise reduction, and feature

extraction convert raw voice data into a trainable format. An Automatic Speech Recognition (ASR) model ensures precise voice recognition, while advanced NLP techniques decode the intent of voice commands. The system understands nuanced requests like "turn on the headlights" or "Change gear to D2." This project uses pre-existing voice datasets, promising safer and more intuitive driving experiences. As the system matures, it paves the way to autonomous driving. Leveraging existing voice datasets, this innovative project enhances driving safety and convenience, laying the groundwork for the future of autonomous vehicles.

Text Summarization
Poster (Microsoft Teams)
Friday, November 17th
4:00pm – 4:15pm
Graduate Student(s): Varun Gottam, Purna Sarovar Puvvada, and Anusha Vunnam
Research Mentor(s): Md Abdullah Al Hafiz Khan

The current era is known as the information era. Every day, millions of gigabytes of data are being transferred from one point to another. As the creation of data became easy, it became hard to keep track of the important points and the gist of data, especially in areas such as research and news. To solve this conundrum, text summarization is introduced. This is a process of summarizing text from across different documents or large datasets such that it can be read and understood easily by both humans and machines.

Thought To Text: An EEG Driven Approach for Predicting Letters
Poster #8 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Christopher Dargan
Research Mentor(s): Md Abdullah Al Hafiz Khan

Brain-Computer Interfaces (BCIs) provide an innovative means of translating the brain's activity into practical data. When the brain activates clusters of neurons to perform a task, these groups of neurons fire together, generating detectable electrical signals. These signals are captured through electroencephalogram (EEG) recordings, representing the brain's electrical activity, or brainwaves. These EEG recordings help capture human thought, enabling communication for individuals who may have lost the ability to communicate through traditional means. Current BCIs face challenges such as invasive data collection, dependency on individual users, and limited text generation methods. Moreover, these approaches may not be feasible for large-scale deployment due to their invasive nature, multi-user signal variation, signal variability of the same user, and noisy external environment. Our research proposes a novel approach, capturing minimal EEG signals through non-invasive methods in conjunction

with machine learning algorithms such as Support Vector Machines to classify and predict letters from the English alphabet based on EEG signals. This methodology aims to overcome existing limitations, paving the way for scalable and user-friendly BCIs.

Toxic Comment Classification Project
Poster #7 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Brandon Solon
Research Mentor(s): Md Abdullah Al Hafiz Khan

The digital landscape has blossomed thanks to the surge of online platforms, boosting the variety and volume of user-created content. But it's not without its shadows; cyberbullying and hate speech have also proliferated, making web spaces less safe. At our project centerstage, we work on creating a machine learning model skilled at spotting toxic comments with precision - this way contributing towards an internet society free from fear or discomfort. We put well-documented datasets to good use along with careful preprocessing maneuvers while trialing diverse machina-learning protocols as part of constructing solid classification architecture for usages beyond current limitations within technology invention applications. Our initial assessments show upbeat outlooks regarding toxicity detection accuracy in comment sections- serving up hope for cordial talk across networks.

Using Vector Semantics to Generate Human Readable Text Summaries and Keywords
Oral Presentation (Microsoft Teams)
Friday, November 17th
1:00pm – 1:15pm
Undergraduate Student(s): Bryson Phillip
Research Mentor(s): Md Abdullah Al Hafiz Khan

In recent times, much attention has been drawn to large language models that can generate text and respond to input in a human-like manner. This is impressive, but simpler applications of natural language processing such as text summarization or keyword extraction can aid in many tasks such as skimming through papers and articles to find relevant information, or querying documents that might have needed information, even if the specific search terms do not show up anywhere. This research will involve analyzing excerpts from various prelabeled articles on Wikipedia in order to train separate recurrent neural networks to output keyword relevance and generative text summaries. An output vector would show how relevant the given text is to certain common topics (Geography, Science, Mathematics, etc.), and a generative model would create text summaries that have comparable parameters to the source text.

Water Quality Monitoring Using ML Algorithms in Cloud-enabled LoRaWAN
Oral Presentation (Microsoft Teams)
Friday, November 17th
2:15pm – 2:30pm
Undergraduate Student(s): Mahimna Patel
Research Mentor(s): Ahyoung Lee, Hoseon Lee, Amy Gruss, and Michael Beach

Water, as one of Earth's most precious resources, is indispensable for the survival and prosperity of all living organisms. It is a fundamental component of ecosystems and a critical element of our daily lives. Monitoring the quality of water plays a significant role in environmental and resource management efforts. Likewise, ensuring safe and clean drinking water is vital, as contaminated water can carry disease-causing microorganisms, chemicals, and toxins that pose health risks when consumed or exposed to the skin. Unfortunately, the effectiveness of traditional water quality monitoring systems has often been hindered by challenges such as high operational costs, sporadic data collection, and delayed response to contamination events. To address these limitations, this paper delves into the integration of Machine Learning (ML) algorithms into Water Quality Monitoring using Cloud-enabled Long Range Wide Area networks (LoRaWAN). ML contributes invaluable data analysis capabilities, including anomaly detection, predictive modeling, and adaptive monitoring strategies. One of the most significant impacts of ML on water quality monitoring is its ability to improve the efficiency and accuracy of data analysis. ML algorithms can be trained on large datasets of historical water quality data to identify patterns and trends. This information can then be used to develop predictive models that can forecast future water quality conditions. This is particularly valuable for detecting and responding to contamination events early on. The integration of ML into water quality monitoring has had a significant impact on the field of environmental protection and water resource management. ML-enabled monitoring systems are helping to improve the efficiency, accuracy, and accessibility of water quality monitoring, while also reducing costs. This is leading to better decision-making and more effective water management practices.

Information Technology

Encrypted Malicious Network Traffic Detection using Machine Learning and Deep Learning
Oral Presentation (Microsoft Teams)
Friday, November 17th
12:00pm – 12:15pm
Undergraduate Student(s): Khoa Nguyen
Research Mentor(s): Liang Zhao

Recently, the amount of encrypted malicious network traffic masquerading as normal traffic of data has increased greatly. This poses a concern for the user's security and privacy. Moreover, malicious traffic rates have been reported to skyrocket during the COVID-19 pandemic. Therefore, we should adopt new methods to tackle such unpleasant traffic detection problems as soon as possible. Regular security solutions depending on common analysis like deep packet inspection have been proven to be less effective while detecting malware using Artificial Intelligence (AI)–based solutions are becoming more popular. These solutions are believed to be less expensive, faster, and more secure since no traffic interceptor is required. Thus, the target of this research is to detect malware traffic flows by extracting new features from multiple popular public sources with well-known machine-learning and deep-learning algorithms such as KNN, Random Forest, and CNNs. These are among the best artificial intelligence algorithms that are expected to produce high (as high as 95%) malware detection rates. The system first extracts relevant features including packet count, size, and protocol type. They are inserted into machine-learning and deep-learning models for detection. The models are trained on a large dataset mixed with benign and malicious traffic to accurately detect the encrypted malicious traffic flows. The conclusion discusses the malicious network traffic detection rates of different feature sets tested by multiple machine learning and deep learning algorithms and the challenges that might occur in the process, including the need for high-quality training data and the possibility of encountering false positives and false negatives. Further research in this area will emphasize improving the model's detection rates and addressing these challenges.

Federated Learning in Cardiac Diagnostics: Balancing Predictive Accuracy with Data Privacy in Heart Sound Classification
Oral Presentation (Microsoft Teams)
Friday, November 17th
2:30pm – 2:45pm
Graduate Student(s): Sricharan Donkada
Research Mentor(s): Seyedamin Pouriyeh

Cardiovascular diseases represent a significant global health concern, accounting for 31% of all worldwide deaths. While machine learning presents a promising avenue for early and accurate diagnosis, the associated ethical and legal challenges, especially concerning data privacy, complicate its direct application. This research paper delves into Federated Learning (FL), a decentralized method, as a potential solution to address data utility and privacy concerns. FL enables devices or servers to hold subsets of overall data, compute local updates, and relay them to a central server without transferring raw data, thus maintaining privacy. The study aims to evaluate the feasibility and efficacy of applying FL to heart disease prediction while maintaining ethical and legal standards. Prior work in this domain, particularly by Wanyong et al., utilized FL for heart sound analysis, highlighting its advantages in data privacy and decentralization. Drawing on this background, our research contributes to the dual objectives of enhancing

healthcare outcomes and ensuring data privacy, setting a benchmark for the future application of machine learning in medical research.

Ideal Laser Wavelengths for Non-Invasive Glucometers
Poster #11 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Tahsin Kazi and John Oakley
Research Mentor(s): Maria Valero

Diabetes and metabolic diseases are some of the most crucial health issues of the 21st century. Monitoring blood glucose, the lead indicator of these diseases, is a cumbersome process of constantly drawing blood or using subcutaneous needles. However, new technologies have emerged for non-invasive blood glucose monitoring that use spectroscopy, which involves emitting light and capturing patient data with cameras. These new devices remove the cost of multiple tests, reduce the risk of skin conditions, and create more patient-friendly solutions.However, the hardware variables of these devices have not been tested thoroughly. One such avenue is via laser wavelength, which affects the data collected and used by these devices. Different wavelengths interact with skin in varying ways, shown by several previous studies. This study aims to investigate the impact of wavelength on performance of the team's non-invasive device across different races, genders, and ages of people. The tested model is to use our previous device with multiple lasers (ranging from 650nm-980nm), an HD camera, and a refactored finger-shroud.Every test with a patient will utilize each of the varying wavelengths of lasers. The wavelengths will be compared to each other in accuracy of the glucose estimation model. Ultimately, we seek to improve our current GlucoCheck model through the comparisons of results and range of errors. A review of recent literature leads us to expect lower precision and accuracy in lower wavelengths, with higher precision and accuracy in higher wavelengths. Finally, we plan to publish our findings in Biosensors, a journal by MDPI, and present them at the National Conference of Undergraduate Research.

Voice Assistants in Healthcare: The Case of GlucoCheck
Poster #10 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Anh Duong
Research Mentor(s): Maria Valero de Clemente

Over the past few decades, there has been significant progress in the development and implementation of voice assistants (VA) in healthcare systems globally. These voice assistants have gained widespread acceptance, making usability a crucial factor to consider. Ensuring

effective and accurate performance in the critical and sensitive healthcare environment is essential. In this work, we present the implementation and interaction of a VA with a device called GlucoCheck, a non-invasive glucose monitor developed at Kennesaw State University. This integration holds significant potential for improving patient care and monitoring glucose levels in a user-friendly manner.

Software Engineering and Game Development

Interaction in Games: Digital Board Game Hybrid
Poster #12 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Ryan Whisenhunt and Logan Haines
Research Mentor(s): Henrik Warpefelt

The realm of digital board game hybrids is a relatively new field, and a majority of games currently use computerization for casual board games or accentuating flavor. There is still plenty of room to use these ideas for more complex board games and means. In this study, we explore the avenues in which digital implementation of physical games can provide a streamlined and accessible gameplay experience. Participants in the study will be given a chance to play a short version of the game. A retrospective will be conducted after, where respondents are interviewed on how well the computer supported the gaming experience. This study reports on the observations and retrospectives of the prototype game.

Interaction in Games: Custom Driving Controller
Poster #11 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Christian Crank
Research Mentor(s): Henrik Warpefelt

The problem I am trying to solve pertains to the high entry costs and the requirements to fully enjoy driving games. Driving games always sound like a fun experience, but without the right controller the game feels lackluster, uncomfortable, and not quite immersive. The problem is, if someone wants a gaming experience that makes the game feel natural and sensory, they may need to drop hundreds to thousands of dollars. Furthermore, they don't even know if the expensive equipment will provide them with the experience they want. These expensive controllers are set up in a way to be universal and familiar to the driving experience, but who is to say that everyone is comfortable with the way that driving is already set up? The solution to this is to show that the Xbox Adaptive Controller can be used to hook up an incredibly cheap, yet

fully customized controller setup. Driving in games takes significantly more inputs than most other games require, so there can be merit to making a custom setup through an Xbox Adaptive Controller, making a wide array of inputs available to make driving in game easier and more intuitive. Furthermore, many off the shelf steering wheel sets don't include enough buttons, switches, etc., to translate to meaningful real-life inputs, leaving players that want maximum interaction frustrated. It's important to say that a custom built controller, especially the one I am making, is not intended to be of the highest quality with the most advanced features. It is, however, a method of enough significance to push interaction to a whole new level beyond gamepad and keyboard.

Interaction in Games: Developing a DIY Multi-Platform Game Preservation Console
Poster #13 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Joel Metukmebong and Stephen Pangilinan
Research Mentor(s): Henrik Warpefelt

Over time, more consoles have been released with unique form factors, and technology has become more expensive and less accessible. This brings up the central issue of "how do we preserve interactive media in a cost-effective manner for consumers?" Preservationists have researched solutions to this question, though different conclusions have been made such as desktop emulation and porting games to newer consoles. While there are projects that aim to create a successful emulation system, these projects do not effectively recreate the feel of using the original hardware. The purpose of this investigation is to discover the extent of modern technologies in emulating and preserving multiple types of consoles of varying forms, analyzing the cost-effectiveness of these solutions, and the engineering skill level required to create a system.

Interaction in Games: KeyBard
Poster #14 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Ian Skoonberg & Mary Dunne
Research Mentor(s): Henrik Warpefelt

Music games often involve a version of musical performance that is more akin to an experience with playing with a musical toy than playing a true musical instrument. While some elements of musical performance are captured, like rhythm and timing, the ability to read sheet music is left out of the play experience. This study aims to investigate in what ways a musical game using a real musical instrument and real musical notation can provide a more educational experience of

music. The prototype for this study will have a game called KeyBard, and custom-made Keytar Controller. The respondents will be tasked with playing the game in order to asses the impact of the intervention on their sight reading skills.

Supporting Hearing Impairment in Games
Oral Presentation (Microsoft Teams)
Friday, November 17th
4:45pm – 5:00pm
Undergraduate Student(s): Nick Goolsby
Research Mentor(s): Henrik Warpefelt

Over 40 million people in the United States alone report that they suffer from some form of hearing loss, which amounts to about 14% of the total U.S. population. Without a standard for accessibility tools in game design, over 40 million hearing-impaired people cannot enjoy the same games as their hearing-able peers, fostering a community that lacks diversity and amiability. Previously, research has focused on specific feature implementations or on identifying what makes accessibility so tricky for developers. This has created a need for the development of a design template that aims to make the process easier for developers using the already researched implementations of features.

The Novel Game Design Lab
Exhibit (Marietta Event Center/Gymnasium)
9:00am – 11:45am
Undergraduate Student(s): Joshua Whorton, Joel Metukmebong, Stephen Pangilinan, Ryan Whisenhunt, Jessica Susanto, Anaiya Tucker, Ethan Johnson, and Angela Okafor
Research Mentor(s): Henrik Warpefelt

The Novel Game Design Lab studies how we can combine new technology and novel approaches to game design to create new and interesting gaming experiences. For this year's symposium, we will be exhibiting Relic 2D, a platform for a variety of studies, including studies of engaging minimalist narratives and game play, as well as player performance and accessibility issues. The overall aim of projects done using Relic 2D is to identify techniques and technologies that let developers achieve a high degree of playability and polish with less development time. We will also be showing preliminary work for TechnoWizard, a VR game aimed exploring how we can implement gesture-based interfaces for rhythm games and pushing the boundaries of interaction design for VR. Lastly, we will be hosting a number of game prototypes from the Game Design and Development program for visitors to test.

Volcano Crawl
Poster #14 (Marietta Event Center/Gymnasium)

Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Stephen Pangilinan, Brooke Ebetino, Reece Freeman, and Jake Hundley
Research Mentor(s): Henrik Warpefelt

Our research question is "How can we make a satisfying jump mechanic?" We know that a good jump needs good air control and mobility. However, we need to learn more about balancing horizontal and vertical momentum, as well as the risk and reward of making jumps. Our project aims to find a balance between risk and reward, as well as momentum by increasing the player's jump height as they make more consistent jumps. We will conduct a study where we use interviews and playtesting to gather qualitative data about the player experience of our mechanics. This research will give more insight into how players find movement mechanics satisfying and how one would implement this.

Radow College of Humanities and Social Sciences

English

Chicks and...: How New Girl was Written by a Woman and Reads Like a Man
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
2:00pm – 2:50pm
Undergraduate Student(s): Mariam Jahad
Research Mentor(s): Anna Weinstein

While the male gaze has dominated the portrayal of male and female relationships in film and media, scripts and pitches written by women tend to stand out in their reflections of traditional societal positions and stereotypes. New Girl has been hailed by its long-standing audience as a radical and fresh take on these relationships and personal growth of, especially male, characters through the running of the series. The show was written and pitched by Elizabeth Meriwether and stars a female protagonist that is unapologetically optimistic, fun-loving and feminine. However, the pitch of the show presents a jarringly unique perspective that reflects a more masculine-based tone. Rather than empathize with her female protagonist, Meriwether seems to rub elbows much more with her male protagonist, Nick Miller, in the pitch. In this presentation, I will be exploring how even woman-written media can reflect a male-dominated industry by analyzing the New Girl pitch, various episodic scripts, episodes and academic studies on these perspectives in film.

I Guess I Can Empower You: Exploring Implicit Gender Biases Within a Feminist Children's Story Draft
Oral Presentation (Microsoft Teams)
Friday, November 17th
12:00pm – 12:15pm
Undergraduate Student(s): Heather Voraphongphibul
Research Mentor(s): Nina Morgan

Research across many academic fields has supported the importance of bias-free language/inclusive authorial tones in writing. Despite the widespread scholarly attempts to establish the necessity of linguistic inclusivity within various written genres, however, few studies explore the existence of gender-based biases within proclaimed feminist literatures—literatures that often do, after all, hope to bring about solutions to implicit biases. The purpose of this study is to highlight the internalized nature of gender-based biases and stereotypes as they surface even within mindful and informed feminist writing. Specifically, this research examines the diction and tone of the author's initial children's book draft of Norah and Noah: The Music Within—a story that is itself grounded in research and that originally sought to empower young girls to pursue their interests and to encourage young boys to advocate for their female friends and family members. Even considering these goals, the draft became unintentionally focused on the male perspective. Feminine empowerment, then, unwittingly became a secondary element of the story; female characters were rendered partially voiceless. The individual contradictions and issues of this children's book draft, along with appropriate revisions of each of these issues, will be analyzed and examined in this study through the lens of feminist rhetorical theories. The results of this study's theoretically-backed examination of the children's book draft will illustrate the pervading presence of gender-based biases as they exist even within writings that are otherwise focused on combating perceptions of gender inequality. This study's findings will also be used to craft a truly empowering final draft of Norah and Noah that is free of feminine stereotyping and notions of female powerlessness; the children's book will be published with funding from an Undergraduate Research and Creative Activities grant.

Is it Possible to Control the Two Horses of the Charioteer?
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
2:00pm – 2:50pm
Undergraduate Student(s): Dallas Dickson
Research Mentor(s): Todd Harper and Michelle Miles

In Plato's The Phaedrus, *Socrates presents a philosophical conundrum as he explores the intersection of madness and rationality. Traditionally regarded as a devoted advocate of reason, Socrates appears to contradict his own philosophical principles by celebrating the virtues of*

divine madness, also known as love, in the dialogue. This apparent inconsistency causes questioning around Socrates' seemingly contradictory praise of the concepts of love and rationality. In the first speech of The Phaedrus, *Socrates argued it is better to do "honest" work with no meaning behind it. This line of reasoning can contribute to a state of complacency. The modern perspective, which has only been recently rediscovered since Socrates first proposed this thought process, allows us to see that an arranged, loveless marriage formed based on money or status is no longer considered the more successful bond compared to one founded on love. It is easily foreseeable that the apathetic scientist who pursues research out of duty will easily grow tired of his or her studies, while the passionate observer will be driven to dig deeper for a longer period of time. This final great speech represents the necessity for any great thinker to retain a level of passion for their work. While the relationship between reason and madness, or love, still maintains a juxtaposing dynamic, the mastering of these opposing ideas is what leads to greatness. In the time of Socrates, this argument pertained to balancing love and wisdom in a relationship. Today, the unfeeling observer is no longer praised to the same degree within the field of research. Scientists must maintain their perspective, avoiding a sense of bias, while maintaining a bond with their research. This unification, although conventionally unreasonable, is precisely what leads to true reason and wisdom.*

Exploring Post-Modernist Gender Through an Individualistic Lens
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
2:00pm – 2:50pm
Undergraduate Student(s): Mio Deputy
Research Mentor(s): Letizia Guglielmo

While the separation of gender and sex is a well-researched topic, there is less information on the post-modernist identities that have resulted from the rejection of the heteronormative. Furthermore, the research that is there does little to account for the diverse and individualistic characteristics of post-modernist identity and instead attempts to look at these identities through a definitive lens. Through interviews with people within several diverse online LGBTQIA+ communities, I explore the possibility that gender is uniquely individualistic and diverse even within the confines of the defined terms that make up post-modernist identity. This view on gender attempts to separate from not just the binary but the conclusive instead embracing the uniquely queer experience that is self-identity and how it is affected but not rigidly dictated by social terminology.

Foreign Languages

Analysis of Italian Poetry of Four Different Writers
Poster #21 (Marietta Event Center/Gymnasium)

Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Abigail Ifran
Research Mentor(s): Federica Santini

Throughout this semester, I have been conducting a qualitative analysis of Italian poetry and examined how not only cultural backgrounds influence writing but how passion brings forth a certain essence to a writer's work that transcends language barriers. Four Italian writers were assessed for this study: two of which live here in the United States and have written poetry and books in both Italian and English and two who primarily write in Italian. This study works as a comparative analysis, not only reading through the lines of the syntax but how one's passion and cultural background bleeds through the paper. The analyses were primarily done in Italian and some in English, depending on the author's source material, in order to get the most accurate understanding regarding their work. These writers come from various backgrounds with very differing perceptions on life and the art and function of poetry. Some poets use their skill to discuss social issues and some view it as a form of anthropology with the spoken language being a living form of it. Poetry in its purest form is the art of preservation, a form of writing with no limitations and no rules like traditional writing.

Geography and Anthropology

3D Printing Cityscapes Using GIS
Visual Art Presentation #2 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Matt Hellerstedt
Research Mentor(s): Uli Ingram

The objective of this research project is to use GIS software to prepare and print a 3D cityscape model. This study will demonstrate the successes and difficulties involved with 3D printing and how the models are affected by minor issues, as well as how diverse GIS tools can be used to display data.

Applying Settlement Models through Chemical Analysis in Bartow County, Georgia
Poster #7 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Bryan A Moss
Research Mentor(s): Terry Powis

During the Middle Woodland Period (300 BC – AD 600), ceremonial centers began to rise throughout the Eastern United States. These centers were hubs for ritual feasting and religious activities related to the Hopewell Mortuary Cult of Ohio. This project will focus on the Leake site and its relation to the surrounding villages in Northwest Georgia, each of which contains Swift Creek sherds. The Swift Creek Complicated stamped pottery contains curvilinear lines which are not present in other decorations of the Middle Woodland period. Swift Creek pottery is prominent in Middle Woodland ceremonial sites and is integrated into the Hopewell Mortuary Cult's interaction network, moving between major Hopewell sites along the Eastern United States. This study will use both artifacts and spatial distribution of sites to identify potential interaction networks which can be applied to settlement models.

Assessment of Age and MNI of Children from Two Early Byzantine Graves in Southern Greece
Poster #2 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Chase Gallagher Rodriguez
Research Mentor(s): Susan Kirkpatrick Smith

This project is an assessment of the age and minimum number of individuals (MNI) from two Early Byzantine gravesites from Chryssi Island, Greece. The goal of this research was to determine the number of juveniles in each of the two graves, A650 and A607, by analyzing the data collected from both graves. For my methods, I analyzed data from commingled bones. This task was difficult because the individuals in the grave were commingled. A commingled burial means that multiple individuals are buried within a single grave. I assessed each type of bone by identifying individual bones and determining the ages of individuals based on their size. I aimed to determine the minimum number of distinct individuals represented within each commingled burial assemblage. Dentition was assessed in a similar way. In A607, there are a total of eight juveniles. The ages range from perinate to 15 years old. In A650, there are a total of ten juveniles. The ages range from neonate to 13 years old. Overall, knowing the approximate number of individuals in these graves is important for understanding how the graves were used during their time. Understanding how these graves were used will give me a better understanding of Early Byzantine life in Chryssi Island, Greece.

Contemporary Immigrant Population Trends in the Atlanta Metro Area and the State of Georgia
Oral Presentation (Microsoft Teams)
Friday, November 17th
1:00pm – 1:15pm
Undergraduate Student(s): Donnie Balkaran

Research Mentor(s): Paul McDaniel

Migration and the movement of people significantly impact the world we live in. People migrate for many reasons, mainly for a better life, family, job opportunities, higher income, affordable housing, education, and even the weather. The purpose of this research is to explore why people are moving to Atlanta and the state of Georgia, the different trends that influence migration, and what countries and states they are moving from. More specifically, this research explores the most recent data (including from the US Census and the American Community Survey) to examine trends in immigrant population settlement, focusing on sub-groups of this population (i.e., country of origin, naturalization status), particularly from Mexico and the Caribbean, across the state of Georgia and in the Atlanta Metropolitan Statistical Area. Specific research questions include: (1) Where within Georgia and the Atlanta metro area are different sub-groups of the foreign-born population residing; (2) What are their general socio-economic characteristics (i.e., education, household income, occupation, etc.); and (3) What are the broader socio-economic characteristics driving these migration and immigrant settlement geography trends? The project incorporates collecting and analyzing quantitative data from the census and visualization of the data using ArcGIS Online, including data from the US Census and the American Community Survey. Results inform our broader understanding of contemporary immigration and immigrant settlement in the Atlanta metro area and the state of Georgia.

GIS for Public Health: Exploring Diseases of Despair in Metro Atlanta
Oral Presentation (Microsoft Teams)
Friday, November 17th
4:30pm – 4:45pm
Undergraduate Student(s): Chanice Brown
Research Mentor(s): Paul McDaniel

Diseases of despair are a set of behaviors that can cause a significant amount of mortality within a population. These behaviors, which typically include drug abuse, alcoholism, and suicides, have existed for quite some time. However, the idea of "Diseases of Despair" is fairly recent. In 2015, researchers Anna Case and Angus Deaton first coined the concept while studying an increase in mortality and decrease in life expectancy amongst middle-aged, white populations in different rural communities. They theorized that external pressures, like economic insecurity and increased morbidity, were driving these populations to seek out dangerous methods to relieve their stress. This theory has acted as a base for several studies regarding our insights into diseases of despair, as well as how these diseases can impact communities in places like the Appalachian region. However, very few studies have examined patterns of these diseases in the state of Georgia and even fewer have examined the Atlanta Metropolitan area. As such, the primary goal of this study is to utilize ArcGIS software to identify spatial patterns of despair behaviors within the region while also investigating environmental and economic trends in the

metro area that could influence the presence of diseases of despair. The results of this study found that there wasn't a direct correlation between diseases of despair and four social determinants that directly influence health outcomes. That said, it is possible that the observed despair mortalities may have resulted from the unexpected hardships, strain on healthcare resources, and general decline in mental well-being brought on by the COVID-19 pandemic. Future research comparing the presence of diseases of despair before and post-pandemic is needed to test if this hypothesis is true.

Glazed Over: Middle Mississippian Ceramics Found at the Cummings Site
Poster #6 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Sydney Murdock
Research Mentor(s): Terry Powis

The Cummings Site is an archaeological site comprised of a large Native American village dating to the Middle Mississippian period (1200-1375 CE). It is located two miles (3.2 kilometers) from the Etowah Indian Mounds, a prominent regional center of the time, in Bartow County, GA. The Cummings Site includes House 1, one of the few Middle Mississippian houses to be fully excavated. Due to the rarity of excavated houses, it provides the opportunity to study ceramics inside and outside of houses. During this time period, ceramics were commonly used for food preparation, storage, and rituals. Recent excavations at the Cummings Site have produced hundreds of ceramic sherds outside of House 1, and this research examines the ceramic assemblage of 17 units from 2022 and the spring of 2023. A comparative analysis of ceramics found outside of House 1 to those found on the floor of the house provides insight to the activities and purposes of ceramic vessels at the Cummings Site.

Indigenous Mortuary Practices Prior to Spanish Influence and Its Cultural Significance
Poster #14 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Amethyst Dunn
Research Mentor(s): Terry Powis

For the Mississippian period (AD 900-1550), we have gathered a great deal of information about the indigenous way of life. Archaeological research has been done on many cultural aspects of Mississippian people in the Southeast, including studies on the nature and extent of their villages, socio-political relationships between villages, the construction of earthen mounds, the food they produced, the size and shape of their houses, how they created their pottery and stone tools, among other practices. However, when it comes to burial practices of Mississippian people

there is little information. How they dealt with and respected their dead is (and has always been) part of their culture. What archaeological information is available is decades old. Some of this may be the result of old archaeological practices of caring more about the significance of the grave goods than the significance of the burial itself. Some of it may also be due to the Native American Graves Protection and Repatriation Act (NAGPRA) enacted in 1990. NAGPRA is a federal law that protects the human remains, mortuary artifacts, and sacred objects of indigenous people. It also helps ensure that ancestral remains and associated grave goods are returned to the appropriate descendant tribe(s). This poster focuses on understanding the burial practices of Mississippian people across Georgia. Questions I will be asking include: What was the significance of mound burials? Did mound burials persist throughout the Mississippian period or did it change over time? How did burial practices differ between major sites and between large and small sites? What was the significance of the grave goods and why did only some burials have grave goods? It is hoped that this study will lead to a more thorough understanding of the cultural significance of why Mississippian people buried their people the way they did.

Practical Online Storage of Archaeological Remains Using Airtable
Poster #1 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Maygui Jean
Research Mentor(s): Susan Kirkpatrick Smith

Databases are foundational components of modern information systems, serving as organized archives for data storage, retrieval, and management. They play a vital role in various sectors, including business, healthcare, education, and government, enabling efficient data handling and informed decision-making. Using the user-friendly database Airtable, this project explores how archaeological data can be stored effectively in contrast to the more complex, more widely used, and less intuitive Osteoware. Osteoware is a software tool specifically designed for the analysis and documentation of archaeological human skeletal remains. It is used primarily by bioarchaeologists, anthropologists, and archaeologists who study ancient human populations and their skeletal remains. Osteoware helps researchers catalog, analyze, and interpret various aspects of human skeletons, including age, sex, and various pathological conditions. Airtable is a contemporary cloud-based collaboration platform that combines the simplicity of a spreadsheet with the complexity of a relational database. It allows users to create, organize, and share structured data and information in a highly customizable and user-friendly interface. Airtable is widely used across a variety of industries and disciplines for the management of projects, data, collaboration, and in this case, for the documentation of archaeological remains. Using images and written descriptions, we will compare Airtable's usability for storing archaeological data with that of its less intuitive counterparts. By bringing a highly customizable system to the

forefront of data collection, this project aims to make this database accessible and known to professionals from all fields.

Spatial Associations of Liver Disease Rates with Socioeconomic Factors in Georgia
Poster (Microsoft Teams)
Friday, November 17th
2:00pm – 2:15pm
Undergraduate Student(s): Nguyet Le
Research Mentor(s): Jun Tu

According to the CDC Cancer Statistics Report in 2020, Liver and Intrahepatic Bile Duct is the 6th leading cancer in both USA and the State of Georgia ranked by Rates of Cancer Death. Aflatoxin-containing foods, alcohol consumption, smoking, overeating, and other risky behaviors are among the factors linked to liver diseases. They have also been related to the socioeconomic status (SES) of individuals. The behaviors and SES of individuals are affected by the socioeconomic characteristics of the communities where they live. However, the relationships between the rates of liver diseases and community-level socioeconomic factors are not well studied. The objective of this project is to examine the spatial associations of the rates of both alcoholic and chronic liver diseases with socioeconomic factors, including income, education level, and social vulnerability index (SVI), at county-level in Georgia using GIS (Geographic Information System) and statistical analyses. GIS is used to map and compare the spatial patterns in rates of alcoholic and chronic liver diseases and socioeconomic factors by counties. GIS-based hot spot analysis is used to identify the spatial clusters of the rates of liver diseases. Statistical analyses, especially correlation analysis, are used to quantify and compare the associations of the rates of both alcoholic and chronic liver diseases with each of the studied socioeconomic factors. This study is expected to reveal the spatial patterns and hot spots of the rates of both alcoholic and chronic liver diseases and their associations with socioeconomic factors across counties in Georgia. It will contribute to a better understanding of the associations of liver diseases with socioeconomic factors and provide useful information for health policy making.

Spatial Distribution of Lyme Disease within the United States
Oral Presentation (Microsoft Teams)
Friday, November 17th
2:30pm – 2:45pm
Undergraduate Student(s): Justin Juraidini
Research Mentor(s): Uli Ingram

Lyme disease is a bacterial infection caused by the bacterium Borrelia burgdorferi. Lyme disease differs from other common infections due to its difficulty being accurately traced back to an initial encounter. Lyme disease can only be transmitted through the bites from various species of

ticks, the ticks are host dependent with a range of hosts from mice, deer, and birds. The hosts grant the ticks of migrating far ranges and inhabiting forest dense areas. With the usage of ArcGIS software, research was conducted to determine migration patterns of ticks and their hosts and cases of Lyme disease reported by counties in the United States as well as, specifically the state of Georgia. The methods used offer a perspective of how and why it is difficult to determine the origin of infection in a specified location due to the possibility of infection and report of infection in two separate counties or even states given the disease's incubation period from anywhere between 3-30 days. Analyses conducted give insight into a rising public health issue utilizing spatial analysis methods.

When Temper Flares: Comparisons of Ceramic Attributes from the Thompson Site with Inference to Subsistence Patterns
Poster #12 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Amanda Noble
Research Mentor(s): Terry Powis

Located in Gordon County, the Thompson Site contains archaeological information that may help to further the understanding of ancient indigenous cultures in the northeast region of Georgia. Subsistence patterns on the eve of corn agriculture remains an area of interest for archaeologists who believe further investigation is necessary, specifically dating between the Late Woodland (700-1000 CE) and Middle Mississippian (1100-1350 CE) periods. A direct method of learning about corn agriculture at this time is through preserved plant remains, such as charred corn kernels. At Thompson, little charred material has been recovered. As a consequence, an indirect method involves examining pottery to determine the nature and structure of food production. Pottery serves, both literally and figuratively, as vessels for a multitude of functions in the past depending on different factors. These factors include form, surface decoration, vessel thickness, presence of sooting from cooking over an open fire, and the type of temper or inclusions added to the clay of the pot prior to firing. Many of the ceramics found at Thompson are believed to have come from houses and an earthen mound located nearby. The mound contained a number of burials, likely of important individuals from within the community. This research focuses on examining the pottery coming from within the earthen mound and houses to determine how they were used in various activities including cooking and storing food. Are there any differences in the pots used between the houses and the burials in the mound? How important is surface decoration and temper in the function of pottery? Essentially, will it be possible to observe changes over time in the function of pottery as corn agriculture became more important throughout the Mississippian period.

History and Philosophy

Typhoon Encounters: How Politics Influences the Naval Response
Poster #17 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Duncan McLendon
Research Mentor(s): Eric Oakley and Masako Racel

The thesis of this paper is that the political and military situation surrounding navies in the late 19th and 20th century shaped how those navies responded to encounters with typhoons. Between the sixty-year period of 1889 to 1945, three separate typhoons formed, struck, and severely damaged various nations' naval fleets across the Western Pacific. Individually, these events were isolated incidents with very little connection between them. However, case studies of each event reveal a pattern in the human response to such natural disasters. The first of these, the Apia Typhoon that struck the island of Samoa in 1889, defused a spark of war between the United States and Germany. The second event, termed the Fourth Fleet Incident, occurred in 1935 when a Japanese fleet preforming training maneuvers sailed into a typhoon at sea, reshaping how the Japanese designed their warships in the pre-World War II period. The final case study occurred in the final stages of the Second World War, when an American fleet off the coast of the Philippines sailed into a typhoon and lost nearly nine-hundred men and three destroyers, suffering the greatest uncompensated loss of life in three years. However, due to the overwhelming advantage of the United States over Japan in the war at this time, the incident was largely ignored and only resulted in the construction of weather stations throughout the Pacific. Through the use of newspapers, diaries, naval reports, and even the Washington and London Naval Treaties, this project utilizes primary source evidence to show that the response to typhoon disasters among navies of the Pacific is still at heart a matter of politics.

Psychological Science

Brain Waves as Predictors of Negative Life Events in College Students
Poster #6 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Mary Katherine Kerlin, Lamar LaTella, Naomi Mwangi, and Alexis Newman
Research Mentor(s): Tim Martin and Erica Holiday

The purpose of this study was to examine whether physiological responses to relevant stimuli could predict the occurrence of certain life events. A sample of 45 participants was used, 5 of which were recruited from the Center for Young Adult Addiction and Recovery, and 40 of which

were recruited from KSU undergraduate psychology classes. Participant's brain activity was measured with the use of an electroencephalography (EEG) while they underwent an oddball task requiring them to react to one of three distinct types of shapes on a computer. The Life Events Checklist (LEC) was used to determine the frequency of negative life events out of 17 possible categories of events. The EEG measures and LEC totals were used in a backward regression with 20 different physiological measures to determine a relationship with the frequency of these life events occurring. These physiological measures indicated the P3 evoked response potential from an oddball paradigm. Results of the backward regression indicate that the mean of P3 amplitudes at electrode Cz predicted the frequency of negative life events, with greater amplitude P3 responses associated with fewer negative events. To our knowledge, this is the first reported association of negative life event frequency with the P3-evoked response potential.

Domestic Minor Sex Trafficking: The Relationship Between Risk Factors and Adverse Childhood Experiences Among Minors
Poster #2 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Caitlyn Hume, Jen Adams, Kelsey Potter, and Samantha Cebelenski
Research Mentor(s): Dorothy Marsil

Modern day slavery or human trafficking is a serious, widespread, yet often unreported crime. The Human Trafficking Institute reported that 64% of criminal prosecutions of trafficking were specific to sex trafficking with the majority of cases involving female victims under 18 years of age (Lane et al., 2022). The Polaris Project (2020) identified 10,836 victims of sex trafficking in the United States through their reporting system; of these, 2600 cases involved minors. There are many risk factors associated with domestic minor sex trafficking (DMST), or commercial sexual exploitation of children (CSEC). These factors include, but are not limited to, a history of abuse, housing instability, and a parent who has been incarcerated (Barnert et al., 2022; Greenbaum, 2014). Additionally, youth who identify as a minority, based on race/ethnicity and sexual orientation, are at a heightened risk of being trafficked. Notably, several of these risk factors overlap with trauma measured on the Adverse Childhood Experiences (ACE) scale (1998). Emerging research has demonstrated that adults who experienced sex trafficking as minors have higher aggregate ACE scores compared to their historical peers in the general population (Byrnes et al., 2023). Given these findings, further investigation with more depth is warranted. The aim of this study was to examine the relation of individual and cumulative ACE scores to risk factors among trafficked minors. Utilizing secondary data analysis, we examined de-identified electronic health records of minors aged 12-17 who were in acute residential care following suspected or confirmed sex trafficking. The data spanned a three-year period from 2020, 2021, and 2022. A socio-ecological model informed the methodology of the chart review. The discussion will focus on

the associations between ACE scores and risk factors from a developmental perspective. In conclusion, recommendations for increasing protective factors through cross-cutting violence prevention and intervention efforts will be highlighted.

Examining the Utility of The Military Service Sleep Assessment in U.S. Veterans
Poster #18 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Sophie Vincent
Research Mentor(s): Brian Moore

Background: Veterans frequently report sleep disturbances. However, little is known about which military or life events most frequently influence veterans' sleep. The focus of this study is to report the specific military and life events that had the most negative effect on sleep quality in veterans by utilizing the Military Service Sleep Assessment (MSSA). Method: Post 9/11 veterans (N = 373) completed an assessment battery examining sleep disturbances, depressive and anxiety symptoms, and of dysfunctional and recovery cognitions. Descriptives (i.e., mean and frequency), t-tests, X2 tests of independence, residuals, and risk ratios were computed to examine the impact of military and life events on sleep quality. Results: The majority of the participants were male (63.8%), served in the Army (61.4%), and were deployed in support of post 9/11 operations (80.7%). A quarter of veterans reported having "trouble falling or staying asleep" (24.9%) as their primary sleep problem. The other most frequently endorsed concerns were "nightmares or bad dreams" (20.6%), and "grinding my teeth while I sleep" (11.8%). Over half (62.5%) of veterans attributed their primary sleep problem to their military service. The military events most negatively impacting sleep were initial entry military training (34.9%), a permanent change of station (19.8%), and deployment(s) (18.2%). Discussion: These findings highlight how military events contribute to poor sleep quality early in military personnel's lives and persist as they become a Veteran. The present findings indicate the long-term impacts of unique military events on sleep health.

Exploring the Lived Experiences of Opportunity Youth through a Developmental Lens
Poster #13 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Will Hodges, Giselle Vazquez, and Amari Cody
Graduate Student(s): Briana Rivera
Research Mentor(s): Chanler Hilley

Opportunity youth (OY) are adolescents and young adults 16 to 24 years old who are not in employment, education or training (OECD, 2023). In the U.S., an estimated 16.4% of youth are

OY (OECD, 2023). Prior studies have established OY are at higher risk for behavioral health problems (Hilley et al., 2019) and socioeconomic disadvantages (Belfield et al., 2012). However, the majority of research on OY is conducted through a social epidemiological lens, with limited attention to their psychosocial development. The objective of this qualitative study is to examine the experiences of disengagement during the transition to adulthood, contributing to our knowledge gaps in this understudied population. We focus on OYs' time use, aspirations and goals, social support and loneliness, and experiences of stigma and discrimination. Participants are being recruited using social media advertising, targeting young adults in the Atlanta metro area. Prospective participants complete a screening survey, and eligible participants are invited to complete a virtual interview. This study is currently in the interview phase, and we aim to interview thirty participants using a structured interview guide. Thematic analysis will be employed to identify and analyze emergent themes from the collected data. This presentation's purpose is to disseminate background research about the experiences of OY, the motivating factors behind this study, and the development of the research design and implementation. We aim to inform practices and policies that support positive behavioral health and reconnection outcomes for OY. By taking a developmental lens toward the experiences of OY, programs and policies can enhance their relevance and appropriateness for this unique subset of late adolescents and young adults.

Financial Wellness in Transitions: The Role of Parental Socialization and Self-Efficacy on Stress Among Young Adults

Poster #19 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Bailey Tocups
Research Mentor(s): Chanler Hilley

The transition to adulthood is a complex period involving many aspects of life (Settersten, 2010). These normative developmental changes combined with recent increases in costs of living and college (Jennifer Ma & Matea Pender, 2022) make the transition to adulthood particularly important developmentally, we consider the distressing and financial components of the transition. To effectively intervene in young adults' stress, it is important to understand the promoting factors of financial well-being and mitigate the risks of financial stress (She et al., 2023). These factors can be both intrinsic, like self-efficacy, or external, like socialization. Self-efficacy is the effort and persistence involving the belief in one's ability (Bandura, 1977). Financial self-efficacy refers to an individual's confidence in managing finances (Lown, 2012). Socialization is the learned behaviors and concepts acquired through interactions with others (Child, 1954). Parental socialization shapes the ideas and behaviors of young adults through teaching, modeling, and their relationships with their parents (Kim & Chatterjee, 2013). This study investigates the relations between young adult college students' reports of financial self-

efficacy, financial socialization, and overall perceptions of stress. Kennesaw State University students (n = 164) participated in an online survey. Using multiple regression analysis, the influence of financial self-efficacy and financial socialization on perceived stress, and the interaction between financial self-efficacy and socialization. Preliminary results demonstrate a negative association between self-efficacy and perceived stress (r = -.275, p <.001) and between parental socialization and perceived stress (r = -.256, p = .001). These results can help better understand the extent of the role financial self-efficacy and financial socialization play on overall stress. This understanding of the individual and contextual financial influences of stress can help young adults, their parents, and financial advisors navigate their financial relationships and help assist individuals in an already tumultuous transition period.

Frontal Alpha Asymmetry and Theta/Beta Ratio Predict Self-Reported Drug Use in College Students

Poster #16 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Lamar LaTella, Mary Katherine Kerlin, Alexis Newman, and Naomi Mwangi
Research Mentor(s): Tim Martin and Erica Holliday

This research explored the ability of brain waves to predict substance use in young adults. The sample consisted of 45 participants who were between the ages of 18 and 34. Participants either consisted of young adults who are in recovery from alcohol & other addictive behaviors or were recruited from various psychology classes. The electroencephalogram (EEG) recorded brain waves of participants with eyes open and eyes closed. With the data collected from the EEG, we used Fourier analysis to estimate spectral power, and computed frontal alpha asymmetry (FAA) and theta/beta ratio (TBR) before and after an oddball task. We ran a backward regression approach in order to see which variables are significant predictors for the brain waves. We found that both FAA and TBR predicted self-reported drug use using the ASSIST scale developed by the World Health Organization.

Negative Implications in Meaningful Work: A Latent Profile Analysis of Meaning and Well-Being Among Nurses.

Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
2:00pm – 2:50pm
Undergraduate Student(s): Edwin Trejo-Rivera
Research Mentor(s): Israel Sánchez-Cardona, María Vera, & Tyler Collette

Meaningful work is key to improving and maintaining well-being among workers. However, a small but supportive amount of research has shown that meaningful work may not always result in positive outcomes, suggesting potential negative implications by acting as a "double-edged sword" to well-being. In this study, we propose to identify distinct profiles based on the perceived meaningful work, work engagement, subjective well-being, and emotional exhaustion among nurses. We sampled 380 nursing staff from the US and collected the data using a Qualtrics Panel. Most of the participants were women (77.6%) and were working primarily in a hospital (55.3%) in the private sector (47.4%). We employed Latent Profile Analysis (LPA) as the methodological framework to identify distinct profiles within our sample based on selected continuous variables. In our analysis, we consider participants' responses to meaningful work, work engagement, subjective well-being, and emotional exhaustion. The LPA showed four profiles, of which two presented a distinct pattern of emotional exhaustion regardless of their well-being scores. Profile 1 showed workers with high meaningful work, work engagement and subjective well-being, and low levels of emotional exhaustion. Profile 2 shows workers with above-average meaningful work, work engagement, subjective well-being, and higher levels of emotional exhaustion. One-way analysis of variance (ANOVA) post hoc test showed non-significant differences in meaning, work engagement, and subjective well-being between both profiles; however, Profile 1 showed significantly lower emotional exhaustion (M = 2.20, SD = .814) compared to Profile 2 (M = 5.50, SD = .769). These findings indicate that workers with highly meaningful work can experience emotional exhaustion and suggest that meaningful work can bring forth a series of consequences to the individual's well-being. Additional research to understand the mechanisms that explain this pattern is needed.

Startle Reflex Measured at the Presence of Snake Pictures versus Smiling Baby Pictures
Poster #13 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Naomi Mwangi
Research Mentor(s): Ebony Glover

In this research project, I measured the startle reflex of my participants when they were exposed to snake pictures which represents a potential threat versus smiling baby pictures which symbolizes a universally positive and emotionally engaging stimulus. Before the participants were presented with the stimuli, they were habituated. This was done so that I could have a baseline startle reflex that I could compare to the startle reflex after presenting the stimuli. Electrodes were placed at the palms of the participants and under their eyes to measure startle reflex. This is especially important in measuring startle reflex because it measures blink responses in the presence of the visual stimuli. Research shows us that there is a positive association between aversive startle and the measures of dispositional fear. This experiment was conducted using SuperLab. The SuperLab software provided precise control over stimulus

presentation and synchronized data collection, enhancing the reliability and validity of the study. The findings suggest that snake pictures trigger a significantly more robust startle reflex compared to smiling baby pictures, aligning with the hypothesis that the startle reflex will be heightened at the presence of a negative stimuli versus a positive stimuli. The goal of this research is to increase the amount of knowledge regarding startle reflex and how it can be used as a measure of PTSD and to deepen the understanding of the individuals with this disorder.

Startle Reflex Responses in the Presence of Angry Facial Expressions Compared to Friendly Facial Expressions
Poster #10 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Nicholas Alba
Research Mentor(s): Ebony Glover

This study aims to discover how individual's startle reflex Reponses change in the presence of Aggressive/angry faces compared to attractive/friendly facial expressions. Utilizing the acoustic startle response through the skeletomuscular system, in which measures adaptive reflexes involved in threat responding. We analyzed exaggerated startle as a predictor of emotion dysregulation and anxiety risk, where we quantify electromyography (EMG) as a noninvasive measure of startle activity while examining the immediate physiological reactions to emotionally charged stimuli. We hypothesize that participants will show a heightened startle and arousal responses when viewing pictures of aggressive/angry facial expressions compared to when participants view attractive/friendly facial expressions. In this current study there are two comparison conditions and the stimulus for each condition will be presented for 5 seconds each with two blocks presented to participants. The observed changes in startle reflex responses will suggest that emotional stimuli, specifically aggressive and attractive facial expressions, will play a crucial role in modulating the startle reflex. Also, understanding how individuals startle responses vary in the context of different facial expressions contributes to the identification of psychophysiological markers of emotional reactivity, as well as exploring the relationship between startle reflex and emotional stimulus could provide further development of targeted therapeutic approaches. Overall, this study contributes to the understanding of how individual's startle reflex responses dynamically change in the presence of emotionally charged facial expressions and the implications of these findings that extend to fields such as psychology and clinical research.

Sucrose vs Social Choice in Rats
Poster #17 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm

Undergraduate Student(s): Bilal Saleem
Research Mentor(s): Erica Holliday and Debbie Bangasser

Operant conditioning is a well-established phycological technique used to study various aspects of behavior, learning, and reinforcement. We can use operant conditioning in rat models when using rewards (e.g., drugs, sucrose, or some other form of incentive) as reinforcers and assess reward seeking behaviors of rats, and the influence of rearing conditions or early life stress on reward seeking behaviors. Operant conditioning allows for research to be done with rats to simulate the drug seeking behaviors seen in humans. Rats can be trained to lever press to gain access to drug or social rewards to model human behaviors and allows us to investigate how the use of reward reinforcement affects the neuropsychological and behavioral patterns that exist following early life adversity in the expression of addiction and substance use disorders. In this study we specifically investigated early life adversity in a low bedding and nesting model's effects on reward choice (e.g., social vs sucrose). In the operant conditioning process, the rats are placed in an operant chamber that is equipped with levers on either side. They learn to press these levers to access the reward on varying schedules of reinforcement. Results from this study indicate early life adversity associated with preference for sucrose reinforcement versus social reinforcement. These results imply early life adversity can prime the brain to seek natural rewards over social rewards that can confer risk for the development of substance use disorders. The Investigation provides an insight into the behavioral aspects of sucrose consumption and sociability, contributing to the understanding of its effects on risk vs. resilience phenotypes. Future directions include using the same methods we can recreate this experiment with THC and study how THC as the reinforcer affects behavior and sociability in rats.

Sociology & Criminal Justice

From Solitude to Solidarity: Exploring Mentorship as a Remedy for Workplace Isolation Among Women in Law Enforcement
Poster #18 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Emma Smalley
Research Mentor(s): Robin Mathis

In the male-dominated field of law enforcement, where women make up only 13.3% of officers, limited representation poses challenges. It can lead to workplace isolation, driven by the experience of being a minority in the workplace. Additionally, the prevailing culture in police departments, which highly values masculine attributes, can further isolate women due to their deviation from the established norm. Workplace isolation poses a significant barrier to women in law enforcement, as it has the potential to hinder their career advancement and well-being. While

past research has acknowledged workplace isolation as one of the many challenges plaguing women in law enforcement today, effective strategies to address gender-based workplace isolation remain understudied. This study aims to bridge this gap by exploring the factors contributing to isolation, analyzing coping strategies, and proposing solutions. To accomplish this, a survey was administered to ninety-one female law enforcement officers in major U.S. cities, and qualitative data was analyzed using values coding to identify shared values, attitudes, and beliefs among the participants. Findings revealed that those with female mentors felt less isolated, valuing the mentorship experience as a platform to discuss gender-related challenges openly. Most participants recognized the advantages of same-gender mentorship, with many expressing a perceived shortage of such opportunities in the law enforcement field. Consequently, a hypothetical mentorship program is proposed within this study, aiming to counter isolation by leveraging mentorship by women for women as a practical solution. This study illuminates the pervasive issue of gender-related workplace isolation in law enforcement, offering insights into its causes and the coping strategies used to address it. The significance of this study's findings lies in their potential to transform the landscape of law enforcement by informing strategies for addressing the systemic challenges that hinder the progression and overall wellbeing of women in the field.

College of Science and Mathematics

Chemistry and Biochemistry

Bis(difluoroborylamidinates) with Flexible Alkylene Bridges as Aggregation-Induced Emitters
Poster #3 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Matthew Moore
Research Mentor(s): Michael Stollenz

4,4-Difluoro-4-bora-3a,4a-diaza-s-indacenes (BODIPYs) represent one of the most prominent classes of dyes because of their small Stokes shifts, high fluorescence quantum yields, and remarkable chemical and photochemical stability. Closely related aza-BODIPYs offer an additional N-donor atom in the bora-heterocycle that is susceptible to Lewis acids, which is particularly useful for chemical sensor applications. Amidinate ligands with various predominantly aromatic substituents allow the incorporation of an unsymmetrical scaffold for the triaza-BF2 heterocycle which is also substantially bulky and therefore beneficial to promote aggregation-induced emission (AIE) as well as increased Stokes shifts. Our concept is based on a

series of new polydentate bis(amidine) ligands LH2 with overall six N-donor atoms and flexible alkylene linkers that serve as ligands for emissive bis(difluoroborylamidinates) [L(BF2)2] that show AIE behavior.

Bottom-Up Proteomics Approach to Identify Fish Proteins in Tenualosa Ilisha and Salmo Salar Linnaeus
Poster #7 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Amal Samih
Research Mentor(s): Mohammad Halim

Proteomics investigation assists to identify and quantify all proteins available in a cell, tissue, or in an organism. Fish is an excellent source of protein and plays a critical role in global food security. Although proteomics studies have been widely used for human diseases and biomedical applications, only few research was reported on fish proteomics. In this study, we employed bottom-up proteomics approach to identify the key proteins present in Ilisha and Atlantic Salmon, two popular fishes found in Indian and Atlantic Oceans, respectively. These fishes live in the ocean, but they move to freshwater rivers or lakes to spawn. To extract proteins, the fish tissue samples were disrupted using a Lysis buffer, then subsequently reduced, alkylated, and digested with trypsin/Lys-C protease mix. The peptides were separated by RP-LC using Vanquish Flex HPLC with a 90 min gradient. An Orbitrap Exploris 240 Mass Spectrometer was used to identify the peptides employing data-dependent analysis method. Proteome Discovery Software was used to search the LC-MS/MS data against the Ilisha and Salmon proteomes from NCBI database using the SEQUEST algorithm. Our preliminary results identified 37 proteins out of 103 in Ilisha and 52 proteins out of 151 in Salmon. The most prevalent protein in Ilisha was Lactate dehydrogenase (LDH) with a sequence coverage of 90%. LDH is a vital protein found in most tissues, that is responsible for converting sugar into cellular energy. On the other hand, Salmon's highest coverage (59%) protein was Glyceraldehyde 3-phosphate. This protein is present during glycolysis and serves as an enzyme that catalyzes the breakdown of glucose.

Developing Non-toxic and Biodegradable Peptide Based Sunscreen
Poster #13 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Lexie Thrasher
Research Mentor(s): Mohammad Halim

Sunscreen is an important product for preventing early signs of aging, damage to the skin, and reducing risk to disease like skin cancer. Two major types of sunscreens, such as organic and

nanoparticle, are available in the market. Organic sunscreens absorb sun rays before they can reach the skin whereas nanoparticles scatter the sunlight. However, some of these compounds are known to be toxic and are not environmentally friendly. The goal of this study is to develop peptide-based sunscreens that are non-toxic, biodegradable, and protect against the UVA and UVB lights. Previously three aromatic amino acids-based peptide sunscreens were synthesized, and it was found that they are able to block UV lights from 190 nm to 280 nm. In the current study, four peptide-based sunscreens (BPA1-4) were developed using 4-Benzoyl-L-phenylalaine (BPA) combining with aromatic and non-aromatic amino acids. These sunscreens were synthesized by standard solid-phase peptide synthesis (SPPS) using rink amide resin and characterized by mass spectrometry and UV-vis spectroscopy. BPA1, a five amino acid-based sunscreen, containing two tryptophan, one tyrosine, and one non-aromatic amino acid showed two distinct UV light absorption bands at 310-240 nm and 240-190 nm. Other three sunscreens including BPA2, BPA3 and BPA4 where BPA was only incorporated with non-aromatic amino acids showed different UV absorption bands ranging from 310 nm to 190 nm. Among them, BPA4 showed promising results with the highest UV light absorption from 340 nm to 190 nm. These results showed that modified phenylalanine may have potential to be developed as efficient peptide-based sunscreen.

Developing Staple Peptide Therapeutics for Targeting the Main Protease SARS-CoV-2
Poster #8 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Kaylee Stone
Research Mentor(s): Mohammad Halim

In December of 2019, the recently discovered SARS-CoV-2 virus started a worldwide pandemic that has since killed around 7 million people. This single-stranded RNA (ssRNA) virus translates 29 proteins in the host cell. Researchers have quickly isolated important proteins from this group, including 3-chymotrypsin-like protease (3CLpro), which is essential for viral replication. At the cleavage sites, 3CLpro cleaves polyproteins. This results in the release of specific proteins that control the viral life cycle. Staple peptides are synthetic peptides that have had an amino acid modification creating a covalent cross link which preserves helical structure and additional serum stability. The inclusion of alpha-methyl phenylalanine in the staple peptide, a TLP-3 analogue, increases stability, protease resistance, and raises the possibility of a 3CLpro targeting inhibitor. To screen inhibitors targeting the 3CLpro, several efficient techniques were established. Due to its cost and accessibility, fluorescence resonance energy transfer (FRET) based assay is used most of the time to measure inhibitor affinity for the 3CLpro. However, in this study selected ion monitoring (SIM) combined with liquid chromatography-mass spectroscopy (LC-MS) was also utilized. The 50% inhibitory concentrations (IC50) for the linear peptide (TLP3L1) inhibitor of 3CLPro were first determined

using the SIM based LC-MS method to evaluate substrate degradation and product generation, and the results were compared using FRET assay. TLP3L1's estimated 50% inhibitory concentration was 6.26 μM, which agreed with the IC50 value determined by the FRET assay (6.53 μM). The staple analogue TLP3S1's estimated IC50 value, as determined by the LCMS assay, was 0.3046 μM.

Development of Water-Soluble Chromophores and Polyelectrolytes
Poster #15 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Sarah Chang
Research Mentor(s): Graham Collier

Semiconducting polymers offer flexible, lightweight, low-cost materials that are used in various applications such as sensors or as active-layer materials in electronic devices such as organic light-emitting diodes (OLEDs). However, most of these semiconducting polymers are shown to be compatible and/or soluble in organic solvents, which carries health and environmental concerns for the synthesis and processing of the materials. As such, there is a need to design new polymeric systems compatible with environmentally benign solvents, such as water. This study will focus on developing water-soluble conjugated polymers which may simultaneously lend their compatibility in biological environments. These polymers are hypothesized to be useful in applications such as nuclei-cell imaging and may be integrated into biomedical devices as sensors or probes. Specifically, the approach will involve a side-chain engineering strategy where the peripheral functionalization of dihydropyrrolopyrrole (DHPP) chromophores and monomers facilitates the development of novel conjugated polyelectrolytes with superior solubility in polar solvents compared to previous iterations of DHPP polymers. Results from these efforts will reveal important structure-property relationships that serve to guide continued development of materials with applicability across a suite of applications. By nature, this research is an interdisciplinary approach utilizing synthetic organic/polymer chemistry for biologically relevant materials.

Effect of Nitro Group Position on the Optical Properties of Pyrrolidinone-Fused-1,2-Azaborine Chromophores
Poster #6 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Ra'Nya Malone
Graduate Student(s): Lyric Gordon, Ophelia Adjei-sah, and Prioska Baruah
Research Mentor(s): Carl J. Saint-Louis

Due to the nitro (NO2) group's strong electron-accepting capability, aromatic compounds with NO2 groups are frequently used in n-type organic conjugates. However, adding NO2 groups to the chromophores' cores can reduce or quench the fluorescence, particularly in heterocyclic aromatic compounds containing three coordinate borons, such as pyrrolidinone-fuse-1,2-azaborines (PFAs). Due to strong intermolecular π-π stacking interactions, these NO2-PFAs tend to aggregate at high concentrations, causing emission quenching, also known as aggregation-caused quenching (ACQ). In this work, we synthesized a series of PFAs substituted with a NO2 group at positions (2-, 3-, and 4-) to investigate the influence of the location of the NO2 group on the optical characteristics of PFAs. Surprisingly, changing the placement of the nitro group on the pyrrolidinone hemisphere of PFAs resulted in distinct optical properties. Compared to 2-substituted NO2-PFA, substitution of the NO2 group to position 3- resulted in significant blue-shifted emission, with no signs of intramolecular charge transfer and increased in fluorescence. 4-substituted NO2-PFA is also blue shifted but at a longer wavelength with respect to 3-, resulting in less fluorescence.

Fabrication of Biodegradable Modified Wood for Future Application
Poster #12 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Ridham Raval
Research Mentor(s): Bharat Baruah

Current research demonstrates the delignification of natural wood (NW) by chemical treatment. In our research, the delignified wood (DW) is impregnated with bio-compatible and bio-degradable polymer to create transparent wood (TW). By incorporating such natural polymers, we have also given way to flexibility in the TW. Additionally, the resultant TW was further modified to have electrical conductivity by incorporating silver nanowires (AgNWs). Such modified wood (MW) would have tremendous potential in optoelectronics, energy storage, and biomedical devices. We characterize samples with FTIR, UV-vis, XRD, EDX, and SEM and further testing for energy storage capabilities.

Impact of Solvents on the Structure of Temporin L Peptide Investigated by Mass Spectrometry
Poster #11 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Journey Lark
Research Mentor(s): Mohammad Halim

Over the past decade, pharmaceutical companies have introduced peptide therapeutics that fight a wide range of diseases, such as cancer, diabetes, bacterial diseases, and more. Temporin-L, extracted from frog skin excretion, is an antimicrobial peptide that is active against Gram-negative bacteria and yeast strains. However, Temporin-L is an extremely hydrophobic peptide and has poor solubility with water and partially soluble in organic solvents. Moreover, when Temporin is dissolved in water they do not show stable secondary structure. In this study, we explore the structural and conformational changes of Temporin L by probing the folding and unfolding states in various organic solvents using high resolution mass spectrometry. Peptide samples were prepared with dimethyl sulfoxide (DMSO), methanol (MeOH), trifluoro-ethanol (TFE) at various percentages from 10% to 90%. When Temporin L was dissolved with 10% percentage of solvents, two distinct charge states (2+ and 3+) were noticed. The highest ion current was observed for 3+ charge state in TFE compared to DMSO and MeOH. This indicates that TFE preserves the unfolded state of the Temporin L due to the liner helical structure. At 50% of solvents, a similar trend was observed where 3+ charge states showed the higher ion current compared to 2+ charge states. Interestingly, when Temporin L was dissolved with 90% of solvents, the highest ion current was detected for 2+ charge state which reveals that peptide is in the folded state, but it lost the helical structure.

Modulation of Optoelectronic Properties of Electron Rich Pyrrolopyrroles via Peripheral Alterations

Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
12:00pm – 12:50pm
Graduate Student(s): Lillian Daniel
Research Mentor(s): Graham Collier

Understanding the structure-property relationship of pyridine-containing chromophores is important for the continued expansion of molecules possible for applications in organic electronic devices. Dihydropyrrole [3,2-b] pyrroles (DHPPs) are synthetically simple and tailorable chromophores that can be manipulated for varying optoelectronic properties based on the functionalities of the starting materials. Several isomeric pyridine-containing DHPPs were synthesized to elucidate how subtle structural changes influenced the fundamental optoelectronic processes via ultraviolet-visible absorbance spectroscopy (UV-vis), cyclic voltammetry (CV), and differential pulse voltammetry (DPV). Initial investigations on the chromophores indicate that the position of the nitrogen within the pyridine does affect the optical properties of the oxidative species of the radical cation. These chromophores also exhibit halochromic responses in the presence of a strong acid. The chromophores were also used as a precursor to a palladium-catalyzed cross coupling Suzuki reaction. The resulting Π-extended isomeric DHPPs exhibit distinct electrochromic and halochromic responses but have minimal effect on the redox

properties. This work aids in developing strategies to tailor optoelectronic properties with simple and tailorable DHPPs for varying applications of electronic devices.

Peptide Therapeutics to Inhibit the Aggregation and Accumulation of Beta-Amyloid Plaques in Alzheimer's Disease
Poster #9 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Kelechi Okere
Research Mentor(s): Mohammad Halim

Alzheimer's disease is a neurological disease that is theorized to be caused by the buildup of the beta-amyloid. Alzheimer's disease is the most diagnosed neurological disease in the United States with 500,000 people being diagnosed a year. There are multiple theories as to why Alzheimer's disease can occur in an individual. The most prominent one is the beta-amyloid hypothesis, which details that senile plaque formation, and the accumulation of beta-amyloid (Aβ) oligomer peptides is the major cause of Alzheimer's disease. In this theory, small and soluble aggregates of beta-amyloid accumulate on the brain, disrupting communication between brain cells and eventually killing them. This is known to cause the major symptoms of Alzheimer's, including memory loss, delusions, and the inability to form new memories. Peptide therapeutics can be used to delay effects of the disease and have been synthesized to bind to beta-amyloid fibrils and inhibit the aggregation and accumulation in the brain. In this study, multiple peptides were synthesized and tested upon their binding ability to the beta-amyloid peptide. The best candidates were chosen to be synthesized and tested. Standard Fmoc solid phase peptide synthesis protocols by CEM Liberty Blue peptide synthesizer were used to synthesize the peptides. Both peptide-resin complexes were cleavage using 95% trifluoracetic acid. Peptides were filtered and precipitated with cold diethyl ether. Peptide characterization was then conducted with Mass spectrometry. One of the peptides synthesized named "LAZ" shows two strong peaks at m/z 312 and 390 which correspond to the +5 and +4 charge states. The synthesized peptide was allowed to bind to the beta-amyloid 12-28 with varying concentrations. The high-resolution mass spectrometry studies showed that the peptide inhibitor strongly interacted with the beta-amyloid. Further research will be conducted on the interaction of these peptides with the beta-amyloid peptide employing native mass spectrometry techniques.

Preparation of Ethylene-Bridged Bis(amidine) Ligands as Precursors for Multinuclear, Blue-Green Emissive Copper Complexes
Poster #7 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Benjamin Gibbas

Research Mentor(s): Michael Stollenz

Multinuclear Group 11 clusters, specifically those that incorporate copper as the first choice of a cheap precursor coinage metal, have attracted considerable interest within in the past decade, since they facilitate closed-shell metal $M^{I}\cdots M^{I}$ ($d^{10}\cdots d^{10}$) interactions (M = Cu, Ag, Au). The fascinating luminescence properties of these multinuclear complex assemblies lead to applications as powerful building blocks for molecular/organic light-emitting diodes (OLEDs). Polydentate ligands that are capable of accommodating defined linear arrangements of Cu^{I} and Cu^{II} ions are of particular interest in this regard, as they can also serve as potentially conducting molecular wires in nanoelectronics. Our concept features a series of new polydentate bis(amidine) ligands **L**H_2 *with a sterically protected flexible backbone. It has recently been demonstrated that such a ligand undergoes with mesitylcopper, a powerful synthon for a variety of unusual Cu^{I} frameworks, a clean conversion into two simultaneously crystallizing Cu^{I} complexes [***L**$_2Cu_4$*] and [***L**$_4Cu_8$*] that show blue (λmax = 460 nm; [***L**$_2Cu_4$*]) or green (λmax = 495 nm; [***L**$_4Cu_8$*]) light emissions in excellent quantum yields. We are now focusing on subtle modifications of the aromatic substituents on the bis(amidinate) framework that allow systematic structural changes of the resulting [***L**$Cu_2]_n$ clusters and fine-tuning of their emission properties.*

Qualitative Analysis of Kavalactones in Various Kava Samples Using GC-MS and DART-MS

Poster #2 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Shayla Kelley
Research Mentor(s): Wei Zhou

Kava, Piper methysticum, is a plant native to the South Pacific that has long been utilized for traditional ceremonial and medicinal purposes. Recent years, however, have seen a rise in abuse of kava products for its anxiolytic and sedative properties. There are also concerns about side effects such as fatigue and dizziness related to overdose of kava consumption. Kava products are freely available in the form of teas, capsules, and powders, found easily at many online and physical storefronts as is not well-regulated in the US despite being a controlled substance in other countries. In this study, GC-MS (Gas Chromatography-Mass Spectrometry), DART-MS (Direct Analysis in Real-Time Mass Spectrometry) instrumental analysis were utilized to identify the major kavalactones among different kava samples. Analysis was conducted on commercially available kava capsules, powders, tea bags, and blended raw roots, using acetone as the extracting reagent. The retention times found by GC-MS for the lactone standards are as follows: dihydrokavain (DHK) was found to have a retention time of 14.3-15.2 minutes, kavain at 15.7-17.2 minutes, dihydromethysticin (DHM) at 19.8-23.7, yangonin at 21.3-26.3, and methysticin at 21.6-26.9 minutes. Using these retention times and the major mass-to-charge

fragments of each compound, these five Kavalactones were found in kava powder, kava root and kava tea samples, while the kava capsule in our study lacked DHM and methysticin and showed only a possible presence of yangonin. These results indicate that the capsules could be the most different one from the other samples in terms of lactone composition. Spectra from DART-MS has given supportive result. Further qualitative and quantitative comparison using GC/MS, FTIR, and DART-MS may be used in the future to better understand the chemical composition of major kavalactone among different kava supplements and product.

Structural, Energetic, and Spectral Analysis of a Model Peptide and its Isomers
Poster #6 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Karen Anisha, Victoria Gonzales, and Younos Hashem
Research Mentor(s): Martina Kaledin

Formamide is a planar structure, the simplest molecule with a peptide bond. It can be utilized as a model for understanding more complex peptides. Formamide has been linked to the study of the origin of life and is regarded to be a possible precursor for prebiotic chemistry. The primary motivation of this work is to understand the potential energy surface (PES) landscape, identify many plausible dissociation channels, and describe the vibrational characteristics of formamide beyond the harmonic approximation. We confirmed the previously known high-energy tautomerization of formamide into formimidic acid and formimidic acid into other isomers. The normal mode analysis is used to calculate harmonic frequencies. Anharmonicities are also evaluated using vibrational perturbation theory (VPT2), vibrational self-consistent field (VSCF), and variational configuration interaction (VCI). These theoretical methods shed light on the impact of anharmonicity on characteristic peptide vibrations, such as amide A, I, and II vibrational modes. Later, the quality of the PES fitting technique was tested by Hashem et al. [J. Chem. Theory Comput. 19 (2023) 5690-5700] using optimized molecular geometries of multiple stational points found in this work.

Synthesis and Characterization of a Nucleobase-Functionalized Dihydropyrrolopyrrole Chromophore
Poster #1 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Edward George Tapu, Arian Charland-Martin, and Lillian Daniel
Research Mentor(s): Graham Collier

Nucleobase-functionalized molecules and polymers have proven to be useful as drug and gene delivery carriers, stimuli-response hydrogels, self-healing materials, and adhesives which motivates their incorporation into conjugated systems. The nucleobase pendant group will serve as an order-inducing motif that will enable molecules or polymers to form multidentate hydrogen bonding, π-stacking, and cation binding interactions. Nucleobase pendants are incorporated as side chain functionalities via a multi-step synthetic strategy. This strategy involved synthesizing nucleobase-functionalized anilines that participate in an Fe-catalyzed multicomponent reaction to attain functionalized pyrrolopyrroles. Nuclear magnetic resonance spectroscopy confirms successful synthesis but also reveals insights into H-bonding motifs between chromophores. The overarching goal of this project is to understand the fundamental structure-property relationships of purine-functionalized molecules that will be important pioneering work for continued development of nucleobase-functionalized molecules and polymers.

Synthesis, Mass Spectrometry Characterization, and Inhibition efficacy of Dimeric Peptide Targeting the Main Protease of SARS-CoV-2

Poster #10 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Blaise Williams
Research Mentor(s): Mohammad Halim

Main protease (Mpro) of SARS-CoV-2 has been identified as an important protein for viral replication. Linear and cyclic peptides have been utilized to block the catalytic dyad of Cys145 and His41 of the Mpro which showed micromolar level inhibition efficiency. However, very few studies are conducted on the dimeric peptides due to the complication in their synthesis. Some of the advantages of peptide dimerization include elevating their antiviral, antimicrobial activity, selectivity, homolytic activity, vesical permeability, and serum stability. Dimer peptides consist of two peptides linked together in one of three ways, sulfur bridging between two cystines, C-terminal linkage using Fmoc-Lys(Fmoc)-OH, and N-terminal linkage using Fmoc-Glu-OH. Our previous studies showed that Temporin L (a peptide from frog skin) and its analogues can effectively inhibit the Mpro with micromolar level efficiency. In this study, dimerization was conducted on two analogues of Temporin L. The synthesis of the peptides utilized automated Fmoc solid-phase synthesis. Peptide products were characterized using mass spectroscopy, ensuring experimental m/z values agreed with theoretical values. Thus far, synthesis of two of the three peptides were confirmed by mass spectrometry which agreed well with the theoretical masses. For the cystine dimerized peptide, peaks detected at m/z 1197.75 and 898.67 correspond to [M+2H]2+ and [M+3H]3+ charge states, respectively with a theoretical mass of 3592.28. For the lysine dimerized peptide, peaks observed at m/z 1505.58 and 758.33 correspond to [M+2H]2+ and [M+3H]3+ charge states with a theoretical mass of 3133.62. The estimated IC50 of the cystine dimerized Temporin analogues obtained from selected ion monitoring based LCMS

protease assay was 994.9 nM compared to the IC50 values of 11.4 and 13.4 μM of the monomer peptides. The effectiveness of the other dimerized peptides will be analyzed by fluorescence resonance energy transfer (FRET) and LCMS based assays.

Understanding Degradation Dynamics of Azomethine-Containing Conjugated Polymers
Poster #19 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Ariane Charland-Martin
Research Mentor(s): Graham Collier

Understanding the influence of environmental effects on the degradation properties of conjugated polymers is an important task for the continued development of sustainable materials for biomedical and optoelectronic applications. In this study, azomethine-containing polymers were synthesized via palladium-catalyzed direct arylation polymerization (DArP) and used to provide fundamental insight into degradation trends. First, the degradability and recyclability of these polymers were confirmed by the shifts in the UV-vis absorbance spectra and the appearance/disappearance of diagnostic peaks in the 1H-NMR spectra. In addition, the aldehyde starting material was recovered at a high yield after degradation and was shown to maintain structural integrity. Solution degradation studies found that varying the solvent and acid used for hydrolysis results in different rates of degradation that range from hours to seconds and correlate to polarity and pKa. Ultimately, this research provides strategies to control the degradation kinetics of azomethine-containing polymers through the manipulation of environmental factors to guide the continued development of azomethine-based materials.

Year Two Microfiber Analysis of Lake Allatoona Sand and Water Using an Optimized Water Sampling Method and an Optimized Extraction Method
Poster #18 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Abby Moen
Research Mentor(s): Marina Koether

This project is part of an on-going study of microfibers found in Lake Allatoona water and sand, as well as tap and deionized (DI) water. Water and sand samples from six different lake sites were collected, processed, and analyzed under a microscope for the presence of microfibers. Lake water samples were obtained using a newly optimized method involving hand-held sieves, and these results were compared to last year's results using plankton nets. Tap and DI water samples were obtained from the laboratory and chemical stockroom and compared to blank results to test

for possible carryover and contamination from DI water. It was concluded that the sites furthest downstream from the Allatoona Dam had the highest microfiber concentration, and the majority of 2023 lake water samples had a higher microfiber concentration than those from Summer 2022 using plankton nets. Tap water was more contaminated with microfibers than DI water.

Ecology, Evolution, and Organismal Biology

Host Selection in Harper's Dodder
Poster #22 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Benjamin Campbell
Research Mentor(s): Joel McNeal

Cuscuta harperi (Harper's Dodder) is a rare, annual, parasitic vine that can parasitize a number of hosts that grow in shallow soils of rock outcrops. Little River Canyon National Preserve, located near Fort Payne, Alabama, is home to the largest populations of C. harperi on sandstone outcrops. C. harperi's host preference varies between populations, with some populations parasitizing only a single species; however, the Little River Canyon population is more diverse in its host selection, making it a good population to study differential success across hosts from year to year. This observational study aims to measure patterns in C. harperi host use, survivorship, and reproductive success. Recently germinated C. harperi seedlings were located and marked in Spring 2016, 2017, and 2023 and their initial hosts recorded. Surviving individuals were relocated in late Summer and their reproductive success measured by counting flowers and fruits. Host use and survivorship varied considerably year to year. Survivorship and fecundity data were analyzed against weather data for the studied years to find correlation between host use, survivorship, reproductive success, and weather patterns such as rainfall.

Above and Below Ground Community Structures in a Longleaf Pine Restoration Site: Native Herbaceous Species and Their Soil Microbiomes
Poster #19 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Dylan Bennett, Olivia Walker, Rylee Shaw, Van Par, and Venya Gunjal
Graduate Student(s): Isabella Vahle
Research Mentor(s): Paula Jackson

The longleaf pine (Pinus palustris Mill.) ecosystem is one of the most diverse ecosystems on the planet and once covered close to 92 million acres of land across the American Southeast. This ecosystem was historically maintained by fires, but due to fire suppression and agricultural and logging techniques, only 3% of it remains. Restoration of this ecosystem has been of interest because of its economic importance and high ecological diversity. The native herbaceous species within this ecosystem have major effects on the maintenance of community structure by serving as fuel for the low-intensity, recurring fires the system depends on. Soil microorganisms, such as bacteria and fungi, are known to aid greatly in many plant processes, primarily nutrient and water acquisition, resistance to infection by pathogens and diseases, and decomposition and nutrient cycling. However, little is known about the relationship between the dominant herbaceous species and soil microbiome compositions within montane longleaf pine ecosystems. In this study, we completed a multiyear, seasonal analysis of the soil bacterial and fungal microbiome compositions upon removal of the two most dominant herbaceous species in a longleaf pine restoration site. Six randomized blocks (2.4m2) were established at Sheffield Wildlife Management Area in Paulding County, GA. Each block contained four subplots (50cm2), each with one of the following treatments: 1) control; 2) most dominant herbaceous species removed; 3) second most dominant herbaceous species removed; 4) soil disturbance: no species removed. DNA was extracted from soil samples from subplots each season and PCR amplified for both fungal and bacterial gene sequences. Results from this study will provide us with baseline data on the microbiome composition within the endangered longleaf pine ecosystem that will be used to better inform restoration practices as more knowledge is gained on the intricate relationships between plants and their associated soil microbiomes.

Abundance of Seagrasses and Algae in Relation to Distances Along a Transect Off the Coast of Tobacco Caye

Poster #1 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Lexi Bailey, Kat Bishop, Sydney Carvalho, and Ester Shimon
Research Mentor(s): Troy Mutchler

Seagrasses, being primary producers, are one of the most productive ecosystems and provide food and shelter to many invertebrates and fish, making it imperative for the survival of these organisms. We sampled off the coast of Tobacco Caye, Belize to determine the abundance of seagrasses and algae in relation to distances along a transect. Factors that can affect the abundance of each species could be human impact, excess nutrients, flow of the current, and light exposure along the transect. Tobacco Caye's many tourists and wastewater wells could provide additional nutrients to promote seagrass growth. Alternatively, this could serve as a disruption to seagrass beds, diminishing growth. We expected a lower relative abundance of seagrasses and

algae as distance increased north along the main transect. We found that we needed more data before we made conclusions about the patterns we observed. Our research is a starting point that can be used for future studies as it gives a general idea of the abundance of the ecosystem around the west coast of Tobacco Caye.

Comparison of Amphibian Occurrence Data in Museum Collections and Citizen Science Databases
Poster #19 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Patrick Young
Research Mentor(s): Todd Pierson

iNaturalist is a fast-growing citizen science platform that offers a unique opportunity to collect geospatial data through user-generated observations. In contrast, contributions of specimens to traditional museum collections are declining. Previous studies have compared these two data sources to highlight the strengths and weaknesses of each. For example, iNaturalist houses an ever-growing user base, has easily accessible data, has more recent records, has more recent observations, and may include records from a greater diversity of areas than museums. Museum records, on the other hand, may have greater accuracy of identifications, more reliable metadata, and are built upon physical specimens that can be examined. Here, we compare geospatial patterns of occurrence data from iNaturalist and museum collections, using Appalachian salamanders as a model system. Our goals were to: 1) see if museum records and citizen science data are distributed similarly on the landscape; 2) specifically evaluate whether records from national parks are more likely to be represented in one or the other. These objectives highlight the importance of citizen science and how it can further our knowledge of salamander geospatial boundaries.

Culled Lionfish Sexual Maturity Over a Four-Year Timespan
Poster #4 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Christina Bland
Research Mentor(s): Troy Mutchler

Lionfish are invasive in the Atlantic and the Caribbean. Like many other invasive species, they do not have any natural predators in these areas, so their population can grow unchecked. This can decrease the population of native fish species due to lionfish eating to excess. Because of their impact on native species, resource managers have incentivized lionfish hunting. Hunters were paid $6 USD for every pound of lionfish they brought in, so they possibly favored larger lionfish

to increase their reward which would lead to an adaptive advantage for fish of smaller sizes. We hypothesized that the lionfish bounty program would affect the average size of lionfish and the size of females at sexual maturity, both of which should decrease. Since 2019, local fisherman brought their lionfish catch to the Tobacco Caye Marine Station to retrieve a financial bounty. Data on fish size, sex, and reproductive status was then obtained from the fish. These data were used to determine the percentage of female lionfish in each of three categories: those that were not sexually mature, those that were, and those that were in the intermediate phase of development. This data was used in conjunction with fish size to estimate the size at sexual maturity. Over the study, the size distribution of mature females appeared to decline. In 2019-2020, the smallest mature lionfish was 18-20 cm, and the average length of mature females was over 20 cm in size. By 2022, the average size of mature fish was 18.5 cm with higher percentages of mature fish in the smaller size classes than in previous years. Differential sampling effort was not accounted for in this study and would need to be addressed before drawing robust conclusions. However, the pattern suggests fishing pressure could drive earlier sexual maturation.

Genetic Identification of an Unknown Waterdog (genus Necturus) Population from an Appalachian River

Poster #5 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Erick Fernando Montes de Oca Sierra
Research Mentor(s): Todd Pierson

Waterdogs (genus Necturus) are a group of fully aquatic salamanders that include several different species distributed throughout the east of the United States. The complex fluvial geography of eastern Tennessee and northern Georgia, as well as the evolutionary history of waterdogs from that genus, may create conditions that promote speciation and hybridization between the species found in the area (e.g., N. maculosus, N. beyeri, and N. alabamensis). In this study, we use genetic data to determine the identity of a population of waterdogs from a river where they had not previously been reported. We used polymerase chain reaction (PCR) and specifically designed PCR primers to amplify mitochondrial DNA from different samples collected along some points of this river, we conducted Sanger sequencing for all samples, and we placed them in an alignment with existing DNA sequencing data from GenBank. We then built a phylogenetic tree to help identify this population and better explain the geographic distribution of the different species of waterdogs in this region, as well as to gain a deeper understanding of their genetic relationships. By better understanding these relationships, we can contribute to efforts to characterize and conserve Appalachian biodiversity—especially because waterdogs (like other amphibians) may be indicators of a healthy ecosystem.

Host Specificity of a Rare Parasitic Plant, Cuscuta harperi

Poster #16 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Will Freyberger
Research Mentor(s): Joel McNeal

Cuscuta harperi (Harper's Dodder) is a rare parasitic vine lacking roots and leaves that is endemic to hot, dry sandstone and granite outcrop habitats. Cuscuta species find its appropriate host plants by following gradients of specific volatile organic compounds in the air emitted by other plants and growing towards appropriate hosts or away from unsuitable species. Geographically separated populations of C. harperi exhibit drastically different host usage from each other, and we aim to determine whether differences in host specificity between populations are due to genetic differences related to responses to volatile chemicals or if observed host use is determined by plastic responses to extrinsic factors. To test for differences in host volatile chemical response between the populations, we will allow seedlings from two populations exhibiting drastically different host use to choose between two potential hosts: (Liatris microcephala (Small-headed Blazing Star) and Bigelowia nuttallii (Nuttall's Rayless Goldenrod)) under identical greenhouse conditions. A population on an outcrop of Altamaha Grit in the coastal plain of Georgia, that specializes exclusively on Bigelowia nuttallii will be compared to a sandstone outcrop population in northern Alabama where individuals grow on a wide range of hosts, including both Liatris microcephala and Bigelowia nuttallii.

Inoculation of Methylobacterium oryzae CBMB20 Reduces Stomatal Conductance in Salt Stressed Tomato
Poster #1 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Minh Phung and Maddie Cusick
Graduate Student(s): Zach Peagler
Research Mentor(s): Mario Bretfeld

Increasing the quality of produce, such as tomatoes, without compromising yield is a top priority given today's increased customer awareness for quality fruit. Hydroponic production achieves high yield but often at the cost of quality of the commodity. This project aimed to determine the potential benefits of foliar and root inoculations of the plant growth promoting bacteria Methylobacterium oryzae CBMB20 on tomato plants grown in a semi-hydroponic setting under high electrical conductivity conditions. Tomatoes were planted in April 2023 and inoculated upon transfer of the seedlings to their final pots. Treatments included a control with no inoculant, a foliar inoculant spray, a root inoculation via chitosan-immobilized bacteria, and a combination foliar and root inoculation. Measurements were taken twice weekly using

PhotosynQ MultispeQ 2.0 and a LI-COR LI-600 porometer/fluorometer. Preliminary results indicate that M. oryzae CBMB20 inoculation significantly reduces stomatal conductance in tomato plants. This reduction in stomatal conductance is strongest in foliar and combination treatments but is present and significant across all treatments. Results for fluorescence parameters varied between the devices. Photosystem 2 quantum efficiency in light (PhiPS2) was not significantly different based on Li-600 measurements, but was significantly lower in the foliar treatment, and significantly higher in the combination treatment based on MultispeQ measurements. From our preliminary data, we can conclude that foliar application of M. oryzae CBMB20 affects stomatal conductance in tomato plants, potentially due to hormonal signaling at the leaf level, and that more data and further analyses are required to elucidate fluorescence parameters.

Insects Detected in Guano from Several Local Species of Bats
Poster #16 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Graduate Student(s): Kerrigan Larkin
Research Mentor(s): Thomas McElroy

Biotic and abiotic factors play an important role in the make-up structure of a community. Typically, resource partitioning occurs when competition occurs, like in insectivorous bat species in North American. These species in North America rely on the use of echolocation and flight to forage for food. Since these bat species feed on the same prey and use the same methods of hunting there may be a partitioning of resources in habitats where multiple species occur. Bats account for 1/5th of mammal species and can be found throughout the world. They generally eat insects, fruit, flowers, and other small animals but this can vary from population to population since their feeding ecology is not truly understood. Competition for food resources among bat species can impact the diet of individual bat species in different areas. Often, the range and habitats of many bat species overlaps. Since these bat species compete for the same resources there should only be a few species in each habitat. Although, often many species can be found in the same habitat. Molecular techniques will allow a catalog to be created describing what individual bats have been eating. From feces, DNA can be extracted, and the DNA barcode for the insects they have consumed can be obtained. Then what a bat feeds on in certain areas during different times of the year can be delineated and compared.

Patterns and Potential Mechanisms of Phenotypic Changes in Urban Small Mammals
Poster #11 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Graduate Student(s): Leslie Lopez and Bri Casement

Research Mentor(s): Nicholas Green

Urbanization is an example of human induced rapid environmental change (HIREC) that can have wide reaching ecological effects including habitat destruction, fragmentation, and alteration of local climates. Effects of urbanization have been shown to negatively impact wildlife as disturbances resulting from urbanization can create novel environments and selective pressures that could lead to changes in morphology, physiology, or both. We investigated how small mammal mass, length, and lipid levels vary along the urban rural gradient. These individuals are important to study as they are as prey animals, seed dispersers, have potential to transmit viruses and parasites to humans and human-commensal animals and are model organisms. We trapped small mammals at 23 sites along an urban-to-rural gradient centered in Atlanta, Georgia, USA from May-August 2023. For each individual, we recorded species, sex, reproductive status, body mass, total length, whole blood cholesterol (CHOL), triglycerides (TRIG), and high density lipoprotein cholesterol (HDL). We also recorded environmental variables such as temperature, ambient light, and plant cover. Body mass was modeled as an allometric function of length to calculate mass-length residuals (MLR) for each individual. We modeled physiological endpoints to assess the impact of environmental and anthropogenic factors associated with urbanization on animal morphology and health. Preliminary analyses suggest that TRIG and HDL are sensitive to urbanization, while CHOL and MLR are not. Total CHOL may be limited by MLR, but other blood endpoints are unrelated to MLR. Analysis is ongoing to clarify these relationships.

Population Genetic Structure of Tricolored Bats (P. subflavus) in the Coastal Plains of the Southeastern U.S.
Poster #20 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Graduate Student(s): Laura Henderson
Research Mentor(s): Thomas McElroy

Significant population declines have occurred in the Appalachian Mountain and Cumberland Plateau regions. Little is known about tricolored bat populations in the Coastal Plain region of the southeastern U.S. where the species has been documented to inhabit transportation structures in addition to tree roosts, caves, and mines. Summer and winter habitat preferences by the tricolored bat are not well understood, particularly regarding the use of manmade roosting structures. The size and distribution of these culvert-dwelling populations are currently unknown but could represent a significant remnant population. The objective of this study was to determine genetic connectivity of tricolored bat populations roosting and/or hibernating in transportation structures and relatedness of Georgia Coastal Plain bats with the heavily impacted tricolored bat populations in the Appalachian Mountains. We collected bats by hand.

We recorded standard morphological measurements. We collected oral swabs and hair samples. Samples were stored in silica gel desiccant at 0°C in the field, then transported to Kennesaw State University and stored at -80°C. DNA was isolated with a DNeasy kit (Qiagen). We surveyed 6 microsatellite markers and will sequence from the non-coding HV1 region of the mitochondrial genome. Our population genetic analyses revealed high dispersal patterns among sampled sites (gene flow); population genetic structure was detected, but it was not associated with roosting locations (sampled sites). Sampled sites contained a mixture of putative populations. Factors other than roosting or hibernacula sites may be structuring populations. We will combine these data with geospatial distribution data and P. destructans presence/absence data to understand factors associated with disease spread and susceptibility to white-nose syndrome. Future studies will investigate the mitochondrial DNA (D-loop) haplotypes of these bats, allowing us to further assess the population genetic structure and genetic diversity of bats impacted by white-nose syndrome.

Quantifying the Role of Water Quality on Nitrogen Cycling in a Trophic Estuary
Poster #11 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Michael Chapman
Graduate Student(s): Ashlyn Stanalonis
Research Mentor(s): Troy Mutchler, Mark McCarthy, Angel Dieppa-Ayala, and Milton Munoz Hincapie

Jobos Bay Estuary is an intertidal, tropical estuary located in southern Puerto Rico. The estuary covers about 12 km2 and has a variety of habitats, such as seagrass beds, mangroves, mud flats, and coral reefs, which play important roles in sediment trapping and water quality maintenance. Seagrasses also serve as nursery and feeding grounds and provide shelter for macrofauna. Currently, the role of seagrasses and water quality on nitrogen (N) cycling in trophic estuaries is not well constrained. Understanding variations in sediment-based effects on N cycling rates and transformations, and how they are associated with water quality, is an emerging area of research. Intact sediment cores will be collected to measure N cycling rates using continuous-flow incubations from invasive (Halophila stipulacea) and native (Thalassia testudinum) seagrass meadows, as well as unvegetated sediments. By measuring dissolved gas (O2 and N2) and net nutrient (N and phosphorus (P)) fluxes at four sites in Jobos Bay, during rainy and dry seasons, we will characterize the potential of sediments to act as a net bioavailable N sink (e.g., anammox/denitrification) or source (e.g., remineralization and N fixation). In March (dry), July (wet), and October (transition) 2023, intact sediment cores will be incubated with and without 15N added as ammonium or nitrate. We expect variations in N sources and removal as a seasonal response to freshwater inputs and N loading, with Jobos Bay sediments acting as a net N sink on an annual basis. Vegetated sites will have higher sediment N cycling rates versus

unvegetated sites for total N2 export via microbial N removal, a valuable ecosystem service. We anticipate results that show active ammonium cycling within the water column. Bare sediment sites expected to exhibit net N fixation or DNRA, and sites with seagrasses will maintain coupled nitrification/denitrification. This research will aid our understanding of the impacts of climate change on microbial N removal to help inform effective management of these ecosystems.

Spatial and Abiotic Effects of Urbanization on Small Mammal Communities
Poster #5 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Graduate Student(s): Brianna Casement and Leslie Lopez
Research Mentor(s): Nicholas Green

Urbanization is known to decrease the richness and abundance of native wildlife populations, fragment natural areas, and increase human and human-commensal animal interactions with wildlife. Dynamics of species persistence in habitat fragments is often understood in the framework of island biogeography theory (IBT), with habitat fragments being analogous to oceanic islands. However, urban environments present different challenges to dispersal and persistence than literal oceanic islands, so the applicability of IBT to urban ecology is unclear. We investigated how small mammal communities respond to spatial and environmental factors associated with urbanization. These communities are important to consider in urban fragments because of their roles as prey animals, seed dispersers, and their potential to transmit viruses and parasites to humans and human-commensal animals. We trapped small mammals at 23 sites along an urban-to-rural gradient centered in Atlanta, Georgia, USA from May-August 2023. Sites were characterized by in situ environmental conditions such as temperature, ambient light, vegetation, and sound; additionally, we obtained landscape-level data on human population, land use, and socioeconomic variables from public databases. We integrated these data using geographic information systems (GIS) and modeled species richness and other community metrics using generalized linear models. Preliminary analyses suggest that small mammal diversity is affected by human population and landscape characteristics at multiple spatial scales. Generally, community diversity decreases with increasing non-forested land cover at all spatial scales; however, the response to human population and other indicators of urbanization varied by spatial scale. Future analyses will clarify the effects of different landscape variables.

Environmental Science

Examining the Effects of Non-Native Seagrass Species on Sediment Chemistry in Jobos Bay, PR.
Poster #14 (Marietta Event Center/Gymnasium)

Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Raven Winant
Graduate Student(s): Kayla Gonzalez-Boy
Research Mentor(s): Troy Mutchler and Mark McCarthy

Seagrasses provide a variety of essential ecosystem services such as erosion prevention, carbon storage, processing water column nutrients, and providing food and habitat for endangered species. These services are invaluable to humans and must be studied to determine how seagrasses may be a link in achieving the overall goal of fighting climate change and preserving earth's coastal and marine ecosystems. Jobos Bay, Puerto Rico hosts a wide variety of marine habitats but is vulnerable to ecosystem damage from human activities. This research was conducted to investigate how the presence of non-native Halophila stipulacea impacts the nitrogen cycle, nutrient availability, and dissolved ammonium pool in Jobos Bay. In March 2023, a total of forty-eight sediment cores were collected from four different habitat types across three different locations in Jobos Bay. Porewater was extracted from the cores and will be examined spectrophotometrically to determine porewater ammonium concentration and exchangeable ammonium concentration. An analysis of variance will be used to compare the concentrations of ammonium among the different habitat types. Due to higher refractory carbon composition in the biomass of Thalassia testudinum, more burial and less decomposition is expected in seagrass beds containing T. testudinum than those with H. stipulacea. I predict that this lower decomposition rate will be detected as lower sediment porewater ammonium concentration. Differences in porewater ammonium concentration associated with these species could indicate changes in the availability of nitrogen for microbial metabolism and nitrogen recycling within the ecosystem.

Impacts of Urbanization and Invasive Species on Insect Diversity within the Fastest Growing Urban Corridor in the US
Poster #4 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Sofia Cuenca Rojas
Research Mentor(s): Clint Penick

Urban expansion areas are expanding globally, with major impacts on biodiversity. These impacts can be both positive and negative though they likely depend on the region where urbanization is happening as well as land management practices. Here, I propose to study the impacts of urbanization on biodiversity in the city of Atlanta, a part of the fastest-growing urban corridor in the United States. Within Atlanta, I will sample 36 sites across an urban gradient to determine the impact of land management practices on biodiversity using ants as an indicator.

Ants are ubiquitous to terrestrial habitats and are therefore a good indicator species of biodiversity due to their abundance, high diversity, well-established methods of collection and ability to be identified to species. I will test the hypothesis that urbanization will have a largely negative impact on ant diversity, with the highest species diversity found in remnant forests and parks. However, southeastern cities, including Atlanta, host a number of invasive species that may affect this pattern, including a recently expanded invasive ant that specializes in forest habitats. Therefore, I will test a second hypothesis that the presence of invasive species will lead to decreased ant diversity in forest remnants compared to other regions where this invasive species is absent. The majority of similar studies have focused on cities in the northeastern United States or abroad, but far less is known about the impacts of urbanization on insect diversity in the Southeast. This work will provide valuable insight into the combined effects of urbanization and invasive species on biodiversity in the Southeast, which is essential for informing future land management decisions.

Investigating Potential Toxin Resistance in an Insectivorous Snake
Poster (Microsoft Teams)
Friday, November 17th
3:00pm – 3:15pm
Undergraduate Student(s): Sam Francus
Research Mentor(s): Todd Pierson

The Rough Greensnake (Opheodrys aestivus) is a non-venomous colubrid native to North America. They are a harmless species with a diet consisting primarily of insects and other arthropods. Recently, a citizen scientist observed the first record of a wild Rough Greensnake consuming an adult Monarch Butterfly. This is remarkable because these butterflies are chemically defended by cardiac glycosides, toxins that they sequester from milkweed in their diet and that are lethal when ingested by organisms lacking the proper resistance. Cardiac glycoside resistance has evolved through convergent evolution in several animals (e.g., some snakes, including those that are dietary specialists upon toads that produce bufadienolide toxins) and occurs through a series of well-characterized amino acid substitutions in the genes that code for Na+/K+-ATPase. However, potential resistance has never been characterized in the Rough Greensnake. Since the toad and monarch toxins are similar, and because some snakes have a resistance to the toad toxins, there stands a possibility that some may also be capable of consuming Monarch Butterflies. To evaluate if the Monarch Butterfly is toxic to the Rough Greensnake, we conducted a polymerase chain reaction to amplify copies of ATP1A1 and ATP1A3 from a Rough Greensnake collected near the citizen science record. We then sequenced these amplicons and screened them for common amino acid substitutions known to confer resistance to cardiac glycosides. Our results contribute to a broader understanding of the evolution of toxin resistance among diverse vertebrate groups.

Mathematics

Mathematical Modeling of Role Selection Dynamics Among Obligate Cooperative Breeders
Poster #16 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Sydney Mungai, Mya Chaari, Michael Sich, and Daria Molkova
Research Mentor(s): Glenn Young

Cooperative breeding is a social system in which individuals, often called helpers, forgo reproduction to provide alloparental care to young. By expending energy and delaying reproduction, helpers provide care at a personal fitness cost. This motivates an important evolutionary question: under what conditions is it beneficial to act altruistically rather than selfishly in a cooperatively breeding social group? To address this question, we developed a system of ordinary differential equations (ODEs) that combine population dynamics with game-theoretic role selection dynamics in a population of obligate cooperative breeders where each individual can choose one of two roles: breeder or helper. We studied our model using a combination of mathematical analysis and MATLAB simulations. Through this analysis, we determined conditions under which the population persists or dies off.

The Growth, Spread, and Mutation of Memes
Poster #1 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Emily Solis-Castillo and Cameron Lowe
Research Mentor(s): Pengcheng Xiao

Memes are constantly being sent around and altered, making the originality of the memes difficult to find and analyze. This study focuses on the utilization of google searches to examine the most common forms of memes that have been searched up on google and recognize the difference between trends in order to determine the best types of memes that can be used for marketing purposes without altering originality. The memes utilized in the study were split between the researchers in which one focused on examining one-hundred memes of famous memes, while the other focused on examining one-hundred memes that were shared through personal experience. Four categories were of primary focus in analyzing the memes: "spikey-decaying," "leveling-off," "smoothly decaying," and "Long-Term Growth." To find the

difference between categories, statistics and best-fit line were utilized to see which memes would fit into the categories and which category is better off for companies to utilize.

Molecular and Cellular Biology

A Major Regulator of Germline Transcription, LSL-1, Contributes to Developmental Defects when Histone Methylation is Inappropriately Inherited
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
12:00pm – 12:50pm
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.

Bacteriophages Infecting the Opportunistic Bacterial Pathogen Pseudomonas aeruginosa
Poster #17 (Marietta Event Center/Gymnasium)

Thursday, November 16th
9:00am – 9:45am
Graduate Student(s): Joanne Harrison
Research Mentor(s): Jean Lu

Pseudomonas aeruginosa is the most prevalent opportunistic bacterial pathogen in hospital-acquired infections which may lead to diseases such as pneumonia, malignant external otitis, bacterial keratitis, and green nail syndrome. Previously, P. aeruginosa infections were treated with antibiotics; however, P. aeruginosa has developed antibiotic resistance which causes treatment to be more difficult. Since using antibiotics to treat infections is difficult, there has been increased interest in effective alternatives to antibiotics such as bacteriophages. Bacteriophages (phages) are viruses that infect and kill their host (bacteria). Several recent studies have demonstrated the effectiveness of phages against bacteria; therefore, phages may be the most effective alternative to antibiotics. This study characterizes and evaluates the effectiveness of two isolated phages (Φ1 and Φ2) against P. aeruginosa. The phages' DNA, and electron microscope pictures were analyzed to characterize the two phages. Φ1 resides in the Siphoviridae family and Φ2 resides in the Myoviridae family. The growth curves and host ranges were analyzed to evaluate potential effectiveness against P. aeruginosa. Φ1 has a latent period of 10 minutes and a burst size of 14 PFU per infected cell. Φ2 has a latent period of 5 minutes and a burst size of 229 PFU per infected cell. A short latent period and large burst size indicate a short reproduction cycle and production of a large number of virions which is desirable for a biocontrol agent. Φ1 was not able to infect and kill one strain of P. aeruginosa while Φ2 was able to infect and kill three strains of P. aeruginosa. The effectiveness of the phage infection against P. aeruginosa will be evaluated in model food systems.

Bruno and B-bodies: Unraveling Nuclear Domain Formation
Poster #8 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Graduate Student(s): Travis Main
Research Mentor(s): Anton Bryantsev

Nuclear domains are membraneless organelles found in the nuclei of eukaryotic cells. The B-body is a nuclear domain that accumulates the protein Bruno (Bru) and exists in the developing flight muscles in Drosophila. We used the B-body and Bru as a model to study formation of nuclear domains. Specifically, we searched for the amino acid sequences that make Bru accumulate in B-bodies. We used genetic engineering to create various Bru mutants, which were subsequently tested in flies. Nuclear distribution of mutants was analyzed by cryosectioning, immunostaining, and fluorescence microscopy. Three RRM domains determine Bru binding to RNA. We determined that all RRMs must be intact for Bru to interact with the RNA scaffold

inside the B-body. Therefore, RNA determines the specificity of protein accumulation in B-bodies. We also tested the role of two unstructured protein regions, called IDR1 and IDR2. Normally, IDRs assist with liquid-liquid phase separation and formation of protein inclusions. Indeed, IDR2 was important for forming nuclear inclusions, however IDR1 was not. Using a series of truncation mutants, we identified a putative regulatory region within IDR1 that controls the ability of Bru to form inclusions. We believe this region is controlled by phosphorylation. Our results help to better understand the formation and regulation of nuclear domains.

Clearing the Air: Hospital-Reported Airborne Illnesses and Dumpsite Dangers
Poster #8 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Naya Phillips
Research Mentor(s): Evelina Sterling

Dump sites, a breeding ground for endotoxins and bio-aerosols, have become increasingly concentrated over the last decade due to the rise in human population, the mass production of goods, and waste resulting from that. Long term exposure of just small bio-aerosols and air pollution from these dump sites have shown an increased risk of diagnoses of asthma, skin irritation, and long-term cough. Past studies that focused on connecting dump sites in proximity to residential communities found a direct correlation between air quality and reported illnesses. Therefore, this study aimed to examine if these correlations are relevant in local communities within a ten-mile radius from dump sites in Gwinnett and Cobb County. The methodology of this experiment included examining and correlating reported airborne illnesses in those communities and the level of air pollutants in the air. To contrast, cities outside of the ten-mile radius were explored to see if there were decreased illnesses reported with the increased proximity from the dump site respectively. As a result, a positive correlation was found between reported airborne illnesses, air quality, and residential proximity to dump sites. Further analysis would be needed to accumulate more data to continue this agenda.

Developmental Phenotypes Caused by the Inappropriate Inheritance of Histone Methylation Require Polycomb Repressive Complex 2
Poster #1 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Zaynab Massenburg
Graduate Student(s): Josh Labus
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. At fertilization, histone methylation must undergo maternal reprogramming to reset the epigenetic landscape in the new zygote. During maternal reprogramming of histone methylation in C. elegans, H3K4me is removed by the H3K4 demethylase, SPR-5, and H3K9me is subsequently added by the histone methyltransferase, MET-2. Recently, we demonstrated that SPR- 5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a severe developmental delay. Recent work from the Strome Lab shows that MES-4 repels the activity of the Polycomb Repressive Complex 2 (PRC2), which includes the H3K27 methyltransferase, MES-2, at germline gene loci in the germline. These findings prompted us to examine whether PRC2 complex-dependent H3K27me3 may contribute to the developmental delay in spr-5; met-2 mutants by concentrating ectopic H3K36me3 at germline gene loci in the soma. To test this possibility, we knocked down MES-2 using RNAi and found that the developmental delay in spr-5; met-2 mutants is completely rescued. By performing RNA-seq and ChIP-seq, we further demonstrate that knocking down MES-2 rescued the ectopic transcription of MES-4 germline genes and reduced the ectopic H3K36me3 at these loci in spr-5; met-2 mutant somas. Together, these data suggest that the PRC2 Complex contributes to a soma-to-germline transition and developmental delay in spr-5; met-2 mutants and provides mechanistic insight into how highly conserved histone modifying enzymes cooperate during development to establish germline versus somatic cell fates.

Exploring the Factors of Muscle Degeneration in Aging Using the Drosophila Model
Poster #13 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Lilla McLendon
Research Mentor(s): Anton Bryantsev

As we get older, we become predisposed to sarcopenia. Sarcopenia is a medical condition in older adults characterized by a slow but persistent decline in muscle mass and strength. The purpose of this study was to determine factors that contribute to muscle degeneration during aging. In our studies, we used Drosophila fruit flies as a model organism, which was possible because muscle tissue is very conservative across distant organisms. Using immunofluorescence microscopy, we quantified muscle damage in 38 inbred genetic fly lines. In parallel, the flies were subject to the climbing test to assess their physical activity. Based on the morphological analysis of 2,200 images of the jump muscle, we determined the lines with naturally high and low tendencies toward muscle degeneration were older in age and participated in a higher level of physical activity. We found a strong positive correlation between muscle damage, age, and the

level of physical activity. Our next step is to run a genome-wide association study to identify genetic factors that correlate with muscle damage. In conclusion, we believe our data will help to better understand the underlying causes of sarcopenia in humans.

Filtration of Lead and Arsenic Through Pleurotus Ostreatus's Mycelium
Poster #19 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Kadi Doumbia, Olivia King, Aisha Abundez, Hannah Perryman, Allisa George, and Blake Ritter
Research Mentor(s): Christopher Cornelison and Daniel Ferreira

Toxic levels of contamination of heavy metals such as lead and arsenic have been known to have detrimental effects on many living organisms. For example, lead exposure is caused by corrosion in pipes, which in turn can lead to kidney impairment or anemia. Arsenic is typically found in natural rock formations and when humans are exposed to arsenic, it can harm the lymphatic system and cause cancer. The purpose of this experiment was to analyze the concentration of lead and arsenic in a solution after filtering them through lyophilized and non-lyophilized mycelia of Pleurotus ostreatus (oyster mushrooms). Lyophilization is the process of freeze drying an organism to remove any water content within it. A block of oyster mushrooms were colonized in a combination of 250 grams oak wood pellets and 250 grams soybean hulls pellets. 16 petri dishes (1.5 inch in diameter) of mycelium were made from the block and were left to colonize for 3 weeks. Once fully colonized, they were separated into two groups: 8 of the 16 petri dishes were lyophilized for 4 days, while the rest were left non-lyophilized. Meanwhile, an initial concentration of 5 ppm, 10 ppm, 25 ppm, and 50 ppm (parts per million) of both heavy metals were filtered through the mycelia over the course of 1-3 hours. Due to lyophilized mycelium's abundant vacant binding sites for sequestering heavy metal ions on their cell surfaces, we hypothesize that the lyophilized group would filter more of the heavy metals. While this held true for the lead solution, our findings diverged with the arsenic solution, which indicates a nuanced relationship between mycelium properties and metal filtration efficacy.

From Proteins to Muscles: looking at the Interaction Between the Protein Akirin and Simjoang
Poster #6 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Graduate Student(s): Armeta Hadjimirzaei
Research Mentor(s): Scott J. Nowak

One of the most fundamental organs to form during the earliest stages of development is the heart. In the fruit fly (Drosophila melanogaster), many genes and proteins work together for the formation of a fully functioning heart. Because cardiac muscles and skeletal muscles share common features, it is possible that some of the genes and proteins that govern skeletal muscle development are also responsible for cardiac muscle formation. Earlier work in the Nowak lab found that akirin works with a chromosome remodeling complex called NuRD. It is hypothesized that the interaction between akirin with the NuRD complex is important for the initiation of muscle developmental pathways in the fruit fly. We are presently exploring whether a functional interaction exists between akirin and one of the subunits of the NuRD complex called Simjoang (simj). This project will investigate whether a mutation in Simj will have an effect on proper heart and skeletal muscle development. We used live confocal imaging to record heartbeat patterns in akirin and simj double heterozygous crosses. In addition we recorded heart beats from akirin and simj self-crosses. We further used immunohistochemistry to image skeletal muscle patterns of mutant embryos from each cross. We determined that cardiac function appears abnormal in akirin,+/+,simj double heterozygous mutant embryos. We further identified a number of skeletal muscle patterning defects in these embryos compared with wild-type sibling embryos. Taken together, these data strongly suggest a genetic interaction between akirin and simj during myogenesis.

Hatching Havens: Identifying Mosquito Larval Habitats at the KSU Field Station
Poster #15 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Tatiana Sidorova, Kayla Vu, Dev Desai, Jayson Clifton, Juan Jimenez, Natalie Sandefur, Peyton Gibson, Destiny Chatfield, Mason Tant, Myles Bacchus, Roger Hernandez, Jeff Wang, and Kyle Swade
Research Mentor(s): Andrew Haddow

Several species of mosquitoes found in the greater Atlanta metropolitan region are known vectors of West Nile and La Crosse viruses. Infection with these arthropod-borne viruses may result in febrile illness, neuroinvasion, long-term neurological sequelae, or death. We investigated the potential for mosquito breeding habitats at the Kennesaw State University (KSU) Field Station. The KSU Field Station is a 25-acre property located in Cobb County, GA, that is used for teaching and research activities, which range from farming to ecological studies involving native flora and fauna. The classes and ongoing research projects taking place at the KSU Field Station require frequent visitation and outdoor work involving students, staff, and faculty – potentially putting these persons at risk of mosquito bites and thus any circulating arthropod-borne virus that might be present. The KSU Field Station was surveyed on August 25th, 2023 for artificial water holding containers and the presence or absence of mosquito larvae. The Container Index

(CI) was calculated per World Health Organization (WHO) guidelines. We determined the CI for the KSU Field Station was 29.0%, which per the WHO indicates a high threat of pathogen transmission (in event arthropod-borne viruses are circulating). Critically needed public health education materials were then developed for KSU students, staff, and faculty. Public health communication efforts were subsequently launched at the KSU Field Station to disseminate and educate persons working at and visiting the Field Station on methods to decrease mosquito exposure and thereby prevent bites.

Identification of Chimpanzee Genetic Variants in Genes Associated with Social Communication

Poster #21 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Ashlyn Swafford, Alek Hanson, and Ryan McCall
Research Mentor(s): Martin Hudson

Current studies support the relationship between single nucleotide polymorphisms (SNPs) in the AVPR1A, FOXP2, and OXTR genes and autism spectrum disorder. Intriguingly, the SNP variant associated with ASD can vary in different human populations. To further understand these variants, we recently sequenced homologous AVPR1A, FOXP2, and OXTR loci in bonobos, the closest living relatives to humans. We found no difference in the bonobo equivalents of the human SNP sites but identified five novel bonobo-specific variants within 17-184 bases of the humans SNPs in FOXP2 and OXTR. Extending this study, we set out to amplify the region of DNA associated with these genes in chimpanzees, another primate that is closely related to humans. To date, we have amplified two loci and found no obvious differences between humans, chimps, and bonobos. Work is ongoing to sequence the remaining variants and to identify the genetic implications of these point mutations in non-human primates.

Looking at the Interaction Between the Proteins Akirin and MTA-Like for Cardiac and Skeletal Muscle Development

Poster #12 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Ariana Craft
Research Mentor(s): Scott Nowak

Congenital heart disease is a cardiac abnormality that is caused due to improper development of the heart. The severity of heart defects can range from minor to severe, with some of the most

severe cases being deformed or missing heart valves. Though we know this developmental issue is linked to genetics, the specific genes that are responsible for the cardiac defect remains unknown. To better understand the genetic mechanism(s) behind heart development, the Nowak lab has identified an acute number of genetic markers that have an impactful role in developing an embryonic heart. To simplify the process the Nowak lab uses Drosophila (aka the fruit fly) to be used as a model organism to better understand and analyze heart development. There are many aspects of development that are conserved between Drosophila and humans. With this notion, we can use these similarities to understand the genetics behind human heart development. We previously identified the conserved nuclear protein Akirin to be an important regulator of gene expression for cardiac development. Our data suggests Akirin works with the Nucleosome Remodeling and Deacetylase (NuRD) complex for proper heart development. Since NuRD contains more than ten different subunits, a variation in mutations within the complex can lead to a variety of abnormalities, including abnormal muscle patterns, misshapen hearts, and/or decrease in cardiomyoblasts. For the purposes of my project, the NuRD subunit MTA-Like will be examined and how it plays a critical role in cardiac development and cardiac function. To achieve this goal recombination of the MTA-Like and toll-cGFP genes are being used to produce possible heterozygous embryonic mutations. To properly analyze these mutations, live confocal imaging will be used to record and analyze heartbeats that are produced from the recombination of the MTA-Like and Akirin cross. The cGFP protein will place several markers on the muscles that we wish to analyze.

Prenatal Cannabinoid Exposure Affects Memory through Alterations in Glutamatergic Receptor Expression

Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
12:00pm – 12:50pm
Undergraduate Student(s): Katie Moerschel
Research Mentor(s): Vishnu Suppiramaniam, Kawsar Chowdhury, & Erica Holliday

As the legalization of cannabis has increased, prenatal exposure to cannabis has also increased significantly and is expected to continue rising. Currently, no therapy is available for cognitive deficits associated with prenatal cannabinoid exposure (PCE). Cognition can be researched through learning and memory which occurs in the hippocampus of the brain through the neurotransmitter, glutamate. The two major glutamate receptors in the hippocampus, N-Methyl D-Aspartate Receptor (NMDAR) and Alpha-Amino-3-Hydroxy-5-Methyl-4-Isoxazole Propionic Acid Receptor (AMPAR) are required for learning and memory formation. This project hypothesizes that behavioral deficits observed in PCE offspring are due to the upregulation of AMPA and NMDA receptor subunits. To test our hypothesis, pregnant Sprague Dawley rats were orally gavaged with 5 mg/kg of pure D9-tetrahydrocannabinol (THC) from gestational day five to post-natal day nine and examined between PND 40-50. To evaluate

the learning capacity and memory retention behavioral experiments were performed such as elevated plus maze (EPM), trace fear conditioning (TFC), and contextual fear conditioning (CFC). Immunoblotting of hippocampal proteins revealed that PCE significantly increased the expression of GluA2, a subunit of AMPA receptors. GluN2A, a subunit of NMDA receptors also showed increased expression due to PCE. In brief, our studies demonstrate, at least in part, the molecular mechanisms of hippocampal-dependent memory deficits associated with PCE.

SPR-5 and MET-2 Maternal Reprogramming Cooperates with DREAM and MEC Complexes to Regulate Developmental Cell Fates
Poster #15 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Sandra Nguyen
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. Recently, it was demonstrated that SPR-5; MET-2 maternal reprogramming antagonizes the H3K36 methyltransferase, MES-4, which maintains a transcriptional memory of a subset of germline genes between generations. Maternal loss of SPR-5 and MET-2 results in ectopic expression of MES-4 germline genes in somatic tissues and a severe developmental delay. Data from the Petrella and Ahringer Labs demonstrates that members of the DREAM Complex, a transcriptional repressor complex that regulates cell cycle, also represses germline genes in somatic tissues through H3K9me2 promoter marking. Furthermore, preliminary data from our lab shows that the histone deacetylation, MEC Complex, is also required to prevent a soma-to-germline transition. These data suggest that the DREAM complex, MEC complex, and SPR-5; MET-2 maternal reprogramming work together to prevent ectopic expression of germline genes in somatic tissues and developmental delay. To test this hypothesis, we knocked down Dream complex and MEC complex members in spr-5; met-2 mutants using RNAi and found that knocking down either complex exacerbates the severe developmental delay that we normally observe in spr-5; met-2. Using RNA-seq, we further demonstrate that knocking down Dream and MEC complex members exacerbates the ectopic expression of MES-4 germline genes in spr-5; met-2 mutant somas. Our findings provide mechanistic insight into how evolutionary conserved transcriptional repressor complexes and reprogramming of histone methylation synergize to ensure proper germline versus somatic cell fates during development.

Wound Healing Analysis for Venom Induced Cell Injury Models
Poster #17 (Marietta Event Center/Gymnasium)

Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Ahsen Choudhary
Research Mentor(s): Eric Albrecht

Wound and regeneration is an important aspect of organismal physiology. This study examined the use of imaging software to assess wound formation by Crotalus atrox venom. Three opensource macros were employed to identify and measure lesion areas (μm2) in cellular monolayers and compare their accuracy to manual tracings of the same lesions. Manual tracing of three separate wound micrographs displayed an average lesion area of 34,024 ± 21,903 μm2. Using the same micrographs, the wound healing size tool (WHST) macros calculated an average lesion area of 34,286 ± 19,928 μm2. In contrast, the SA_NJ macros and Wh_NJ macros reported an average lesion area of 128,692 ± 338,811 μm2 and 2,376 ± 67 μm2, respectably. This suggests WHST more accurately identified and calculated the wound lesions produced from Crotalus atrox venom.

Physics

Study of De Haas van Alphen Oscillations in Cs (V1-xTix)3Sb5
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
12:00pm – 12:50pm
Undergraduate Student(s): Ian Kendrick
Research Mentor(s): Chetan Dhital

Kagome metals are known to be materials of great interest due to their propensity toward the stabilization of novel correlated and topological electronic states. Vanadium based Kagome metals such as CsV3Sb5 have exhibited charge density wave order and novel superconductivity at low temperature due to the presence of both sharply dispersing and non-dispersing electronic bands. Recently it has been shown that the Ti substitution for V produces two distinct domes of superconducting regions in the phase diagram of Cs(V1-xTix)3Sb5 mimicking the effect of hydrostatic pressure. To understand the evolution of Fermi surface upon Ti substitution, we have carried out magnetization measurements at high magnetic field and low temperatures. At such high magnetic fields and such low temperature, the magnetization oscillates and becomes periodic in inverse magnetic field, a phenomenon known as de Haas van Alphen effect. The number of distinct frequencies provide information about the number of electronic bands and their sizes, the temperature dependence of amplitudes of oscillations provides effective mass of the carriers, and the angle dependence of those frequencies provide the shape of the Fermi surface. In this work, I will present analysis of Fermi surface topology and effective mass of charge carriers in Cs(V3-xTix)3Sb5 and compare to parent compound CsV3Sb5.

College of the Arts

Art and Design

3D Printing Clay Research Project
Poster #1 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Camila Peña
Research Mentor(s): Jeff Campana

The question this project aims to answer is which regional clay bodies are most compatible with 3D printing? This project is a synthesis of the last year of research conducted as an advanced ceramics student as well as the lead student assistant in the 3D Tech Lab in the School of Art and Design. This unique pursuit bridges two distinct disciplines together, one being an ancient building medium and the other being a modern, innovative technology. Research in context would include Jonathan Keep's literature, as it has been fundamental to the conceptualization of this project. The research being conducted makes a unique contribution to the area of inquiry since testing commercially available clays for 3D printing makes the technology more accessible to students, faculty, and the university. Readily available materials and more interaction with the 3D printing machine will allow its use to gain more traction and awareness, as well. The methods behind the completion of this project will involve testing locally available clays by printing them in a standard form and having them analyzed throughout the ceramic process to compare and contrast the clays to each other. The analysis will allow for the creation of sculptural forms that are informed by the material findings. The work produced will be exhibited in the Senior Capstone exhibition this fall and the data will also be synthesized and presented to the university's 3D Tech Lab network. The anticipated results of this research would consist of artifacts and documented data. By understanding which clays work best with the equipment given, the frontier of 3D printing with clay becomes less unknown. There is plenty of new territory to be explored with this practice, and this research project can bridge the ancient medium of clay with the modern technology of printing even closer than before.

Graphic Novel Anthology: Exploring the Raw American Life on the Margins of Society
Poster #9 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Aria Leinberger

Research Mentor(s): Joseph Karg

My proposed project aims to create a graphic novel anthology that delves into the lives of Americans residing on the fringes of society, exploring the multifaceted aspects of what I call "raw American life." The graphic novel anthology will consist of a collection of short stories, each highlighting a unique narrative of individuals or communities experiencing life on the edges of society. These stories will capture the struggles, triumphs, and everyday realities of people often overlooked in mainstream American narratives. Our goal is to provide a platform for marginalized voices and shed light on the diverse and complex experiences of the American tapestry.

Theatre and Performance Studies

Hottentot Haze: The Intoxication Narrative of Sara Baartman
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
3:00pm – 3:50pm
Undergraduate Student(s): Jetta Whitehurst
Research Mentor(s): Thomas Fish

Sara Baartman was exhibited as a human curiosity in 19th century Europe due to her distinctive physical features. As seen in records of Hottentot Venus performance such as La Venus Hottentote, a hand-tinted engraving from Paris in 1814, Baartman smoked an opium pipe as she was viewed by her audience. Based on the interpretation of the archival engraving in tandem with historical review, there are two primary reasons for the inclusion of a pipe in Hottentot Venus performance: to appeal to a postcolonial audience and for Baartman to maintain the little power she had over her circumstances. With smoking, Baartman was a woman of color subdued for her spectators but was able to avoid confronting her harsh reality while adhering to South African tradition. Ultimately, intoxicants were involved in Baartman's exploitation, contributing to the psychic and social repercussions that led to her physical death.

Influential Catholic Nun: Hrosvitha's Impact on the Power and Roles of Women through Constance during the Middle Ages
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
3:00pm – 3:50pm
Undergraduate Student(s): Isabella Jones-Padilla
Research Mentor(s): James Davis

This presentation explores the life of Medieval playwright and nun Hrosvitha and her impact on the role of women during the late Middle Ages. It will analyze and break down her play Dulcitius to discuss the theme of female independence with autonomy over their own body. In addition to reading of the play, this presentation includes the examination of the Middle Ages to contextualize the treatment of women and how her play challenged society. This project is done through research into Hrosvitha's Dulcitius, the patriarchy in her German hometown Bad Gandersheim, and the marginalization of women through a lens of materialist feminism. This study is something that has limited research. Although there have been a few articles who talk about Hrosvitha and how she challenged the role of what women were in theatre by becoming the first documented female playwright, this project will dive deeper into exactly how she did this within Dulcitius. This topic does have relevance today, Hrosvitha being one of the first feminist dated, even with her covert style of feminism within the male-dominated society. It is important to highlight the powerful females that used their voices to influence others and allowed for a freer place for woman voices in society within literature, playwriting, and theatre.

Under the Wig: A Critique on the Usage of Boy Actors in the Renaissance
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
3:00pm – 3:50pm
Undergraduate Student(s): Christopher Nastasi
Research Mentor(s): Jim Davis

This paper examines the treatment of boy actors in the Renaissance between the years 1300-1600. With very little primary source material due to the low literacy rate in the Renaissance era, analyzing court records is the primary way of understanding how theatre companies and society harmfully treated the boy actors. One of the many issues the boy actors faced was their perception from the audience. This study analyzes through a materialistic lens, how the audience treated the boy actors. By using this Marxist approach, focusing on the role of labor, the study dives deeper into the direct physical abuses the boy actors endured by older male audience members. This paper critiques the glorified viewpoint of Shakespeare's plays and the role of these "female" performances by offering a different angle into the limited protections for the boy actors. By looking at the mistreatment of the boy actors today, the paper contextualizes a longer history of the abuses into child actors dating back to the early modern period.

Southern Polytechnic College of Engineering & Engineering Technology

Electrical and Computer Engineering

Business Strategy Proposal for LoRaWAN Enabled Device
Poster #9 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Hudson Brock, Cody Huynh, Shakib Quddus, and Tariq Walker
Research Mentor(s): Jeffrey Yiin, Nicholas Ellwanger, and Walter Thain

The present study is dedicated to exploring the market potential of the NatureNavigator, a survival device developed within the framework of the CPE 4800 and CPE 4850 capstone courses. The study is conducted within the Honors Senior Capstone Project course. The NatureNavigator serves as a vital tool for users in outdoor settings by collecting and presenting key environmental data, alongside features like Long Range Wide Area Network (LoRaWAN), plant image detection, and GPS for enhancing wilderness survival. Its primary goal is to increase user's survival by storing key information and communicating without the need for cellular signal. The research methodology encompasses a comprehensive review of pertinent research papers, and an analysis of market studies centered on the hiking community. The primary goal of these methods is to gain deeper insights into the NatureNavigator's prospective applications and market positioning. Additionally, the research involves interviews with industry experts contributing to a more refined understanding of the NatureNavigator's practical implications.

Controlled Radiation Capsule for Precision and Rapid Cancer Treatment
Poster #15 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Bailey White, Junia Nguyen, and David Roque
Graduate Student(s): Sowjanya Palagani
Research Mentor(s): Hoseon Lee and Zsolt Kollar

This research aims to transform cancer treatment through the optimization of brachytherapy, with a focus on reducing treatment duration, setup complexities, and financial burdens, all while emphasizing patient safety. Patients living at a distance from radiation clinics, particularly those undergoing extended Low Dose Radiation brachytherapy, often struggle with the formidable financial challenges associated with securing nearby accommodations. In response to these issues, the research introduces a radiation capsule designed to condense the conventional six-month treatment period to approximately just one week, thereby significantly reducing the duration of required accommodations. This capsule is especially relevant considering the construction cost of $40 million for a single-room proton therapy system, a financial hurdle that

affects countless patients. The radiation capsule employs minimally invasive procedures, eliminating the need for invasive probing, marking a departure from conventional High Dose Radiation brachytherapy treatments. It harnesses wireless power transfer technology, ensuring seamless energy transfer from an external planar rectangular coil to an internal coil, both reinforced with Metglas sheets to amplify magnetic field strength. A built-in safety mechanism ensures the capsule automatically closes in the absence of current, thereby guaranteeing patient well-being. However, the most interesting aspect of this research is the introduction of Medium Dose Radiation (MDR), which bridges the treatment gap between High Dose Radiation (HDR) and Low Dose Radiation (LDR), significantly reducing radiation hazards while shortening treatment durations to a matter of days. This research introduces improvements in cancer treatment, enhancing accessibility, efficiency, and patient safety. By introducing MDR therapy, it not only eases the financial burdens of patients but also ensures shorter treatment times, making cancer treatment more efficient and patient centered.

Digital Beamforming Algorithm for Wireless Power Transfer
Poster #17 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Kevin Trujillo, Mitch Walker, and Saba Mabood
Research Mentor(s): Hoseon Lee and Zsolt Kollar

There are billions of Internet of Things (IoT) devices connected worldwide with that number growing year after year. IoT devices include smart locks, motion and pressure sensors, digital assistants, and anything else that connects to the internet. All IoT devices require power. A majority of IoT devices use cables to deliver power and truly wireless devices use batteries, which typically also require cables to charge. Charging billions upon billions of batteries can be a challenge. Additionally, many IoT devices are buried underground or are embedded within walls or other inaccessible areas. We are developing a wireless power transfer system to address the problem of physically accessing the device in order to be charged or powered. Specifically, this is an algorithm to control the RF subsystem to enable beam steering with a patch antenna array. This algorithm consists of four stages: start-up, searching, optimization, and charging. The startup stage ensures that the algorithm has the necessary information available and ensures that the array has power. The searching state searches the available area to find the approximate location of the device before moving into the optimization state. The optimization state narrows down the search area to find the more precise location of the device. Once the more precise location has been found, the algorithm starts a clock and continuously checks the battery level. Once the battery is adequately charged, or enough time has elapsed, it returns to the searching state to find the next device.

Low-Cost Shortwave-Infrared Spectroscopy (SWIRS) for Stroke Risk Screening in Pediatric Sickle Cell Disease
Poster #14 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Katie Cho
Research Mentor(s): Paul Lee

Sickle cell disease (SCD) has a profound effect on the brain. In sub-Saharan Africa where most of SCD patients (~75%) live and access to medical care is limited, ~11% of SCD children will develop a stroke by the age of 20. Although early identification is critical to treatment, transcranial doppler ultrasound (TCD), the standard screening tool, is not widely available in low-resource settings due to its high cost and need of trained personnel. Speckle contrast optical spectroscopy (SCOS) may provide a user-friendly and cost-effective solution to this unmet need. SCOS is an emerging optical technique that can quantify blood flow in deep tissues (> 0.5 cm) with an inexpensive instrumental cost. Traditionally, SCOS uses a near-infrared (NIR,700-900nm) light source and a CCD/CMOS array to detect variations in the spatial speckle patterns at the tissue surface that are caused by moving red blood cells. However, NIR SCOS suffers from an insufficient SNR for the noninvasive brain monitoring and the detected signals are significantly contaminated by the extracerebral layer contribution. Therefore, the project goal is to investigate the feasibility of affordable SWIR SCOS system for assessing brain blood flow in deep tissues by performing a computational verification in comparison with the NIR SCOS system.

Mini-Drones in Automated and Energy-Efficient Fruit Harvesting
Poster #18 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Tariq Walker and Sam Fernandes
Research Mentor(s): Yan Fang

This project is poised to revolutionize agriculture by automating fruit harvesting through the use of intelligent mini-drones equipped with an onboard camera. This camera is powered by a specialized technology called YOLOv5, a Convolutional Neural Network (CNN) designed for real-time object detection. The YOLOv5 CNN has been meticulously trained to recognize specific fruits such as grapes and tomatoes, with tomatoes being the primary focus of this project. These smart drones collaborate with a mobile drone, similar to a smartcar, which processes the camera data and assists in fruit collection. The onboard camera on the smart drones plays a pivotal role in accurately identifying ripe fruits on plants. Once a fruit is detected, the drones delicately sever it from the plant, allowing it to fall gently to the ground. Subsequently, the

mobile drone efficiently collects these harvested fruits. Central to this research is the utilization of the onboard camera and the YOLOv5 CNN technology. These advancements ensure precise fruit recognition and enable the drones to operate efficiently without frequent recharging. The project emphasizes the seamless integration of this smart camera, sophisticated YOLOv5 algorithm, and drone systems, creating a cohesive and efficient harvesting process. Beyond the realm of agriculture, this research addresses critical challenges such as labor shortages and high operational costs associated with manual fruit harvesting. Moreover, the automation of farming practices contributes to environmental sustainability by reducing the ecological impact of traditional farming methods. In summary, our project demonstrates the practical application of the onboard camera and YOLOv5 CNN technology in automating fruit harvesting. By leveraging these innovations, we showcase the feasibility of efficient, technology-driven agriculture. This initiative marks a significant step toward a sustainable and automated future in farming practices.

Raman Microscopic Measurement analyses of ZnO Thin Films grown on Sapphire by Metalorganic Chemical Vapor Deposition

Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
11:00am – 11:50am
Undergraduate Student(s): Kahari Moore, Ikram Talukder, and Jenny Williams
Graduate Student(s): Manika Tun Nafisa
Research Mentor(s): Benjamin Klein, Ian Ferguson, and Zhe Chuan Feng

The Raman Scattering (RS) characterization technique was employed to investigate ZnO thin films, grown on sapphire substrates through the process of metalorganic chemical vapor deposition (MOCVD). In this investigation, ZnO thin films were grown within a specifically designed Low-Pressure Rotating Disk MOCVD Reactor. The growth process involved a temperature range of 200 to 1000°C, with growth pressure spanning from 5 to 80 Torr. Diverse ZnO thin films with varying thicknesses (10-230 nm) were deposited on c-plane sapphire substrates. Samples were prepared with a consistent O2 flow rate of 8348 mmol/min. The Raman Microscope was used to measure the peaks of three different samples of ZnO at three different laser powers respectively: 10%, 50%, and 100%. These measurements were obtained with 1800 l/mm grating, a laser wavelength of 532nm and a Raman Shift with a range of 100cm-1 to 900 cm-1. The results indicated prominent peaks at 379 cm-1 (with a deviation of 1), 417 cm-1, 577 cm-1 (with a deviation of 1) and 750 cm-1 respectively. This study provides clarity regarding the identification of the samples as ZnO grown on Sapphire substrates and offers insights into the crystalline quality of the sample materials.

Raman Spectroscopy of GaN on Si with Varied Thin Film Thickness for High-Temperature Semiconductor Devices

Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th

11:00am – 11:50am
Undergraduate Student(s): Kahari Moore, Ikram Talukder, and Jenny Williams
Graduate Student(s): Manika Tun Nafisa
Research Mentor(s): Benjamin Klein, Ian Ferguson, and Zhe Chuan Feng

This study explores the potential of GaN on Si thin films as a promising material for high-temperature semiconductor devices, owing to its impressive thermal properties and performance characteristics. Two GaN on Si samples were grown using Metal Organic Chemical Vapor Deposition (MOCVD), with different film thicknesses, and their potential for high-temperature applications was comprehensively assessed by performing Raman spectroscopy at various temperature levels. The experimental results provided valuable insights into the material's behavior at elevated temperatures. At 300°C, the GaN E2 (High) peak showed a Raman shift at 562.38 cm^{-1} for high-thickness samples and 561.49 cm^{-1} for low-thickness samples. The corresponding Full Width at Half Maximum (FWHM) values were 8.07 cm^{-1} and 8.11 cm^{-1}, respectively. As the temperature decreased to 200°C, the E2 (High) peak shifted to 563.99 cm^{-1} for high-thickness samples and 562.75 cm^{-1} for low-thickness samples. Notably, low-thickness samples exhibited a relatively consistent peak position and a narrower linewidth at this temperature. Further cooling to 100°C resulted in GaN E2 (High) peaks at 565.30 cm^{-1} and 564.06 cm^{-1} for high-thickness and low-thickness samples, respectively. Importantly, the FWHM decreased, indicating improved crystalline quality at lower temperatures. The A1 (LO) peak positions and FWHM values followed similar trends. This comprehensive analysis underscores the significant impact of GaN on Si thickness on its thermal performance, with lower thickness samples demonstrating superior thermal stability. The findings hold promise for optimizing GaN on Si thin film thickness in high-temperature semiconductor device applications, enhancing their reliability and efficiency, including GaN High Electron Mobility Transistors (HEMTs), Schottky diodes, power ICs, power modules, RF amplifiers, and microwave devices.

RF System Design for Phased Array Beam Steering for Far-Field Wireless Charging for Remote, Inaccessible IoT Sensors
Poster #20 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Bailey White
Graduate Student(s): Sowjanya Palagani
Research Mentor(s): Hoseon Lee and Walter Thain

Wireless power transfer is of interest for applications such as remote, inaccessible IoT sensor deployment. There is a challenge to charging these sensors due to their remote location and inaccessibility. This work is part of a larger system that includes a transmitter and receiver for wireless power transfer. Specifically, this work addresses the radio frequency system design for a

flat, phased-array antenna that produces a narrow, steerable beam of focused energy in the 2.4 GHz – 2.5 GHz frequency range. The antenna is mounted on a mobile charging system that can be moved close enough to the remote sensor for charging. The beam power must be capable of charging the sensor's energy storage batteries or supercapacitors, but not exceed regulated power limits. The antenna and RF system design should be capable of 2-way communication with the sensor. A survey of possible phased-array system designs is performed and the tradeoff between analog and digital phased-array beamforming is investigated. A preliminary RF system design is proposed, and possible available components identified. Simulations are used to assess aspects of the design.

Engineering Technology

Developing Prosthetics with Deep Learning and Soft Robotics
Poster #4 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Noah Clark
Research Mentor(s): Turaj Ashuri

Recent advancements in the fields of soft robotics and artificial intelligence have allowed for the use of novel techniques in addressing the challenges experienced by the more than two million amputees in the United States. Such challenges include controlling myoelectric prostheses, which require an extensive amount of training and calibration to use. Such designs result in modern prosthetics being incredibly expensive, along with increasing the risk of overuse injury and device rejection by the amputee. Therefore, we propose a novel design which uses machine vision and soft robotics to create an automatically grasping prosthetic. This prosthetic uses a convolutional neural network for identifying the appropriate grasp type for the object in question, which will then call a second neural network which is trained on finite element data to finely control the movement of the prosthetic. The prosthetic itself is designed with soft robotics in mind so that it grasps and functions more similarly to that of a human hand. The final objective of this project is to create a fully functional prosthetic which aims to reduce the overall costs of prosthetics by serving as a basis for which future human prosthetics can be built off of and commercialized. This will in the long run increase the quality of life for people with amputations by providing them with more adaptable and affordable prosthetics.

Civil and Environmental Engineering

Experimental Study of Portland Cement Concrete Mixed with Fly-Ash Type F

Poster #2 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Stuart Sittle
Research Mentor(s): M.A. Karim and Youngguk Seo

This experimental study will present the data generated from several sets of tests of Portland Cement Concrete (PCC) mixed with recyclable waste materials, specifically Fly-Ash Type F (FATF). The first set of data will be from partially replacing fine aggregate with FATF and the second set of data will be from partially replacing cement with FATF in PCC. During this experimental study, concrete samples (4-inch diameter and 8-inch height cylinders) will be cast for both the sets. In the first set fine aggregates will be replaced by FATF at four different levels (5, 10, 15, and 20% by weight) and cured in water for periods of 7, 14, 28 days. While in the second set, cement will be replaced at four different percentages (10%, 20%, 30%, and 40% by weight) for the same environment and curing periods. The slump will be measured during the casting of the concrete samples for all mixes in order to help understand the workability of the PCC. The development of compressive strength and resistivity in each sample will be measured after each curing period to understand the strength and durability of the PCC. The strength, workability and durability will be compared with control data. It is expected that the PCC mixed with FATF will have the same or higher strength, workability, and durability than that of control PCC. It is also expected that there will be correlations of strength with resistivity. The test data will enable us to determine the optimal amount of FATA to replace fine aggregates and cement in the PCC mixes. The advantages of using recyclable FATA in PCC mixes include reducing the amount of waste material that goes to landfills, and cost savings, by preserving the virgin raw materials.

Impact of Air Pollution Exposure in Latino Communities: An Equity-based Framework for Environmental Engineering
Visual Art Presentation (Microsoft Teams)
Friday, November 17th
12:30pm – 12:45pm
Undergraduate Student(s): Daphne Vital
Research Mentor(s): Pegah Zamani

How can the emerging field of engineering contribute to devising innovative and holistic strategies that lead to a substantial improvement in the quality of life and overall well-being of underserved immigrant communities? Hispanic communities make up the second-largest ethnic group yet, live in more polluted environments than their white counterparts and battle higher rates of poverty. With low-income neighborhoods come unsafe and often hazardous environmental factors that harm the health of their inhabitants. Environmental engineering, a

newer branch of the discipline that combines civil and chemical engineering ideas, could offer various solutions to such socio-cultural and environmental issues, in particular relating to air and water pollution. Previous reports have found strong connections between race and pollution in a neighborhood but fail to propose long-term solutions to these issues. This research focuses on the effects of environmental racism and how it harms the health of Latino communities through specific scenarios. The study would also investigate possible solutions that environmental engineering practices can offer. How can the engineering solutions effectively address the challenges and opportunities presented by specific socio-cultural demographics, with the ultimate goal of fostering resilience and thriving communities, especially among Latino immigrants? The study will identify common issues in different environmental settings, gather socio-cultural data from previous relevant studies about environmental health, and then analyze and compare it to data from a more affluent and predominantly white area. The expected findings of this research would include establishing a more robust connection between the environment and sociocultural factors affecting Latino immigrants. Additionally, the research aims to highlight how an exciting new field of engineering could contribute to providing innovative solutions to improve the lives and well-being of these individuals - taking into account factors such as sustainable resource management, cultural sensitivity, and community engagement.

Impact of Traffic on Air Pollutant, PM10 in and Around Schools
Poster #7 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Lily Wisner and Ali Rana
Graduate Student(s): Thaddeus Peake
Research Mentor(s): M.A. Karim and Parth Bhavvsar

This research study investigates the influence of traffic on Particulate Matter, specifically PM10 in and around school during the drop-off and pickup hours. The study will focus on in and around an Atlanta local elementary school. PM10 is a fine particulate matter produced from engine emissions that may pose significant health risks, particularly to children and individuals with pre-existing respiratory conditions such as asthma. To monitor the concentrations of PM10 emissions, we will employ Purple Air monitoring sensors. Data collection will include monitoring of PM10 levels during morning (drop off) and evening (pick up) peak hours, considering variations in weather and temperature. Additionally, we will collect PM10 from the surrounding areas of the school environment to understand aerial distance (approx. 1 mile, based on the settling velocity of PM10) as to how far the PM10 may come from and contribute to in and around schools. PM10 data will be compared with ambient air quality as well as with EPA MCL to see the level of elevation. Statistical analysis will be performed to see the significant difference of PM10 in and around schools with ambient air quality and EPA MCL. It is expected that PM10 in and around schools will be statistically higher than ambient air quality and EPA

MCL and hence it will prove that high emissions of PM10 come from vehicles during drop off and pick up hours.

Monitoring and Evaluation of Particulate Matter in and Around Schools.
Poster #18 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Brianna Greiner and Brandon Perez
Graduate Student(s): Thaddeus Peake
Research Mentor(s): M.A. Karim and Parth Bhavsar

Vehicular traffic contributes to a range of gaseous air pollutants and to suspended particulate matter (PM) of different sizes and composition. Air quality standards around academic institutions are a critical concern due to the potential impact on the health and welfare of students and staff members. This study will monitor and evaluate the concentrations of PM2.5 in the ambient air in and around schools during peak hour pick-up and drop-off times. A focus will be placed on understanding the sources, levels, of PM2.5 in and around schools. The study utilizes a comprehensive approach that combines real-time monitoring of PM concentrations, meteorological data, traffic patterns, and school-specific information. Data will be collected for a number of months during peak hours, from 7 am to 2 pm, when vehicular traffic is at its highest, contributing to the dispersion of PM2.5 from various sources previously mentioned. The study is expected to produce a data set of particulate matter utilizing sample collection and standard models to evaluate the air quality in and around schools and will be compared to ambient air quality standards to assess the conditions that presumably contribute to elevated air pollution in and around schools.

Optimization of Partial Replacement of Fine Aggregate and Cement with Fly-Ash Type C in Portland Cement Concrete
Poster #8 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Ibrahim Alamayreh
Research Mentor(s): M. A. Karim and Youngguk Seo

The positive impacts of fly ash on the performance of Portland cement concrete (PCC) have been well recognized, but few studies have addressed the potential use of fly ash as a partial replacement for fine aggregates. An experimental study was launched at the beginning of Fall 2023 to investigate the effect of Fly-Ash Type C (FATC) to partially replace the fine aggregate and cement in Portland cement concrete (PCC). The study will conduct a series of experiments with 4"x8" concrete cylinders substituting fine aggregates in PCC mixes with different

percentages of FATC (5%, 10%, 15%, and 20%). Also, substituting cement with varying percentages of FATC(10%, 20%, 30%, and 40%). The main focus will be to monitor strength, workability, and durability. Control samples will be tested with virgin materials to establish the baseline data to compare the data with partially replaced PCC at different curing periods (7, 14, and 28 days) under water-cured conditions. This approach will provide valuable insights into how concrete behaves when mixed with our waste material. The test data will enable us to determine the optimal amount of FATC to replace fine aggregates and cement in PCC. The advantages of using recyclable FATC in concrete mixes, include reducing the amount of waste material that goes to landfills, and cost savings, by preserving the virgin raw materials. It is expected that some content of waste in the concrete mix will provide the same and/or higher strength compared to the control samples. Additionally, we expect to identify correlations related to resistivity under any conditions.

Industrial and Systems Engineering

Analyzing the Impact of Cognitive Workload and Personal Factors on Biomechanical Responses in Healthcare Activities

Poster #3 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Graduate Student(s): Aquib Irteza Reshad
Research Mentor(s): Luisa Valentina Nino de Valladares

The intricate interactions between cognitive workload, psychosocial job aspects, and individual characteristics—all of which have a big impact on occupational health—are explored in this study. This research aims to understand how workplace environment, social dynamics, and other psychosocial factors influence individuals' perceptions of mental workload, and how this mental workload perception impacts biomechanical responses that might have implications in the development of Work-related Musculoskeletal Disorders (WMSDs). Furthermore, the study explores the impact of individual characteristics like age, gender, and anxiety on cognitive workload and biomechanical responses, indicating the significance of individual techniques for managing workplace demands. In this study, participants will be senior nursing students and registered nurses who will have to implant a nasogastric tube on a mannequin under three different conditions. Following that, a variety of tools will be used, including saliva samples to check cortisol levels, reflective marker sensors for in-depth biomechanical analysis, and Tumeke software to assess body postures through ergonomic methods such as RULA and REBA, alongside personality assessment using the Big Five traits and subjective workload evaluation via NASA-TLX, SURG-TLX, and VAS. This study seeks to cast light on the complicated interaction between cognitive workload and physiological behavior, so assisting in the

development of solutions that improve workplace and employment conditions and minimize the risk of WMSDs.

Assessing Cognitive Load and User Experience in Virtual-Reality Enhanced Blood Donations
Poster #16 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Isabel Acklen, Tiffany Ramirez, Elizabeth Kimber, and Luz Corral Parra
Research Mentor(s): Robert Keyser, Lin Li, Joy Li, and Maria Valero

The aging baby boomer blood donor base, coupled with decreases from younger age groups, is an ongoing public health concern and impacts all people in need of blood transfusions regardless of gender, age, racial, or ethnic background. There is an urgent need to expand the blood donor pool to include more younger generations, first-time donors, and underrepresented populations. The integration of virtual reality (VR) technology and mobile apps represents a cutting-edge innovation in the field of blood donation. Leveraging the immersive capabilities of VR, this project seeks to alleviate anxiety, discomfort, and fear experienced by donors, particularly first-time donors, during the blood donation process. We will investigate the cognitive load of donors, such as anxiety, stress, and sensory overload, through different surveys and human factors instruments.

A Time Study Analysis of Fluoride Varnish Application in Pediatric Well-Visits to Address Health Disparities among Children
Poster #4 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Emily Rodriguez-Jacobo, Nathanael Peterson, and Justin Nguyen
Research Mentor(s): Robert Keyser and Christina Scherrer

Dental decay is the most common chronic disease in children. Fluoride varnish (FV) is a preventive oral health service with proven effectiveness at reducing dental caries in dental and primary care settings. The objective of this study was to determine how long it takes to apply FV treatments during primary care well visits to address one of the most common barriers as reported by pediatricians – lack of time. FV treatment videos were collected at six clinics in Georgia with rigorous time studies conducted on each video to determine the Standard Time for the FV treatment process as well as the FV Application Component of the process and reasons for delays. Median Standard Times varied by clinic, ranging from 67.7 seconds to 166.9 seconds

with an overall median of 109.7 seconds. Findings from this study support the inclusion of FV applications as a common practice during primary care well visits.

Comparison of Different Weighting Scales when Measuring Mental Workload
Oral Presentation (Microsoft Teams)
Friday, November 17th
12:30pm – 12:45pm
Undergraduate Student(s): Isabella Duque
Research Mentor(s): Luisa Valentina Nino de Valladares

Mental workload, a concept within the field of human factors and ergonomics, refers to the cognitive and perceptual demands that individuals experience while performing various tasks in the workplace. Assessing mental workload holds a significant role in designing occupational tasks, as inappropriate levels can impact job performance, employee well-being, and even workplace safety. By assessing and optimizing mental workload, organizations can enhance productivity, reduce errors, and foster a healthier work environment. The NASA Task Load Index (NASA-TLX) and the Surgery Task Load Index (SURG-TLX) are two tools used to subjectively assess mental workload. Both tools offer unweighted and weighted mental workload measurements. Weighted TLX assessments are infrequently employed by researchers due to their strong correlation with unweighted TLX measures and the additional time needed to collect pairwise weightings during experiments. The aim of this study is to compare weighted and unweighted TLX scores. Different weighting scales (weighted, unweighted, rating, and ranking) were used to estimate the TLX scores. Pearson correlations and paired t-test analysis were used to compare the unweighted and weighted TLX scores across tasks and conditions. The results will allow us to know if there is any significant difference in the scores between weighting alternatives; therefore, improving the process of selecting the appropriate scale when using the TLX surveys. The goal is to identify a technique that will produce accurate results but does not require too much time or resources and especially will not generate fatigue, stress, or boredom on those filling out the surveys.

Exploring the Influence of Emotions on the Code Quality of Novice Programmers
Poster #12 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Graduate Student(s): Rosemary Tufon & Lisero Mugula
Research Mentor(s): Luisa Valentina Nino de Valladares, Maria Valero, and Adriane Randolph

Code quality is an important metric for the evaluation of software. Besides technical factors that affect the quality of code, such as clarity, maintainability, reliability, and security, behavioral

factors such as motivation, communication, time management, and emotions can also impact the quality of code. Emotions can have a significant impact on an individual's performance while performing a task such as writing code. This research investigates how novice programmers' emotions impact the quality of their code during Python development in an experimental setting. A relaxation technique was introduced to examine its potential influence on emotions and programmer performance. The study uses non-invasive EEG to measure activity in the left and right prefrontal cortex, often associated with emotions. Code quality is evaluated using the Code-based Deep Knowledge Tracing method. Surprisingly, initial findings suggest that positive emotions may lead to lower-quality code among novice programmers. Expanding upon this study may help establish this connection more firmly, as well as shed light on how negative emotions affect code quality and provide recommendations for placing programmers in different emotional states.

Improving the Efficacy of the Emergency Severity Index
Poster #11 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Graduate Student(s): Anita Ajuebor
Research Mentor(s): Luisa Valentina Nino de Valladares & Sweta Sneha

When you are checked into an emergency room, you are categorized by a widely used triage system known as the emergency severity index (ESI). The index rates the patients' symptoms on a scale of 1 to 5 with 1 meaning immediate lifesaving care is required and 5 being non urgent minor illnesses. This tool has helped promote clinical urgency by allowing the triage nurses and doctors to know exactly which patient need to be seen first. While there has been great success with the utilization of the ESI as is, the challenges lie when multiple patients fall under the same index number. Currently there is no algorithm that could further break down the whole number index to one that includes decimals places to further discriminate between diagnosis. Using orbit regression models this research hopes to determine whether it is possible to add an additional algorithm to differentiate the severity of patient symptoms that fall within the same general index number. Our long-term goal is to improve overall health and decrease waiting times and uncertainty in the emergency department. The research endeavors to revolutionize emergency care systems, bringing advantages to patients, healthcare practitioners, and society in general.

Investigating Cultural Barriers to Blood Donations in the United States
Poster #4 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Nabhan Karim
Research Mentor(s): Robert Keyser, Lin Li, Maria Valero, and Joy Li

After the pandemic began in early 2020, the United States has experienced a steady decline in blood donation rates. This sharp decline in blood donors can be attributed to two major factors: the ability to attract new donors as well as the retention rate of new and previous donors. Studies have shown that the minority populations in the US have a significantly lower blood donation rate compared to the Caucasian population. This study investigates through an extensive literature review if there are societal and cultural barriers that contribute to the significant gap between different ethnicities and blood donation rates. We are expecting to see cultural and societal barriers to blood donation such as: old mindsets regarding blood use for ritual purposes; a shortfall in knowledge regarding blood donations; the lack of outreach within minority groups; distrust with medical facilities/research due to previous transgressions; and higher occurrences of blood related diseases such as sickle cell disease. By understanding these barriers, we can more effectively develop strategies to overcome them, which in turn can be used to increase both the blood donor population and their retention rate.

KWAD - KSU all Weather Autonomous Drone
Poster #16 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Nick Farinacci, Sebastian Gomez, Stewart Baker, and Ed Sheridan
Research Mentor(s): Adeel Khalid

"KWAD" or "KSU all-Weather Autonomous Drone" project was sponsored by Ultool, LLC to the KSU Research and Service Foundation to create a lightweight drone capable of capturing HD video during all-weather operations. The conditions of all-weather operation include rainfall of one inch per hour and wind speeds of up to twenty miles per hour. In addition, a global minimum structural safety factor of two is required to ensure the system's integrity in extreme weather conditions. Potential mission profiles include autonomous aerial delivery, topological mapping in high moisture areas, security surveillance, search and rescue operations, emergency transportation of medical supplies, and wildfire investigation. The integration of weatherproofing technology will provide the operator maximized mission versatility in degraded weather conditions. KWAD will incorporate autonomous flight technology, allowing the operator to easily set waypoint missions before and during flight, enabling it to travel to waypoints without manual control input. Satisfying these requirements shifts the operator's focus to data collection relevant to the mission while evaluating potential flight hazards.

The Behavior of Portland Cement Concrete Mixed with Sewage Sludge Ash
Poster #5 (Marietta Event Center/Gymnasium)
Thursday, November 16th

9:00am – 9:45am
Undergraduate Student(s): Allen Yun
Research Mentor(s): Yongguk Seo and M.A. Karim

As one of the strongest and most cost-effective substances used in constructions is Portland Cement Concrete (PCC) that uses lots of materials. However, its usage is not without consequences, as producing concrete utilizes a significant amount of non-renewable natural resources, such as sand and various other aggregates. This consumption of natural resources enhances the further depletion of these materials, damaging the environment. To reduce this environmental impact, alternative aggregates are being considered, such as recycled waste materials, sewage sludge ash (SSA). SSA is a by-product produced during the incineration of dewatered sewage sludge from wastewater treatment plants. Previously used as a soil fertilizer, SSA has garnered increased attention due to its pozzolanic attributes. When grounded into a fine material, SSA has been found to be cementitious, and can be potentially used as replacement for fine aggregate in concrete. In this project, we will examine the workability and strength of SSA in PCC by replacing varying percentages of fine aggregate with SSA (5%, 10%, 15%, and 20%). Each percentage of SSA will be tested at different curing periods (7-,14- and 28-day) In addition, a control batch will be cast to provide a baseline of comparison of the typical strength and workability of concrete. Through this experimentation, we can expand our knowledge on the behavior of PCC mixed with SSA. The benefits of using SSA in concrete will be recycling waste materials to reduce waste going into landfills. We expect that the strength of the concrete with the SSA will be the same, or stronger than, the control batch, and that there will be certain correlations with resistivity.

The Blood Donation Crisis and Virtual Reality Applications
Poster #5 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Elizabeth Kimber and Gabrielle Kerbage
Research Mentor(s): Robert Keyser and Joy Li

In the United States, blood donation is imperative to the health and well-being of the population. Despite this, in recent years, the supply and flow of blood has decreased dramatically due to varying factors such as anxiety and stress. But, with blood demand rising by 2-3% every year and only about 3-4% of the population willing to donate, it is imperative to implement easily assessable methods that combat stress and anxiety and increase blood donation retention. In particular, recent studies delving into virtual reality implementations have highlighted a potential solution to the blood donation crisis. The overall purpose of this research is to accurately determine causes of low blood donation and identify possible solutions in the field of virtual reality. Specifically, we delve into contemporary stress theory, implementations with

landscapes and soundscapes, and the idea of presence. The findings of this study show that virtual reality holds promise as a potential remedy to address the declining American blood donation rates. The contemporary stress theory has found that stress and anxiety have a significant impact on deterring potential donors. The application of VR technology to create immersive landscapes and soundscapes has the potential to alleviate anxiety and stress, thereby increasing the willingness of individuals to donate blood. One important discovery is that VR can strongly evoke a sense of presence, where participants feel completely immersed in the virtual world. This sense of presence can distract donors from the stress related to the blood donation process and make the experience more enjoyable, leading to an increase in retention rates. In conclusion, the study contends that utilizing VR technology can improve the issues of stress and anxiety in relation to blood donation, possibly increasing the number of donors and helping meet the rising demand for blood.

Work-Related Psychosocial Factors Effects on NASA-TLX Dimension Scores and Body Postures

Poster #13 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Rodrick Adams
Research Mentor(s): Valentina Niño

How we perceive our work relates to how our body reacts to help facilitate task performance. Some studies have demonstrated that work psychosocial factors can significantly impact employee health on psychological and physical levels. However, the cross-sectional nature of the study's design did not allow for causal interpretations. In this study, participants performed two tasks (sitting and standing), under four different levels of mental workload (conditions: baseline, interruptions, time, and alarms). NASA- Task Load Index was used to assess the perception of mental workload for each condition across six dimensions: mental demand, physical demand, temporal demand, effort, performance, and frustration level. Rapid Entire Body Assessment scores for the standing task and Rapid Upper Limb Assessment scores for the sitting task were used to determine body postures. We juxtaposed NASA-TLX scores with corresponding REBA/RULA scores to evaluate the effect of the perceived mental workload on respective body postures. One-way ANOVA was performed to evaluate the effect of the experimental conditions on each response variable. The results of the experiment showed that the higher the perception of mental workload, the more of an effect it has on body postures. ANOVA analyses showed the most statistically significant difference in the dimensions' scores was associated with the standing task. Temporal Demand and Performance scores were the most affected by the psychosocial factors in both sitting and standing tasks across the different conditions. Gender has an effect on Physical Demand and Performance (higher on females) dimensions' scores; however, it has no effect on REBA nor on RULA scores. The fact that females rated their performance

higher than men causes further inquiries since in general women tend to think they underperformed their male counterparts.

Mechanical Engineering

Antimicrobial Bio-sustainable Nanocomposites for the Food Packaging Industry
Poster #8 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Rannah Ross and Jason Stephen
Research Mentor(s): David Veazie and Eric Mintz

The wide usage of plastic packaging has caused serious plastic waste disposal problems, which, in turn, create massive environmental pollution. In 2018, the World Wildlife Fund also 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. 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 and considered magnetic packaging materials, 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.

Autonomous Lunar Investigation and Communications Explorer (A.L.I.C.E.): Conceptual Design of Lunar Rover with Autonomous Capabilities
Poster #2 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Sohini Gupta
Research Mentor(s): Adeel Khalid

The present paper describes the development of the Autonomous Lunar Investigation and Communications Explorer (A.L.I.C.E.). The A.L.I.C.E. is a lunar rover design concept tailored for enhanced lunar exploration while minimizing human interference. The rover must follow a set of requirements, ensuring its survivability on the Moon. The design of A.L.I.C.E. was specialized to account for Clavius Crater being the landing point and mission area. Details of this paper include its mission profile, thorough explanations of the process of selecting optimal instruments, CAD models of A.L.I.C.E. with descriptions of each view, and calculations regarding weight and power consumption of the rover. The rover will be used to collect lunar soil samples. These samples will be stored in an on-board compartment and brought back to the base station. Results and analysis of the model tested in simulation are also discussed. By reducing human intervention and increasing scientific data collection capabilities, this concept offers a significant leap forward in lunar surface exploration, potentially paving the way for future space missions and scientific discoveries.

Biomimetic Locomotion of a Hexapod Robot
Poster #14 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Matthew Ackerman & William Marks
Research Mentor(s): Dal Hyung Kim

Hexapod robots have been studied extensively for practical applications in surveillance, rescue, and exploration due to their static stability and adaptability. However, these applications are constrained by the potential failure of damaged legs. Previous methods included adapting the gaiting pattern through optimization, but the resulting efficiencies are variable. Meanwhile, animals can adapt to these shortcomings. Through the use of a previously developed imaging system, the Transparent Omnidirectional Locomotion Compensator (TOLC), the leg positions of an ant, whose motion has been adapted to five-leg perambulation, can be extracted. The TOLC presents an infinite walking plane that records the leg positions through a deep-learning-based image processing algorithm. The positions are implemented into the hexapod robot via motor angles calculated through inverse kinematics, allowing for biomimetic motion that will provide the robot with adaptability during operation even when faced with leg failure. This research can be extended further to the effective gaiting of arm-leg manipulators and swarm control for laborious tasks.

Design and Analysis of Wind Speeds and Pressure on the Inlet of the CMF56-7B Engine to Enhance Performance
Oral Presentation (Microsoft Teams)
Friday, November 17th
1:30pm – 1:45pm

Undergraduate Student(s): Mouhamadou Diop
Research Mentor(s): Adeel Khalid

The CMF56-7B, 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 aviation industry is grappling with multifaceted challenges, including those related to environmental sustainability, rising fuel costs, and higher competitiveness. Continuous improvements in aircraft and engine economy are essential to meet these challenges. The objective of the research is to identify opportunities to enhance the performance and efficiency of the CMF56-7B engine, one of the most popular engines in the market. With the intention of modifying the inlet's profile to increase pressure inside the intake, an examination of wind speeds and pressure on the CMF56-7B engine's inlet is presented. The efficiency and performance of the engine can be increased by optimizing the airflow through the inlet, which can result in less fuel being used and fewer pollutants. The size and shape of the inlet nacelle are modified in this research. The goal is to determine the optimal combination of these parameters that will help maximize the air pressure before the compressor. This will help increase inlet and compressor efficiency and overall engine performance. Anyone concerned with the design and upkeep of aircraft propulsion systems, including aerospace engineers, aircraft manufacturers, and others, will be interested in the conclusions of this paper. The knowledge gained from this research will help to enhance aeronautics technology and open the door for future air travel that is more efficient and sustainable.

Design and Development of Remote Operated and Soft Biomimetic Amphibious Mud Skipper
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
11:00am – 11:50am
Undergraduate Student(s): Sungchan Cho, Lucas Schwenck, Connor Talley, Britt Walker, and Rafael Juarez
Research Mentor(s): Ayse Tekes

In this study, an amphibious, remotely operated, soft biomimetic locomotive mechanism that can reliably travel over rough terrain and swim in water is presented. The design of this mechanism is inspired by the mudskipper and consists of two soft fins, two compliant arms, a central body, and a compliant tail, utilized to travel on both land and water surfaces. The parts of the biomimetic robot are 3D printed using thermoplastic polyurethane and polylactic acid to sustain its contact with the ground in a unique way. The robot utilizes four servo motors to consistently move two compliant arms and soft fins to overcome obstacles. While the fins swipe back and forth across the fluid surface to generate movement, the tail is utilized in a vertical swiping motion to

propel the robot through the water and assist in turning. The mechanism is remotely operated by a Bluetooth controller and powered by onboard batteries. All the electronics are encased in a waterproof housing so that the robot can swim in water without the hazard of shorting. Additionally, the MATLAB Simscape model of the robot was created to optimize the link lengths and analyze the locomotion behavior.

Design and Implementation of UAS For Remote Atmospheric Sensing
Poster #5 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Sebastian Gomez, Nick Farinacci, and Ed Sheridan
Graduate Student(s): Stewart Baker
Research Mentor(s): Adeel Khalid

In this project, we detail the design, fabrication, and assembly of a quad-rotor Unmanned Aerial System (UAS) specifically tailored for delivering sensors to challenging environments. While our primary focus is equipping the UAS with gas sensors for manhole inspections and cameras for surveys, our progress has been concentrated on the design and fabrication of structural components and the sensor deployment mechanism, and initial flight tests. Upcoming work will include Finite Element Analysis (FEA) of the vehicle structure and the formulation of a mathematical model predicting power consumption, range, endurance, and motor performance during varied flight phases. The UAS features a distinctive design derived from unique payload requirements, suggesting its versatility for remote sensing across diverse sectors and its applicability beyond traditional engineering domains.

Faradaic and non-Faradaic Charge Transfer Mechanism for Energy Storage Systems
Poster #14 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Ben McKinney, Duy Pham, Jake Ivrin, and Sonnett Kowalski
Research Mentor(s): Ashish Aphale

Faradaic and non-Faradaic charge transfer mechanisms play an essential role in energy storage and conversion processes. The faradaic charge transfer mechanism involves electrochemical reactions that result in the exchange of electrons between the electrode and the electrolyte. Whereas the non-faradaic charge transfer mechanism involves charge storage without significant chemical reactions at the electrode-electrolyte interface. In this work, we report a hybrid nanocomposite material operating on both Faradaic and non-Faradaic mechanisms simultaneously. The hybrid electrodes containing conducting polymer and graphene oxide were synthesized using electropolymerization process and the effects of graphene oxide (GO) on

polypyrrole were studied. Details of electrode synthesis, electrochemical testing, and fabrication of device as a button cell will be discussed. Polypyrrole and graphene oxide (PPy/GO) films were tested using electrochemical methods such as cyclic voltammetry (CV), Electrochemical Impedance Spectroscopy (EIS), and Galvanostatic Charge Discharge (GCD) to assess electrode performance. The results generated from such tests will provide insights into the ohmic, non-ohmic, and Warburg resistances along with specific capacities and charge discharge behavior of the electrodes. These insights will be discussed and compared with electrodes with different levels of graphene oxide.

In Situ Thermal Conductivity Measurement during Micro/nanoscale Tensile Test
Poster #4 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Simon Bratescu
Research Mentor(s): Jungkyu Park

With the rise in technological advancement in consumer electronics, the average trend of the industry is to decrease the size of these electronics for increased use cases and efficiency. Therefore, comprehensive studies must be performed on the fundamental components of microelectronics to determine the effective potential of these devices. For this study the thermal conductivity of micro-scale materials is being measured under strain for the use case of wearable microelectronics that require high heat dissipation characteristics. To investigate the thermal properties of microscale samples during mechanical strain at the same time, we developed an in situ thermal measurement method by combining infrared thermal imaging camera and KLA T150 nanoscale tensile tester. The sample heating is accomplished by taking a sample with a custom designed electronic heating system to impose heat flux in the sample. The sample is then preheated to 100 degrees Celsius, which allows time to equilibrate. Once the sample reaches equilibrium a thermal image is taken on an infrared camera, from there the tensile tester induces 10% strain and another thermal image is taken. This process is repeated along different strain percentages, and from these images the dimensions of the sample and thermal conductivity can be measured. The thermal conductivity values are acquired by curve-fitting the temperature distribution obtained to a cooling fin formula. For the successful demonstration of the development apparatus, we tested polymer-based materials. Further experimentation is required to establish a consistent trend.

Osteoinductive Nanocomposites for use as Bone Scaffold Materials Useful with 3D Printing
Poster #6 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm

Undergraduate Student(s): Crawford Allen, Cap Pruitt, Tim Roundtree, and Demetrius Johnson
Research Mentor(s): David Veazie and Eric Mintz

Worldwide, over 4.5 million bone tissue reconstructive surgical procedures are performed annually to treat bone defects. Due to bone infections, bone tumors, congenital disabilities, and fracture caused by traumatic injuries in which extensive bone mass is missing, lost, or damaged, there becomes a need to use materials to repair bone. Historically, doctors started repairing bone using brute force methods, for example, fixation using steel rods. Overtime, the materials, and technologies used to repair bone have progressed from using metal and ceramic implants, which completely replace bone to the current field of tissue engineering, which aims to leverage our body's natural ability to heal and reform bone with the help of a 3D scaffold. Such an evolution is due to extensive research efforts to develop materials and regenerative therapies that lead to regenerative healing resulting in the bone as opposed to the permanent replacement of bone. The goal of this project is to develop materials to meet this need. The development of nanocomposites using calcium carbonate nanorods would be a cost-efficient method to initiate osteoinductivity. Incorporation of rod-shaped nanoparticles will also reinforce the polymer matrices and produce directionally dependent mechanical and barrier properties upon extrusion; these properties are interrelated to the material degradation. The addition of calcium carbonate nanoparticles will increase the melt viscosity of these polyesters. The investigating of these nanocomposites to establish the structure-property relationship by the researchers in this Vertically Integrated Project will allow for nanocomposite design considering both bone scaffold performance, and fabrication using 3D printing.

Role of Alloy Oxidation on Performance of Solid Oxide Fuel Cells for Clean Energy Generation
Poster #4 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Mason Cox
Graduate Student(s): Duy Pham, Tyler Slivers, and Arzoo Perveen
Research Mentor(s): Ashish Aphale

As the global demand for electricity grows, the need to lower carbon emissions become increasingly important. To face this challenge many research and development projects have explored alternative sources of clean energy to integrate into existing energy infrastructure. One such alternative is solid oxide fuels cells (SOFCs) which have emerged as a potential energy conversions system using fuels such as hydrogen for its power generation processes. Electrochemical reaction between hydrogen and oxygen from the air generates electricity, producing water (H2O) as the by-product. Typically operating within a temperature range of

500-900°C, SOFCs can regularly produce power without the need for revitalization if the fuel supply is maintained. A metallic interconnect (IC) is used on both cathode and anode electrodes, serving as a current collector and as a gas manifold to deliver gases to both electrodes. The oxidation behavior of these alloys has a significant impact on the electrical properties of oxide scales under the complex operating atmosphere of SOFCs. This work will investigate the role of different alloys and their oxidation behavior as a function of time and temperature on performance of SOFC cells. The effects on area specific resistance (ASR) measured under high temperature will be studied. The implications of alloy oxidation and corrosion under systems operating conditions will also be investigated. Additionally, their effects on the conductive pathway in an electrochemical cell will be discussed. The findings relating to this research have potential applications in energy storage and conversion for transportation, residential, and commercial systems.

Role of Carbon-Based Nanocomposites for Energy Storage
Poster #2 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Jake Irvin, Duy Pham, Jacob DiLeonardi, Ava Giffen, and Sonnett Kowalski
Research Mentor(s): Ashish Aphale

In this work, graphene will be integrated into polypyrrole (PPy) polymer matrices to form Graphene-PPy (GrPPy) nanocomposites. The GrPPy nanocomposites will be synthesized and investigated for their use in ultracapacitor devices as electrodes. We hypothesize that due to graphene's electrochemical properties and high surface area, that the composites will provide superior energy storage performance.GrPPy nanocomposites will be synthesized using an electrochemical deposition and the performance will be evaluated using various electrochemical studies in the presence of various aqueous electrolytes. Distinct Faradaic and non-Faradaic charge transfer mechanisms will be investigated using cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS), and galvanostatic charge-discharge (GCD) studies. The results of various experiments, including different percentages of dopants and their effect on ultracapacitor performance will be presented. Lifecycle testing of the devices will be presented. The role of different aqueous electrolytes and their effect on performance will be discussed. Ion transfer between the electrolyte and GrPPy surface will be presented.

Synthesis of Layered Conducting Polymer Electrode for Superior Ultracapacitor Performance
Poster #10 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am

Undergraduate Student(s): Jake Irvin, Jacob Dileonardi, Mason Cox, and Ben McKinney
Graduate Student(s): Duy Pham
Research Mentor(s): Ashish Aphale

Ultracapacitors (UCs) are electrochemical energy storage (EES) devices that provide considerable fast charge-discharge capabilities and large storage capacity. UCs are comprised of two electrodes that house an electrolyte with a porous separator. Electrochemical double layer capacitors (EDLC) that are comprised of carbon-based materials such as activated carbons have an electrostatic charge storage mechanism, also known as non-Faradic storage. The other well-known UCs are psuedocapacitors that are comprised of conducting polymers or metal oxides and have a redox charge storage mechanism, known as Faradic charge transport. Currently, pseudocapacitors are thoroughly researched, however, the role of conducting polymer structure and property as a function of the deposition method currently remains limited. In this work, conducting polymer electrodes, polypyrrole (PPy) are synthesized using electrochemical depositions with controlled cycles and their performance is investigated. The UCs will be tested using cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS), and galvanostatic charge/discharge (GCD) to understand the role between deposition cycles and electrochemical performance. Material characterization such as XRD and FT-IR with surface morphology such as SEM are analyzed to give more insights into this charge kinetics between these variations of cycles.

Robotics and Mechatronics Engineering

Integrating LiDAR with Depth and RGB Cameras for Enhanced Robot Perception and Navigation
Poster #18 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Franccesca Tabertus, Roxie Reese, Tyler De Austria, Lauren Castellon, Charles Koduru, and Jose Chagoya Herrera
Research Mentor(s): Muhammad Hassan Tanveer and Razvan Voicu

LiDAR, an acronym for Light Detection and Ranging, stands as a leading technology in expanding the perceptual horizons beyond the inherent constraints of conventional camera systems. This technology operates by emitting laser pulses and subsequently measuring the time it takes for the light to return, enabling precise distance measurements within its immediate field of view. Distinguished by its resilience in varying environmental conditions, LiDAR exhibits exceptional performance, even in low-light or suboptimal lighting scenarios, while delivering distance measurements at a remarkably high spatial resolution. Within the context of this study,

a 2D LiDAR sensor has been employed. The data acquired by this sensor, denoting the distances to all objects within the measurement radius sharing the same elevation as the laser emitter, is effectively transformed into a 2D map. This map grants enhanced environmental awareness to the robot, providing it with the capacity to discern its surroundings, adeptly avoid obstacles, and strategically plan its path of traversal. To address the inherent limitations of the 2D LiDAR sensor, a complementary approach is adopted. Integrating data from a depth camera introduces a three-dimensional perspective, equipping the quadruped robot with the ability to gather spatial information across a more extensive field of view. Furthermore, the incorporation of RGB cameras facilitates object recognition, thereby affording the quadruped robot, GoAir 1, a comprehensive understanding of its environment. This combination of sensory modalities empowers the robot with the requisite information to make sound and prudent decisions, whether it is operated under manual guidance or autonomously navigates its surroundings using Simultaneous Localization and Mapping (SLAM) techniques.

Data Collection, Heat Map Generation for Crack Detection Using Robotic Dog Fused with FLIR Sensor

Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Wednesday, November 15th
11:00am – 11:50am
Undergraduate Student(s): Jose Chagoya Herrera, Roxie Reese, Tyler De Austria, Lauren Castellon, Charles Koduru, and Franccesca Tabertus
Research Mentor(s): Muhammad Hassan Tanveer and Razvan Voicu

The importance of monitoring crucial infrastructure, like power plant transformers and key civil structures, cannot be overstated for ensuring longevity and safety. One significant advancement in this area is the accessibility of Forward-Looking Infrared (FLIR) cameras, which are now widely available due to reductions in manufacturing costs. These cameras, boasting high precision in temperature data collection and visualization, offer potential applications in various fields. This paper emphasizes the innovative application of FLIR cameras in infrastructure monitoring, particularly for power transformers and aging civil structures like bridges. For transformers, the FLIR camera can penetrate and record internal temperatures, helping identify deviations from standard operating temperatures. Any anomalies could then trigger preventive measures, minimizing operational hitches. Similarly, for structures like bridges, regular FLIR analyses can discern temperature variances which may signal potential wear or fractures, facilitating timely maintenance. To enhance safety and efficiency in data collection, this research proposes integrating FLIR cameras with mobile robots, exemplified by the Unitree GoAir1. Such an approach allows for distant, yet accurate, surveillance, ensuring minimal risk to operators while maximizing precision in infrastructure health assessments.

Enhancing Autonomous Navigation in Quadrupeds through RGB-D Camera Integration and Visual Waypoints
Poster #17 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
4:00pm – 4:45pm
Undergraduate Student(s): Roxie Reese, Tyler De Austria, Lauren Castellon, Charles Koduru, Jose Chagoya Herrera, and Franccesca Tabertus
Research Mentor(s): Muhammad Hassan Tanveer and Razvan Voicu

The multifaceted capabilities of RGB-D cameras present an avenue for real-time area mapping and empower robots with algorithmically driven situational awareness. By amalgamating extracted point clouds with synchronized video and directing this composite data through detection platforms like YOLO or Faster R-CNN, we can enhance the quadrupedal Unitree Go1's prowess in persistent object recognition. This approach leverages the depth camera for autonomous pathfinding, eschewing reliance on local GPS. Instead, the robot navigates by visually establishing waypoints, drawing from both naturally occurring markers, such as landmarks, and universally recognized symbols like ArUco markers equipped with custom dictionaries. We further propose a convergence of this method with global GPS tracking, fusing expansive area mapping with real-time navigation, thereby augmenting the accuracy in both destination pinpointing and waypoint identification.

Intelligent Facade Innovation (IFI): Using IIoT, Digital Twin, and Next-Gen Architecture Designs
Oral Presentation (Microsoft Teams)
Friday, November 17th
3:30pm – 3:45pm
Undergraduate Student(s): Diana Salamaga
Research Mentor(s): Razvan Voicu

The urgent need for sustainable and eco-friendly solutions in architecture has never been more pressing as the world grapples with the escalating threats of climate change and the global energy crisis. As buildings are responsible for significant global energy consumption and carbon emissions, sustainable design efforts must focus on optimizing building performance and reducing energy consumption. Smart buildings have emerged as a pivotal solution to address these challenges, utilizing advanced technologies to create a more sustainable and efficient built environment. Lean building design is an essential concept in sustainable architecture that focuses on minimizing waste and maximizing efficiency throughout the design, construction, and operation. By optimizing the use of materials, energy, and resources, lean building design can reduce a building's environmental impact and lower operating costs. Facades play a critical role in lean building design, as they are the primary interface between the interior and exterior

environments, aiding in regulating the indoor environment, reducing energy consumption, and optimizing building performance. Facades can incorporate various technologies, such as solar panels, shading devices, and energy-efficient glazing, to improve energy efficiency and indoor comfort. Moreover, with the integration of Building Internet of Things (BIoT) and Facade Internet of Things (FIoT) technology, facades can be optimized for real-time data analysis, enabling dynamic control and monitoring of environmental factors such as temperature, humidity, air quality, and occupancy. While several papers have explored the implementation of Industry 4.0 trends on intelligent buildings, only a few have researched the integration of IoT on smart facades and the implementation of a digital twin concept. This research project aims to fill this gap by investigating the value of integrating IoT on smart facades and implementing the digital twin concept on kinetic facades.

Wellstar College of Health and Human Services

Health Promotion and Physical Education

Alcohol Consumption Contributions to Exhaustion and Mental Health
Poster #10 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Jakeria Wallace and Faith Shelton
Research Mentor(s): Kevin Gittner

Excessive alcohol consumption has been linked to various negative physical and emotional effects on the human body. A common experience reported by individuals is the aftermath effects excessive alcohol consumption can have on the body, such as feeling tired and low on energy. The depressant properties of alcohol can leave individuals feeling exhausted due to changes in sleep patterns, dehydration, and electrolyte imbalances. This research seeks to understand how alcohol consumption contributes to feelings of exhaustion and fatigue while identifying the repercussions it may have on mental health. Faith and Jakeria's hypothesis is that they expect people to feel tired and have low energy with heavy alcohol use. They are defining heavy alcohol use as binge drinking which is equivalent to 5 standard drinks in men in a 2 hour period, and 4 standard drinks in women in a 2 hour period. When this study is finalized, they expect to find that the more regularly someone consumes alcohol, the more likely they are to feel tired and have low energy nearly every day. They have found relevant data that have variables capable of comparing the relationship between heavy alcohol use and feeling less energetic. The relevant variables have been cleaned and they will run multiple analyses to answer their research question. Understanding if there is a strong positive relationship between increased drinking and feeling tired/ having low energy can contribute to the discussion of healthier approaches. Upon

completion, this research aims to highlight the correlation between excessive alcohol intake and mental health issues that may arise from overindulgence. Further potential research would include how long the effects of occasional heavy drinking last and if there is a threshold for the adverse physical effects, we are researching to be permanent.

An Analysis of The Relationship Between Alcohol Consumption and Depression
Poster #21 (Marietta Event Center/Gymnasium)
Thursday, November 16th
11:00am – 11:45am
Undergraduate Student(s): Jasmyn May and Cailee Terry
Research Mentor(s): Kevin Gittner

Several studies have shown that there is a bidirectional relationship between alcohol use and depression. This implies that they can increase their risk of the other disorder, exist simultaneously, and/or worsen one another. Alcohol, a psychoactive substance that can be highly addictive, plays a prominent role in American culture. It's concerning that the normalization of bad habits related to alcohol consumption often blinds Americans to the potential harm they're causing to their bodies. Alcohol is used regularly as a coping mechanism, so there is an overlap between people with depression and people who consume alcohol regularly. But it is considered to be a depressant, a substance responsible for suppressing stimulation and arousal in the brain. Depression is a very common type of mental health disorder and cannot be narrowed down to one single cause. Depression can lead to detrimental health and behavioral problems if left untreated. The goal for this research is to examine whether there is a relationship between alcohol consumption/ abuse and depression. The data used was extracted from the 2013 National Survey on Drug Use and Health, collected from interviewers asking a series of questions that were related to mental health and alcoholism. This survey was conducted across all fifty states and was checked for accuracy. Social influence may have impacted an individual's response, especially revolving around mental illness. Once the study is concluded, the expectation is to find a relationship. We hypothesize there will be a strong relationship between the two variables. The purpose of this study is to inform people who are predisposed to depression and raise awareness of the fact that they could potentially increase their risk if they consume alcohol regularly. It also aims to promote a healthier relationship with alcohol for Americans by informing them of the possible dangers.

Average Household Income in Relation to Individual Dietary Consumption of Fruits and Vegetables
Poster #17 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
1:00pm – 1:45pm
Undergraduate Student(s): Elizabeth Burchfield and Bella Spencer

Research Mentor(s): Kevin Gittner

The purpose of this analysis is to review data from the USDA Economic Research Survey in a data collection regarding FoodAPS National Household Food Acquisition and Purchase Survey. Our data includes a sample size of 4,826 participating households with 279 variables describing each household. Several variables were utilized which include average collective income for households, perceptions of fruit and vegetable prices and quality, self-reporting items about perceived fruit and vegetable consumption, and financial survey responses. With these chosen variables we made initial inferences that there would be a relationship between income and fruit consumption. We predict that throughout the duration of the study, we will find a relationship to explain how collective income affects recommended fruit and vegetable consumptions in households. We began our study by cleaning our data and variables as they pose relevance to our research. Then we began making graphs and charts of each variable to visually inspect univariate variables. When we begin running analysis, we will perform statistical testing to identify if there is a relationship between our independent variable (fruit and vegetable consumption) and our dependent variable (household income). Through the results of these, we can start making conclusions as to whether our hypothesis can be supported. Our analysis models will include frequency tables that will show various correlation coefficients between both our categorical and continuous variables and present any statistical relationship between our chosen variables. Finally, conclusions are drawn from T-tests to show our hypothesis and prediction is supported and that there is some relationship between our variables to show that average household income may influence fruit and vegetable consumption. If these results show predicted conclusions, we will have evidence that allow for policy change and public health advancements as it relates to ensuring individuals have readily access to healthy diets regardless of income.

Distraction Culture: The Origin Story of Notification Stress
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
1:00pm – 1:50pm
Undergraduate Student(s): Benedicte Kalonda
Research Mentor(s): Mari-Amanda Dyal and Amanda Redinger

Long gone are the days when procrastination was the sole culprit of poor productivity through the chronic delay of task completion, which has also been linked to a range of stress-related health problems (e.g., headaches, digestive issues, and insomnia). Today's culture has given rise to the phenomenon of pre-crastination, whereby a technological notification demands and receives immediate attention despite its level of urgency. This propensity to abandon flow and groove is becoming normalized, and the public health impact is currently unknown. These notifications, a seemingly benign cost of technological advances, are setting the stage for a new level of stressor examination. The public health implications are plentiful when examining how people work,

interact with technology, and cope in a healthy way. To date, there has been minimal chatter in the literature specific to notification stress, which is both surprising and troubling, especially when the role of technology in society is considered. Workshop participants will be subject to a simulation that mimics an everyday encounter with technological notifications while also attending to various cognitive tasks. A pre-post instrument will be developed and administered to assess perceptions, impact on several wellness dimensions, and overall productivity. It is anticipated that data will yield confirmation that technological notifications are indeed impacting productivity. Beyond this, assessments will reveal multi-dimensional impact and inform the path forward for practice and research. While procrastination and pre-crastination are not deemed public health enemy number one, their presence does suggest 1) increased risk of chronic disease and mental health issues; 2) spillover into general health behaviors (e.g., delayed physical activity and screenings); and 3) a lack of coping and motivation. This workshop will demonstrate this presence while also equipping participants with practical tools for management and coping, which represents a larger call to action.

Exploratory Data Analysis on Race & Doctor Visits
Poster #21 (Marietta Event Center/Gymnasium)
Thursday, November 16th
9:00am – 9:45am
Undergraduate Student(s): Isabelle Fevrier and Kelly Gordon
Research Mentor(s): Kevin Gittner

Our study will look at the race of a child and if they have had a visit with their primary care-provider within the last 12 months. We obtained our information from the National Survey of Children's health. The data set sample is 42,777 children aged 1-17 and the data set includes 831 variables. this data is from the year 2020, Between June 2020 and January 2021. Even though the data sets include a plethora of information on factors affecting children, we specifically are looking at if the children are part of the majority (white) or if they are a minority, and a yearly doctor visit. Doctor visit are essential for children at least once a year because they asses their physical and emotional needs, support their growth and development, and overall make sure everything is okay in the child's life. Minority children are more likely to have a language barrier, experience implicit bias and not have the correct insurance, all factors that affect visiting the doctor. While at the doctor minority children are also less likely to be screened for disorders such as mental illnesses. Other variables that we will include are the sex of the child and if they have experienced a negative experience (outside the doctor office), due to their race. The research question for our study is Does the race of a child have an impact on whether they see their primary-care giver at least once a year. The main variables of the study are race (SC_RACE_R) and doctor visit in 12 months (S4Q01). We choose this variables as well as the alternative variables because we believe that the race of a child somewhat affects their amount of doctor visits.

The Impact of Parentification on Adult Health Behaviors and Outcomes
Poster #3 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
2:00pm – 2:45pm
Undergraduate Student(s): Elizabeth Burchfield
Research Mentor(s): Mari-Amanda Dyal

Parentification is a multi-dimensional phenomenon that is often examined as it is occurring to affected members of this population: children. More specifically, adolescents tend to be the primary focus of such research endeavors devoted to areas like mental health and substance use. The literature is ripe with best practices for many disciplines (e.g., social work, psychology, etc.) in service to those impacted by parentification as well as those that are responsible for imparting the parentification experience (i.e., parents).What is less understood is how parentification informs health behavior and outcomes in adulthood, which is the focus of the current research that seeks to further these conversations with a comprehensive extension into specific health behaviors and outcomes as they relate to the experience of parentified adults. An evidence review will occur to 1) identify the gaps in understanding between parentification in adults and specific health behaviors and outcomes and 2) discern to the extent possible which demographic variables (e.g., gender, age, etc.) are of significance to the parentification experience. The review will begin the development of an instrument in which parentification and underrepresented health behaviors and outcomes will be assessed. Results will reveal the gaps in understanding and provide the path forward for future research activities by way of evidence-based instrument development and assessment., which will deepen the existing conversation around the impact of parentification on adult health behavior and outcomes. Parentification is not a new concept, nor is the conversation around it. However, the health impact on adulthood has not been fully explored as it relates to 1) health behaviors like help seeking and self-care and 2) multi-dimensional health outcomes: physical, emotional, social, etc. This endeavor will yield insight that several disciplines and affected populations can use to either strengthen or sustain health behaviors and outcomes.

Statistical Relationship of Substance Rehabilitation Mental Health Screenings and Facility Ownership Type
Poster #11 (Marietta Event Center/Gymnasium)
Wednesday, November 15th
3:00pm – 3:45pm
Undergraduate Student(s): Tatiana Denton and Destinie Ocasio
Research Mentor(s): Kevin Gittner

Millions of people in the United States struggle with alcohol and drug use issues, which affect a sizable section of the population. Addiction to drugs and mental illness frequently overlap. The goal of this research is to determine whether there may be a relationship between the availability of mental health screenings and the ownership of substance abuse clinics, specifically those managed by state governments. The study was concentrated on a sample of substance use facilities in southeastern states: Georgia, Florida, North Carolina, and South Carolina by using information from a 2020 survey conducted by the Substance Abuse and Mental Health Services Administration. The two main factors of interest were the availability of mental health test screenings at facilities and the ownership type. Along with the two main factors, there were other characteristics considered as well. Those being whether facilities offered detoxification as a form of treatment and the age of the patients. Data cleansing, logging, and visualization approaches were used in SPSS. The initial EDA's key results showed that most substance use centers are run by private non-profit groups. State government-run centers came in fourth among ownership types, despite the difficulties of assessing categorical factors, according to the statistics. Additionally, about 80% of the clinics offered mental health examinations. The data also provided important information about ownership distribution and the frequency of these services. After the initial testing, the need for multiple contingency tables was necessary to see all the varying relationships in the sample size. The results from the main contingency table showed a contingency coefficient of 0.130. This would be considered a weak to no relationship between ownership type and metal health screenings. The disparities between for-profit and non-profit organizations in the landscape of substance use disorder treatment should be investigated in future research, along with quantitative characteristics.

Nursing

Why do Nursing Students Avoid Oncology for Nursing Field Placement Post-graduation? An Undergraduate Experience in Descriptive Content Analysis
Oral Presentation (J.M. Wilson Student Center – Ballrooms)
Thursday, November 16th
1:00pm – 1:50pm
Undergraduate Student(s): Madison Barnett
Research Mentor(s): Tracy Ruegg

Significant progress in cancer diagnosis and treatment underscores the demand for oncology nurses and accentuates the nursing shortage. Lack of staffing strains experienced nurses causing them to have the highest turnover rates of all cancer clinicians, impacting patient outcomes. Oncology nurses play a vital role in providing comprehensive care, addressing medical, emotional, spiritual, and educational needs. Years of reluctance of prelicensure students pursuing the oncology field post-graduation exacerbates the nursing crisis. Understanding the

reasons behind student avoidance is crucial for developing strategies to attract and retain nurses in the oncology field. The primary objective of this research was to identify and analyze factors contributing to nursing students' aversion to oncology as field placement following graduation. The aim was to gain insights into student perceptions and prior experiences that may influence field choice. Qualitative interviews were conducted in the parent study involving 30 prelicensure nursing students from different educational degree programs nationwide. Interviews explored students' opinions, experiences, and knowledge regarding oncology nursing. A descriptive content analysis was employed to meet study objectives. Three prominent categorical themes each with 3-4 sub-categories emerged from the data analysis: 'Emotions in Care' encompassing fear, emotional self-strain, and unknown emotional resilience; 'Perceptions of the Disease' included death, depressing, and boring work environment; and 'Prior Experience' consisting of a lack of education, lack of clinical exposure, complexity of cancer topic, and personal experience. Because most nursing student perceptions of the oncology field are compromised by lack of accurate information contributing to negativity of the specialty, educators need to improve education and mentorship to encourage students to consider oncology as a rewarding field placement post-graduation. Offering prelicensure oncology education can increase the quality of care of future patients with cancer, ultimately improving patient outcomes in oncology settings.

Public Health Education

Mental Health in Racial Minorities
Poster #9 (Marietta Event Center/Gymnasium)
Thursday, November 16th
10:00am – 10:45am
Undergraduate Student(s): Victoria Edward and Vanessa Moreira
Research Mentor(s): Kevin Gittner

This study will examine the primary mental health diagnoses and race of individuals across the United States in the year of 2020. This data was collected by the Substance Abuse and Mental Health Services Administration (SAMHSA) from both MH-TEDs and MH-CLD to compile accurate data. The dataset sample size consists of 6,945,521 participants. The dataset contained over 43 different variables, but due to the significant role that race continues to play in contemporary culture, we were especially interested in examining the connection between race and mental health. Racial minorities have more risks factors and social determinants that can negatively impact their mental health. Racial minorities are most affected by economic status, education, healthcare access, discrimination, and racism making it more difficult for them to take care of their mental health. The majority has better access and does not face as much discrimination when seeking mental health care. Our research question is whether there is a significant difference between mental health diagnosis in racial minorities compared to the racial majority. The primary variables we are focusing on are: Mental health diagnosis (MH1) which is

our dependent variable and racial minorities which is our independent variable. MH1 contained 13 values, we recoded this variable into four values, depressive disorder, schizophrenic disorder, bipolar disorder, and alcohol/substance abuse disorder. We also recoded our race variable into whether the individual was a minority or non-minority. The alternative variables we chose in this study are education, age, and sex. We chose these variables because they represent the social determinants that can detrimentally impact racial minorities mental health and vice versa. We plan to use the variables selected to support our hypothesis that racial minorities have more primary mental health diagnoses compared to the racial majority.