26TH ANNUAL

UNDERGRADUATE RESEARCH SYMPOSIUM

UNIVERSITY OF SOUTH ALABAMA
UNDERGRADUATE RESEARCH

WEDNESDAY, OCTOBER 23, 2024

1:00PM

USA STUDENT CENTER

BALLROOM

26th Annual Undergraduate Symposium
Wednesday, October 23, 2024

Welcome
Dr. Christy Wheeler West
Director of the Office of Undergraduate Research

Invited Student Presentations:
Olivia Breisacher
Emilie Dedeaux
Tyler Fickling
Madeline Potter
Olivia Powers
Ava Rittle

Phi Kappa Phi Poster Award

Poster Sessions – Student Center 2nd floor lobby
1:00 Odd-number posters
3:00 Even-numbered posters

Sponsored by:
Alabama Space Grant Consortium, University of South Alabama Academic Affairs, University of South Alabama Graduate School, College of Arts and Sciences, Mitchell College of Business, College of Medicine, School of Computing, College of Education, College of Engineering, and Pat Capps Covey College of Allied Health Professions

Welcome!

At this 26th Annual Undergraduate Research Symposium at the University of South Alabama, we gather to celebrate the efforts and achievements of more than 90 budding scholars. Whether you join us as a proud mentor or parent, a curious student or faculty member, a University administrator, or other guest, I know you will be impressed with all these outstanding student researchers have accomplished, especially through the challenges faced in the last couple of years.

The Office of Undergraduate Research (OUR) seeks to promote scholarly and creative activity and enhance critical thinking, problem-solving skills, and communication. We take pride in our foundational role in developing the scholars and scientists of tomorrow. Still, our work would be empty without the tremendous commitment of the faculty mentors who not only foster the progress of the research projects but also nurture the undergraduate researchers in their scholarly development.

We are grateful for the generous sponsorship of the Alabama Space Grant Consortium, the Academic Affairs Office, and individual colleges and departments. We also express our appreciation to the members of the University Committee on Undergraduate Research, especially for their time and insight in support of the Summer Undergraduate Research Fellowship (SURF) program.

Dr. Christy Wheeler West
Director, Office of Undergraduate Research

Dear Colleagues and Students,

Welcome! This year marks a very special Undergraduate Research Symposium as we celebrate the 26th year since its inception. This symposium showcases the extraordinary efforts of our developing scholars as they present their research to the University community. The University of South Alabama prides itself on supporting undergraduate research as the impact of students working with faculty research mentors is profound. The benefits for students participating in scholarly activities are well documented, including enhanced opportunities to develop creativity, think critically, problem solve, and embrace intellectual independence. Undergraduate students participating in research are well prepared for their post- graduation plans, whether that is to begin their career in the professional world, continue studies in higher education, or a combination of both. Ultimately, the impact of undergraduate research is widespread as faculty and students examine issues collaboratively, and disseminate their findings in the scholarly community. It is through this dissemination that participation results in an impact to the global community as new knowledge is contributed.

It is with great pride that we commend our students and faculty who participate in the research endeavor through the Office of Undergraduate Research. We are confident that all who participate in the symposium will enjoy the experience and be inspired by the extraordinary work of their peers.

Andrea (Andi) M. Kent, Ph.D.
Executive Vice President and Provost

Oral Presentations

Olivia Breisacher
Major: Biomedical Science
Faculty Mentor: Dr. Jonathan Perez
Department: Biology
College: College of Arts and Sciences
Exploring Differential Gonadal Gene Expressions Associated with Breeding States in Zebra Finch (Taeniopygia guttata)

Emilie Dedeaux
Major: Biology
Faculty Mentor: Dr. Jeremiah Henning
Department: Biology
College: College of Arts and Sciences
Factors shaping classroom, departmental, and institutional belonging of females in STEMM at the University of South Alabama

Tyler Fickling
Major: Anthropology
Faculty Mentor: Dr. Lesley Gregoricka
Department: Sociology, Anthropology, and Social Work
College: College of Arts and Sciences
Exploring the Influence of Burial Depths on Decomposition Rates & Soil pH in Mobile, AL

Madeline Potter
Major: Computer Engineering
Faculty Mentor: Dr. Na Gong, Dr. Jinhui Wang
Department: Electrical and Computer Engineering
College: College of Engineering
Colorectal Cancer Detection in Mice using Artificial Intelligence

Olivia Powers
Major: Anthropology
Faculty Mentor: Dr. Allyson Shea
Department: Microbiology and Immunology
College: Frederick P. Whiddon College of Medicine
Urosepsis Diagnostics in Low-Resource Countries Using a Modified Water Quality Test Kit

Ava Rittle
Major: Electrical Engineering
Faculty Mentor: Dr. Daniela Wolter Ferreira Touma
Department: Electrical and Computer Engineering
College: College of Engineering
How Will the Increase of Electric Vehicles Impact the Power Grid?

Mentor Honor Roll

Mentor, Department	Nominated By
Dr. Brenda Beverly Speech Pathology & Audiology	Nafia Sarhadi
Dr. Jason Coym Chemistry	Anastasia Davis
Dr. Na Gong Electrical & Computer Engineering	Destinie Diggs
Dr. Caitlyn Hauff Health, Kinesiology and Sport	Madison Ensminger
Dr. Jeremiah Henning Biology	Emilie Dedeaux
Dr. Nancy Kelley Social Work	Solange Silva
Dr. Silas Leavesley Chemical Engineering	James Bond
Dr. Jeffrey Medlin Meteorology	James Klueppel Jr.
Dr. Sinéad Ní Chadhain Biology	Kathy Hacker
Dr. Jonathan Perez Biology	Olivia Breisacher
Dr. Terrence Ravine Biomedical Sciences	Dev Mehta
Dr. Nancy Rice Biomedical Sciences	Suhas Patil
Dr. Sarah Sayner Physiology & Cell Biology	Dylan Peters
Dr. John Soltys Neurology	Manisha Gangasani
Dr. Jason Strickland Biology	Gwyneth Vogler
Dr. Jinhui Wang Electrical & Computer Engineering	Madeline Potter
Dr. Shenghua Wu Civil, Coastal and Environmental Engineering	Carly Charbonnet, Charles Turner

University Committee on Undergraduate Research
Program Director: Dr. Christy Wheeler West

College	Member, Department
Pat Capps Covey College of Allied Health	**Robin Mockett**, Biomedical Sciences
College of Arts and Sciences	**Jason Coym**, Chemistry **Lesley Gregoricka**, Sociology, Anthropology, and Social Work **Zoya Khan**, Foreign Languages **Christine Lindeman,** Art & Art History **Steven Schultze,** Earth Sciences **Jack Shelley-Tremblay**, Psychology **Jason Strickland**, Biology
Mitchell College of Business	**Al Chow**, Marketing and Quantitative Methods
School of Computing	**Tom Johnsten**, Computer Science
College of Education and Professional Studies	**Ryon McDermott**, Professional Studies
College of Engineering	**Na Gong**, Electrical and Computer Engineering **Silas Leavesley**, Chemical and Biomolecular Engineering
Honors College	**Doug Marshall**, Sociology
College of Medicine	**Thomas Rich,** Pharmacology
College of Nursing	**Rebecca Graves**, Research, Development, and Evaluation

Office of Undergraduate Research
Located in the Honors College
Seamans' Bethel Theatre
(251) 460-6243

Research Area	Posters
Allied Health and Nursing	5, 8, 42, 45, 71, 81, 86, 89
Arts and Humanities	11, 40
Biology	3, 10, 18, 20, 23, 32, 33, 39, 44, 55, 66, 67, 87, 90, 91, 95
Biomedical Science/Engineering	13, 16, 17, 25, 27, 35, 37, 53, 61, 63, 72, 73, 74, 78, 82
Business	9, 38, 48, 93
Chemical Science/Engineering	1, 7, 21, 28, 49, 52, 54, 57, 62, 69, 94, 96, 97
Earth Science/Engineering	15, 43, 46, 50, 65, 68, 70, 77, 83, 88, 92, 98
Mathematics and Computing	12, 22, 31, 47, 64, 76, 84
Physical Science/Engineering	2, 14, 19, 36, 60, 80, 92
Social and Behavioral Science	4, 6, 24, 26, 29, 30, 34, 41, 51, 56, 58, 59, 75, 79, 85

Poster: 2

Alyssa Albers

Major: Chemistry

Faculty Mentor:
Dr. James H. Davis Jr.

Department: Chemistry

College: College of Arts and Sciences

Funding Source(s): SURF, Alabama Space Grant Consortium

Delignified Wood as a Platform for Advanced Materials: Practical Applications

Climate change and environmental conservation are increasingly prevalent issues. This research project seeks to create environmentally benign versions of everyday technological products such as batteries and pesticides. Lithium-ion batteries are used worldwide as one of the most common sources of electrical energy. These batteries are composed of hard metals that are incredibly toxic to the environment if not properly disposed of. Unfortunately, these batteries tend to end up in landfills where they can consequently leach out into the surrounding environment. The use of wood as the physical platform for electrical energy is bio-innocuous and therefore better for the environment. This project created a galvanic cell using the cellulose husk of delignified wood as a porous membrane and a silver ionic liquid solution as the support electrolyte or charge carrier. The ionic liquid was chosen as the support electrolyte because ionic liquids do not evaporate and therefore do not release vapors into the atmosphere, thus making them more environmentally friendly. Like batteries, spray-over pesticides and herbicides are widely used and evoke many environmental issues. To combat these negative effects, the development of a slow-release, bio-innocuous, targeted platform would be incredibly beneficial to the environment. This targeted platform was created using delignified wood as the technical application platform, and the slow-release capacity was measured using a deep eutectic solvent (DES).

Poster: 1

Aidalynn Allen

Major: Biomedical Science

Faculty Mentor:
Dr. Kaushik Venkiteshwaran

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF

Stormwater Phosphorus Removal and Recovery Using Iron-Biochar Augmented Hybrid Geotextiles

Excessive use of phosphorus (P), a vital nonrenewable nutrient in fertilizers, leads to P-contaminated stormwater runoffs causing eutrophication and hypoxia threatening ecosystems, wildlife, and human health. Therefore, there is a vital need to remove and recover P for the beneficial reuse of stormwater. Current green infrastructure (GI) methods such as rain gardens and bioswales, are designed for flow management, not removal of soluble pollutants such as P.

The objective of this research was to develop an Iron-Biochar augmented non-woven geotextile fabric for GI applications. Augmenting P adsorbing Iron and Biochar onto geotextile will allow convenient retrieval of the adsorbents from GI and recovery of P for beneficial reuse. In the study, geotextiles were packed with different amounts of biochar to provide varying surface areas for iron attachment. Iron was augmented onto biochar-packed geotextiles using a chemical precipitation method. Thereafter the iron-biochar geotextiles (Fe-BC-Geotex) were washed, dried, and analyzed for P adsorption.

The Iron amending experiment demonstrated that biochar increases the surface area for iron attachment. The 50% Fe-BC-Geotex (50% biochar by weight) had the highest iron capacity of 432±53.8 mg-Fe/g-Fe-BC-Geotex, whereas, the Fe-Geotex with no iron had the lowest iron capacity (58±7.8 mg-Fe/g-Fe-Geotex). However, the Fe-Geotex with no biochar had the highest P adsorption capacity of 10.2±0.48 mg-P/g-Fe-BC-Geotex, whereas, the 50% Fe-BC-Geotex had the lowest P adsorption capacity (5.6±0.21 mg-P/g-Fe-BC-Geotex). Biochar does increase iron attachment but does not translate to higher P adsorption capacity.

Poster: 3

Kristen Allen

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning

Department: Biology

College: College of Arts and Sciences

Funding Source(s): Glass Half Full Recycling Company

Evaluation of Coastal dune plant seed germination in glass sand substrates

Restoration of coastal dunes relies on transplants of nursery stock into barren sand environments following tropical storms, however, long-term vegetation stability and biodiversity will be shaped by the ability of seeds to germinate and establish within coastal dunes. Globally, ~70% of sandy beaches around the world are experiencing erosion leaving natural sand substrate for restoration in short supply. As an alternative for dredging sand substrates from offshore, recycled glass sand (cullet) has been proposed as a potential source of restoration substrate, however, may lack the natural microbial communities that promote seed germination. To understand how glass sand substrate and native microbial communities impact seed germination within a variety of native Northern Gulf of Mexico dune taxa, we established a factorial seed germination experiment in which we germinated seeds from 13 species within recycled glass sand or sterile beach sand that either received inoculation with native soil microbes or was a non-inoculated control. Our goal was to: (1) test the efficacy of recycled glass sand as an in-situ restoration substrate in coastal dunes and (2) understand if glass sand efficacy could be improved by inoculating with native microbial amendments. Overall, we found minimal differences within germination patterns when comparing glass sand to natural beach sand substrates with or without native microbial treatments. However, we found strong germination differences across our species. Further study will need to be done on recycled glass sand (cullet) as a source of substrate used for dune restoration, but our results suggest that glass sand substrate provides a similar germination environment for native dune species.

Poster: 4

Molly Armstrong

Major: Psychology

Faculty Mentor:
Dr. Erica Ahlich

Department: Psychology

College: College of Arts and Sciences

Weight Stigma and Cancer Care: A Qualitative Analysis

Weight stigma is discrimination and unfair treatment based on an individual's body weight. Research suggests that weight stigma is prevalent in healthcare settings. Studies have shown that 69% of individuals with obesity face discrimination from healthcare providers. Fear of stigmatization prevents individuals with obesity from seeking medical care, thus worsening health and increasing the risk of common comorbidities of obesity, such as cancer. Women with obesity are less likely to be referred for cancer screenings (e.g., pap smears, mammograms). This research study aims to explore perceptions of individuals with breast cancer related to weight stigma across the cancer care continuum. To date, 18 individuals have been recruited nationally, with the following inclusion criteria: BMI ≥ 30, age 19-90, United States resident, and the ability to speak English. The target sample is 40. Participants in the Declined Treatment group must have been offered but opted not to receive breast cancer screening in the last 12 months. Participants in the Screened group must have undergone a breast cancer screening within the past 12 months. Treatment group participants must have completed cancer treatment in the past 12 months. The Survivorship group requires cancer treatment completion in the past 1-5 years. Eligible participants engage in qualitative interviews, approximately 1 hour in duration, aimed at exploring weight stigma during cancer care. Example questions include: "Can you recall when someone in the healthcare setting during the cancer screening/treatment process treated you differently because of your weight?" The interviews are recorded and will be transcribed for analysis.

Poster: 5

Rani Badve

Major: Biology

Faculty Mentor:
Dr. Glen Borchert

Department: Pharmacology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): SURF

Assessing ChatGPT's Ability to Identify Dermatologic Conditions

ChatGPT is one of many natural language processing models (NLP). This particular NLP, developed by OpenAI, can serve as a major information source for the field of medicine; however, the accuracy of ChatGPT for medical queries is unknown. AI is rapidly advancing; the latest AI technology available is ChatGPT 4.0, which promises more accuracy and precision in responses compared to the precious models. With increased accuracy of results, the question of whether AI can serve as a tool for healthcare providers is questioned. Combined with healthcare professionals, the prospect of a healthcare professional treating patients using their knowledge combined with a tool that has access to millions of medical knowledge can turn into reality, should AI prove to be reliable.

Poster: 6

Myra Bajwa

Major: Biology

Faculty Mentor:
Dr. Casey L. Daniel

Department: Family Medicine

College: Frederick P. Whiddon College of Medicine

Funding Source(s): SURF, USA Health Mitchell Cancer Institute

Barriers for Community Pharmacies as Vaccines for Children (VFC) Providers in Rural Alabama: Opportunities for Solutions

Significant HPV vaccination disparities exist between rural and urban areas in the U.S. A primary barrier is low access to preventive care in rural areas. One of the most promising strategies to overcome this is increasing access by offering HPV vaccination in non-traditional, convenient health settings, such as pharmacies. Community pharmacies (i.e., independently run rather than chain pharmacies) are frequently trusted, valued resources in rural areas. In Alabama, community pharmacies are eligible for enrollment in the Vaccines for Children (VFC) Program, a federally funded program that provides free vaccines to children and adolescents under 18 years old and uninsured, underinsured, American Indian, or Alaska Native. However, fewer than 7 community pharmacies have enrolled as VFC providers, with some later discontinuing participation. This study seeks to understand VFC pharmacies' experiences with the program, reasons for unenrollment, strategies for improvement and to increase community pharmacy VFC enrollment, and potential barriers that might deter other pharmacies from enrolling in the future. One-on-one qualitative, semi-structured interviews were conducted with relevant stakeholders, including former and current VFC pharmacists and employees from the Alabama Department of Public Health (ADPH) and field staff. Verbal interviews were transcribed and analyzed using NVivo qualitative data analysis software. Interviews were coded to determine predominant themes. Preliminary results show barriers in maintaining pharmacy VFC enrollment, and barriers to the program's overall effectiveness, providing opportunities for improvement. Community pharmacies provide increased access to preventive services and offer positive, long-term health impacts for the rural areas they serve. However, strategies must be developed to ensure community pharmacies as VFC providers are sustainable over time. Doing so will facilitate viable, improved health outcomes in rural, medically underserved areas of Alabama and beyond.

Poster: 7

Bailey Baxter

Major: Biomedical Science

Faculty Mentor:
Dr. David Forbes

Department: Chemistry

College: College of Arts and Sciences

Funding Source(s): SURF

Assembly of Potent and Selective Inhibitors of PP5

Protein phosphatase 5 (PP5) is a serine/threonine phosphatase implicated in various cellular processes, including stress response, cell growth, and apoptosis. The dysregulation of PP5 has been associated with cancer progression, making it a potential therapeutic target. Norcantharidin, a derivative of cantharidin, is a known inhibitor of PP5; however, its undesirable cytotoxicity limits its clinical application. To enhance its therapeutic potential, we synthesized a series of norcantharidin derivative prodrugs aimed at increasing selectivity for PP5 inhibition in cancer cells.

Our synthesis approach involved an anhydride ring opening reaction of norcantharidin with various alcohols to form ester derivatives. This reaction proceeds via nucleophilic attack of the alcohol on the anhydride ring, yielding the corresponding norcantharidin ester. By modifying the alcohol moiety, we were able to introduce functional groups that enhance selectivity and reduce off-target effects. Additionally, cinchonidine and cinchonine, chiral alkaloids, were used to create stereoisomerically enriched norcantharidin derivatives. The resulting prodrugs exhibited promising stereospecific interactions with PP5, potentially leading to improved therapeutic results.

Poster: 9

Marion Bell

Major: Marketing - Marketing Management Concentration

Faculty Mentor:
Dr. Jennifer Zoghby

Department: Management

College: Mitchell College of Business

Digital Marketing for Non-Profit Organizations on the Gulf Coast

Non-profit organizations depend on the support of their donors and volunteers to make an impact in their community. By analyzing the current efforts and strategies of Gulf Coast non-profit organizations, we can understand the most effective digital communication and marketing methods. My working project problem is the need for funding, volunteerism, and community awareness for nonprofit organizations. Unlike consumerism, when it comes to this type of marketing, it is a trade of money or time for a good feeling. The benefit to the donor or volunteer is often not a physical benefit or convenience. Nonprofits do not need to be left in obsolete marketing practices. This research uses an online form including statistics from websites and social media platforms as well as volunteerism and donations to consider the current condition of digital marketing through a sample of Gulf Coast organizations.

Poster: 8

James Bond

Major: Chemical Engineering

Faculty Mentor:
Dr. Silas Leavesley

Department: Chemical and Biomolecular Engineering

College: College of Engineering

Detection of Colorectal Cancer Progression and Detection Procedure using Hyperspectral Imaging Microscopy.

Colorectal cancer (CRC) is leading as one of the most prevalent types of carcinomas within the United States and is the fourth most common cancer behind lung and bronchial cancer in new cases for the year of 2023. Despite the advancements in diagnostics and treatment, CRC is still a significant contributor to cancer mortality which emphasizes the need for further research in detection and therapy. Utilization of hyperspectral imagery as a new potential technology for detecting CRC is attempted within this procedure . Hyperspectral imaging is a technique that can collect and analyze the image of a sample across the electromagnetic spectrum to attain a spectrum for each pixel of an image. This technique allows for identification of materials by their signature spectrum. In this study, a murine model of CRC was used which allowed due to the ability of inducing CRC within the subjects as well as the efficient mimicking of human CRC which gives the opportunity to observe tumor detection and progression in a controlled environment. The murine CRCmodel was implemented using Azoxymethane (AOM) along with the colon irritant Dextran sodium sulfate (DSS). Results from this study will be used to evaluate the potential of hyperspectral imaging microscopy and colonoscopy for detection of CRC at different stages in efforts to maximize early detection and diagnosis therapies.

Poster: 10

Olivia Breisacher

Major: Biomedical Science

Faculty Mentor:
Dr. Jonathan Perez

Department: Biology

College: College of Arts and Sciences

Funding Source(s): SURF

Exploring Differential Gonadal Gene Expressions Associated with Breeding States in Zebra Finch (*Taeniopygia guttata*)

Aseasonal or opportunistic breeders utilize short term environmental cues to regulate and time reproductive efforts. Unlike seasonal breeding taxa the mechanisms used by opportunistic breeders, such as Zebra Finches (*Taeniopygia guttata*), to initiate or terminate reproduction are poorly understood. Regulation of reproductive function can occur at multiple levels including the brain, pituitary and gonads. In this project we utilized a water restriction paradigm to induce a non-breeding state in Zebra Finches, this induced partial gonadal regression in females, but not males. Thus we compared the gonadal transcriptomes of breeding and non-breeding males and females to identify changes associated with reproductive state. We identified significant changes in expression of 17 genes in females, but only one gene in males, Steroidogenic Acute Regulatory protein (StAR). StAR plays a crucial role in regulating gonadal sex hormone synthesis. Thus altering expression of androgens responsible for modulating reproductive behavior. The fewer differences observed in males compared to females possibly reflects an evolutionary adaptation to optimize reproductive success. While females must invest more to maintain a developed follicular hierarchy, maintenance of moderately sized gonads and sperm production may pose minimal cost to males. Maintaining functional gonads across breeding conditions, while modulating androgen production would help males maximize their chances of successful reproduction when conditions become favorable.

Poster: 11

Stella Callister

Major: Psychology

Faculty Mentor:
Dr. Benjamin Hill

Department: Psychology

College: College of Arts and Sciences

The Wandering Mind: Variability in Mindfulness is Associated with Improved Aspects of Executive Functioning

Previous research to evaluate mindfulness and cognition has produced mixed results, there has also been no evaluation of variability in mindfulness as a predictor of cognitive ability. This study aims to evaluate the relationship between intra-individual variability (IIV) in mindfulness and cognitive performance. In this study 274 university participants completed the Five Facet Mindfulness Questionnaire (FFMQ), along with the CNS Vital Signs computerized test battery. The IIV was then computed from the FFQ facet T-scores. Furthermore, high and low cognitive performance groups were formed into the top and bottom 16% of the sample by using the Neurocognition index (NCI) score from the CNS Vital Signs (N=52 High NCI performance and N=46 low NCI performance). Pearson r correlation was then used to evaluate the correlation between mindfulness IIV and CNS Vital Signs domains. As a result, Mindfulness IIV was shown to be negatively associated with performance on the domains of psychomotor speed, composite memory and verbal memory. As for the High NCI group, IIV mindfulness was positively associated with cognitive flexibility, executive functioning and was negatively related to visual memory. Per the low NCI group, IIV mindfulness was negatively related to psychomotor speed, composite memory and verbal memory. There was no relation found for individuals FFMQ facet scores and CNS Vital Sign domains.

In conclusion, there was an association of consistency in self-reported mindfulness (lower IIV) with greater processing speed and memory performance in the overall sample. However, the relationship of mindfulness IIV and cognitive performance displayed between the high NCI performers compared to the low NCI performers displayed great variability. The low NCI group may be representative of low effort and therefore may explain why more self-reported mindfulness was associated with worse performance for processing speed and memory and therefore could be the driving force behind results in the overall sample. With said, the findings for high NCI performance groups are quite unique and do imply an relationship between increased variability in mindfulness facets along with improved cognitive flexibility and executive functioning.

Poster: 12

Luke Cashwell

Major: Electrical Engineering

Faculty Mentor:
Dr. Samuel Russ

Department: Electrical and Computer Engineering

College: College of Engineering

Development of a High-Performance, Cost-Effective Algorithm for Real-Time Fourier Transform Analysis on an Efinix Trion T120 FPGA

This project presents the development of a high-performance, cost-effective, and power-efficient pipelined algorithm designed to execute 10,000 Fast Fourier Transforms (FFTs) per second on an Efinix Trion T120 FPGA. Each FFT processes 4096 signed 13-bit elements, facilitating real-time data analysis for a Time-Domain Impedance Probe (TDIP) operating at a maximum data rate of 490 Mbit/s. The algorithm utilizes the FPGA's built-in multipliers and dual-port memory cells to optimize data storage, transfer, and processing. It achieves this high performance while only using approximately 4% of the Look-Up Tables (LUTs), 7% of the integrated RAM cells, and 15% of the multipliers available on the FPGA. The implementation successfully performs one FFT in 6216 clock cycles.

Poster: 13

Zachary Chancey

Major: Biomedical Science

Faculty Mentor:
Dr. Wito Richter

Department: Biochemistry and Molecular Biology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): ORET Pilot Funding

Type 4D cAMP-Phosphodiesterase (PDE4D) as a novel therapeutic target in obesity

The cAMP-phosphodiesterase 4 (PDE4) family comprises four genes, PDE4A, B, C, and D. Chronic treatment with non-selective PAN-PDE4 inhibitors induces weight loss and improves glucose homeostasis in humans and animals, suggesting a therapeutic potential of targeting PDE4s for the treatment of obesity and metabolic diseases. However, this class of drugs also produces adverse gastrointestinal effects that limit their clinical utility. Conversely, targeting individual PDE4 subtypes is a promising approach to separate the therapeutic benefits from the adverse effects of current PAN-PDE4 inhibitors. Mice with a global genetic deletion of one PDE4 subtype, PDE4D (global PDE4D-knockout mice), mimic the metabolic phenotype produced by PAN-PDE4 inhibitor treatment, including a reduction of body and fat tissue weights, and improvements in blood glucose and lipid homeostasis. This suggests that inactivation of PDE4D may mediate the metabolic benefits of PAN-PDE4 inhibitors. However, as global PDE4D-knockout mice lack PDE4D in all cells from conception, this mouse model does not allow us to test whether preexisting obesity and metabolic disease may be reversed by the subsequent inactivation of PDE4D or to delineate in which cells/tissue PDE4D exerts its metabolic effects. To fill this knowledge gap, this project characterizes the metabolic phenotype of a new mouse model that employs the CRE/loxP system to allow the inducible and/or cell type-specific inactivation of PDE4D.

Poster: 14

Carly Charbonnet

Major: Mechanical Engineering

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF, Alabama Space Grant Consortium

LDPE-modified Asphalt

Plastic waste accumulation poses a significant environmental threat, potentially endangering our natural resources and ecosystems. This project aims to address the challenge of stockpile of recycled low-density polyethylene (rLDPE) by repurposing it for use in asphalt. Specimens were prepared using a warm mix asphalt method. Indirect tensile cracking test (IDEAL-CT), ideal shear rutting test (IDEAL-RT), and Cantabro loss test were all performed in the lab on 4 different dosages (0.0%, 0.3%, 0.6%, and 0.8% by weight of mixture) of rLDPE in 100% RAP. rLDPE was mixed in with Reclaimed Asphalt Pavement (RAP) and Evotherm P25. Results showed that rLDPE improve the cracking tolerance index but reduces workability. Additionally, rLDPE improved volumetric properties due to its low melting point during mixing but increases mass loss in the Cantabro loss test. This research helps to understand the potential of rLDPE in RAP, its future use in sustainable materials management, and the durability of eco-friendly asphalt pavements.

Poster: 15

John Conner

Major: Environmental & Sustainability Sciences

Faculty Mentor:
Dr. Amy Sprinkle

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Population of Blue Crabs (*Cardisoma guanhumi*) in Turneffe Atoll Belize

The Blue Land Crab (*Cardisoma guanhumi*) is a commercially and ecologically vital species to Turneffe Atoll in Belize and to the Caribbean at large. As the crabs are so abundant, little research has been devoted to estimating their actual population size. I have conducted a mark and recapture study and estimated the approximate population size of 2900 individuals. By understanding population size and distribution, we can better asses the species' role in the ecosystem and develop strategies to insure its continued abundance and ecological function.

Poster: 16

Cambridge Cooper

Major: Biomedical Science

Faculty Mentor:
Dr. Dhananjay Tambe

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering

Funding Source(s): SURF

The AirDropper

Can pipetting be automated using compressed air? Pipetting is one of the most repetitive and critical tasks in a cell biology lab, and compressed air is one of the most ubiquitous resources in such a lab. As such, the performance needs and the means, if matched, can enhance accuracy and productivity and reduce contamination and cost even in the labs with very low financial resources. My SURF research has produced such a device; we call it an AirDropper. The device is built using low-end pneumatic devices and a low-power microcontroller. Just the necessary components purchased individually would cost a lab less than $100 to build an AirDropper. The current version can aspirate and dispense at a flow rate of ~1 ml/sec or slower and a volume of ~50 µl or larger. In the initial tests, the errors in volume of dispensed fluid were comparable to the error in the weight of centrifuge tubes used to conduct the measurements. By applying the principles of fluid mechanics, we have identified several parameters of the system that can improve accuracy and resolution of the amount of liquid dispensed. We hope to optimize and standardize the system and pave a way for it to become a routine instrument in both research labs and industries.

Poster: 18

Jacob Cooper

Major: High School Research Student

Faculty Mentor:
Dr. Jonathon P. Audia

Department: Microbiology and Immunology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): American Chemical Society Project SEED

DEVELOPMENT OF A MICROTITER PLATE PLATFORM UTILIZING THE COMPLEMENT COMPLEX TO TEST THE ANTIMICROBIAL POTENTIAL OF AMYLOID-BETA

Amyloid-beta (Aβ) peptides, particularly the Aβ40 and Aβ42 isoforms, are central to Alzheimer's disease pathology due to their aggregation into amyloid plaques. Recent research suggests Aβ may also play a role in innate immunity by exhibiting antimicrobial properties. One proposed mechanism is the enhancement of complement-mediated bacterial killing, where Aβ interacts with the complement system to bolster immune defense against pathogens. This study aimed to develop microplate-based assays to investigate whether Aβ can augment complement-mediated antimicrobial effects against *Escherichia coli* strain K12.

We cultured *E. coli* to mid-log phase in glucose-supplemented VB medium. The bacteria were exposed to varying concentrations of fetal bovine serum (FBS), as a source of complement-mediated killing, with and without Aβ40 and Aβ42 peptides in 96-well microtiter plates. Bacterial growth was monitored using a LogPhase 600 Growth Curve machine, and viability was assessed by colony-forming units on LB agar and live/dead staining, followed by flow cytometry. Kanamycin served as a positive control, demonstrating expected bactericidal effects.

Our results indicated FBS exhibited bactericidal activity against *E. coli* K12 due to complement proteins, but Aβ40 and Aβ42 did not significantly enhance this effect. Future studies will explore whether factors such as peptide concentration, incubation time, human serum, and variations in complement activity may influence Aβ's potential to modulate complement-mediated bacterial killing.

Poster: 17

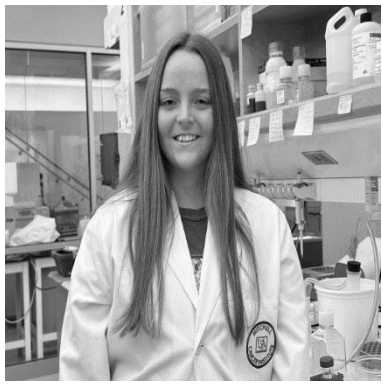
Emily Crouch

Major: Biomedical Science

Faculty Mentor:
Dr. Chandrani Sarkar

Department: Pathology

College: Frederick P. Whiddon College of Medicine



Funding Source(s): USA Mitchell Cancer Institute

Impact of adipocytes on lymphatic endothelial cells: Insights into breast cancer progression

Despite improved therapies, breast cancer (BCa) remains the second leading cause of cancer-related deaths among US women. Obesity, a widespread problem in the US, is one of the major risk factors for developing BCa, and it is linked to lymph node metastasis, unfavorable prognosis, and therapeutic resistance in BCa patients. Emerging evidence indicates that adipocytes, which are one of the most abundant cell types in the BCa tumor microenvironment (TME), promote BCa progression. Lymphatic endothelial cells, lining the walls of lymphatic vessels, also constitute a considerable portion of the BCa TME and play an important role in facilitating the metastatic spread of BCa cells. However, the interaction between adipocytes and lymphatic endothelial cells in BCa and how it contributes to disease progression is poorly understood. In this study, we report that mature adipocytes support the proliferation and migration of lymphatic endothelial cells through the soluble factors that they secrete in the growth medium. Understanding the molecular mechanisms that regulate the crosstalk between adipocytes and lymphatic endothelial cells in the TME of BCa can open up possibilities for targeted therapeutics that could improve the survival of BCa patients.

Poster: 19

Spencer Dalgety

Major: Computer Engineering

Faculty Mentor:
Dr. Samuel Russ

Department: Electrical and Computer Engineering

College: College of Engineering

Funding Source(s): SURF, Alabama Space Grant Consortium

Design, Implementation, and Verification of a DC-powered Solar Cell Test Bench

In this project, a DC-powered photovoltaic cell test bench is constructed for the ongoing JagSat-2 project at the University of South Alabama. Testing solar cells is vital to any satellite project; however, testing solutions are very expensive, with average options costing thousands of dollars to build and operate. Additionally, battery chargers connected to Maximum Power-Point Tracking (MPPT) chips require a stable light source to test and operate. This project utilizes DC power supplies to allow for direct, stable halogen light to be used inside a lab while also allowing for different lighting conditions to be tested. This project prioritizes cost-efficiency and modularity by utilizing off-the-shelf components that easily available. Initial tests find that current, voltage, and temperature data are similar to that of sunlight, but the halogen bulbs heat up the solar cells over time. A fan is included and tested in this project as a simple means of mitigating heat build-up. A successful DC-powered setup is achieved with a final budget of under $800 USD.

Poster: 21

Anastasia Davis

Major: Biomedical Science

Faculty Mentor:
Dr. Jason W. Coym

Department: Chemistry

College: College of Arts and Sciences

Funding Source(s): SURF

The Characterization of Aromatic Stationary Phases For Uses in High Performance Liquid Chromatography

High Performance Liquid Chromatography is an analytical chemist technique used to separate a sample into its individual components for purposes of characterization and studying a specific molecule and/or compound. Traditionally High-Performance Liquid Chromatography in different industries, such as the environmental and pharmaceutical industries, uses stationary phases that are already well characterized such as the C18 stationary phase for separation. Stationary phases in HPLC are specific ligands bonded to a column that the sample is pushed through using a high-pressure pump. The sample is also pushed through with a mobile phase that is usually a mixture of water, acetonitrile, and/or methanol. However, recently, aromatic stationary phases, which have benzene rings bonded to the interior surface of the column, have been produced, but because of how modern they are, they have not been well characterized. As explained by this study done at Northwest University in China, although much research has been done on aromatic stationary phases, there is little to no reporting done on the relationship between retention of solutes and these more modern aromatic stationary phases (Y Sun, 2023). This project took several aromatic stationary phases (Biphenyl, Pentalflouraphenyl, and Phenyl-hexyl) and characterized them so future separations can be more efficiently done. These aromatic stationary phases were also compared to a traditional stationary phase known as C18.

Poster: 20

Emilie Dedeaux

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning

Department: Biology

College: College of Arts and Sciences

Funding Source(s): SURF

Factors shaping classroom, departmental, and institutional belonging of females in STEMM at the University of South Alabama

Despite decades of calls and initiatives to diversify science, technology, engineering, math, and medicine (STEMM) disciplines, females are still more likely to leave STEMM career paths compared to male peers, often depicted as a leaky pipeline. Females in STEMM often experience social alienation, greater self-doubt, and lower sense of belonging and academic satisfaction due to a mismatch in values and bias of STEMM, which traditionally have been normed driven by white, male values. While a lot of research has focused on the barriers faced by females in STEMM, while fewer have focused on the positive experiences in classrooms, within STEMM departments, and institutions that reinforce and strengthen their belonging and commitment to STEMM careers.

To address these concerns, we applied a Bioecological Systems theory to contextualize drivers of sense of belonging for students within departmental, classroom and individual-level phenomena that strengthen belonging for females in STEM. Through interviews that were conducted in 2021, we found common themes among institution, department, and classroom settings that encouraged belongingness and self-efficacy or discourage belongingness and self-efficacy (Google et al., 2023). We found that 43.33% of female students find that their professors care for student success, 76.67% of females report their departments having friendliness and openness, and that 43.33% of females have a sense of community at the University of South Alabama. However, 26.67% of females feel that faculty do not care in the classroom, 20% of females feel that their department has an elitist departmental culture, and 16.67% of females have experienced a lack of transparency with the University as a whole.

Poster: 22

Destinie Diggs

Major: Computer Engineering

Faculty Mentor:
Dr. Na Gong

Department: Electrical and Computer Engineering

College: College of Engineering

Funding Source(s): SURF

Viewer-Aware Low-Power Mobile Video System

Video streaming is essential for mobile devices, but battery life is drained due to intensive computation of large amounts of data. We propose a new video system design by considering how users perceive videos in different environments. With such user awareness, over 40% power savings can be enabled by the designed video system.

Poster: 23

Catherine Dodd

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning

Department: Biology

College: College of Arts and Sciences

Funding Source(s): NSF

Xanthum gum addition to improve the efficacy of recycled glass sand substrate in coastal restoration

Restoration of coastal dune ecosystems following tropical storms or erosion events often requires the addition of dredged substrate from offshore to replenish lost beach sand. Because of the high economic costs and negative ecological impact of dredging offshore sand, there has been a search for alternative substrate sources. Substrate made from recycled glass bottles has been proposed as an alternative, however the efficacy for coastal plants and organisms has received limited research attention. To improve stability of substrate, xanthum gum polysaccharide is often used to bind substrates, while also providing a carbon source to establish microbial communities. Our project seeks to understand if xanthum gum addition into glass sand substrate improves survival and growth of transplanted *Uniola paniculata* (seaoats).

To test this question, we established thirty 7-gallon plastic pots that were filled with glass sand substrate or glass sand substrate with xanthum gum. Three sea oat plugs were placed in each pot and were individually labeled. We measured leaf number and tallest blade of each plant weekly, over the duration of our experiment and watered plants every three days. Our preliminary data suggest that sea oats in the xanthan gum have higher growth rates compared to the control group. While these results are preliminary, they do suggest that xanthan gum addition can positively affect the growth of sea oats, likely through improved retention of water and improved microbial activity.

Poster: 24

Madison Ensminger

Major: Psychology

Faculty Mentor:
Dr. Caitlyn Hauff

Department: Health, Kinesiology and Sport

College: College of Education and Professional Studies

Funding Source(s): SURF

Is Weight Training a Potential Treatment for Those With Obsessive-compulsive Disorder?

Obsessive Compulsive Disorder (OCD) is characterized as having obsessions that lead the person afflicted to need to satisfy the compulsions; failure to satisfy compulsions can lead to extreme distress, and unfortunately, many conventional treatments for OCD, such as medication or psychotherapy, do not always work (Swierkosz-Lenart et al., 2023). One potential treatment option that has been explored for OCD that has shown favorable results is aerobic exercise (Bottoms et al., 2022). Yet, to date, there is no available information on how weight training might be an alternative method for treatment. Thus, the purpose of this project was to investigate the relationship between OCD and weight training, specifically exploring if a six-week weight training intervention decreases symptom severity. Prior to starting the six-week weight training program, participants were pre-tested using the Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989), to see if they scored high enough to qualify for the study. After the participants finished the weight training program, they were asked to take the Y-BOCS again to see if their rate of compulsions and obsessions lessened over the course of the six weeks. As of September 26, 2024 one participant has completed this intervention study and there are two participations enrolled in this intervention study. Data collection is ongoing. There are currently no results. We hope that the scientific community can use the outcomes of this research to address the current treatments or adjunct treatments for those who suffer from OCD.

Poster: 25

Kaitlyn Evenson-McMurtry

Major: Exercise Science - Pre-Professional Concentration

Faculty Mentor:
Dr. Matthew Stratton

Department: Health, Kinesiology and Sport

College: College of Education and Professional Studies

Funding Source(s): SURF

The Effect of Consuming a Commercially Available Carbohydrate Beverage Throughout A Resistance Training Workout in Recreationally Trained Males and Females

Background: Consuming carbohydrates (CHO) throughout a workout is a well-established practice throughout endurance sports. However, there is a paucity of literature as to its impact on resistance training (RT) performance. This study sought to examine the impact of consuming CHO during an RT workout on muscular performance.
Methods: 10 resistance-trained males (n=5, 28.6±8.4yrs) and females (n=5, 20.6±1.5yrs) completed 4 laboratory visits. On visit 1, a 1RM was established for barbell bench press, dumbbell incline row, dumbbell shoulder press, and lat pulldown. During visits 2-4, participants completed a workout consisting of 3 sets to failure using 75% of their 1RM while consuming 28oz of either a CHO beverage providing 50g of CHO, flavor-matched placebo, or water. Total repetitions were recorded for each exercise, set, and throughout the full session. A Condition:Set repeated measures (RM) ANOVA was used to examine differences in repetitions across sets for each exercise. One-way RMANOVAs were used to assess variations in total repetitions for each exercise and the full session between conditions. Significance was accepted at $p \leq .05$.
Results: No Condition:Set interactions (*p*s>.583) or main effects of condition (*p*s>.398) were found for any variable. No significant differences were detected across conditions for any exercise or all repetitions completed throughout the session (*p*s>.140).
Conclusions: These data suggest that, in a laboratory setting, consuming 50g of CHO throughout an upper body RT workout does not impact the total volume completed when compared to a flavor-matched placebo or water.

Poster: 26

Tyler Fickling

Major: Anthropology

Faculty Mentor:
Dr. Lesley Gregoricka

Department: Sociology, Anthropology, and Social Work

College: College of Arts and Sciences

Funding Source(s): SURF

Exploring the Influence of Burial Depths on Decomposition Rates & Soil pH in Mobile, AL

This study investigated the relationship between decomposition and surface soil pH, as well as the applicability of the accumulated degree days (ADD) equation for estimating the postmortem interval (PMI) in Mobile County, Alabama. Three 25-lbs. hogs were used as human analogs. One was placed on the surface (0'), while two others were buried at depths of 2' and 4'. Changes in surface soil pH were measured biweekly over a period of two months. Changes related to decomposition at differing depths were also observed after exhuming the hogs. Results indicate that surface soil pH means at 0' (8.06 ± 0.66), 2' (8.34 ± 0.53), and 4' (8.04 ± 0.55) did not differ significantly from control surfaces or from one another. Additionally, hogs received decomposition scores of 32, 27, and 20 (out of 35), respectively. While soil pH is known to change directly surrounding a decomposing organism, the lack of change here suggests that decomposition may not measurably impact the surface, perhaps limited by the thick clays present at the burial site. As a result, surface pH levels are an unreliable means of estimating PMI or identifying clandestine graves. Next, decomposition rates predictably occurred more slowly in deeper burial environments, presumably due to cooler temperatures. However, the ADD equation predicted that the surface hog would take approximately one year for remains to skeletonize to this degree. This discrepancy highlights the faster decomposition rates in this area, driven by hotter average temperatures and high humidity. These findings suggest that the ADD equation, developed based on compiled data from across the U.S., is not applicable in subtropical environments like Mobile.

Poster: 28

Isabela Flores

Major: Chemical Engineering

Faculty Mentor:
Dr. Kevin West

Department: Chemical and Biomolecular Engineering

College: College of Engineering

Funding Source(s): SURF, Office of Naval Research

Effect of Concentration on Surface Tension of Select Aq. Ionic Amines

Direct-air chemical carbon dioxide capture, although a seasoned concept, has become of increasing interest with rising CO_2 emissions. Exploring alternatives to the traditionally used monoethanolamine, such as taurate salts, is imperative due to quality-of-life concerns associated with the odor. Surface tension is a measure of the extent that a liquid's surface acts like an elastic "skin." Lower surface tension is linked to higher mass transfer between the gas and the liquid phases, which is desirable in this application to facilitate the acid-base reaction that captures the CO_2. Due to this impact of surface tension on mass transfer, the effect of concentration of two aqueous ionic amines, XTau and XN-MeTau, on surface tension was studied. The pendent drop method of measurement was used with an optical tensiometer that applied goniometry and the Young-Laplace equations to find the surface tension. XTau had little effect with measurements of 78.3, 77.4, 79.8 mN/m for concentrations of 35, 45, and 55 mass%, respectively. However, XN-MeTau meaningfully decreased the surface tension with 65.5, 62.5, and 55.8 mN/m being observed for concentrations of 35, 45, and 55 mass%, respectively. These surface tension measurements will give greater insight into balancing surface tension and viscosity goals for a solution that will effectively and efficiently capture CO_2.

Poster: 27

Manisha Gangasani

Major: Chemistry

Faculty Mentor:
Dr. John Soltys

Department: Neurology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): SURF

Data Analysis of Multiple Sclerosis Studies

Multiple sclerosis (MS) is a neuroinflammatory disorder that affects the brain, spinal cord, and optic nerve. The diagnostic criteria of MS requires dissemination in time and space of symptoms due to its symptomatic similarity to other neurological conditions. After a diagnosis is made, the Expanded Disability Status Scale (EDSS) is used to measure and monitor changes in the severity of disability over time. The first phase of this project involved clinical observation of patients at the Strada Patient Care Center to understand scoring on the EDSS and the progression of symptoms through MRI and physical examinations. The second phase of the study was a literature review to identify the number of sources available on PubMed, a nationally recognized research database, that included a racially diverse population size. Specified inclusion criteria were used to refine the results of each search to focus on an individual racial group. Of the 152 PubMed articles that met the initial inclusion criteria, a majority did not mention the race or ethnicity of their included patients. By failing to specify the race of these populations, generalizations are being made about minorities without considering how it will impact underrepresented patients in clinical studies. More studies must be completed using minority groups to provide a reliable measure for disease progression and diagnosis. This will diversify the database and applicability of these studies to be more representative of multiple sclerosis populations.

Poster: 29

Cordelia Gillenwater

Major: Marine Sciences

Faculty Mentor:
Dr. Heidi Lyn

Department: Psychology

College: College of Arts and Sciences

Funding Source(s): Gulf Scholars Program

Exploring the effects of weak electric fields on elasmobranch movement in managed care.

The effects of electric output from marine construction are vastly understudied. As marine construction projects throughout the Gulf of Mexico increase, it is becoming increasingly important for scientists to understand these effects and how they will impact various marine organisms. One subclass of marine organisms that are of particular interest to scientists is elasmobranchs, which have the uncanny ability to detect and respond to electric impulses. In this project, we are partnering with scientists at Disney Epcot's "The Seas" exhibit to study any observable effects of weak electric fields on the behavior of elasmobranchs in managed care. Specifically, we will use current readings on electromagnetic fields and compare movement patterns of the three Gulf of Mexico endemic species— the Sandbar Shark *Carcharhinus plumbeus*, the Blacknose Shark *Carcharhinus acronotus*, and the Scalloped Hammerhead Shark *Sphyrna lewini*— within the environment. Through this ex-situ observational study, we aim to provide researchers, industry leaders, and policymakers with a baseline of information for effective and educated decisions regarding marine construction in the Gulf of Mexico.

Poster: 30

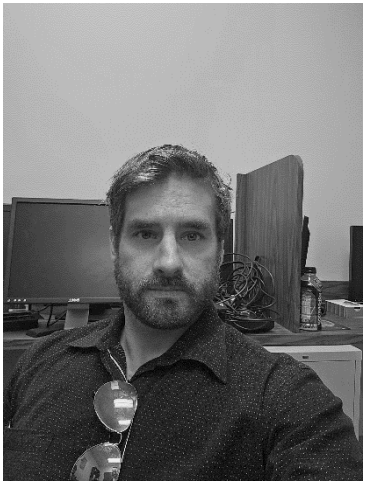
Kenneth Gomien

Major: Psychology

Faculty Mentor:
Dr. Benjamin Hill

Department: Psychology

College: College of Arts and Sciences



Chronic Stress and Smoking Moderate the Relation Between Hippocampal Volume and Long-Term Memory in Older Hispanic Adults

Objective: We evaluated how self-reported chronic stress and lifetime smoking behavior moderates the relation between hippocampal volume and memory.
Method: 841 Hispanic adults (mean age = 63.12 years, SD = 8.03; mean years of education = 10.01, SD = 4.65; 67% female) underwent MRI of the brain and completed the HCHS Chronic Stress measure, a lifetime nicotine use question, and the WMS-III Logical Memory Delayed Recall subtest (LM-II). Two models evaluating HCHS Chronic Stress score and lifetime smoking behavior as moderators of the relation between hippocampal volume and LM-II were run.
Results: Moderation analyses revealed the endorsement of ever smoking cigarettes was a significant moderator for the relation between hippocampal volume and LM-II performance (Smoking: Estimate= -0.012, p=0.005). Additionally, increased chronic stress was also a significant moderator for the relation between hippocampal volume and LM-II performance (Chronic Stress: Estimate= -0.001, p = 0.021).
Conclusions: The current findings suggest that smoking and chronic stress each acted as a moderator of the relation between hippocampal volume and memory, though the effects were small. Future research should examine whether there is a dose-response relationship for cigarette smoking and how this moderates brain health and memory. Additionally, whether there is an interactive effect between stress and smoking warrants further study.

Poster: 31

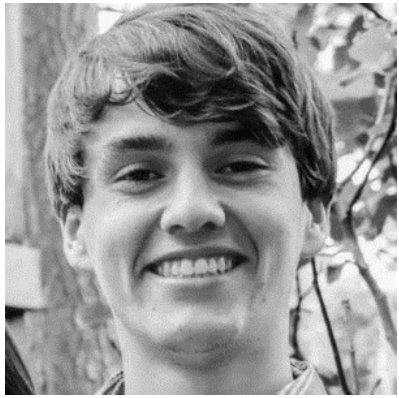
Peyton Haas

Major: Mechanical Engineering

Faculty Mentor:
Dr. Joseph Richardson

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering



Funding Source(s): SURF

Statistical Testing of New Psuedo-Random Number Generators

As the amount of sensitive data transferred across the internet increases, the importance of fast, high performance pseudo-random number generators cannot be understated. This study seeks to test a newly developed PRNG from a family of PRNGs developed in-house against two PRNGs in common use. This family of PRNGs uses two separate stages to generate the final integer; a deck of integers is generated and shuffled at a predefined interval, from which the nth digit is pulled. This digit is generated through error propagation in floating-point arithmetic. The two PRNGs tested to benchmark the novel PRNG were AES and the Mersenne Twister. AES is noted for its widespread use in cryptography, as it is the current encryption standard implemented worldwide in software and hardware. The Mersenne Twister is a lightweight algorithm capable of producing a large number of random integers and is the default PRNG implemented in many rand() functions in a variety of programming languages. The software used to conduct all testing was TestU01. TestU01's BigCrush battery, which collects 160 test-statistics and calls approximately 238 random numbers, was run on all three PRNGs. The in-house PRNG performed much better than the Mersenne Twister statistically and similarly to AES. Both AES and the Mersenne Twister were significantly faster than the new PRNG. Despite being slow, the similar performance to AES is a promising development for the novel PRNG.

Poster: 32

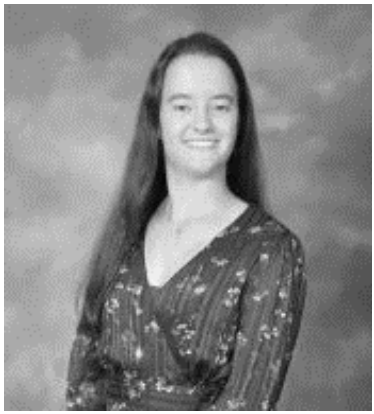
Kathleen Hacker

Major: Environmental & Sustainability Sciences; Marine Sciences

Faculty Mentor:
Dr. Sinéad Ní Chadhain

Department: Biology

College: College of Arts and Sciences



Funding Source(s): SURF

Bioprospecting for Novel Chitinase Enzymes

Chitin is the second most common polymer found in nature, second only to cellulose. Unlike cellulose, chitin contains nitrogen, which can be recycled through chitin degrading bacteria. This polymer is found in many invertebrates, such as crabs, shrimp, and insects with hard exoskeletons. Many genera of bacteria can have the ability to degrade chitin. The vast number of different bacterial species and bacteria's tendency to mutate and evolve, leave many strains of bacteria critically under researched. Here, multiple species of chitin degrading bacteria, particularly *Pseudomonas*, *Acinetobacter*, and *Stenotrophomonas* were isolated, identified, and studied for their ability to degrade chitin. Isolation techniques included serial dilutions, gridded plates, and streaking isolates onto various media plates containing colloidal chitin. The 16S rRNA gene of the most efficient chitin degraders were gene sequenced to identify the bacteria. Growth assays were performed to quantify growth on chitin and the DNS assays were used to quantify production of *N*-acetylglucosamine from chitin. Lastly, the isolates were screened for the presence of chitinase genes by PCR with five isolates testing positive. Future work will focus on cloning and characterizing the chitinases from the best chitin degrading bacteria.

Poster: 33

Gracie Hankins

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning

Department: Biology

College: College of Arts and Sciences

Funding Source(s): National Science Foundation Convergence Accelerator Program through Award #2230769

Impacts of Glass Sand and Salinity on *Heterotheca subaxillaris*

Human activities have altered coastal and marine habitats over time because of increases in coastal development, land-based and water-based pollution, coastal and marine resource use, invasive species and changes in coastal geography. With a continuing trend for human populations to concentrate near the coasts, the pressures and potential impacts on coastal and marine habitats will only increase. Once habitats are damaged or lost it is difficult and costly to recover the benefits and services that they provide. However, in recent decades, we have seen increased efforts to identify, conserve and restore critical habitats along the Gulf of Mexico. Partnership efforts by academia, federal, state and local agencies, non-governmental organizations, industry and community groups have contributed to an increased knowledge base on restoration and conservation science. This track highlights research, monitoring, management, policy and educational approaches to coastal and marine conservation and restoration efforts in the Gulf of Mexico. We also encourage managers to share their experiences of how they have utilized restoration and conservation science to inform resource planning and management and managers and researchers on how they measure restoration successes.

Poster: 34

Summer Hendrix

Major: Political Science

Faculty Mentor:
Dr. Scott Liebertz

Department: Political Science and Criminal Justice

College: College of Arts and Sciences

The aggravating effect of income on partisan polarization.

Look at how American citizens' income moderates the effect of partisanship and political ideology on their opinions of a number of public policies, including access to Social Security and Medicare. Knowing that increased income leads to increased political polarization is important because it helps policymakers and social leaders understand how economic disparities can deepen political divides. Recognizing this link also underscores the broader impact of economic inequality on political and social dynamics. We looked at multiple surveys conducted by AP/NORC and consistently find that ideological differences on a number of issues are greater at higher levels of income. We used Stata to analyze the data. We found that while elite Republican and Democrat leaders exhibit starkly divisive views on Social Security and Medicare, ordinary individuals' perspectives tend to converge towards a more common stance. Specifically, lower and middle-class citizens express similar preferences about the longevity and accessibility of Social Security, viewing it as a vital safety net due to their contributions and hopeful anticipation of its availability when needed. This shared perspective among ordinary individuals contrasts with the pronounced polarization perceived among elites. Additionally, lower-income brackets exhibit reduced polarization compared to affluent elites, indicating a more unified outlook among those directly reliant on social security benefits.

Poster: 35

Jeremy Herren

Major: Biomedical Science

Faculty Mentor:
Dr. Neil Schwarz

Department: Health, Kinesiology and Sport

College: College of Education and Professional Studies

Funding Source(s): SURF

Effects of Oxidative Stress on Plasma and Serum Kallistatin Levels

BACKGROUND: Kallistatin is an enzyme released by the liver in times of oxidative stress, functioning as an anti-coagulation enzyme, increasing blood flow. No research has been done in the effects of trained-status on release of this enzyme. Therefore, the purpose of this study is to chart serum levels of kallistatin and perforin during times of oxidative stress across different populations. **METHODS:** Ten young strength-trained men (average age ± SD) completed a pre-testing session, finding 3-5 RM on 6 exercises. These values were used to estimate 1RM a whole-body workout. A standardized workout was constructed from the estimated 1RM. Following 3 days of rest, participants returned fasted. Chocolate Fairlife (7.2 mL/kg) was provided 30 mins before the first blood draw. Participants then competed the regimented workout. These exercises worked to promote an oxidatively stressed state. A blood draw followed the workout, then two more at 90 min intervals. 30 mins post workout, more fairlife was provided. Biological samples were centrifuged. The resulting serum and plasma samples were frozen for future analysis with an automated ELISA. Levels of Kallistatin were recorded.

Poster: 36

Aramis Hoffmann

Major: Mechanical Engineering

Faculty Mentor:
Dr. Carlos Montalvo

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering

Python Waypoint Control Algorithm for RC Car

This study examines the viability of a waypoint control algorithm for a remote-controlled car. Due to an increase in the demand for self-driving vehicles, more methods of autonomous navigation need to be developed that can reliably traverse given environments. One method of manufacturing such an autopilot is by programming a waypoint control algorithm into the system, creating a simple but robust method of autonomous travel. Waypoint controls first give the computer a waypoint, which is a set of coordinates to travel to in the future. The vehicle then uses a GPS to find its current location, as well as a magnetometer and an angular rate sensor to find what direction the vehicle is pointing. The computer then compares its current location with the waypoint and determines the angle it needs to turn and distance it needs to travel in order to reach its destination. If the computer is given several waypoints, it can travel to each of them in whatever order the programmer or user sees fit, allowing for complicated paths. It is a robust method of piloting vehicles through known environments with either no obstructions or static ones, such as when flying through empty air or navigating an obstacle course. Additionally, it only requires a few sensors like a GPS to function, though more can be added if needed such as a barometer to monitor the altitude of flying vehicles. While waypoints are fairly understood, the code for most waypoint controls is rather complex and not very accessible to undergraduate students. To remedy this, a simple version of the waypoint controls will be made in Python on a Raspberry Pi, making the system easier to learn and implement. In order to test waypoint controls, a Raspberry Pi with a GPS sensor will pilot an RC car, using the waypoint control algorithm as navigation.

Poster: 37

Connor Holm

Major: Biomedical Science

Faculty Mentor:
Dr. Robert Barrington, Mr. Killian Brewer

Department: Microbiology and Immunology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): SURF, Lions Eye Research Institute

Trained immunity provides protection against *Pseudomonas aeruginosa keratitis*

Pseudomonas aeruginosa (*P. aer.*), an opportunistic bacterial pathogen, is the leading cause of gram-negative keratitis (GMK). Recently, several outbreaks of GMK were caused by *P. aer*. contaminated eye drops. Designing protective therapies to protect individuals from GMK is complicated given that the eye is an immune-privileged tissue. Trained immunity refers to reprogramming innate immune cells to become more responsive against pathogens. This is achieved by triggering pattern recognition receptors (PRR) that prepare cells for infection. Preliminary studies suggest that stimulating Formyl Peptide Receptor (FPR), a PRR, with bacteria-derived peptide N-Formylmethionine-leucyl-phenylalanine (fMLF) enhances the innate immune response of mice to GMK.
To test whether fMLF pretreatment enhances the innate immune response to *P. aer.* in the cornea, three separate assays were employed. First, an in vitro assay was performed to determine whether fMLF pretreatment increases macrophage phagocytic capacity. Second, bone marrow from fMLF and vehicle-pretreated mice was examined to determine differences in hematopoietic stem cell (HSC) and multipotent progenitor cell (MPP) expression. Lastly, dry eye infections with *P. aer.* were performed on vehicle and fMLF pretreated mice. Corneas were harvested and innate immune cells were analyzed via flow cytometry. fMLF pretreatment increased macrophage phagocytosis, HSC and MPP number and frequency, and innate immune cell number in the cornea. Our results indicate that fMLF pretreatment enhances the immune response, and reprograms the innate immune system at the progenitor level. Further investigation is required to validate macrophage activation and assess cornea damage.

Poster: 38

Stephanie Huynh

Major: Management - General Management Concentration

Faculty Mentor:
Dr. Jennifer Zoghby

Department: Management

College: Mitchell College of Business

Surveying the Effects of Repetitive In-Person and Word of Mouth Appeals to Gen-Z on Fundraising Outcomes

Charity and philanthropy have an immense impact on many parts of human life. In 2022, Americans gave nearly $500 billion to charity, most of which went towards the religion, human services, education, grantmaking foundations, and health sectors (“Nonprofit Fundraising Statistics to Boost Results in 2023” n.d.). In 2022, while the overall total of donations declined, a majority of main philanthropic sectors saw donations that exceeded pre-pandemic levels (Schulte 2023), suggesting that the COVID-19 pandemic had a positive impact on donation patterns and revealing a potential gap in related literature published between 2019 and today. Studying the donation patterns of students at the University of South Alabama will allow the researcher to both identify motivation patterns in Gen-Z donors and gauge reactions to repetitive campaigns This investigation will explore the efficacy of repetition as a fundraising tool, determining if aggressive marketing tactics—online and in-person—appeal most to Gen Z donors and ultimately, yield successful fundraising campaigns. It will include an exploratory quantitative survey and interviews. The researcher will compile findings and data into a research presentation and poster, and will share their findings with on-campus organizations and regional non-profits that seek to appeal to potential Gen-Z donors.

Poster: 39

Emily Jansen

Major: Communication

Faculty Mentor:
Dr. Amy Sprinkle, Dr. Ronald Baker

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Age of Snappers in Mangroves Relative to Distance From Reef

Understanding the behavior of snappers in mangroves can help with preservation and other studies relating to the ecology of reef and mangrove systems. A recent study found that reef fish live in different areas during their different life stages. It showed that these fish stay close to mangroves and nurseries during the juvenile stage and move to the reef during adulthood. For our study, we examined the snapper population near the Calabash Caye Field Station in Turneffe Atoll to assess consistency with previous findings. To look at this, students deployed Garmin cameras in different locations while measuring their distance from the reef using GPS marker points. Our results showed that there is no particular relationship between age and distance from the reefs. This conclusion is due to the very small number of adults documented in all locations, and the large number of early juveniles found throughout the sites. Due to our findings, more research should be done on snapper habitat preferences in different ecological systems. For future studies it is important to locate areas with high diversity in order to accurately gather data on snapper preferences.

Poster: 40

Trinity Jenkins

Major: Anthropology

Faculty Mentor:
Dr. Philip Carr

Department: Sociology, Anthropology, and Social Work

College: College of Arts and Sciences

Funding Source(s): SURF

Analyzing Historical Death Records: The Impact of Evolving Medical Terminology

The history of epidemic disease can inform our present and allow us to shape our future in terms of using our understanding of its spread to how we respond. However, the data from past epidemics requires special consideration because of the lack of medical knowledge and ignorance of disease resulted in aninability to make specific diagnoses regarding cause of death. Here, I use hundreds of death records from Mobile, AL dating from 1819-1923 to investigate the change in cause of death terminology and associated mortality rates. During these 100+ years, many epidemics plagued Mobile such as smallpox, malaria, and yellow fever, killing hundreds to thousands of people at a time. Physicians would often use generic causes ofdeath such as consumption, fever, dropsy, and apoplexy. Over time, as medical knowledge advanced, these were replaced with more precise terminology such as tuberculosis, typhoid fever, congestive heart failure, and stroke. The results demonstrate the evolution of terminology over 104 years and the correspondingdecline of mortality rates in Mobile, Alabama. The research also proves that historical documents such as death records can be used to understand populations advancements in public health and medical knowledge over time. The death records can also be used to examine who in a population in terms of race, sex, and age was specifically affected during these times of almost continuous epidemics.

Poster: 41

Holly Kennedy

Major: Speech and Hearing Sciences

Faculty Mentor:
Dr. Kimberly Smith

Department: Speech Pathology and Audiology

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF

Characteristics of Adult Neurotypical Oral Reading

This study characterized neurotypical adult oral reading using accuracy (number of words pronounced correctly), rate (time, in minutes, to read the text), fluency (words read correctly per minute), and comprehension to provide a preliminary comparison data set for neuro-atypical populations. Eight neurotypical adults (aged 21-59) read 2 children's books, 2 fiction and 2 nonfiction stories at the eighth grade reading level. Participants were audio recorded while reading for later scoring and given 5 multiple choice comprehension questions after each stimulus. The results were expected with reading accuracy at 98% or higher and comprehension at 93% or higher. The average fluency score of the participants was 166 correct words per minute. Also as expected, the participants' performance on the children's books were slightly better than on the fiction and nonfiction stories. The accuracy score for the children's books was 100%, while the accuracy for the fiction and nonfiction stories were both 99%. The comprehension scores for the children's books was 100% as well, while the fiction stories comprehension was 97.5% and the nonfiction comprehension was 96.3%. Overall, the adult neurotypical readers performed as expected, and the results serve as a preliminary comparison dataset for disordered adult readers. Data collection will continue in the future to obtain a larger dataset.

Poster: 42

Ashlyn Kilgore

Major: Speech and Hearing Sciences

Faculty Mentor:
Dr. Kimberly Smith

Department: Speech Pathology and Audiology

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF, USA
Adult Speech and Language Lab

Influence of Hearing Loss on Self-reported Hearing Ability and Listening Fatigue in Persons with Aphasia

Aphasia is a multimodal language impairment usually caused by a stroke that impacts about 2 million people in the United States (National Aphasia Association, 2024). Aphasia negatively impacts a person's ability to verbally communicate and comprehend speech. Aphasia is more common for older adults who may also experience age-related changes in hearing and auditory processing (Cruickshanks et al., 2003; Roth, Hanebuth, & Probst, 2011). The presence of hearing loss likely exacerbates the communication difficulties experienced by persons with aphasia (PWA). Ineffective communication impacts interactions with all communication partners, including healthcare providers, impeding therapeutic outcomes. There is currently limited information on self-reported hearing difficulties experienced by PWA. Thus, this preliminary study sought to understand self-reported hearing difficulties in five PWA through a case history questionnaire, Cognitive Linguistic Quick Test-Plus, hearing screening, and hearing-specific questionnaires: Speech and Spatial Qualities of Hearing Scale - 12, and Vanderbilt Fatigue Scale. All participants failed the hearing screening, but 3 reported never talking with a medical professional about their hearing. All participants rated themselves having at least some listening fatigue and difficulty hearing in certain scenarios. Two participants indicated they wore hearing aids. The results suggest there are individual differences in hearing ability, referrals to hearing specialists, and use of hearing aids among PWA. These preliminary results provide a foundation for future work examining self-reported hearing-related difficulties in PWA and how healthcare professionals interact with PWA related to their hearing.

Poster: 43

James Klueppel

Major: Meteorology -- Professional Track

Faculty Mentor:
Mr. Jeffrey Medlin

Department: Earth Science - Meteorology

College: College of Arts and Sciences

Funding Source(s): SURF, Alabama Space Grant Consortium

Life Cycle and Intensification Patterns of Major Hurricanes

Using twenty-six years (1998-2023) of advisory data from NOAA's National Hurricane Center (NHC), this study examined and documented basic evolutionary characteristics of Category 3 (>111 mph) and higher tropical cyclones (TC) according to where they evolved (e.g., open Atlantic Ocean, landfall in the U.S, Caribbean and/or Gulf of Mexico). Ninety storms total were examined with the following geographic origins: Atlantic (58), Caribbean (28) and Gulf of Mexico (4). Thirty-eight storms evolved completely over the open Atlantic ocean (i.e., no landfall) and the remainder (52/90) made landfall. For each storm, basic traits such as life span, mean sea-level pressure (and trends), storm motion, intensity changes (especially rapid intensification 'RI', defined as 30 kt increase in 24 h) and radius of maximum winds (including changes vs. latitude) were cataloged every six hours. In particular, 6h minimum central pressure (MSLP) and intensity changes were examined. It was anticipated and later verified that both certain climatologically preferred Julian dates and locations for RI would be found. This study was purely exploratory to see what the data may show in hopes of further advancing our knowledge of where, when and exactly how this class of hurricanes evolved. By the official definition of 'rapid intensification', it was found that all ninety storms exhibited RI at some point in their lifespan. For storms making landfall in locations bordering the Gulf of Mexico or Caribbean Sea, the minimum MSLP for each storm's lifespan often occurred shortly before landfall. While all storms experienced RI, fascinatingly most of them achieved their minimum surface pressure via different means (as some exhibited a more continuous and definitive pressure plunge, and others, more of a stair-step trend). Finally, this study also investigated whether El Nino vs. La Nina conditions had any potential effect on the number of major hurricanes per year. Poor correlations were found due to both small sample size and an overwhelming amount of neutral El Nino-Southern Oscillation (ENSO) years.

Poster: 44

Elise Knoll

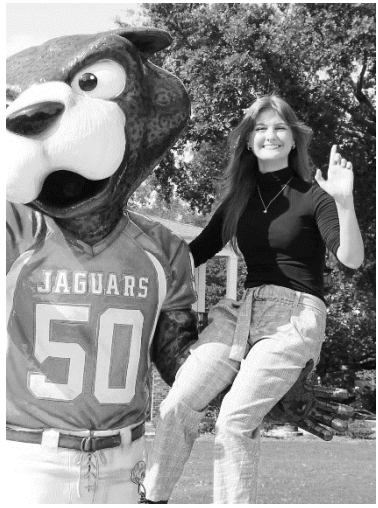
Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle, Dr. Ronald Baker

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Funding Source(s): Stokes School of Marine and Environmental Sciences



Bigger and Better: Do Bigger Lionfish Eat More?

Recently, the invasive lionfish populations in the Caribbean have been increasing. As population numbers are on the rise, the negative impacts on both native fish and coral populations are also rising. As lionfish are opportunistic feeders, it is expected that the bigger lionfish will be able to hunt with a greater variety, broadening both which sizes, species, and number of fish they can hunt and thereby increasing the number of fish found in their stomachs. This study found that the midsized [15-29.9 cm] lionfish had the highest number of fish in their stomachs, and the bony fishes were the most well represented group.

Poster: 45

Grace Koons

Major: Nursing

Faculty Mentor:
Dr. Kimberly A. Williams

Department: Community/Mental Health Nursing

College: College of Nursing

Funding Source(s): Sigma Theta Tau Zeta Gamma

Feasibility, Acceptability, and Competency of MI Communication in an Undergraduate Nursing Program

While Motivational Interviewing (MI) is increasingly used in healthcare settings, undergraduate nursing programs may be slow to incorporate MI into the curriculum. The increasing MI training in undergraduate nursing curriculum increased competence in MI skill to increase positive health behaviors improving patient outcomes. The goal of this study is to determine the feasibility, acceptance, and MI competency among undergraduate nursing students aged 19 and older at the University of South Alabama College of Nursing. The design of this pilot study was a one-group post-test survey method of acceptability and feasibility and evaluation of competency videos evaluated by the MITI to determine competency following MI training. Data was entered into a SPSS® statistical data file and cleaned. Missing data was assessed for both the degree and pattern. Descriptive statistics will be computed for all major study variables. This study found that undergraduate students report MI to be acceptable and feasible for use in nursing and demonstrate movement towards competencies as evaluated for the MITI competency assessment. MI is a form of collaborative communication used in nursing that promotes positive health behaviors in patients while giving patients the strength, autonomy, and motivation to change on their own accord. Incorporating MI training into an undergraduate nursing curriculum will enhance competency in the skill and prepare students for patient interactions.

Poster: 46

Abigail Kratsch

Major: Geography

Faculty Mentor:
Dr. Steven Schultze

Department: Earth Science - Geography

College: College of Arts and Sciences

Funding Source(s): SURF

Microclimatic Temperature extremes found in different plant zones on San Cristóbal Island, Galápagos, Ecuador

The Galápagos Islands are one of the most biodiverse places in the world, home to many endemic species of birds, mammals, reptiles, and plants. In the past decades agriculture has expanded to meet local demand and governmental sustainability initiatives. Along with the introduction of invasive species, land use change has greatly impacted the landscape of the island. Temperature differences in remote ecological settings are a field that has had plenty of theoretical research, but surprisingly little observational research. Often, a lapse rate-based model is used to estimate temperature differences in such areas. Dry and moist adiabatic lapse rates can give an approximate temperature based on ground observations, however in complex terrain this is an oversimplification. We currently have placed 10 MX2302a HOBOMobile Bluetooth Connected Weather Microsensors in aerated housings that are spread across the island along one of the major roads on the island, each being carefully placed in different plant zones as the road changes elevation. Each sensor records the temperature, humidity, and dew point in each location, every minute of every day. These sensors were placed in March 2023 and will remain until March 2025. This experiment is giving an unprecedented view of the microclimatic difference across the island. This study focuses on a comparison between the lapse rate driven temperatures and based on a sea level elevation weather station in our study and the actual observations made at 9 or 10 different weather stations that we installed for this study. The goal is to find the temperature extremes by calculating the dry and moist adiabatic lapse rates and comparing them to the actual observations by examining how above or below the observed temperatures are from what they are supposed to be from the lapse rate calculations. This will also highlight potential microclimatic influences including land use, aspect, slope, and windward-leeward dynamics.

Poster: 47

Garrett LaCoste

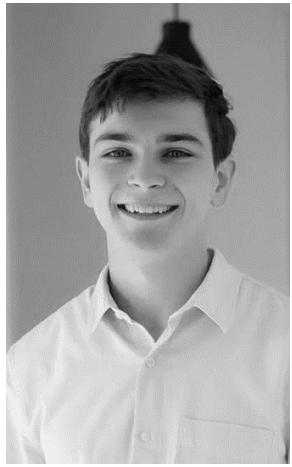
Major: Computer Science

Faculty Mentor:
Dr. J. Todd McDonald

Department: Computer Science

College: School of Computing

Funding Source(s): SURF, Alabama Space Grant Consortium



JAVA LEXER CREATION FOR IMAGE-BASED DEEP LEARNING ON TOKEN-LEVEL SOFTWARE VULNERABILITY DETECTION

The paper that this research is inspired by analyzes the effectiveness of image based deep learning on token level software vulnerability detection. The research takes PHP source code, turns it into tokenized source code using a lexer, turns it into a picture, and runs it through deep learning machines to ascertain how safe the source code is. This research seeks to find out if we can go through that same process using java source code. To take the first step in accomplishing this, we had to first identify if we could create tokenized source code via a lexer made in JavaCC. A lexer takes source code and turns it into tokenized source code by breaking it down into its smallest part. We built a lexer and tested it using open source java source code. At the conclusion of the summer, we had successfully created a lexer that handled basic java source code. However, we encountered problems dealing with source code comments which caused our token counts to be greater than we expected. Ultimately, the research performed this summer as a part of SURF took a first step in determining the effectiveness of image based deep learning on token level software vulnerability detection of java source code.

Poster: 48

Angelina Ladner

Major: Marketing - Marketing Management Concentration

Faculty Mentor:
Dr. Jennifer Zoghby

Department: Management

College: Mitchell College of Business

Funding Source(s): SURF

Investigating Generation Z's Ambivalence To Fast-Fashion

Generation Z consumers may desire low-price access to fashion microtrends in order to keep up appearances on social media. Yet Generation Z consumers, more than other generational cohorts, express concerns about the damaging environmental impacts of fast-fashion. This research project explores the ambivalence of Generation Z consumers toward fast-fashion. It includes exploratory qualitative interviews with Generation Z consumers, as well as an exploratory quantitative survey. Exploratory qualitative and quantitative research results will be documented throughout the early stages of the project. The surveys will be archived, and all survey results will be maintained for this project as well as potential future research. Currently, a larger quantitative survey is being conducted among Generation Z consumers.

Poster: 49

Michael Lambert

Major: Chemistry

Faculty Mentor:
Dr. Larry Yet

Department: Chemistry

College: College of Arts and Sciences

Funding Source(s): SURF

Synthesis, Screening, and Optimization of Aryl-Phosphinopyridines from Site-Selective Functionalization of 2,4-Dichloropyridine in Palladium-Catalyzed Cross-coupling Reactions

Palladium-catalyzed cross-coupling reactions have become a ubiquitous tool in the synthesis of previously inaccessible heteroaryl compounds because of the efficient, catalytic nature of the reaction. Development of novel monophosphine ligands to achieve the cross-coupling of substrates that were generally unreactive under standard conditions has developed into an extremely important area of research in the field of synthetic organic chemistry. The Suzuki-Miyaura cross-coupling reaction is a metal-catalyzed reaction between an arylboronic acid and a heteroaryl halide. Phosphorus ligands have proven to be excellent auxiliary catalysts as a mechanism to not only stabilize the Pd-complex associated with the catalytic cycle but also facilitates a faster transition of Pd between the Pd(0) and Pd^{+1} and Pd^{+2} states (faster reductive elimination/oxidative states in the catalytic cycle). In addition, phosphine ligands have shown promise in facilitating site-selectivity based on the structure and electronic properties of the ancillary catalyst used. Such selectivity can be advantageous for synthesis of a variety of new heteroaromatic moieties that may have use in biologically active systems. Herein, we present a synthetic route for the initial production of aryl-phosphinopyridine ligands from site-selective functionalization of 2,4-dichloropyridine and subsequent screening to test the efficacy of ligands synthesized.

Poster: 50

Luke Lansdown

Major: Electrical Engineering

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF

Review of Green Energy in the Gulf of Mexico

The issue of climate change is an ever-growing trouble for the world economies and environment. A quick and effective transition to a carbon zero world economy is crucial to keeping the climate from breaking down further. This review focuses on the implementation and feasibility of practicality and cost of renewable energy sources in the Gulf Coast Region (GCR) in the United States. In this paper there is the discussion of different types of renewable energy conversion methods that are already being used in the Gulf Coast and renewables that are still in question and development stages. This report will also focus on looking at different reports about Wave Energy Converters (WEC's) and determining which design would be most feasible in the Gulf Coast Region.

Poster: 51

John Lawrence

Major: Anthropology

Faculty Mentor:
Dr. Erin Nelson

Department: Sociology, Anthropology, and Social Work

College: College of Arts and Sciences

Funding Source(s): SURF

A Study of the Iconographic Style and Motifs of Pensacola Incised Pottery

The Pensacola culture refers to Native American people living along the northern coast of the Gulf of Mexico from ca. 1250-1700 C.E. who were ancestral to modern day Choctaws, Creeks, and other Indian people. Archaeologists recognize Pensacola culture in part by its pottery, which is often decorated with elaborate incised designs. This study analyzes the iconographic style and motifs of Pensacola Incised pottery. A corpus of iconographic designs was assembled based on published works and non-funerary pottery from archaeological sites curated by the University of South Alabama's Center for Archaeological Studies. Pottery designs were then categorized by motif, theme, and style, and assigned to chronological groups defined by Knight et al. (2004). This research led to the expansion of the Pensacola iconographic corpus, an assessment of the frequency of design motifs within each chronological group, and a refinement in our understanding of how Pensacola iconographic designs changed over time.

Poster: 52

Tia Lofton

Major: Biomedical Science

Faculty Mentor:
Dr. Kaushik Venkiteshwaran

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF

Developing a Reusable Iron-Impregnated Geotextile Fabric for Arsenic Removal from Non-Point Wastewater

Arsenic, a highly toxic metal poses significant environmental and public health risks, particularly in areas impacted by legacy mining activities and industrial operations such as power plants. These sites often contain elevated subsurface concentrations of arsenic, leading to contamination of the surrounding environment via stormwater runoffs. Current techniques to mitigate non-point arsenic pollution typically involve spreading arsenic-adsorbing agents, such as iron and aluminum oxide, across the affected area. However, these methods are unsustainable, as the continuous addition of adsorbents can lead to secondary pollution from the adsorbents themselves. Moreover, the adsorbent and arsenic can leach from the soil during heavy storms or flooding events, exacerbating the contamination.

This research proposes the use of iron-impregnated non-woven geotextiles (Fe-Geotex) as a sustainable approach for arsenic removal from stormwater. These geotextiles can be strategically placed within stormwater systems to capture arsenic, and subsequently retrieved for reprocessing and reuse. Commercial geotextiles were procured and impregnated with iron using a chemical precipitation method. Experiments show that Fe-Geotex can rapidly adsorb arsenic with a capacity of 4.4 mg-Arsenic /g Fe-Geotex, comparable to other iron-based adsorbents. Desorption of arsenic was achieved by reducing arsenic to arsenite (As(III)) ions using L-cysteine, which have a weaker binding affinity to iron oxide, leading to its release from the fabric. This reduction reaction was carried out at 50°C and successfully released up to 48%, thereby allowing the Fe-Geotex for re-adsorption and reuse. This approach advances the field of stormwater treatment by integrating removal and reusability for a sustainable system.

Poster: 53

Caleb Lopansri

Major: Biomedical Science

Faculty Mentor:
Dr. David Forbes

Department: Chemistry

College: College of Arts and Sciences

Funding Source(s): SURF

Inhibitory Effects of Stereometric Isomers

Protein Phosphatase 5 (PP5) is an enzyme linked to the proliferation of human breast cancer and mouse leukemia cells when overexpressed. This association suggests that inhibiting PP5 could promote anti-tumor effects. To enhance the inhibitory activity and selectivity towards PP5, efforts on the assembly of derivatives limited to the number of synthetic steps have been conducted. Prior results revealed stereospecificity when racemic norcantharidin derivatives substituted at position five of the tricyclic scaffold were co-crystallized with the enzyme. Exploiting the desymmetrization using Cinchona alkaloids via enantiotopic-group differentiation was explored on the norcantharidin system. Notably, prodrugs generated through stereospecific ring-opening with Cinchonine and Cinchonidine emerged as the more potent inhibitors. The enhanced potency of these stereochemically refined prodrugs paves the way for future investigations into PP5 selectivity and its interactions with various compounds.

Poster: 54

Mary Helene Marmande

Major: Chemistry

Faculty Mentor:
Dr. David Forbes | Dr. Richard Honkanen

Department: Chemistry | Biochemistry and Molecular Biology

College: College of Arts and Sciences | Frederick P. Whiddon College of Medicine

Funding Source(s): SURF

Norcantharidin Based Prodrugs: Decorating the Carbon Scaffold One Atom at a Time

Both cell culture and animal models of tumor development indicate that Protein Phosphatase 5 (PP5) plays a role in the progression of breast cancer cells. PP5 expression is responsive to both estrogen and HIF1 (hypoxia inducible transcription factor 1), and PP5 acts to inhibit stress induced signaling cascades that trigger apoptosis. Cantharidin, a naturally occurring toxin from the blister beetle, and norcantharidin, a derivative of cantharidin, are catalytic development inhibitors of PP5, but they also inhibit PP1 and PP2A, which makes them toxic to eukaryotic cells. Our long-term goals have focused on the synthesis of norcantharidin derivatives that will selectively inhibit PP5 over PP1 and PP2a with even greater potency. Yet to be explored, however, and the focus of this work is the stereospecific ring-opening of the anhydride functionality of norcantharidin. Exploiting the desymmetrization using *Cinchona* alkaloids via an enantiotopic-group differentiation has revealed a potential rise in potency. The enhanced potency offers an opportunity to tune next generation derivatives for future investigations into PP5 selectivity and potency.

Poster: 56

Dani Maxon

Major: Anthropology

Faculty Mentor:
Dr. Philip Carr

Department: Sociology, Anthropology, and Social Work

College: College of Arts and Sciences

Funding Source(s): SURF

Native American Graves Protection and Repatriation Act: A University of South Alabama Case Study

Human remains receive special treatment in all cultures, and scientists can learn a great deal from the study of human skeletal material. Archaeologists routinely excavated human skeletons from archaeological sites throughout the twentieth century, as well as ancient human remains found by members of the general public often ended up as donations to museums and archaeological curation facilities. However, in 1990, the Native American Graves Protection and Repatriation Act (NAGPRA) required all federally funded agencies and institutions that receive any form of federal funding to diligently and respectfully return the remains of Native American ancestors, their funerary belongings, sacred objects, and objects of cultural patrimony to their descendants. The descendants of those long-passed individuals deserve consideration. It is their ancestors that have contributed to the expansion of knowledge, and it is within their right to return home. The University of South Alabama is one of many institutions to respond to NAGPRA. Over the years, the university has worked to repatriate skeletal remains and associated objects to the appropriate sovereign Tribes. The current work includes examining the contents of 2,250+ boxes held in the Archaeology Museum curation, most of which contain only artifacts, such as pottery and stone tools. Importantly, some do contain bags of bones, mostly non-human, and we work to identify any human remains, and examine the associated archival records to facilitate repatriation. Additionally, consultations are held with the 19 federally recognized Tribes with an expressed interest in Alabama to ensure proper protocols and procedures are followed for proper treatment. It is the ultimate goal of the University to formally and respectfully return all human remains in our collections as requested.

Poster: 55

Amber McAbee

Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle, Dr. Ronald Baker

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Funding Source(s): USA Study Abroad

Effects of Current Intensities and Lionfish (*Pterois spp.*) Size on Activity Levels

The invasive lionfish (*Pterois spp.*) are known to alter reef communities and ecosystems in invaded areas such as the Caribbean Sea. This study aimed to investigate the effects of lionfish size and current intensity on their activity levels, providing insights into their behavioral ecology in invaded areas. We hypothesized that smaller lionfish would be more active in low-current environments, while larger ones would show reduced activity in high currents. Between May 12 and May 16, 2024, we observed nine lionfish across four patch reefs, recording their activities—inactive, hovering, or hunting—every 30 seconds during five-minute intervals. Lionfish were categorized as small (~100-240 mm) or large (~241-380 mm), and current intensity was classified as low, medium, or high. Our findings indicated that smaller lionfish were generally more active than larger individuals, who tended to increase their hunting behavior. Notably, high current conditions were associated with heightened overall activity but did not promote hunting. In contrast, low current environments, while resulting in lower overall activity, facilitated a greater frequency of hunting. These results suggest that while smaller lionfish are more active overall, larger individuals may be more effective hunters, especially in calmer waters. This study highlights the importance of understanding lionfish behavior in relation to environmental factors, informing better management strategies to control this invasive species and mitigate its ecological impacts.

Poster: 57

Hunter McCormick

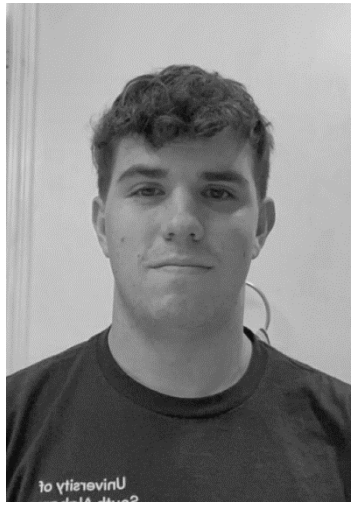
Major: Chemical Engineering

Faculty Mentor:
Dr. Brooks D. Rabideau

Department: Chemical and Biomolecular Engineering

College: College of Engineering

Funding Source(s): SURF



The Effects of Nitrogen on CO_2 Adsorption in Cu-BTC

Molecular simulations of mixed gas adsorption, such as CO_2/N_2 in metal-organic frameworks (MOFs), often treat nitrogen as a passive component. Typically, these simulations consider CO_2 as the only explicit gas component but at a reduced partial pressure, implicitly accounting for the presence of N_2. To evaluate this approach, we conducted separate adsorption simulations of CO_2/N_2 in the MOF Cu-BTC, treating nitrogen explicitly in one case and implicitly in the other. Gibbs Ensemble Monte Carlo simulations were performed at 25°C and 10 bar, varying the CO_2 mole fraction from 0 to 1. Our findings reveal that implicitly treating nitrogen can lead to an 8% overestimation of CO_2 adsorption in Cu-BTC, with the most significant overestimation occurring at the lowest CO_2 partial pressures. This study underscores the necessity of explicitly modeling N_2 in mixed gas adsorption studies.

Poster: 58

Jewel McCrary

Major: High School Research Student

Faculty Mentor:
Dr. Jack Shelley-Tremblay

Department: Psychology

College: College of Arts and Sciences

The Effect of Perceived Appearance on Body Schema Integration in the Rubber Hand Illusion

The psychological processes of perception and cognition work together to enable the brain to process and interpret stimuli in its surrounding environment. Distorted perception, however, can lead to changes in thinking patterns, physiological sensations, or, as demonstrated in the rubber hand illusion, changes in mental structures as innate to humans as the body schema. The rubber hand illusion, first carried out by Botvinick and Cohen, investigates changes in perception as well as neuroplasticity by performing an illusion aiming to make participants feel as though a fake rubber hand is actually a part of their bodies (1998). Another perceptual illusion known as the size-weight illusion (SWI) has found that if a participant believes their hand is larger than it actually is, they will also believe objects they pick up weigh more than they actually do (Haggard and Jundi, 2009). This experiment, an intersection of these illusions, seeks to successfully establish the rubber hand illusion and confirm the premise of the size-weight illusion. Additionally, this experiment aims to further investigate the effect of traits associated with perception-altering disorders on measures of body schema integration for the rubber hand. Participants first completed a survey aiming to assess how much they personally identified with traits associated with Body Dysmorphic Disorder (BDD). Next, participants engaged in a preliminary weight training task as well as a measure of proprioceptive drift before undergoing the RHI induction. During the induction, participants either viewed a magnified version of the rubber hand or viewed the rubber hand at its normal size. Participants then completed a final measure of proprioceptive drift as well as a weight estimation task where they were instructed to verbally estimate the masses of different cups. To conclude the experiment, participants were asked to complete a subjective survey on their feelings of ownership over the rubber hand. Although the proposed hypotheses on traits associated with BDD and the size-weight illusion were not currently supported by the results in terms of statistical significance, non-significant trends in the data could support each of the hypotheses in future experiments if larger sample sizes were used.

Poster: 59

Grace McDavid

Major: Biomedical Science

Faculty Mentor:
Dr. Erica Ahlich

Department: Psychology

College: College of Arts and Sciences

The Role of Coping Mechanisms in the Association between Weight Bias Internalization and Mental Health

Individuals with obesity are more likely to experience stigmatizing and discriminatory experiences due to their weight. Weight bias internalization (WBI) occurs when individuals start adopting and believing these negative stereotypes about themselves. Weight bias internalization has been linked to adverse mental health outcomes like depression, anxiety, stress, and low self-esteem. The use of positive coping mechanisms could have a mitigating effect on adverse mental health outcomes in individuals facing stigmatization. This study aims to investigate the relationship between weight bias internalization, coping mechanisms, and adverse mental health outcomes. It is hypothesized that weight bias internalization will be associated with depression, stress, anxiety, and self-esteem, but that the association will be weaker for those with more positive coping strategies. Data will be collected using self-report measures of these variables. Participants will be 395 adults with obesity, recruited from Prolific.

Poster: 60

Skyler McMillan

Major: Civil Engineering

Faculty Mentor:
Dr. Bret Webb, Dr. Trung Do

Department: Civil, Coastal and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF, Alabama Space Grant Consortium

Quantifying Resilience: Measuring Risk in Elevated Coastal Structures Facing Wave and Surge Hazards

This research aims to establish a methodology for assessing the risk faced by elevated residential buildings due to wave and surge hazards. Translating this risk into probabilities of structural damage and recovery efforts. The significance of this work lies in addressing the increasing threats posed by past hurricanes and future climate change scenarios, including sea level rise and intensifying storms. By developing a precise measure of vulnerability and resilience, the project will offer valuable insights into preparedness strategies for coastal communities. The project's objective is to quantify risk for elevated coastal structures, enhancing our understanding of their susceptibility and resilience to these hazards. This knowledge is crucial for informing building codes, disaster preparedness, and infrastructure development. Dauphin Island, AL, serves as the testbed for this methodology. Initially, a comprehensive map of building footprints, including elevation and architectural data, will be created and overlaid on the island's topography. The building footprints will be derived from an AI-based model, with data sourced from the National Structural Inventory (NSI) provided by the U.S. Army Corps of Engineers, and validated through fieldwork. The second phase involves quantifying the probability of structural damage by integrating fragility curves with wave and surge maps generated by the University of South Alabama's coastal engineering research group. This approach will create a comprehensive framework for evaluating risk and resilience in coastal communities, ultimately enhancing efforts to mitigate the impacts of natural disasters on elevated structures.

Poster: 61

Dev Mehta

Major: Biomedical Science

Faculty Mentor:
Dr. Terrence Ravine

Department: Biomedical Sciences

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF, Peter Larson, CEO/President Klarity Medical Inc. and the USA Department of Occupational Therapy

Contamination Potential of Thermoplastics used to Construct Patient Orthoses by Antibiotic-Resistant Bacterial Pathogens causing Healthcare-Associated Infections

This project focused on determining if differences in hydrophobicity of thermoplastic materials used to construct patient orthotic splints affects bacterial adherence and/or adhesion to its surface. Splints are used to immobilize patient limbs due to surgical wounds or burns. Hydrophobicity is measured by water contact angle (WCAs) analysis. Differences in material surface hydrophobicity impacts bacterial adherence and adhesion. Splint contamination by antimicrobial resistance (AR) bacteria vancomycin-resistant (VRE) *Enterococcus faecalis*, methicillin-resistant *Staphylococcus aureus* (MRSA), and extended-spectrum beta-lactamase (ESBL) *Escherichia coli* severely limits patient treatment options. These are major bacterial pathogens causing healthcare-associated infections (HAIs). Three thermoplastic sheets with varying WCAs were evaluated by separately seeding each one with an AR bacterium. Differences in bacterial adherence and adhesion were evaluated by sampling each material at 1-hour and 24-hours, respectively. No significant difference was seen in the number of bacteria recovered from any of the 3 materials at either 1-hour or 24-hour sampling intervals. However, more VRE bacteria were transferred to each material in comparison to MRSA and ESBL - *E. coli*. Although not statistically significant, VRE was recovered in greater numbers from all thermoplastic sheets after a 1-hour contact time. MRSA was the only bacteria recovered from all 3 thermoplastic materials at 24-hour sampling. Fewer bacteria of each type being recovered at 24-hour sampling could indicate nonviability or increased adhesion making them difficult to remove. Literature supports the latter since all 3 bacteria are known to last months on surfaces. Evaluation by scanning electron microscopy will be performed to detect dry biofilm formation.

Poster: 62

Gabriel Merchant

Major: Chemistry

Faculty Mentor:
Dr. Mark Gordon

Department: Chemistry - Iowa State University

College: Not at USA (we'll be in touch for details if needed)

Funding Source(s): Summer Undergraduate Laboratory Internships (SULI)

The Effect of Kinetic Energy on Covalent Bonding

Covalent bonding is one of the most important concepts in chemistry. However, even with this importance it has been the topic of scientific debate as to its origins. The prevailing theory in the early 20th century was that bonding occurred due to an accumulation of electrons in the bonding region which caused a decrease in the potential energy. This provided a simple electrostatic explanation that is still taught to this day. In 1962 Dr. Klaus Ruedenberg published a landmark paper in which he demonstrated that the driving force of covalent bonding lies in the lowering of interatomic kinetic energy. He found this to be due to the constructive quantum interference and the delocalization of electrons across both nuclei. This leads to an imbalance between the kinetic and potential energies which led to a secondary effect of orbital contraction. Orbital contraction would decrease the potential energy and increase the kinetic energy to bring the energies into accordance with the virial theorem. These ideas have come to be accepted by many over the past 60 years, but they still face many opponents. Recent studies have suggested that orbital contraction is not possible on atoms with shielding orbitals due to electron repulsion between the shielding and valence electrons. Further investigation is required of Dr. Ruedenberg's work to determine whether orbital contraction is possible with shielding orbitals. To accomplish this the dissociation of diatomic molecules was analyzed using Dr. Ruedenburg's quasi atomic orbital (QUAO) analysis. By performing this analysis with both multi-configurational self-consistent field (MCSCF) and configuration interaction (CI) orbitals the differences in energy between contracted orbitals and free atom orbitals (uncontracted orbitals) can be studied to determine if contraction is significant factor in bonding.

Poster: 63

Jackson Miller

Major: Biology

Faculty Mentor:
Dr. Wito Richter

Department: Biochemistry and Molecular Biology

College: Frederick P. Whiddon College of Medicine

Type 4 cAMP-Phosphodiesterase (PDE4) as a Novel Therapeutic Target in Xerostomia.

Saliva, while often taken for granted, is indispensable for oral health and overall well-being, as inferred from the significant impairments suffered by patients with salivary gland dysfunction which include xerostomia (the feeling of dry mouth), difficulty chewing/swallowing/digesting food, oral infections/inflammation, and tooth decay. There is a critical need for novel therapeutics as current mainstay treatments, such as muscarinic receptor (M3AChR) agonists, are effective in only a portion of the patient population, and currently used saliva substitutes produce only inadequate, short-term relief. We have shown previously that inhibition of Type 4 cAMP-phosphodiesterases (PDE4s), a group of isoenzymes that hydrolyze the second messenger cAMP, stimulates salivation in normal/healthy mice. In addition, while inflammation is often a driver of salivary gland dysfunction, PDE4 inhibition is well-known to exert potent anti-inflammatory benefits. Thus, we propose that targeting PDE4s may serve to alleviate both the cause (inflammation) and symptoms (xerostomia) of salivary gland dysfunction and may thus represent a novel, promising therapeutic approach. To test this hypothesis, this project will test whether inhibition of PDE4 may serve to prevent- and/or reverse salivary gland dysfunction in mice challenged with inflammatory stimuli. In our experimentation, the correct dosage of our PDE4 inhibition drug restores salivation completely in mice whose saliva production has been impaired due to LPS (inflammation).

Poster: 65

Kelsey Netherton

Major: Meteorology -- Professional Track

Faculty Mentor:
Dr. John Lanicci

Department: Earth Science - Meteorology

College: College of Arts and Sciences

Funding Source(s): SURF

A Climatological Study of Cold Season Tornadoes Along Alabama's Gulf Coast

I have compiled a climatology of cold-season tornado events for 2003 – 2023 over Mobile and Baldwin Counties. For this study, we defined the cold season as mid-October to mid-March. We defined a tornado event day as a 24-hour period on the same calendar day when tornadoes were observed within our defined study area. Characteristics were tabulated for 35 individual tornadoes over the 21-year study period. I utilized the 3-hourly gridded data from the North American Regional Reanalysis residing on the NOAA/ESRL website to build composites using the closest 3-h analysis time preceding the first tornado occurrence on an event day. Composite analyses were created for most mandatory pressure levels and were examined for key severe-storm precursors. The results of the composite analyses show that strong south-southwesterly winds bring warm, moist air from the Gulf of Mexico onshore at the lower levels with a cold front located to the west. There is a thermal trough present at the mid-levels preceding the height trough, implying cold air advection causing the trough to deepen. The upper-level trough position also shows that the composite system has a baroclinic tilt. At the jet stream level, there is a curved jet streak maximum over the Texas-Louisiana border. The exit region of the jet streak creates upper-level divergence and rising air over the region of interest. The baroclinic tilt of the system also leads to favorable vertical wind shear. In sum, the composite analyses indicate a number of favorable conditions for tornadic thunderstorms.

Poster: 64

Angel Nguyen

Major: Computer Science

Faculty Mentor:
Dr. Tom Johnsten, Dr. David Bourrie | Dr. Sytske Kimball

Department: Computer Science | Information Systems and Technology | Geology

College: School of Computing | College of Arts and Sciences

Funding Source(s): NSF

Analyzing Near-Surface Inversions

Near-surface thermal inversions occur when the surface of the earth cools after sunset as a result of the emission of long-wave radiation. Thermal inversions play an important role in reducing visibility and influences when to spray pesticides. This kind of inversion occurs when the Earth cools quickly, which can lead to pollution and smog being trapped in the lower atmosphere. Our goal is to improve the quality assurance of ground-based observational data and increase the understanding of the conditions that contribute to near-surface thermal inversions. This study examines South Alabama Mesonet data from Fairhope, Alabama in 2013 to 2014. Our analysis looks at this data from both seasonal calendar months and solar days based on the astronomical solstices and equinoxes. We have implemented Hierarchical Density-Based Spatial Clustering of Applications with Noise (HDBSCAN) to examine the significance and frequency of weather parameters, in order to identify clustered features that are responsible for the occurrences of near-surface thermal inversions. HDBSCAN clusters data by assessing point density and generating cluster hierarchy determined by stability, which manages parameter densities and noise. Due to the multidimensional structure of data, this algorithm can process results that are noisy or contain outliers from unpredicted weather patterns. Through classifying comparable features, we can find distinct patterns in temperature, humidity, wind, air pressure, and other atmospheric variables that contribute to these inversions. These results will help improve forecasting of near-surface temperature inversions that greatly impact agricultural activities by understanding the seasonal and solar conditions that influence near-surface thermal inversions.

Poster: 66

Anita Nguyen

Major: Biomedical Science

Faculty Mentor:
Dr. Glen Borchert

Department: Pharmacology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): NSF grant 2243532 awarded by the Division Of Molecular and Cellular Bioscience

MicroRNA Biogenesis Machinery: A Detailed Examination of Enzymatic Requirements

MicroRNAs (miRNAs), a class of noncoding RNAs approximately 20 nucleotides in length, play essential regulatory roles in cellular processes such as proliferation, differentiation, apoptosis, and metabolism. Alterations in miRNA expression have been implicated in the pathogenesis of various human diseases. While the enzymes involved in miRNA expression were long thought to be well-defined, recent research has uncovered the existence of multiple non-canonical pathways for miRNA biogenesis. Our recent analysis has revealed that miRNA expression is often globally suppressed in tumor cells compared to normal tissue. Intriguingly, enzyme knockouts within the canonical miRNA biogenesis pathway, such as Dicer, have demonstrated significant expression of miRNAs through non-traditional processing mechanisms. Despite these advances, a comprehensive catalog of enzyme dependencies has been lacking. This summer, we employed our in-house program, Fragment Finder, to determine the expression profiles of all miRNAs and numerous related small noncoding RNAs (sncRNAs) in both normal HCT116 colon cancer cells and HCT116 knockouts of major canonical miRNA processing enzymes. Our findings reveal several major subsets of miRNAs and related sncRNAs defined by shared miRNA processing enzyme dependencies. This research has the potential to offer new therapeutic targets and novel strategies for selectively altering specific miRNA subgroup expressions, contributing significantly to the field of miRNA biology and its clinical applications.

Poster: 68

Connor Novack

Major: Civil Engineering

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF

Cold mixed RAP Pavement to reduce carbon presence

This project was a fifth year inspection and analysis of a road segment made entirely of reclaimed asphalt pavement. This reclaimed asphalt pavement (RAP) is the product of recycled pavements that have been crushed before adding a rejuvenator and being repaved for a new road. This method of paving is still in development as this project is one of many occurring across the country to gather information about RAP and its lifespan and quality.

Poster: 67

Emily Parrish

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning, Dr. Jonathan Perez, Dr. John O'Brien

Department: Biology

College: College of Arts and Sciences

Funding Source(s): Alabama Audubon, Gulf Scholars Program, Association of Southeastern Biologists

Ghosts in Glass: Ghost Crabs as Judges of Glass Sand for Coastal Restoration

Coastal erosion impacts ecosystems worldwide. Restoration typically involves replenishment of sand that is dredged from deep water despite evidence of high ecological damage and economic costs. As an alternative, sand made from recycled glass bottles may provide more sustainable substrate while reducing glass entering landfills. Our goal is to determine whether glass sand is a viable option for coastal restoration via its impact on a critical indicator organism in coastal dune ecosystems, the Atlantic Ghost Crab, *Ocypode quadrata*. Ghost crabs were live-trapped from Dauphin Island, Alabama and reared in sand environments containing full beach sand, half beach sand and half glass sand, and full glass sand for 8 weeks. In order to compare the stress responses of each treatment, the crab's initial and final stress hormone levels (Crustacean Hyperglycemic Hormone), carapace widths, weights, and claw dimensions were collected. There were no significant differences in mortality ($F=2,30=0.7585$, $p=0.4771$), carapace widths ($F2,14=0.4131$, $p=0.67$), weights ($F2,14=2.8286$, $p=0.09362$), or claw dimensions (dominant $F2,14=3.5073$, $p=0.05824$ and non-dominant $F2,14=0.2404$, $p=0.7895$). Overall, our growth and survival data indicate that recycled glass substrates may be a viable option for beach restoration projects, as evidenced by the lack of differences between ghost crab growth and survival between natural and glass substrates. Followup studies will focus explicitly on physiological and behavior changes in ghost crabs between our substrates.

Poster: 70

Darshan Patel

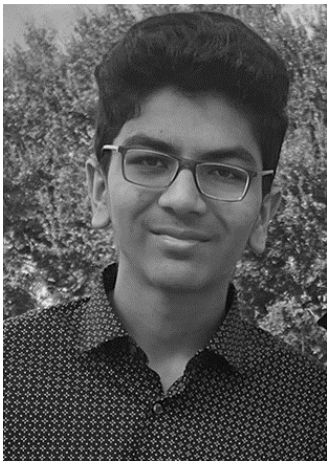
Major: Mechanical Engineering

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF



Evaluation and Performance Testing of Asphalt Binder PG 67-22

In order to choose which performance grading asphalt binder to use the binder first must be tested under different circumstances. The monotonic test assessed for shear stress, shear strain, yield energy, and monotonic cracking index (MCI). This test can be conducted under different shear rates and temperatures. This paper evaluated the PG 67-22 asphalt binder at 20°C, 10°C, and 0°C and each temperature with the following shear rates 0.10%, 0.25%, 0.50%, 0.75%, and 1.0%. The same test was conducted after long-term aging the binder. The values output from the test shows the performance of the asphalt binder. The testing shows that as the shear rate increases so does the shear stress, shear strain, yield energy, and MCI. The same is true for the long-term aged binder. The values also decrease as the temperature increases for both the unaged and the long-term aged binder. This highlights the importance of using this grading of asphalt binder under only certain temperatures and shear rates which correlates to the speed of cars to increase the durability of the pavement.

Poster: 69

Riya Patel

Major: Chemical Engineering

Faculty Mentor:
Dr. Kevin West

Department: Chemical and Biomolecular Engineering

College: College of Engineering

Funding Source(s): SURF

Investigating the Vapor Pressure Curves of Ionic Liquids using Thermogravimetric Analysis

Ionic liquids (ILs), salts that are liquids at or near room temperature, are compounds that can be used in various applications in the chemical engineering industry. The reason why ionic liquids are used is because they have unique properties with low melting points and high tunable properties, such as solubility – which are of interest in heat transfer fluids for solar thermal energy production. Current heat transfer fluids that are being used are inefficient and have very high melting points, therefore their range of use is limited. Solar thermal energy is a large renewable source, where sunlight is converted into a thermal energy source, and then used to produce electrical energy. Generally, ionic liquids are considered to be thermally stable and have negligible vapor pressure but if the temperature is raised higher at longer periods of time, they may degrade or vaporize. The vapor pressure needs to be measured for ionic liquids because we must see its effect on thermal stability, and we can use the data collected to improve and develop models that predict behaviors such as interactions with surroundings and volatility. Many of these ionic liquids do not have known Antoine constants so the vapor pressure is not readily available. The vapor pressure can be determined by using a thermogravimetric analysis (TGA), which can calibrate the vapor pressure of a known compound to model and determine the vapor pressure of various ionic liquids. The Langmuir method enables the determination of the vapor pressure which can ultimately be used to determine the Antoine constants of ionic liquids, and thus reproduce the vapor pressure on demand. The experiments show that the vapor pressure of the ionic liquid can be measured even though it is minute, it cannot be neglected when considering the high-temperature thermal stability of compounds.

Poster: 71

Suhas Patil

Major: Biomedical Science

Faculty Mentor:
Dr. Nancy Rice | Dr. Jason Brooks

Department: Biomedical Sciences | Emergency Medical Services

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF

Evaluating Bystander Ability to Identify and Manage Out-of-Hospital Cardiac Arrest

Annually in the United States, more than 360,000 people experience sudden out-of-hospital cardiac arrest (OHCA) of whom nearly 95% do not survive to discharge. However, OHCA survival outcome is observed to improve by nearly 3 fold when CPR resuscitation is attempted from bystanders. While the American Heart Association, “Chain of Survival,” highlights the importance of early 911 activation, early CPR, and rapid defibrillation, the importance of a bystander ability to properly identify OHCA remains unclear. This body of work employs a retrospective analysis of 53 million EMS activations characterized in the National Emergency Medical Services Information System dataset to comprehensively evaluate bystander ability to identify and manage OHCA. Of these 53 million EMS activations, 289,165 patients met the inclusion criteria, and were grouped based on reason for dispatch, of which 163,881 were dispatched as cardiac arrest and 125,284 were dispatched for reasons other than cardiac arrest. Then, the type of care provided prior to EMS arrival was evaluated for both groups. A significant relationship between dispatch reason and the type of care received prior to EMS arrival was determined using a chi-square test. To further elucidate this association between proper identification and effective management, a logistic regression model was employed to determine the likelihood of proper management, (i.e if resuscitation was initiated prior to EMS arrival) as a function of proper identification. Results showed that proper identification of cardiac arrest odds of resuscitation being attempted by 89%. Another logistic regression model was used to determine demographic influence on proper identification as a function of dispatch reason, which revealed that proper identification is significantly associated with patient gender and incidence location.

Poster: 73

Dylan Peters

Major: Biomedical Science

Faculty Mentor:
Dr. Sarah Sayner

Department: Physiology and Cell Biology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): SURF

Bicarbonate-Lactate vs. cAMP

Acute respiratory distress syndrome (ARDS) is a life-threatening condition with few treatment option and poor clinical outcomes. Pulmonary microvascular endothelial cells (PMVECs) form the alveolar capillary barrier which can become disrupted during ARDS leading to fluid accumulation in the airspaces of the lungs and compromised gas exchange. Blood bicarbonate and lactate levels can become elevated during ARDS. Studies have shown that PMVECs express the bicarbonate-stimulated soluble adenylyl cyclase (sAC or AC10). Further, the pulmonary endothelial barrier is compromised when exposed to increasing concentration of bicarbonate and bicarbonate is necessary for LPS-induced increased permeability in the isolated perfused lung. However, the mechanism of bicarbonate-stimulated endothelial barrier disruption is unresolved. Interestingly, recent reports in hepatocytes suggest lactate also activates AC10. The cellular actin cytoskeleton regulates cell shape, and, in turn, endothelial barrier integrity. Currently it is unclear whether AC10-mediated re-organization of the actin cytoskeleton is responsible for bicarbonate-induced endothelial barrier disruption or whether lactate regulates AC10 activity in PMVECs. Thus, PMVECs were exposed to increasing concentrations of lactate and bicarbonate in the presence and absence of the AC10 inhibitor, LRE1, and the levels of cAMP quantified. In a separate set of studies, PMVECs were stained with rhodamine phalloidin to visualize the actin cytoskeleton. While preliminary studies suggested lactate increased cAMP in PMVECs, a more rigorous analysis trended toward an increase but was not statistically significant. Further, immunocytochemistry reveals actin reorganization in the presence of elevated bicarbonate. While these studies suggest bicarbonate alters the actin cytoskeleton, further experiments are required.

Poster: 72

Brandon Pham

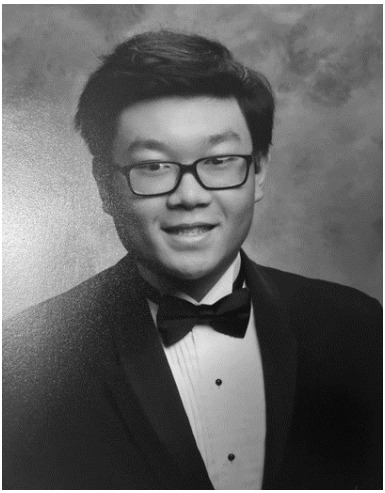
Major: Biomedical Science

Faculty Mentor:
Dr. Christopher M. Francis

Department: Physiology and Cell Biology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): Department of Physiology & Cell Biology



Enhancement of Biological Image Analysis with AI

Second messenger signals are crucial in cellular responses, with calcium signal transients in the vascular endothelium regulating vessel tone via nitric oxide production. These signals form distinct “signatures” that vary between vascular beds and are altered in disease states, making their decoding vital for vascular physiology. Knighten et al. recently introduced S8, a new method for analyzing time series data with dynamic regions of interest (ROIs). This method improves upon traditional static ROI analysis by adapting to time-varying signals and high-dimensional imaging data. However, S8's reliance on intensity-based adaptive thresholding can misidentify signals when data are affected by artifacts like bleaching or movement. To enhance S8's accuracy, we developed a method using convolutional neural networks (CNNs), specifically 2D and 3D UNet architectures, to segment time-series data. Trained on synthetic and biological data, the 2D UNet achieved a prediction accuracy of 99.34% and outperformed traditional thresholding in low signal-to-noise conditions. The UNet was also more robust to artifacts such as sample warping and focal plane movement. We plan to integrate the 2D UNet into the S8 algorithm to improve time-series analysis in artifact-contaminated datasets, while considering cloud-based strategies to overcome current hardware limitations for 3D UNet implementation.

Poster: 74

Aaryan Piracha

Major: Biomedical Science

Faculty Mentor:
Dr. Nancy Rice

Department: Biomedical Sciences

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF, Biomedical Sciences Department

Comparative Analysis of NF-κB1 Gene Promoter Methylation in Normotensive and Hypertensive Kenyans

Accounting for the majority of deaths worldwide, non-communicable diseases (NCDs) present the greatest health challenge of the twenty-first century. Specifically, cardiovascular diseases (CVDs) exceed all other NCDs in annual deaths and especially affect low- and middle-income countries (LMICs). Hypertension, being the primary risk factor for CVD, affects over 75% of adults in LMICs due to inadequate health care and preventative measures. Epigenetic modifications of DNA are important mechanisms that regulate gene expression; DNA methylation, in particular, affects cytosine residues in cytosine-phosphate-guanine (CpG) islands on the promoter sequence. Preliminary studies have shown that promoter methylation levels of NF-κB1, a gene linked to hypertension, negatively correlate with systemic arterial pressure. Moreover, previous research in this lab analyzed percent methylation at 8 different CpG islands in the NF-κB1 promoter region: results indicated a lower percent methylation for hypertensive individuals. Thus, the purpose of this study is to replicate these findings for data reliability. Saliva samples were collected from individuals in Kasigau, Kenya, a rural area with a prevalence of hypertension, and used to isolate genomic DNA. The 65 purified DNA samples will subsequently undergo bisulfite conversion, PCR amplification, and pyrosequencing to assess methylation at each CpG island.

Poster: 75

Alexander Potter

Major: Psychology

Faculty Mentor:
Dr. Philip Smith

Department: Psychology

College: College of Arts and Sciences

Funding Source(s): GRIP

Examination of the Relations of Exposure and Experience with Firearms with Dispositional, Acquired, and Practical forms of Suicide Capacity

Suicide is one of the leading causes of death worldwide, and the use of firearms are the leading method of suicide. The Interpersonal Theory of Suicide states when an individual has the desire for suicide, they also must have the capacity for suicide to make an attempt on their life. The Three-Step Theory (3ST) of suicide expanded on this notion of suicide capacity to include three types: dispositional capacity (tolerance for physical pain), acquired capacity (reduced fear of death), and practical capacity (access and familiarity with deadly methods). Prior research has shown exposure to firearms to be positively correlated with suicide capacity but has lacked in showing a relationship between unique aspects of experiences with firearms and suicide capacity. The current study examined the relationship between suicide capacity and endorsement of having lived/currently living in a house with a firearm, firearm carrying, and having received firearm training. The study consisted of a diverse group of 1,085 high school students across 4 high schools, who completed a self-report electronic survey. Results only partially support the hypothesis, with the only significant relationship between family gun ownership and dispositional capacity, and firearm carrying behavior and acquired capacity. We expected to see a relationship between firearm experience and practical capability, but there was no significant effect.

Poster: 76

Madeline Potter

Major: Computer Engineering

Faculty Mentor:
Dr. Na Gong, Dr. Jinhui Wang

Department: Electrical and Computer Engineering

College: College of Engineering

Funding Source(s): SURF, ASGC/NASA

Colorectal Cancer Detection in Mice using Artificial Intelligence

Artificial intelligence can be used in many applications. One of these applications is in cancer detection. More specifically, AI can be used in colorectal cancer detection. Traditionally, when detecting colorectal cancer, a colonoscopy is performed, and the data is later analyzed to determine if cancer is present. However, this process can be simplified, if AI was developed in such a way that it could run in real time during the colonoscopy, detecting the cancer, and even staging it. This project seeks to provide the basis towards developing an AI model that can be able to do this. Previously, the model was created to detect colorectal cancer in humans, by taking in an image and saying if there was cancer, and where it was at. However, it had two main limitations: it was very slow and resource-heavy, and did not have a large set of data to learn from. This project seeks to fix these limitations through data on mice instead, since there is more data that can be collected and more possibilities of development, like in developing staging capabilities. In this project, transfer learning was used to develop a new AI model that can detect colorectal cancer in mice, in a fast, accurate, and efficient way.

Poster: 78

Olivia Powers

Major: Anthropology

Faculty Mentor:
Dr. Allyson Shea

Department: Microbiology and Immunology

College: Frederick P. Whiddon College of Medicine

Funding Source(s): SURF

Urosepsis Diagnostics in Low-Resource Countries Using a Modified Water Quality Test Kit

Urinary tract infections (UTIs) are the second most common infectious disease worldwide and a leading cause of hospital-acquired sepsis. Bacteremia, the presence of bacteria in the bloodstream, is the most severe complication of UTIs. Early diagnosis and treatment are crucial for reducing mortality and slowing disease progression; however, current diagnostic methods, such as blood and urine cultures, are costly and often unavailable in rural or developing regions. To address this, we developed a novel urosepsis screening protocol using Aquagenx® water quality field test kits, which detect *E. coli*, the most common cause of urosepsis, and other coliform bacteria through colorimetric and fluorescent indicators. This modified kit can detect bacteria in human urine and blood without requiring laboratory equipment, making it suitable for resource-limited settings. We confirmed the kit's accuracy in detecting *E. coli* and coliforms in the presence of blood and urine. Since the clinical definition of a UTI is $>10^3$ colony-forming units (CFU) per milliliter of urine, sample dilution was required. Using artificially generated samples, we observed a false positive rate of 32.0% for UTI- (10^2 CFU/mL) samples and a false negative rate of 0.0% for UTI+ (10^3 CFU/mL) samples. We then tested human urine samples from University Hospital. For bacteremia diagnosis, where the clinical definition is a single CFU, 2 mL of blood was the maximum volume added to the Aquagenx® bag without affecting the color change or fluorescence. To address the kit's limitation in detecting Gram-positive bacteria, we are currently developing a secondary test bag to identify species like Enterococcus and Staphylococcus using traditional microbiological media. These innovations offer an affordable solution for bacterial pathogen detection in urine and blood, especially where traditional culture methods are unavailable, improving early diagnosis and treatment outcomes.

Poster: 77

Michael Reynolds

Major: Mechanical Engineering

Faculty Mentor:
Dr. Joseph Richardson

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering

Funding Source(s): SURF, Alabama Space Grant Consortium

Observed Satellite Temperature during an Orbit of a CubeSat

Representing the correlation between the temperature recorded by the sensors aboard Jag-Sat 1 satellite (CubeSat) and the orbital position of the satellite would help in the design of future CubeSat missions through knowledge of the minimum and maximum temperatures that the components of the satellite would likely experience while in space. The components on a satellite typically have a range of temperatures which they can withstand while still offering optimal performance. The goal of this project was to analyze the thermal data transmitted from Jag-Sat 1 to determine its thermal response while in low-earth orbit. An ability to correlate temperature with orbital position was complicated by the fact that the transmitted data did not include the orbital position of the satellite. A software program General Mission Analysis Tool (GMAT) was used to resolve this using a two-line element set (TLE) to model a stable orbit of Jag-Sat 1. Points on the orbit are represented with a timestamp which was then correlated with temperature of various components. GMAT was used to animate the location of the earth in reference to the sun and the orbital position of the satellite to find which orbital points were in the earth's shadow and which were in direct sunlight. A conclusion drawn from the research was that Jag-Sat 1 had a very brief time in the earth's shadow and much more time in direct sunlight. The thermal data presented may serve as a general design condition for similar orbits and may also be used as a validation case for subsequent thermal models used to predict the environment based on numerical simulation of the radiative heat transfer problem in conjunction with various internal components which generate heat. This information should be useful for future CubeSats launched by South Alabama and should also be broadly useful to designers of CubeSats in general.

Poster: 79

Addison Rhodes

Major: Speech and Hearing Sciences

Faculty Mentor:
Dr. Dahye Choi

Department: Speech Pathology and Audiology

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF

Effects of Camp Dream. Speak. Live. on children who stutter's Communication Competence, Self-advocacy, Resiliency and Knowledge of Stuttering

Background: Children who stutter are more vulnerable to bullying and show significant outcomes emotionally, socially, and vocationally (Byrd et al., 2016). To address this issue, the Arthur M Blank Center has been conducting Camp Dream.Speak.Live, a week-long intensive therapy program, since 2007. This program aims to promote positive quality of life, improve communication skills, peer relationships, and confidence when speaking in children who stutter (Byrd et al.). While substantial improvements in quality of life after camp have been reported, there has been a lack of research investigating which individuals benefit most from camp.

Purpose: Therefore, this study aims to examine whether Camp Dream.Speak.Live-Alabama improves communication, advocacy, and resiliency skills in children who stutter, while also identifying which children benefit most from the camp experience.

Method: Participants included 7 children who stutter aged 7 to 16 years and attended the camp at the University of South Alabama. Outcome measures included scores from the CARE assessment questionnaires (Byrd, 2023), administered before and after the camp. Data analysis included statistical tests for quantitative results and a review of participant's verbal responses to open-ended questions in the CARE assessment for qualitative results.

Results: Findings demonstrated significant improvements in communication competence, advocacy skills, resiliency, and knowledge of stuttering regardless of gender. Younger children and children with lower initial knowledge of stuttering showed greater improvements in communication competence and knowledge of stuttering respectively, highlighting the program's educational impact.

Poster: 92

Derek Ricafort

Major: High School Research Student

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF

The Development of a Precipitation Simulator for Analyzing Mass Loss of Various Asphalt Samples

Open Graded Friction Course (OGFC) is a thin layer of porous asphalt spread over more densely packed asphalt to allow better drainage of surface liquid. There is currently a lack of research in understanding the optimal times for maintenance for OGFC.

Finding a proper maintenance time is crucial, especially when considering high temperatures and heavy traffic loading causing the most damage to OGFC. In this study, we designed a precipitation simulator that included a filtration system, a continuous water system, a transparent plastic box to contain asphalt test samples, and a water assembly. Our precipitation simulator records different temperatures and water pressures while analyzing the effects on various asphalt samples.

Poster: 80

Ava Rittle

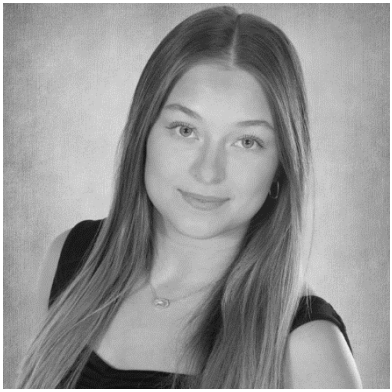
Major: Electrical Engineering

Faculty Mentor:
Dr. Daniela Wolter Ferreira Touma

Department: Electrical and Computer Engineering

College: College of Engineering

Funding Source(s): SURF, NSF



How Will the Increase of Electric Vehicles Impact the Power Grid?

How will the increase in electric vehicle (EV) penetration impact the power grid, and how can power companies and consumers help control the use of energy consumption? As the use of EV's is expected to increase in coming years, power companies need to start thinking about how to generate or conserve more power. While power companies are responsible for managing their power output, consumers can easily help conserve energy by simply changing their daily habits. In the next few years, power companies and consumers may need to adjust their lifestyle in order to keep energy consumption low and prevent the power grid from overloading. This project investigates how the increasing penetration of EV's will affect the power grid and if the power grid is ready to support the EV growth.

Poster: 81

Nafia Sarhadi

Major: Biomedical Science

Faculty Mentor:
Dr. Brenda L. Beverly

Department: Speech Pathology and Audiology

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF

A Shared Book Reading Program for Improving Emerging Literacy: Engaging Community Partners in the Greater Mobile Region

Early childhood literacy is a social determinant of health, and higher overall literacy leads to better health literacy, which in turn promotes healthy habits as well as knowledge for medical consent and decision-making. Increasingly, researchers seek community engagement to improve implementation and outcomes for investigators and study participants. The broad aim of this project was to engage partners and participants from non-mainstream and/or under-resourced communities to enroll in an ongoing early literacy program for families of four year olds. Two ways that we identified potential participants were an information table at a public library and consultation with the USA Center for Healthy Communities. The information table resulted in 12 interactions with 5 families who signed up and received a free book. However, of those 5, no families enrolled. In contrast, the USA Center for Healthy Communities consultation led to an in-person meeting with the leadership of Bay Area Women Coalition who offered assistance in recruiting as well as monetary compensation for neighborhood participants. Next steps are: (1) to seek study funding; (2) to modify study elements for implementation in the targeted community; and (3) to develop a memorandum of understanding with the community partner. This project is a shift away from investigator-led toward community-based participatory research, a translational strategy to address health disparities and create sustainable benefits.

Poster: 83

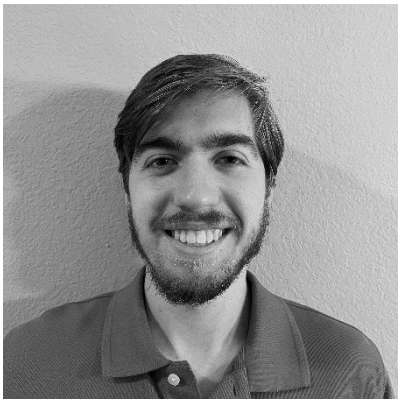
Kurt Schmitkons

Major: Geography

Faculty Mentor:
Dr. Gabriel de Oliveira

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences



Funding Source(s): Fearn Undergraduate Summer Research Scholarship

Using EVI and NDVI to Measure Vegetation Recovery After Hurricane Michael

This study's goal was to determine if the Enhanced Vegetation Index (EVI) and Normalized Difference Vegetation Index (NDVI) remote sensing techniques could be used to measure the damage to and recovery of vegetation around the path of Hurricane Michael. The Category 5 hurricane made landfall on October 10th, 2018 and caused extensive damage to developed and undeveloped land alike. The study was conducted using data from 22 satellite images taken by Landsat 8 and 9 between January 2018 and November 2023. The EVI and NDVI were calculated using tools in ArcGIS Pro. For analysis, 4 locations were selected in Florida Panhandle counties close to the path of Hurricane Michael. The EVI and NDVI values of each location in each image were then compared to create a timeline of vegetation growth and decay. Analysis showed that the change in EVI and NDVI values immediately after the landfall of Hurricane Michael remained similar to seasonal changes recorded throughout the rest of the studied time period in two of the four locations, while the other two locations showed a noticeable drop in both EVI and NDVI in late 2018 and 2019. By the end of 2019, the EVI and NDVI values for all locations were either similar to or higher than the values recorded in January 2018, indicating that the vegetation in all locations had recovered within about a year. The results indicate that EVI and NDVI can be used to measure vegetation recovery in tropical cyclones as well as other natural disasters.

Poster: 82

Noor Shalan

Major: Biomedical Science

Faculty Mentor:
Dr. Kaushik Venkiteshwaran | Dr. Terrence Ravine

Department: Civil, Coastal, and Environmental Engineering | Biomedical Sciences

College: College of Engineering

Funding Source(s): SURF

Toxicity and Biodegradability of Novel Boronium vs. Conventional Quaternary Ammonium Based Anti-Microbial Compounds in Wastewater Systems

Quaternary ammonium compounds (QACs) are highly effective as disinfectants, herbicides, and pesticides; thus, overuse causes high levels of residual toxicity in domestic and industrial wastewater. QACs can be toxic to essential bacteria breaking down pollutants in wastewater treatment plants (WWTPs) and can remain untreated in effluent, harming the environment, and contributing to antibiotic resistance, posing risks to human health. Novel boronium-based antimicrobial compounds have demonstrated efficacy in eliminating bacteria, fungi, and viruses. If the boronium compounds exhibit lower residual toxicity, they could offer a promising alternative to QACs. Because these compounds are still in development, their potential toxicity to the biological WWTP process is yet to be fully evaluated. Therefore, the objective of this study is to conduct a comparative toxicity analysis between the QAC alkyl(ethylbenzyl)dimethylammonium chloride and two novel boronium compounds. The conducted analyses follow OECD guidelines and utilize a standard freeze-dried aerobic bacterial culture that closely mimics WWTPs' mixed bacteria communities. Toxicity is assessed by measuring and comparing the dissolved oxygen consumption rate (DOCR) of the bacterial culture fed an ideal substrate (glucose and nutrients) in the presence of the test compounds at varying concentrations. Experiments were conducted by comparing QAC to boronium compounds at concentrations ranging from 0.5 to 7 mg/L, based on expected residual levels in wastewater. Initial results show similar toxicity between QAC and boronium compounds, but bacteria exhibit signs of adaptation. Future experiments will extend beyond 7 days to better capture bacterial adaptation and determine if boronium compounds have lower residual toxicity than QACs.

Poster: 84

Gabriel Sharbel

Major: Computer Science

Faculty Mentor:
Dr. Jeffrey Mudrock

Department: Mathematics & Statistics

College: College of Arts and Sciences

Funding Source(s): SURF

Maximizing Satisfied Requests in List Coloring

Graph coloring was introduced in the 1850s with the famous Four Color Problem about coloring the regions of a map in such a way that any two regions sharing a border receive different colors. Over the past 170 years, the study of graph coloring has led to the development and discovery of beautiful and useful mathematics. Applications of graph coloring can be found in computer science, scheduling, problems on social networks, and the equitable distribution of resources. In this project, we study a variant of graph coloring called flexible list coloring which was introduced by Dvorák, Norin, and Postle in 2019. In flexible list coloring each vertex of a graph gets a list of available colors and each vertex may have a preferred color assigned to it. We then wish to color each vertex with a color from its list so that adjacent vertices receive different colors, and we satisfy as many color preferences as possible. We present some results on flexible list coloring of complete bipartite graphs. This is joint work with Timothy Bennett, Michael Bowdoin, Haley Broadus, Daniel Hodgins, Adam Nusair, and Josh Silverman.

Poster: 85

Solange Silva

Major: Social Work

Faculty Mentor:
Dr. Nancy Kelley

Department: Sociology, Anthropology, and Social Work

College: College of Arts and Sciences

Funding Source(s): SURF

"Intimate Partner Violence Among Older Women"

The purpose of this project was to describe the experiences of older women who have been in relationships involving Intimate Partner Violence (IPV). Unfortunately, IPV is still prevalent in modern society. The typical dynamic of this type of relationship is power and control, where the abuser tries to dominate the victim into submitting to their advantage. IPV affects people of all ages, gender identities, racial backgrounds, socioeconomic statuses, and sexual orientation. Although IPV has been well-analyzed among younger populations, there is a lack of scholarly research addressing the specialized issues experienced by older women in these situations. Because of this, there is a lack of social policies, services, and programs that concentrate specifically on older women who have experienced IPV. Older survivors are normally at risk of developing health problems like chronic stress, cardiac issues, and depression. This leads to emotional problems linked to their experiences such as helplessness, frustration, anger, hopelessness, and low self-esteem. Due to the rapidly increasing aging population, healthcare providers and community service professionals should provide IPV screenings to women aged 60 and older to prevent them from being overlooked for any form of abuse. It is also important for frontline workers to be able to distinguish between caregiver elder abuse and IPV so that the right help can be accessed. Healthcare workers are the ones who directly connect with the survivors and play an important role in determining the available resources, which can significantly impact the well-being of the older person.

Poster: 86

Shubhangi Singh

Major: International Studies

Faculty Mentor:
Dr. Nancy Rice

Department: Biomedical Sciences

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF, Pat Capps Covey College of Allied Health Professions Collaboration Research Support Program Award

Community-based Intervention to Reduce Hypertension in Kenya (CIRHIK) – A pilot study

Cardiovascular diseases (CVD) are the leading cause of global mortality, with a disproportionate impact on low and middle-income countries (LMICs). Among these diseases, complications from hypertension—the primary risk factor for CVD—account for 9.4 million deaths annually. Thus, addressing hypertension is crucial for reducing the global CVD burden. For the past 13 years, the Principal Investigator (PI) has led research and community development projects focused on cardiovascular health in Kasigau, Kenya, a region with a high prevalence of unmanaged hypertension. This proposal outlines a 6-month pilot cohort study that will employ a multi-dimensional approach to reduce CVD risk by integrating education, social support, and access to long-term disease management. The study aims to enhance participants' knowledge of hypertension, improve self-efficacy regarding self-care behaviors, increase adherence to follow-up care, and achieve significant reductions in systolic blood pressure. The results will inform the development of larger, evidence-based therapeutic and behavioral management strategies for hypertension in Kasigau, potentially serving as a model for other countries grappling with poverty and health disparities.

Poster: 88

Jackson Stogner

Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle, Dr. Ronald Baker

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Funding Source(s): Stokes School of Marine and Environmental Science

Porifera Presence Amongst Varying Seascape Environments on Turneffe Atoll near Calabash Caye Field Station

During the Marine Field Science Course MAS 488 which took place in May 2024, I had the opportunity to travel with peers from University of South Alabama and our instructors, Dr. Amy Sprinkle and Dr. Ron Baker to Belize in order to work alongside researchers from University of Belize to conduct independent case studies. For my study's subject, I looked at *Porifera* (Sea Sponge) species richness, abundance, and evenness of distribution when observed across five seascape environments on Turneffe Atoll near Calabash Caye Field Station. *Porifera* are a widely varied phylum and can affect reef ecosystem health both positively by creating symbiotic relationships with small organisms, and negatively by competing with coral species for space. Many individual species are valuable in modern healthcare for their unique chemical properties which can be used in new medications. I chose to utilize underwater video cameras, slates, and transects for on-site observations to record a visual reference for size, number, and species type of sponge at each site. A consensus for species at each site was taken from these visual references. By compiling a total species list and deriving pie charts of species distribution, comparisons can be made for species abundance in each environment. Tracking species presence in these environments could aid future researchers in assessing ecosystem health, as well as bioavailability of study subjects for medical science.

Poster: 87

Isabella Swan

Major: Biology

Faculty Mentor:
Dr. Jason Strickland

Department: Biology

College: College of Arts and Sciences

Funding Source(s): USA Biology Department

Sequencing *Sphaerodactylus* gecko genes to identify new species

Sphaerodactylus geckos are found in Mexico, South America, and the Caribbean and are known for their small size, with some species fitting on the tip of a finger. The genus *Sphaerodactylus* is known for its abundant speciation, yet collection in South and Central Mexico have been limited due to rugged terrain that has led to vast unexplored regions. In addition, sociopolitical obstructions have made field research difficult and herpetological species remain unidentified even though the area is a biodiversity hotspot. Recent expeditions into the region found several morphologically unidentifiable *Sphaerodactylus* geckos suggesting they might be unidentified species. To determine if the collected geckos are new species, we have isolated DNA from the gecko samples and are using Sanger DNA sequencing of two mitochondrial genes, 12S and cyt-b, to place them in the family tree of the genus using phylogenetic methods. We were able to determine there are at least two putative new species of *Sphaerodactylus* by comparing their DNA sequence with that of known species. The next steps are to combine the morphological and genetic data to describe the new species of geckos which will add to our understanding of speciation in the genus and biodiversity in Mexico.

Poster: 89

Alyssa Sykes

Major: Speech and Hearing Sciences

Faculty Mentor:
Dr. Ashley Flagge, Dr. Nicholas Stanley, Elise Money-Nolan

Department: Speech Pathology and Audiology

College: Pat Covey College of Allied Health Professions

Funding Source(s): SURF

Dual Task Cost to Posture During a Speech-in-Noise Listening Task

This study investigates the interaction between balance and listening in noise in young, healthy adults through the use of a dual task paradigm. Building on prior research, this study examined how different signal-to-noise ratios (SNRs) impact balance, and how varying balance conditions influence speech-in-noise comprehension. The study addresses two main questions: (1) How is balance, as measured by sway, affected by varying listening conditions?, and (2) How is speech-understanding-in-noise accuracy affected by varying balance conditions? Participants were tested in four balance conditions from the modified Clinical Test of Sensory Integration in Balance (mCTSIB): firm surface with eyes open (FSEO), firm surface with eyes closed (FSEC), compliant surface with eyes open (CSEO), and compliant surface with eyes closed (CSEC). Speech-in-noise performance was assessed using the Quick Speech in Noise test (QuickSIN) at five SNRs: Quiet, -4 dB, -2 dB, 0 dB, and +2 dB. Baseline measurements for both tasks were taken before the experimental tasks. Preliminary findings show that speech accuracy decreases with more challenging balance conditions, with the greatest decline observed at -2 dB and -4 dB SNRs. Balance sway was most pronounced in the CSEC condition, as anticipated. Additionally, performance was better with eyes open compared to eyes closed. These results suggest that balance difficulties can influence speech-in-noise accuracy, and that the impact varies with different balance conditions. This study highlights the interplay between balance and speech understanding, underscoring the need for further research, especially in aging and clinical populations.

Poster: 90

Kaitlyn Tolliver

Major: Biology

Faculty Mentor:
Dr. Tuan Tran

Department: Biology

College: College of Arts and Sciences

Funding Source(s): College of Arts and Sciences

Survey of bacterial wilt disease in Alabama and the genetic diversity the causal pathogen: *Ralstonia solanacearum*

Ralstonia Solanacearum is a bacteria that destroys the plants vascular system and their ability to grow. It causes bacterial wilt disease on more than 250 plant species including tomatoes, potatoes, and eggplants, etc.. *R. solanacearum* infects host plants through their roots and moves up through the vascular system, where it multiplies and blocks the flow of water and nutrients. Although *R. solanacearum* is known to be prevalent in the Southeastern U.S., there has been no official report or literature about the bacterium's genetic diversity and virulence. This research project will evaluate the status of bacterial wilt disease caused by *R. solanacearum* in the state of Alabama, as well as the virulence of the pathogen on common tomato varieties.

Poster: 92

Charles Turner

Major: Mechanical Engineering

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF

The Development of a Precipitation Simulator for Analyzing Mass Loss of Various Asphalt Samples

Open Graded Friction Course (OGFC) is a thin layer of porous asphalt spread over more densely packed asphalt to allow better drainage of surface liquid. There is currently a lack of research in understanding the optimal times for maintenance for OGFC.

Finding a proper maintenance time is crucial, especially when considering high temperatures and heavy traffic loading causing the most damage to OGFC. In this study, we designed a precipitation simulator that included a filtration system, a continuous water system, a transparent plastic box to contain asphalt test samples, and a water assembly. Our precipitation simulator records different temperatures and water pressures while analyzing the effects on various asphalt samples.

Poster: 64

Izabel Valdez

Major: Computer Science

Faculty Mentor:
Dr. Tom Johnsten, Dr. David Bourrie | Dr. Sytske Kimball

Department: Computer Science | Information Systems and Technology | Geology

College: School of Computing | College of Arts and Sciences

Funding Source(s): NSF

Analyzing Near-Surface Inversions

Near-surface thermal inversions occur when the surface of the earth cools after sunset as a result of the emission of long-wave radiation. Thermal inversions play an important role in reducing visibility and influences when to spray pesticides. This kind of inversion occurs when the Earth cools quickly, which can lead to pollution and smog being trapped in the lower atmosphere. Our goal is to improve the quality assurance of ground-based observational data and increase the understanding of the conditions that contribute to near-surface thermal inversions. This study examines South Alabama Mesonet data from Fairhope, Alabama in 2013 to 2014. Our analysis looks at this data from both seasonal calendar months and solar days based on the astronomical solstices and equinoxes. We have implemented Hierarchical Density-Based Spatial Clustering of Applications with Noise (HDBSCAN) to examine the significance and frequency of weather parameters, in order to identify clustered features that are responsible for the occurrences of near-surface thermal inversions. HDBSCAN clusters data by assessing point density and generating cluster hierarchy determined by stability, which manages parameter densities and noise. Due to the multidimensional structure of data, this algorithm can process results that are noisy or contain outliers from unpredicted weather patterns. Through classifying comparable features, we can find distinct patterns in temperature, humidity, wind, air pressure, and other atmospheric variables that contribute to these inversions. These results will help improve forecasting of near-surface temperature inversions that greatly impact agricultural activities by understanding the seasonal and solar conditions that influence near-surface thermal inversions.

Poster: 91

Gwyneth Vogler

Major: Biology

Faculty Mentor:
Dr. Jason Strickland

Department: Biology

College: College of Arts and Sciences

Funding Source(s): SURF

Shimmering Scorpions: Understanding Fluorescence with Genomics

Scorpions fluoresce under ultraviolet (UV) light due to chemicals, including β-carboline and 4-methyl-7-hydroxycoumarin, embedded in their exoskeleton. The biological reason for fluorescence and the biosynthesis pathway for making the chemicals are unknown. Our primary goal was to use reference-level scorpion genomes to identify possible gene candidates involved in the biosynthesis pathway. We also tested possible treatments that change fluorescence in scorpions by maintaining live and deceased scorpions under constant UV light exposure. To investigate the genes, we used genomes from two scorpions: *Centruroides hentzi* and *Hadrurus arizonensis*. We looked for specific genes, which were identified as involved in animal fluorescence based on literature research. Sequences for candidate genes were downloaded and used to find possible matches in the reference genomes. Over forty genes were found to be analyzed in future experiments. To investigate the changes in fluorescence, four scorpions were placed under constant UV light for two weeks, and four were left under a 12-hour white light/dark cycle. After two weeks, they were taken out of the UV light. The scorpions left under constant UV light for two weeks almost completely lost their fluorescence, but after being removed from under the UV, fluorescence started to slowly reappear. We now have a list of candidate genes and some potential manipulative experiments to test for gene expression changes during fluorescence recovery. By identifying the biosynthesis pathway of the scorpion's fluorescent chemicals, we can ultimately test hypotheses for why fluorescence exists.

Poster: 93

Maya Wasilewski

Major: Economics & Finance - Finance Concentration

Faculty Mentor:
Dr. Alan F. Chow

Department: Marketing and Quantitative Methods

College: Mitchell College of Business

Comparison of Fama-French Five-Factor Model Using Factors Developed from Different Historical Datasets

An ongoing effort in Investment Finance is trying to estimate current and future pricing for equities traded in world stock markets. Many asset pricing models have been developed and presented, including those presented by Fama-French. Their three and five factor models are presented with factors developed by the originators and are included on the Kenneth French website via Dartmouth University. We will utilize the Fama-French five-factor model to estimate future returns, specifically comparing factors that are derived from the Center for Research in Security Prices (CRSP) dataset with those sourced from Bloomberg. In this study, we analyze the "Magnificent Seven" stocks (Alphabet, Amazon, Apple, Invidia, Meta, Microsoft, and Tesla) to compare the performance of the model using factors developed using the data CRSP and the Bloomberg Terminal's data. To determine which data yields a more accurate in estimating future stock return, we will use the Pitman closeness criterion. Pitman (1937) proposed that an appropriate measure of the efficiency of an estimator would be to determine the closest estimator to a parameter.

Poster: 95

Maggie Weimer

Major: Biomedical Science

Faculty Mentor:
Dr. Tuan Tran

Department: Biology

College: College of Arts and Sciences

Funding Source(s): USDA Special Crop Block Grant Program

Understanding the contribution of Remorin nanodomain proteins to plant tolerance to salinity stress

Global warming and rising sea level lead to an increasing threat of soil salinity globally. High levels of salinity can lead to widespread crop damage and yield loss. Many plants have adapted to be more resistant to salinity changes in the soil, allowing them to grow in a wider range of soil environments. Remorin genes encode for a family of proteins that are found in all land plants, and their contribution to plant health and hardiness has not been fully investigated. These genes are split into groups 1-6 based on their phylogenetic origin and the shape of the protein that they produce. Very few of these genes have been found to contribute to the hardiness of plants in response to both abiotic and biotic stresses. This study investigates the effects that several groups of remorin genes have on the salt tolerance of Arabidopsis thaliana. Using germination assays and growth experiments on no-salt and high-salt media, we evaluated the tolerance of wildtype and Remorin mutants against salt stress. We have identified at least one member of Remorin (group 1) that play important roles in plant response to salinity. These results show that some of the remorin genes could potentially be utilized to engineer higher salt tolerance in crop plants.

Poster: 94

Liam West

Major: High School Research Student

Faculty Mentor:
Dr. Arjun Dahal

Department: Physics

College: College of Arts and Sciences

Funding Source(s): NSF

Synthesis of Monolayer Tungsten Disulfide for Photocatalytic Hydrogen Generation

As a result of the industrial revolution and the advancement of modern technology, carbon emissions and greenhouse gases have entered the atmosphere, causing a gradual increase in average global temperatures and a change in the global climate. One major source of emissions of these harmful gases is the production of energy, which is constantly in high demand. The most direct solution to the problem is to develop methods of effective production of cleaner, carbon-neutral energy. Hydrogen is a clean and productive source of energy through combustion, as it produces zero carbon emissions and the product of combustion of hydrogen with oxygen is only water. Hydrogen production through the photocatalysis process by splitting water in the presence of sunlight and photocatalyst materials is a promising method for generating clean energy. Developing efficient photocatalysts is a crucial step in producing hydrogen via the photocatalytic process. Tungsten disulfide (WS_2) has demonstrated promising photocatalytic properties, particularly in monolayer form. Although there are several prior studies on synthesizing WS_2 monolayers, there is still a lack of reliable methods for preparing high-quality WS_2 monolayers. In this study, we employ the chemical vapor deposition (CVD) method to deposit monolayer WS_2 on Al_2O_3 substrate, using WO_3 and sulfur as precursors. This investigation intends to evaluate the optimal conditions of consistent monolayer deposition of tungsten disulfide on Al_2O_3 using this method. This research will benefit future studies by providing optimized synthesis conditions for the large-scale production of WS_2 monolayers for photocatalysis applications.

Poster: 97

Charles Whillock

Major: Chemical Engineering

Faculty Mentor:
Dr. Sean Walker

Department: Systems Engineering

College: College of Engineering

Funding Source(s): SURF, Alabama Space Grant Consortium

Development of a Dynamic Simulation for Hydrogen Refueling Processes

With the goal of analyzing and optimizing configurations of a hydrogen vehicle refueling station, we developed a robust dynamic simulation for the hydrogen fuel cell refueling process. Starting from the high-pressure tank — temperatures, pressures and gas flow are calculated in each component. To create a model that can be applied to many real-world processes, we included features such as gas pre-cooling, cascade filling, and simultaneous refueling. With this, important economic and safety parameters such as energy consumption, fill times, and maximum temperatures can be acquired. Methods and equations were adapted from the National Renewable Energy Laboratory's software "H2Fills" and implemented into Aspen Custom Modeler. Comparing simulation results showed that our model, despite more simplifications, is in good agreement with its parent program.

Poster: 96

Star Williams

Major: Chemical Engineering

Faculty Mentor:
Dr. Alexandra Stenson

Department: Chemistry

College: College of Arts and Sciences

Funding Source(s): SURF

Identification of Microplastics

The growing demand for plastics and their resistance to degradation has led to a build-up in the environment. The plastic build-up is not only unsightly but also hazardous. If ingested the plastic can cause inflammation, respiratory stress, and reproductive abnormalities. Ingested microplastics can also be a gateway for pathogens and pollutants to enter the body. To combat this ever-increasing problem, researchers need a way to effectively identify and quantify microplastics. Of the many methods currently used, most are too laborious, time-consuming, or expensive. This study uses FTIR spectroscopy and fluorescent microscopy to analyze microplastics in surrounding wastewater treatment plants. By taking samples from the influent and effluent samples, the removal of microplastics from the wastewater can be measured while also comparing the advantages and disadvantages of each method. The fluorescent microscopy is faster; however, it cannot distinguish between plastic types like the FTIR. Therefore, the most effective plan is to use fluorescent microscopy to analyze the bulk of samples and FTIR to analyze a fraction of the samples. The FTIR was used to identify 5 of the most common consumer plastics, polyethylene (PE), polypropylene (PP), polystyrene (PS), and polyethylene terephthalate (PET). Based on the data collected from the FTIR, the trend in the number of identified plastics in the influent compared to the effluent seems to be as predicted. More of each type of plastic has been found in the effluent samples as opposed to the influent, meaning the wastewater treatment plants are somewhat effective in the removal of microplastics. However, with faster and more reliable data the treatment plants may be able to find a way to completely remove plastics from the wastewater.

Poster: 98

Walker Winkler

Major: Mechanical Engineering

Faculty Mentor:
Dr. Melike Dizbay-Onat

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering

Funding Source(s): SURF, NOAA

Investigation of Activation Times and Temperatures Impact on Physical Adsorption Properties of Biochar

Biochar is recognized for its eco-friendly nature, efficiency, recycling potential, and cost-effectiveness. This has allowed it to gained significant traction as an adsorbent. It's adsorption properties are influenced greatly by the of biomass source and the activation methods employed. Among these activation conditions, activation temperature and activation time play a pivotal role in shaping the unique properties of biochar. This study focused on a comprehensive exploration of the influence of these activation methods on the pore structures and adsorption capabilities of uniform particle-sized biochar derived from pine. The biochar was activated at four specified temperatures: 550°C, 650°C, 750°C, and 850°C, and times ranging from 1 to 4 hours. After activation, we washed and dried the samples. We then measured the burn-off ratio, pore characteristics, and conducted aproximate analysis on each sample. Our research involved a rigorous examination, determining the adsorption isotherm profiles, pore sizes, and surface areas. We aimed to explain the relationship between activation time, temperature, and the resulting properties of biochar. We found that as activation time and temperature increased, adsorption rates increased as well. The Brunauer-Emmett-Teller (BET) surface area ranged from 231.7±5.6 m2/g for untreated biochar to 614.0±15.7 m2/g at 850°C. The lowest burn-off ratio measured was at 650°C at 18.72%. The greatest burn-off ratio was found at 750°C at 40.93%. This knowledge provides valuable insights into enhancing the effectiveness of biochar as a sustainable and efficient adsorbent.

University of South Alabama
Office of Undergraduate Research
Seaman's Bethel Theatre
5920 USA Dr South
Mobile, AL 36688
Ph: (251) 460-6243