OURI Annual Summer Student Showcase
August 10th, 2026, 12:30pm – 1:30pm
Science Learning Center

Fish-Mediated Microbial Transfer and Its Effects on Coral Microbiomes and Coral Resilience
Authors: **Patrick Akins**
Faculty Mentor: *Carsten Grupstra, Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

Coral reefs are among the most ecologically important ecosystems on Earth, but are increasingly threatened by climate change, disease, and other environmental stressors. This project studies how microbes from reef fish interact with coral microbial communities to determine how fish-mediated microbial transfer influences coral health, microbial composition, and resilience under environmental stress. The laboratory experiments first artificially bleach the corals before exposing them to microbial communities introduced from fish feces. This will be followed by analyses of changes in the coral microbiome and physiological indicators of coral health. This project is underway and we are working to collect data. By the end of the project, we hope to better understand the influence of reef fish on coral holobionts and how these interactions could support future conservation and restoration efforts.

Association Between ADGRL3 Gene Variants and ADHD Prevalence
Author: **Arianna Alcantara**
Faculty Mentor: *Susan Norstrom, Charles E. Schmidt College of Science*
Funded by: L.E.A.R.N. - Learning Environment and Academic Research Network

ADHD is a neurodevelopmental disorder influenced by complex relationships of genetic and environmental influences; however, the exact genetic factors and their specific roles in ADHD susceptibility remain unclear. Using the NIH All of Us Research Hub, a cohort of 414, 372 individuals with both genomic and electronic health records was obtained. We hypothesized that the odds of ADHD would be higher for those carrying an ADGRL3 variant. However, odds ratio analysis showed that individuals carrying an ADGRL3 gene variant had significantly lower odds of ADHD than those who did not (OR = 0.62, 95% CI [0.58, 0.66]). This result challenges the idea that ADGRL3 gene variants increase ADHD susceptibility, showing a more complex relationship between the gene's variants and the disorder. Further research is needed to clarify this association and to determine whether specific variants affect ADHD susceptibility differently.

Optimized Synthesis of Glycosylated Building Blocks for Modeling Tumor-Associated MUC1 Glycoforms
Authors: **Hunter Anderson, Anthonela Oliveros, Stephanie Salterini, and Maré Cudic**
Faculty Mentor: *Maré Cudic Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

During epithelial carcinogenesis, a transmembrane glycoprotein, MUC1 undergoes aberrant glycosylation, exposing cancer-related structures such as sialyl-Tn (sTn). In this study, we evaluated the synthesis of Ser-sTn building block by modifying the sialic acid donor to improve its yield, thereby facilitating its incorporation into MUC1 glycopeptides via Fmoc-based solid-phase peptide synthesis. We assessed N-Troc-protected and 5N,4O-oxazolidinone-derived sialic acid donors for their effectiveness in forming α-sialoside. The key precursor, phenyl-β-1-thiogalactoside, was prepared on a large scale, followed by installation of Troc group or formation of the cyclic oxazolidinone ring in three additional steps. All compounds were characterized via 1H and 13C NMR spectroscopy. Our results indicate that neither Troc or cyclic oxazolidinone, which adds four additional steps to the overall synthesis, provide a significant advantage over phenyl β 1 thiogalactoside. The molecular modelling studies may help identify alternative protecting groups to advance synthetic strategies for MUC1-based prophylactic and immunotherapeutic approaches.

Association Between ADGRL3 Gene Variants and ADHD Prevalence
Author: **Adrian Arias**
Faculty Mentor: *Yao Cheng, College of Engineering and Computer Science*
Funded by: College of Engineering and Computer Science

The increasing demand for truck parking has created challenges for freight transportation by reducing parking availability and increasing driver search times. This project investigates the use of computer vision to automatically detect truck parking occupancy using images collected from Florida Department of Transportation (FL511) traffic cameras. Over six weeks, approximately 216 to 288 hours of footage were collected, producing more than 30,000 extracted frames. A subset of 328 images was selected and annotated in Roboflow, including 1,863 truck instances and 194 empty parking-space instances. A YOLO-based object detection model was trained to identify parked trucks and estimate parking occupancy. Preliminary evaluation achieved 96.5% precision, 49.4% recall, a 56.8% F1 score, and 53.1% mAP@50. Ongoing work focuses on expanding the labeled dataset and developing separate daytime and nighttime models to improve recall and robustness under varying lighting conditions. This approach may support real-time truck parking monitoring and improve freight transportation efficiency.

Oligodendrocytes on the Move: Temporal Exit Dynamics in Developing Zebrafish
Authors: **Sofia Aristizabal**
Faculty Mentor: *Laura Fontenas, Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

Oligodendrocytes (OLs) are central nervous system (CNS) glial cells that generate myelin. In zebrafish CNS boundary cells, OLs can cross into the peripheral nervous system (PNS). This study characterizes OL exit dynamics, behavior within the PNS, and consequences on CNS OL abundance. Live confocal timelapse imaging of wild type and mutant larvae was performed throughout nervous system development. I tracked the number and timing of OLs exiting the CNS and measured the number and length of myelin sheaths they formed along peripheral axons. I also analyzed larval cryosections to assess the number of OLs remaining in the CNS. Overall, I found a critical period where OLs exit more frequently, primarily during earlier development. After migrating into the PNS, I show that OLs form myelin sheaths along peripheral nerves, suggesting plasticity in the PNS. Together, these findings highlight the developmental plasticity of OLs as they migrate and function beyond the CNS.

Evaluating Storm Driven Subaerial Beach Morphology and Sedimentology Changes in Response to Hurricanes Erin, Imelda, and Melissa for Select Beaches in Palm Beach County, Florida
Author: **Alondra Calderon, Kayla O'Brien, and Tiffany Roberts Briggs**
Faculty Mentor: *Tiffany Roberts Briggs, Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

Beaches are significant to coastal regions, providing habitat for marine and terrestrial organisms, protecting infrastructure, and are crucial to the economy. However, coastal areas are at higher risk of erosion, sea-level rise, and human activities such as pollution and development. In this study, we evaluated storm-driven morphology and sediment responses to Hurricane Erin, Imelda, and Melissa, three major storms in the Atlantic basin with varying intensity off the southeastern Florida coast. Twelve study sites were selected, and morphology and sediment were sampled for pre- and post-storm events in Palm Beach County, Florida. Results of this study are aimed at increasing understanding the processes of hurricane-driven effects on coastal regions that impact communities, the environment, and wildlife.

Against the Current: Gender, Labor, and Community Resilience Through Jeju's *Haenyeo* (Women of the Sea)
Author: **Sara Cardona**
Faculty Mentor: *Yangsook Kim, Dorothy F. Schmidt College of Arts & Letters*
Funded by: Office of Undergraduate Research and Inquiry

This project examines the historical and contemporary experiences of Jeju's Haenyeo, women free divers, whose lived experiences have shaped the gendered division of labor, family life, and community resilience on Jeju Island, South Korea. Drawing on archival materials and ethnographic fieldwork, including interviews with Haenyeo, the study examines how Haenyeo became primary breadwinners in many households while navigating patriarchal expectations that positioned women's labor as both essential and undervalued. It also investigates the collective strategies Haenyeo developed through cooperatives, cultural practices, and intergenerational networks to sustain their work and communities. By focusing on women's embodied labor, care, and resistance, this project highlights how Haenyeo have negotiated economic survival and social recognition across changing political and historical conditions. Ultimately, this study highlights how women's collective labor and strategies can reshape household economies, challenge gendered divisions of labor and patriarchal family norms, and sustain local communities despite persistent gender inequality.

Thinking Like a Fly: Emulating Insect Vision with Simple Sensors
Authors: **Gabriel Falco Finger**
Faculty Mentor: *Daniel Raviv, College of Engineering & Computer Science*
Funded by: College of Engineering and Computer Science

Visual looming is the visual cue of an object increasing rapidly in size as it approaches the viewer. This research aims to use visual looming as a signal for computer vision as a process for motion detection. Using the derivative of a light signal, the signal was processed to achieve a looming value, calculated as the ratio of a signal's derivative to its instantaneous value. The research focuses on processing this value using basic circuit components. The mathematical operations behind the signal processing gave insight into the limitations of mathematical functions and hardware. After testing with predefined mathematical functions, a cadmium sulfide photocell was used to test the response of the circuit to varying, real-world light signals. The results found from the research give insight into the mechanisms behind analog processing and hardware limitations as they pertain to mathematical functions represented with electrical signals.

Occurrence of PFAS in Reclaimed Irrigation Water and Associated Soils
Author: **Sebastian S. Hernandez, Ankon Baral, and Yalan Liu**
Faculty Mentor: *Yalan Liu, College of Engineering & Computer Science*
Funded by: Office of Undergraduate Research and Inquiry

Per- and polyfluoroalkyl substances (PFAS) can enter soils when reclaimed wastewater is used for irrigation. This study evaluated extractable organofluorine (EOF) in reclaimed irrigation water and associated soils from three locations on Florida Atlantic University's Boca Raton campus. Irrigation-water samples were collected over three sampling days, while soil samples were extracted using methanolic ammonium hydroxide followed by solid-phase extraction and combustion ion chromatography analysis. EOF was detected in all water and soil samples. Water concentrations ranged from 23.72 to 133.48 ng F/mL, and soil concentrations ranged from 47.02 to 91.94 ng F/g. Concentrations varied among locations and sampling days, but the water and soil results did not show a clear location-specific relationship. Poor spike recoveries limited quantitative confidence in the measurements. Future work should optimize the extraction procedure, evaluate matrix-spike recovery, and expand sampling to better assess whether reclaimed-water irrigation contributes to the presence or accumulation of organofluorine in soils.

Breastfeeding Perceptions and Maternal Sensitivity During Novel Events
Author: **Joshua Hernandez**
Faculty Mentor: *Nancy Aaron Jones, Charles E. Schmidt College of Science*
Funded by: L.E.A.R.N. - Learning Environment and Academic Research Network

Breastfeeding plays a critical role in early mother-infant interactions and may influence caregiving behaviors that support infant socioemotional development. Previous research has examined the effects of breastfeeding duration and perceived breastfeeding quality on maternal sensitivity, but the role of breastfeeding perception during novel emotions remains unexplored. It is hypothesized that a positive perception of breastfeeding will be associated with maternal sensitivity during infants' exposure to novel events. Maternal sensitivity will be assessed through observed caregiver behaviors during structured novel tasks, while breastfeeding perception will be measured through parent surveys regarding their breastfeeding experiences. Findings from this research may improve understanding of factors that promote sensitive caregiving and inform interventions designed to strengthen early mother-infant relationships as well as supporting healthy infant socioemotional development.

Imaging of Lipid Droplets using Novel Acylglycerol Analogs
Authors: **Regan Hostetter and Nicholas McInchak**
Faculty Mentor: *Maciej J. Stawikowski, Charles E. Schmidt College of Science*
Funded by: Office of Undergraduate Research and Inquiry

Lipid droplets (LDs) are dynamic organelles that regulate energy storage, lipid metabolism, and cellular signaling. Our group previously developed fluorescent acylglycerol analogs that exhibited distinct uptake and trafficking patterns depending on whether they resembled monoacylglycerols, diacylglycerols, or triacylglycerols. Here, we developed four new analogs to determine how naphthalimide conjugation position and fatty acid attachment to a 2-aminoglycerol scaffold influence cellular uptake, intracellular trafficking, and LD biogenesis. Live-cell localization was evaluated after 1- and 24-hour incubations and after a 1-hour exposure followed by a 24-hour pulse-chase period. To investigate trafficking mechanisms, cells were treated with inhibitors of diacylglycerol O-acyltransferase 1, diacylglycerol O-acyltransferase 2, or fatty acid-binding protein 4. The analogs showed pronounced structure-dependent differences in uptake, localization, and effects on LD formation. These findings were consistent with our previously reported DONDI-5 probe, a structural mimic of 1,2-diacylglycerol, and suggest that monoacylglycerol-like probes are internalized more rapidly than diacylglycerol- and triacylglycerol-like analogs.

Piloting Culturally Responsive Metadata for Generative AI Using FAU Art and Design Collections
Author: **Francis Jeune**
Faculty Mentor: *Mehrdad Sedaghat Baghbani, Dorothy F. Schmidt College of Arts & Letters*
Funded by: Office of Undergraduate Research and Inquiry

Field Deployment of FAU-Made Adsorbent Materials to Prevent Harmful Algal Blooms
Author: **Karen Jones**
Faculty Mentor: *Masoud Jahandar Lashaki, College of Engineering & Computer Science*
Funded by: College of Engineering & Computer Science

Mineral-Dependent Wettability Alteration in Carbonate-Rich Geologic Systems
Author: **Mia Mandili**
Faculty Mentor: *Myeongsub Kim, College of Engineering and Computer Science*
Funded by: College of Engineering & Computer Science

A significant fraction of crude oil remains trapped within the pore structures of reservoir rocks after primary and secondary recovery, motivating the development of improved experimental tools for investigating enhanced oil recovery (EOR). This study presents a microfluidic technique for visualizing and quantifying oil penetration in PDMS-based microfluidic platforms designed to simulate reservoir rocks. To better replicate the mineral composition of natural carbonate formations, calcium carbonate ($CaCO_3$) and magnesium (Mg) were incorporated into PDMS. Crude oil stained with Nile Red enabled fluorescence imaging of oil penetration within the materials, while penetration depth was quantified from fluorescence images and validated using 3D micro-computed tomography. Results demonstrate that Nile Red significantly enhances visualization of oil penetration and enables quantitative estimation of penetration depth, while incorporation of $CaCO_3$ and Mg increases penetration depth compared with conventional PDMS. The proposed method establishes a reproducible platform for investigating capillary-driven oil transport in porous media and evaluating mineral-modified microfluidic materials for EOR studies.

Quantifying the Sim-to-Real Gap in OceanSim for Underwater Stereo Depth Estimation
Authors: **Samuel Merlin**
Faculty Mentor: *Georgios Sklivanitis, College of Engineering and Computer Science*
Funded by: College of Engineering and Computer Science

Underwater remotely operated vehicles (ROVs) depend on accurate depth perception for navigation, obstacle avoidance, environmental monitoring, and infrastructure inspection. However, light attenuation, scattering, suspended particles, and uneven illumination can degrade stereo correspondence and depth-estimation accuracy. Because repeated pool and open-water testing is costly and time-consuming, simulation offers a practical alternative for perception development. This project will quantify OceanSim's sim-to-real gap for underwater stereo-depth estimation. A ROS 2-integrated digital twin of a BlueROV2 equipped with an OAK-D S2 stereo camera will be developed and evaluated through matched simulated and physical experiments. Tests will vary target distance, viewing angle, illumination, and water visibility. Estimated depth will be compared with ground-truth measurements using relative depth error and related performance metrics. Differences between simulated and measured error distributions will identify conditions under which OceanSim reliably predicts stereo-depth performance and where additional calibration or real-world validation remains necessary for autonomous underwater perception research and deployment.

Characterization of Methionine Sulfoxide Reductase A and B3 Protein Expression in Doxorubicin-Treated Human Umbilical Vein Endothelial Cells
Author: **Jack H. Meyer**
Faculty Mentor: *Howard M. Prentice, Charles E. Schmidt College of Medicine*
Funded by: Office of Undergraduate Research and Inquiry

Doxorubicin (DOXO) is a potent chemotherapy drug, but its medicinal use is severely limited due to its negative cardiovascular effects. While prior research has focused on DOXO-induced injury in cardiomyocytes, endothelial cells are increasingly recognized as an important contributor in cardiovascular dysfunction. DOXO promotes oxidative stress in endothelial cells through excessive reactive oxygen species (ROS) generation, leading to mitochondrial dysfunction, cellular senescence, and loss of vascular integrity. Methionine sulfoxide reductases (Msr) are antioxidant repair enzymes that reverse oxidative damage to methionine residues in proteins. Preliminary RNA sequencing analysis identified increased expression of MsrB1, MsrB2, and MsrB3 following DOXO exposure in mouse heart lysates. This study aims to assess and characterize the extent to which changes occur in expression of MsrA and MsrB3 proteins respectively, in human umbilical vein endothelial cells (HUVECs) treated with DOXO to evaluate their potential involvement in endothelial response to chemotherapy-induced stress.

Examination of Microglial Morphology and Characteristics in the Dorsal Raphe Nucleus After Exposure to Early Life Stress

Authors: **Samuel Mittleman, Nicole L. Baganz, Paula A. Gajewski, and Randy D. Blakely**
Faculty Mentor: *Paula Gajewski, Stiles Nicholson Brain Institute; Randy D. Blakely, Charles E. Schmidt College of Science, Charles E. Schmidt College of Medicine, and Stiles Nicholson Brain Institute*
Funded by: Stiles Nicholson Brain Institute

Early life stress (ELS) produces effects that persist in adulthood, altering behavior and increasing susceptibility to neurobehavioral disorders. ELS can disrupt normal immune activity, elevating inflammatory markers. Increasing evidence suggests inflammation disrupts serotonin signaling, often producing behavioral effects seen in neurobehavioral disorders like depression and anxiety. Neuroinflammation is regulated by distinct immune cells in the brain known as microglia, which can produce inflammatory signaling molecules and alter their morphology as a result. These inflammatory signaling molecules, such as IL-1β, regulate their target cells via their cognate receptor, IL-1R1, which is known to be present on serotonin neurons. Behavioral data showed rescue of ELS-dependent behavioral changes when mice lacked IL-1R1, even though inflammatory molecules remained present. I performed examination of microglial morphology in these mice to determine whether the reactivity of these immune cells was altered in a similar direction, pointing toward a potential target for therapeutic intervention in the future.

Investigation of Natural Products (Alpha-santalol and Curcumin) as Potential Therapeutic Agents against Triple-Negative Breast Cancer Development

Author: **Sara Nasif and Ajay Bommareddy**
Faculty Mentor: *Ajay Bommareddy, Charles E. Schmidt College of Medicine*
Funded by: Office of Undergraduate Research and Inquiry

Being a complex malignancy, breast cancer, particularly the triple-negative type (TNBC) is one of the dreadful diseases with an increased risk of metastasis and relapse. Compared to the other types of invasive breast cancer, TNBC has fewer treatment options. Previous studies including those from our group have shown the antitumor potential of alpha-santalol, extracted from sandalwood oil and curcumin from turmeric against various cancers. The current study was undertaken to explore the role of these compounds against TNBC employing MDA-MB 231 breast cancer cells. Experimental methods including wound healing, clonogenic, cell viability, Western blot analysis and ELISA assays were used to assess the effects on cell viability, migratory potential and expression of various proteins. Results show that combination of alpha-santalol and curcumin is contributing to increased cell death in comparison to individual compounds. Currently, we are analyzing the expression of proteins to understand the role of NOTCH signaling pathway as a potential molecular mechanism.

Diverged Eugenol Synthase Isoforms in Tobacco, Identified Through Expression and Structural Modeling

Authors: **Maxine Nazaire**
Faculty Mentor: *Xing-Hai Zhang, Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

Eugenol is a compound produced by plants for protection against microorganisms and herbivores while also attracting floral pollinators. It is made by eugenol synthase (EGS1), an enzyme found in aromatic plants such as basil and responsible for their characteristic smell. This study investigates why tobacco does not produce eugenol. Using basil's EGS1, selected EGS1 isoforms in tobacco were identified and their conserved catalytic residues were compared by sequence analysis. Prepared cDNA from tobacco tissue and unique primers were used to quantify tobacco's expression of these related genes. 3D structural models were generated to visualize key structural differences. These proteins likely descend from a shared ancestral gene with EGS1 but diverged at the substrate-

binding pocket, shifting catalysis toward a different product. Clarifying this divergence deepens our understanding of how enzyme families evolve new functions and how plants diversify their defense mechanisms.

Canonical Glucocorticoid Receptor Signaling Drives Long-Term Behavioral Programming following Early-Life Stress
Author: **Aneesh Nudurupati and Erik Duboué**
Faculty Mentor: *Erik Duboué, Harriet L. Wilkes Honors College*
Funded by: Office of Undergraduate Research and Inquiry

Early-life stress (ELS) can produce persistent changes in neuroendocrine function and anxiety-related behavior, but the mechanisms linking developmental stress to adult phenotypes remain unclear. Previous work from the Duboué lab demonstrated that chronic stress during 2–6 days post-fertilization elevates later-life anxiety-like behavior and basal cortisol in zebrafish, identifying glucocorticoid signaling as a likely cornerstone of developmental programming. This project investigates whether glucocorticoid receptor (GR) signaling is required for these long-term effects. We hypothesize that GR activation during this developmental window alters transcription of genes involved in brain development, producing enduring behavioral changes. This summer, we established a behavioral platform that minimizes visual stimuli, optimized genotyping of GR loss-of-function fish and collected preliminary locomotor and novel-tank behavioral data. Future experiments will compare wild-type and GR-knockout zebrafish with and without ELS to determine whether GR is required for anxiety-like phenotypes. These studies will clarify how stress hormones reshape the developing vertebrate brain and may reveal mechanisms relevant to stress-related neurodevelopmental disorders.

The Protective Role of Torin1 against Doxorubicin Induced Muscle Atrophy
Authors: **Xena Pereira**
Faculty Mentor: *Andy Khamoui, Charles E. Schmidt College of Science; Claudia Rodrigues, Charles E. Schmidt College of Medicine; Nishant Visavadiya, Charles E. Schmidt College of Science*
Funded by: Office of Undergraduate Research and Inquiry

Cancer patients may suffer from cancer cachexia, a wasting syndrome that presents with muscle atrophy. This study aims to determine the effectiveness of Torin1, a mammalian target of rapamycin inhibitor and autophagy agonist, at lessening or preventing Doxorubicin-induced muscle atrophy by targeting oxidative stress through autophagy. Muscle tissue from cancer bearing and non-cancer bearing mice treated with either saline, Doxorubicin, or Doxorubicin+Torin1 were analyzed by histochemistry and spectrofluorometry. Experiments such as COX and SDH stains will determine muscle fiber size, in situ succinate dehydrogenase (SDH) activity, and the reactive oxygen species (ROS) concentration within muscle mitochondria. The results showed that Torin1 lessened muscle atrophy, normalized the number of hyperreactive SDH-positive muscle fibers, is a marker of dysfunctional mitochondria, and lowered ROS and oxidative stress. These findings suggest that autophagy activation in muscle may be a promising treatment to better the quality of life for patients with Doxorubicin-induced muscle atrophy.

Angiocrine Signaling in Neurodegeneration
Author: **Stella Potenti**
Faculty Mentor: *Claudia Rodrigues, Charles E. Schmidt College of Medicine*
Funded by: Office of Undergraduate Research and Inquiry

According to the World Health Organization, nearly 10 million cases of dementia are reported every year. Current treatment for dementia focuses on managing symptoms to slow progression. Identification of novel mechanisms that contribute to neurodegeneration is essential for the development of preventative and therapeutic strategies to treat dementia. Studies have shown that vascular dysfunction correlates with dementia. However, the mechanisms connecting vascular health, neurodegeneration and cognitive decline remain elusive. The goal of our project is to

investigate the potential involvement of endothelial-specific circadian clock deficiency in neuroinflammation and neurodegeneration. We used a genetic mouse model in which Bmal1, a circadian clock regulator is deleted in endothelial cells. Brains were harvested for molecular analysis. We found significant changes in the expression of Adamts4, an extracellular matrix regulator. Adamts4 gene polymorphisms have been previously reported in Alzheimer's patients. Ongoing studies are focused on the analysis of other markers of neuroinflammation and neurodegeneration.

The Illusion of Inclusion: Examining the Relationship between Gender Quota Design, Compliance, and Democracy in Central America
Author: **Sarah Roldan**
Faculty Mentor: *Lucas Perelló, Dorothy F. Schmidt College of Arts and Letters*
Funded by: Office of Undergraduate Research and Inquiry

Electoral gender quotas are used globally to increase women's political representation, helping women overcome cultural and systemic barriers (Tripp & Kang, 2008). The outcome of these affirmative electoral measures, however, varies significantly based on quota design, enforcement mechanisms, democratic quality, and party mandates (Schwindt-Bayer, 2009; Paxton & Hughes, 2007). This study analyzes 5,965 legislative officials in Costa Rica, El Salvador, Honduras, Nicaragua, Panama, and Guatemala based on gender distribution and quota implementation from 1953 to 2025. Referencing the Liberal Democracy, Women's Political Empowerment, and Women's Political Participation Index, we found that Costa Rica has implemented the most effective regional gender quota, on account of their strong quota design, enforcement mechanisms, party mandates, and democratic quality. Ultimately, increases in numerical legislative representation only correlate increases in women's empowerment when seen under a strong democratic framework – when democracy wavers, gender quotas become tools of political legitimization that masks the absence of genuine inclusion.

Investigating the Role of CGAS in Huntington's Disease Ribophagy
Authors: **Alyssa Rozenblat and Anuradha Kesharwani**
Faculty Mentor: *Srinivasa Subramaniam, Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

Huntington's disease (HD) is an inherited neurodegenerative disorder caused by an expanded CAG repeat in the HTT gene, resulting in the production of mutant huntingtin (mHTT) protein and progressive degeneration of striatal neurons. Growing evidence suggests that mHTT disrupts autophagy and inflammatory signaling, contributing to disease progression. Cyclic GMP–AMP synthase (cGAS), a cytosolic DNA sensor, regulates both innate immune responses and autophagy through the cGAS–STING pathway. Recent findings indicate increased ribosome occupancy on cGAS mRNA in HD, suggesting altered translational regulation. Furthermore, cGAS expression is elevated in HD striatal cells compared with healthy cells, while HD cells exhibit enhanced autophagic activity. The ribophagy-associated proteins RPL12 and NUFIP1 are also upregulated, indicating altered ribosome turnover. This study aims to investigate the role of cGAS in ribophagy during nutrient deprivation by quantifying ribosomal protein levels over time, providing insight into mechanisms underlying HD pathogenesis.

Using the P-Star Model to Forecast Short-Run Inflation
Author: **Jack Steckel**
Faculty Mentor: *Bryan P. Cutsinger, College of Business*
Funded by: Office of Undergraduate Research and Inquiry

The P-Star model uses the quantity theory of money to derive an equilibrium price level, and the gap between that level and actual prices should then predict inflation. In terms of measurement, most monetary aggregates simply sum their components together. The Divisia aggregates weight each component by how much it contributes to

spending, which helps to capture the money that households and businesses actually rely on. Our study extended Peter Ireland's quarterly P-Star framework to monthly United States data. We then built our sample from nine Divisia aggregates published by the Center for Financial Stability, and we tested each one from 1967 forward. All nine were positive and significant. Our model reduced twelve-month forecast error relative to a random walk, while the Phillips Curve performed worse than that same benchmark. In essence our results help to show that properly measured money still carries information about future inflation.

Beyond Practice: Examining the Effects of Post-Practice Daytime Sleep and Quiet Rest on Speech-Motor Learning
Authors: **Brielle Walter**
Faculty Mentor: *Anne L. van Zelst, College of Education*
Funded by: Office of Undergraduate Research and Inquiry

Spoken language relies on accurate and precise articulation. Memory consolidation occurs during offline intervals, including sleep, and promotes efficient learning of new skills. This study investigates the less-examined effects of post-practice daytime naps and quiet rest on speech-motor learning. Ten native English speakers ages 18 to 25 were trained on a Danish vowel contrast and randomly assigned to a three-hour period containing sleep or quiet rest, or immediately moved to the post-training. We computed 3-D Euclidean distance (F1, F2, F3) between the participants' productions and the Danish targets and compared the effect sizes (Cohen's d) across conditions. This preliminary sample revealed that the sleep group showed greatest improvement from pre- to post-test (d = 0.20), compared to quiet rest (d = 0.08) and immediate testing (d = 0.05). Further research may lead to new interventions and educational practices for individuals with motor speech disorders and those learning a new language.

Phenotypic Characterization of Drosophila Attractin in Neuroendorine Cells
Author: **Holly Ward, Emily Arbesfeld, Fernanda Salomo del Bianco, Kat Sankey, and Tanja A. Godenschwege**
Faculty Mentor: *Tanja A. Godenschwege, Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

Loss of function of mammalian Attractin (Atrn) transmembrane protein has been linked to metabolic and behavioral disorders (e.g. sleep and feeding), as well as neurodegeneration. Its function has only been characterized with respect to melanocortin receptors in the hypothalamus and hair follicles to regulate appetite and pigmentation respectively that do not explain many of the pleiotropic phenotypes. Non vertebrates do not express melanocortin receptors, yet Drosophila Atrn (Dsd) mutants mimic the mammalian cellular, organismal, and behavioral phenotypes. We show that Dsd is expressed in insulin producing cells, and other neurosecretory cells that release hormones homologous to mammalian corticotropin and calcitonin, which are known to regulate various functions relevant to organismal health such as stress responses, feeding behavior, body-fluid secretion, starvation tolerance and lifespan. Here we assessed the effects of Dsd loss or gain of function on life-span, high sugar diet, starvation and desiccation.

Not Presenting Today

User-Defined Privacy-Aware Robot Mapping and Navigation via Semantic Mapping and Motion Planning
Author: **Nisa Albino**
Faculty Mentor: *Minghan Wei, College of Engineering and Computer Science*
Funded by: Office of Undergraduate Research and Inquiry

In Situ Characterization of ECM Microdomains and C1q Localization Using Multiplexed Array Tomography

Author: **Valentina Campos, Arshia Prem, and Michael Robinson**
Faculty Mentor: *Simon Pieraut, Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

Complement component molecule C1q, known for its role in immune responses, has emerged as a major regulator of brain function. It is mostly recognized for its role in synapse elimination through microglia-mediated phagocytosis. Dysregulation of C1q can contribute to the pathology of neurodegenerative diseases like Alzheimer's through excessive synaptic elimination. However, there is little known about how C1q diffusion and bioavailability is regulated. Previously, our laboratory identified a strong accumulation of C1q within the extra-cellular matrix (ECM). The ECM is a three-dimensional molecular meshwork surrounding cells that plays a critical role in regulating plasticity. We therefore hypothesize that ECM, via a strong interaction with C1q, provides a reservoir for this signaling molecule. In this study, we used stereotactic brain injection to manipulate ECM integrity. Combined with our histology work, we aim to determine how ECM composition controls the distribution of C1q and its impact on synaptic network and microglia activation.

A Serological Survey of Infectious Pathogens in Florida Scrub-Jays

Author: **Kanaa Clarke**
Faculty Mentor: *O. Alejandro Aleuy Young, Charles E. Schmidt College of Science*
Funded by: Charles E. Schmidt College of Science

National Science Foundation Center for Smart Streetscapes
My Summer Streetscapes High School Program

Digital Transparency Initiative: An Intelligent Government Record Recommendation System for Citizen Access

Author: **Levni Apraku-Mensah**
Faculty Mentor: *Suvosree Chatterjee, College of Engineering and Computer Science; and Jenifar Selim, Sara Sevilla, and Serena Hoermann, Charles E. Schmidt College of Science*

The rapid advancement of digital technologies has transformed how governments collect, manage, and store citizen information, making online public records containing personally identifiable public information (PIPI) increasingly accessible. While these systems improve transparency and administrative efficiency, they also raise concerns about citizens' awareness of and access to the information held about them. Although prior research has examined government transparency and public records, limited attention has been given to how citizens identify, understand, and interact with their own government-held records. This research proposes a citizen-centered digital transparency platform that leverages artificial intelligence to help residents identify relevant government records and navigate the legal processes for requesting access, correction, or removal where permitted by law. Using West Palm Beach as a case study, the project aims to improve transparency, accessibility, and citizen engagement with government-held information.

SmartWalk: AI-Based Pedestrian Detection and Driver Alert System for Intersection Safety

Author: **Ryan Calixte and Cassandra Glomann**
Faculty Mentor: *Suvosree Chatterjee, College of Engineering and Computer Science; and Jenifar Selim, Sara Sevilla, and Serena Hoermann, Charles E. Schmidt College of Science*

Pedestrian safety at urban intersections remains a significant concern due to increasing traffic volumes and declining driver attention. Palm Beach County has experienced persistent concentrations of crashes at major intersections, placing pedestrians, cyclists, and motorists at greater risk of injury and death, causing citizens to grow fearful of commuting. This proposal presents an artificial intelligence (AI)-based pedestrian detection and driver alert system designed to improve intersection safety by monitoring crosswalks. When pedestrians are detected approaching or entering a crosswalk, the system alerts drivers through visual and audio notification systems, encouraging drivers to yield. By combining real-time object detection with digital, colored displays corresponding to alert levels, SmartWalk aims to reduce collisions, increase pedestrian confidence when navigating intersections, encourage driver awareness, and promote safer transportation throughout West Palm Beach.

Proxirail: An AI-Based Framework for Quantifying Pedestrian Near-Miss Events at Railway Grade Crossings

Author: **Adrian Garcia and Gerald Mano**
Faculty Mentor: *Suvosree Chatterjee, College of Engineering and Computer Science; and Jenifar Selim, Sara Sevilla, and Serena Hoermann, Charles E. Schmidt College of Science*

Pedestrian–train collisions remain a significant safety challenge despite physical barriers designed to prevent track intrusions. In 2025, 56% of pedestrian-train collisions in the U.S. occurred when pedestrians ignored the crossing gates meant to stop and protect them from the train. Existing computer vision approaches detect pedestrians at railway grade crossings but do not quantify the severity or frequency of unsafe interactions. This paper presents ProxiRail, a computer vision framework that combines pedestrian detection, multi-object tracking, and Post-Encroachment Time (PET) to quantify pedestrian near-miss events. The framework also incorporates contextual information, such as warning gate status, to provide a more comprehensive assessment of crossing safety. Requiring no additional sensing infrastructure beyond an existing fixed camera, ProxiRail enables behavioral risk profiling of railway grade crossings and provides a foundation for safety analytics and future dynamic risk assessment at grade crossings through integration with real-time train information APIs.

CitySpeak: An AI-Based Mascot for Conversational Civic Engagement
Author: **Sabrina Kaiser**
Faculty Mentor: *Suvosree Chatterjee, College of Engineering and Computer Science; and Jenifar Selim, Sara Sevilla, and Serena Hoermann, Charles E. Schmidt College of Science*

Public participation is essential to effective local governance, yet traditional civic engagement mechanisms may present obstacles to many, limiting community involvement. This paper presents Wes, our AI-powered conversational mascot designed to collect public feedback through natural conversations with citizens in public spaces. Wes integrates a computer vision module to detect pedestrians, as well as a large language model (LLM) to engage citizens in context-aware conversations grounded in knowledge of city projects, geographic information, and current municipal developments. Each interaction is automatically summarized into structured insights and visualized through an analytics dashboard, providing city officials with actionable community feedback. Although the current implementation focuses on West Palm Beach, the proposed architecture is readily adaptable to other municipalities.

StreetSense: An AI-Based Web Application for Sidewalk Infrastructure Monitoring and Reporting
Author: **Vanessa Pierre, Brian Li, and Daventzky Edouard**
Faculty Mentor: *Suvosree Chatterjee, College of Engineering and Computer Science; and Jenifar Selim, Sara Sevilla, and Serena Hoermann, Charles E. Schmidt College of Science*

Many cities lack complete and up-to-date information about sidewalk conditions. These gaps affect pedestrians, cyclists, people with disabilities, and local government workers who depend on accurate infrastructure information to improve safety and accessibility for all residents. This paper proposes StreetSense, an artificial intelligence-based civic infrastructure monitoring system currently focused on West Palm Beach, Florida. The system allows users to upload photos of sidewalk and public walking-area issues. Computer vision models would classify visible problems, rank the issue based on a calculated severity score, and place reports on a map. A large language model then generates an issue summary that helps users submit clearer reports through existing West Palm Beach systems, such as WPB Key or the City Hotline. Unlike general sidewalk-mapping systems, StreetSense WPB focuses on adapting visual AI and civic reporting workflows to local infrastructure needs. StreetSense computer vision, geospatial mapping, and social-science-informed design to support safer, and more accessible public spaces.

Vertically Integrated Projects (VIP)

A Scoping Review of Artificial Intelligence Research Within Child Welfare: Research-Driven Implications for Enhancing the Well-being of Families and Professionals

Author: **CJ Bingham, Rosalinda Esther, London Taylor, and Nadely Benoit**
Faculty Mentor: *Morgan Cooley, College of Social Work & Criminal Justice; Alan Kunz-Lomelin, College of Social Work & Criminal Justice; Fernando Koch, College of Engineering and Computer Science*

Artificial intelligence (AI) is increasingly being explored in child welfare, yet its applications and implications remain fragmented. This presentation summarizes the results of a scoping review examining how AI is being used across child welfare research and practice. The review followed the methodology described by Mak and Thomas (2022) and was reported using the PRISMA 2020 guidelines (Page et al., 2021). Articles identified across three databases were categorized into: (1) practice-based applications spanning the child welfare continuum, (2) research on AI implementation in child welfare, and (3) theoretical or foundational AI research relevant to child welfare. Findings highlight emerging opportunities for AI to support decision-making, service delivery, and research, while emphasizing the need to address ethical considerations, transparency, and responsible implementation. Recommendations are provided for future research, policy, and practice to ensure AI is used to support child welfare professionals, children, families, and allied service providers.

Advancing Behavioral Connectomics: Translating Connectomic Simulations into Behavioral Approximations with the Fast Escape Response of Drosophila

Author: Juan Lopez
Faculty Mentor: *Rodrigo Pena, Charles E. Schmidt College of Science; Rod Murphey, Charles E. Schmidt College of Science; Casey Spencer, Harriet L. Wilkes Honors College*

Recent advances in connectomics have produced large-scale anatomical reconstructions of Drosophila neural circuits, yet most analyses remain static or rely on highly abstracted models. We present a computational framework that executes measured connectome data as biophysically grounded neural simulations. The framework aggregates neuronal morphology and connectivity from Drosophila connectome datasets (MANC, male-CNS) via the neuPrint+ API, systematically repairs and annotates neuron skeletons, and instantiates conductance-based, morphology-aware network models in NEURON. Executed neural activity can be coupled to a physics-based body model in MuJoCo, enabling circuit-driven motor output to generate behavior in a physicalized fly model. Using this approach, we demonstrate that anatomically defined circuits can produce structured motor outputs consistent with known circuit function, despite incomplete physiological annotations. This work provides the first reference framework for evaluating the behavioral consequences of executing connectome-scale circuitry.

Beach Occupancy Monitoring for Coastal Resilience

Author: **Bao Nguyen**
Faculty Mentor: *Soyoung Park, College of Business; Jinwoo Jang, College of Engineering & Computer Science*

Coastal areas experience varying levels of tourist concentration, with popular beaches facing overcrowding, while less-visited beaches experience limited economic activity. This project proposes a computer vision system that aims to support coastal resilience by providing real-time data on beach occupancy. Live video frames from public cameras are periodically captured and analyzed by a crowd-counting model to estimate the number of people present on selected beaches. By comparing occupancy levels across multiple beaches, the system provides a way to distinguish between overcrowded and undercrowded locations and reveals behavioral patterns that can help with planning tourist redistribution strategies. This could reduce traffic congestion and environmental strain on well-known beaches, while boosting local economies of less-visited ones.

Glia-dependent Potassium Buffering Modulates Motor Circuit Function in Drosophila
Author: **Kimberly Schweiger, Panteha Sartipi, Nahila Davis, and Cesar Ceballos**
Faculty Mentor: *Casey Spencer, Harriet L. Wilkes Honors College; Rodrigo Pena, Charles E. Schmidt College of Science*

Glial cells maintain ion homeostasis, but how potassium buffering shapes neural circuit function remains unclear. Inwardly rectifying potassium channels (Kir/Irk) mediate extracellular potassium clearance, yet their circuit-level roles are not well defined. Using Drosophila melanogaster and its well-characterized giant fiber escape circuit, we disrupted glial potassium channels Irk2 and Irk3 with subtype-specific Gal4 drivers to examine how buffering affects circuit physiology. The central nervous system (CNS) includes astrocyte-like glia (ALGs), ensheathing glia (EGs), and cortex glia (CGs) (Kremer et al., 2017); while prior work has focused on astrocytes (Chen et al., 2025; Geier et al., 2025; Kelley et al., 2018), we extend analysis to additional subtypes identified through single-cell atlas screening for Kir/Irk candidates. In vivo electrophysiology shows altered motor circuit function with reduced buffering, particularly in ensheathing glia. Confocal microscopy confirmed the anatomical relationships between glia and the motor circuit. These findings suggest that glial potassium buffering contributes directly to motor circuit stability and failure thresholds.

Membrane-Mediated Amyloid-β Aggregation and Mitochondrial Dysfunction in Alzheimer's Disease
Author: **Md Raza Ul Karim, Mohammed Selim, Tram Nguyen, Jevon McLeod, Miloph Decius, Nadhri Mahal, and Emily Romanczuk**
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Alzheimer's disease (AD) is a progressive neurodegenerative disorder marked by memory loss and cognitive decline1. Although extracellular amyloid-β (Aβ) plaques are a hallmark of AD, growing evidence suggests that early intracellular Aβ accumulation, particularly within mitochondria, contributes to mitochondrial dysfunction, oxidative stress, and neuronal degeneration2. Although Aβ-induced mitochondrial dysfunction has been widely studied, the molecular mechanisms by which Aβ disrupts mitochondrial membrane integrity remain unclear. Our invitro lab we synthesize, purified and characterize Aβ peptide and its interaction with cardiolipin membrane to assess membrane damage and peptide aggregation, aiming to identify the earliest molecular events underlying mitochondrial toxicity in Alzheimer's disease3. Our computational study cover NAMD REST2 remodeling study4 to figure out underlying interaction for the study.

Public Opinion of Sargassum Presence on Floridan Beaches
Author: **Iris York**
Faculty Mentor: *Soyoung Park, College of Business; Jinwoo Jang, College of Engineering & Computer Science*

Sargassum is a prevalent seaweed that has been a part of southern-Floridan beaches for years. Recently, the presence of this leafy brown seaweed has significantly increased, through algae and sargassum blooms. This research sought to gauge public opinion on this increase by analyzing YouTube content related to sargassum in Florida. The data used was collected through YouTube's publicly available API, which retrieved associated meta data containing the keywords "Sargassum" and "Florida." The text data was preprocessed to remove non-content elements (e.g., "
" tags). This prevented confusion with the unrelated characters. Topic modeling was then conducted utilizing BERTopic, with Hugging Face supporting text representation and visualization. The results from this research allow valuable insight into public focus and opinion of sargassum presence and could mark areas of interest for future study. Two examples: "florida_ruined_state_ruin" and "tourism_organism_primarily_dune" show resentment towards sargassum, and how these frustrations bleed into existing problems with tourism.