

Undergraduate Research Scholars Symposium

Abstract Book

FEBRUARY 27, 2019

Texas A&M University



LAUNCH

UNDERGRADUATE RESEARCH

Symposium Schedule

Free & Open to the Public

AM

9:00-11:15		oral presentations
10:00-11:00		poster presentations

PM

1:00-4:30		oral presentations
3:00-4:00		poster presentations

Student Voices from the 2017-2018 LAUNCH URS Symposium

“I really appreciated receiving feedback on my presentation from the professors right after I presented. It gave me a really good idea of the things that I need to work on improving.”

“I liked presenting to people that didn't necessarily have the same technical background, and the questions they asked were useful as well.”

“Low pressure environment. I got great feedback from faculty who've done this before and were very direct about exactly what they liked and what I could have done better.”

“I like that the active listeners gave constructive feedback and that they were polite and asking questions. I liked that the Symposium was open to everyone and that it gave a comfortable space to present. For being the first presentation for many of us, it was great that we felt comfortable in our own space.”

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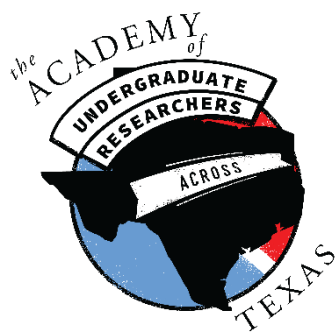
About the LAUNCH URS Symposium

The LAUNCH Undergraduate Research Scholars (URS) Symposium showcases undergraduate researchers in the Undergraduate Research Scholars thesis program. The URS thesis program provides undergraduates with a graduate student experience by allowing them to participate in research, produce a professional document, and communicate their findings as principal authors to the University's scholarly community.

The URS Symposium is free and open to the public. Faculty, staff, post-doctoral and graduate students, as well as undergraduate students from all disciplines are encouraged to visit the LAUNCH URS Symposium to learn about numerous research projects being conducted on campus by undergraduates and discover ways to get involved in research at Texas A&M University.

Special Recognition

The Academy of Undergraduate Researchers Across Texas (AURA Texas) is a community of elite student researchers at the two flagship universities in the state, and provides these exceptional students with networking opportunities, the chance to hone their professional skills, and a venue to discuss the importance of undergraduate research and the impact it has on their lives and in Texas. Through AURA Texas, LAUNCH: Undergraduate Research at Texas A&M University, College Station, aims to strengthen the visibility of undergraduate research in Texas with our counterparts at The University of Texas at Austin and offices of Government Relations.



The second annual meeting of the Academy of Undergraduate Researchers Across Texas (AURA Texas) coincides with the LAUNCH URS Symposium. Members of AURA Texas from both Texas A&M University and The University of Texas at Austin will present research posters during the afternoon poster session in the MSC Bethancourt Ballroom.

Oral Session 1: 9:00-10:00 AM

Room: MSC 2500

Grid Simulation to Model Use Cases for Blackout Restoration Using Electric Vehicles

Clare Lamers and Clay Ozuna

Power blackouts pose physical, financial, and reputational risks that impact surrounding areas negatively. Electric vehicles can serve as generators, supplying power in blackouts to help make the grid robust and mitigate the damage caused. As load demand continually increases, generation capacity has remained relatively stable. Our project will focus on the possibility of using electric vehicles as a generation source to solve the load growth problem. This will be done by building a unique grid simulation to fulfill a demand for an end to end model. From the model, we can simulate blackouts and explore the possibility of using electric vehicles to aid restoration.

Queen of a Sun-Drenched Land

Eliza Dawn Thomas

Queen of a Sun-Drenched Land centers around Ramona Santos Riojas, a graduate student of animal science at the University of Sao Paulo. She enjoys her studies and is eager to discover the newest innovations in the field of agriculture, but she still feels guilty about the life she left behind at her family's farm on the Parana River floodplain, especially considering that her father took her leaving for school as a personal betrayal. When her father's death forces her to return home and exposes the truth, that the farm is failing, in part due to a devastating disease sweeping through their cattle herds. She is forced to go to Tarleton State University in Stephenville, Texas, following a professor she met in the past who may have clues regarding the disease. Once in Texas, she has to contend with a vastly different culture, language barriers, and isolation" in addition to the fact that she can see and interact with entities no one else can see, figures from myth and lore. She will eventually discover that she is more closely linked to the myth of a lua, the moon goddess, than she ever imagined, and this special link could be the key to saving the farm. This creative work examines the way traditional Brazilian culture influences the lives of modern Brazilians, and also how living and studying in a culture different from one's own can affect a person's connection to their home as well as psychological wellbeing.

Using Climate Factors to Explain the Increasing Incidence of Anaplasma phagocytophilum in Minnesota and Wisconsin from 2005 to 2015

Adam Peterson Baker

The human incidence rate of anaplasmosis has been increasing in recent years within the United States, especially in Minnesota and Wisconsin. Some researchers have demonstrated that climate affects the distribution of tick-borne diseases. Thus, I aim to identify the relationship between climate factors and *Anaplasma phagocytophilum* infections in Minnesota and Wisconsin from 2005 to 2015. I will retrieve data for infections and climate factors from publicly accessible sources including National Notifiable Diseases Surveillance System and National Oceanic and Atmospheric Administration Climate Data Online. I then will conduct the analysis using multiple linear regression models to identify and quantify the importance of climate factors on anaplasmosis infection rates.

Room: MSC 2501

Automated Printed Circuit Board Test Bench

Millie Kriel

Printed Circuit Boards are used to electrically connect components that are soldered onto the board in order to perform a function or task. They are manufactured by etching out copper traces from the copper layer that is adhered to a non-conducting substrate. Testing a PCB by manually applying and measuring signals is a very time consuming process. However, designing and building a specific automated functional test for one PCB could be expensive and could become obsolete if another board design needs to be tested. To solve this problem, a software interface will be designed that initializes and completes a test using commonly found, laboratory electrical equipment. The program will allow users to input a PCB's functions and pass/fail criteria and then to run the test to receive a test report, indicating the result of each function's test status.

Polycyclic Aromatic Hydrocarbons (PAHs) and Polychlorinated Biphenyls (PCBs) in Epibenthic Deep-Sea Megafauna of the Northern Gulf of Mexico

Michael Chase Lawson

A total of 48 persistent, bioaccumulative, and toxic substances (PBTs) were analyzed in epibenthic deep-sea megafauna, and Sargassum spp. using gas chromatography mass spectrometry (GCMS); 16 polycyclic aromatic hydrocarbons (PAHs), and 29 polychlorinated biphenyls (PCBs). The epifauna were taken from the Gulf of Mexico at a depth of around 2,000 m during the summer of 2017, and Sargassum spp. from overlying surface water during 2015-2016. Six independent diagnostic ratios were used in determining the source(s) of the PAHs. It was found that the most predominate PAHs in the deep-sea megafauna were of pyrogenic (combustion) origin. The compound present in the highest concentrations for both the invertebrates and Sargassum spp. was dibenz[a,h]anthracene, which is a pyrogenic compound present in gasoline emissions and other end products that result from the combustion of organic matter. Benzo[a]pyrene, another high molecular weight compound found in high levels during this study is also a pyrogenic compound found as a result of the same processes. The most prevalent PCBs found in the deep-sea invertebrates were PCB 101, and PCB 138; for Sargassum spp. PCB 18 was found at the highest concentrations. The findings suggest that these predominantly anthropogenic pollutants are being delivered to the deep ocean, as well as to the organisms inhabiting it, at significant concentrations.

The Use of Second Life as a Synchronous Learning Tool in an E-Learning Environment

Taylor Bell and Emily Tepera

This study attempts to close the gaps found in previous studies targeting online learning that show student engagement is poorer in online courses as compared to face-to-face courses and this poor engagement poses risks to both the student and their instructors (Stott, 2016). We carried out this research in conjunction with Texas A&M's online undergraduate course, EHRD 315 (Applied HRD in the Workplace). In this course, learners will be required to participate in three case studies throughout the semester in Second Life (See Table 1). The learners created a Second Life account, completed a basic navigation training, and then participated in an interactive simulation for EHRD 315. Live actors role played the different characters in this simulation. Using Dr. Marcia D. Dixon's validated engagement survey, in Fall of 2018 a baseline engagement level was established using the traditional e-learning version of the course as it had been taught the past four years. In the Spring of 2019, the case study discussions which were previously completed through google hangouts, were moved to the virtual world, Second Life, and the students were asked to complete the simulation(s). After completion of all simulations, Dr. Dixon's engagement survey was sent out to the students in Spring of 2019. While the case studies will be required for the class, the survey is completely voluntary. The survey yielded quantitative data which was analyzed for learner engagement in a synchronous e-learning activity using the medium of Second Life. The expected outcome of this research will be a new tool that e-learning facilitators can utilize for administering online classes that will effectively engage learners and hold them accountable for their learning.

Room: MSC 2502

Screening for Hetero-Multivalent Binding of Lectin: Optimization of a Turbidity-Based Emulsion Agglutination Assay

Rachel Tindall

A thorough understanding of the process bacterial pathogens use to infect host cells is an important factor in developing an antimicrobial that will provide efficient and effective defense against such infection. The first step of this infection process is initiated when a protein on the surface of the bacteria binds to lectin receptors on the surface of the host cell. This binding, when comprehensively analyzed, can provide insight that improves design of special drug delivery techniques. We optimized a turbidity-based emulsion agglutination assay for high-throughput analysis of this binding mechanism between proteins and lectin for applications in screening of specific bacterial characteristics. By successfully developing a protocol using simple, highly available instruments, including an UV spectrometer and tip sonicator, to prepare emulsions of model membranes, our goal is to develop a method that allows us to screen large molecular libraries in order to identify the combinations of proteins that exhibit hetero-multivalent binding characteristics and apply this knowledge to improve drug delivery for specific bacterial infections, so that lower concentrations of drugs can be used to battle disease.

Contradictions in Community: How Plurinationalism Transforms the National Community

Rebekah Jordan Burnham

Community is an idea that has taken many forms and subsequently offers no decisive definition. Because of the ambiguity regarding the concept of community, I will seek to understand community as it relates to the nation-state, specifically in order to understand the emerging phenomenon that is plurinationalism. Ernest Gellner's definition of the nation-state has come to be accepted by scholars as the correct delineation of nation-states. Nation-states are based upon the principle of nationalism, which holds that the political unit and cultural unit should be congruent in order to produce political legitimacy. Nationalism is therefore the principle that lends political legitimacy to a nation, and nationalism is likewise the foundation from which the nation is produced. Given the idea that the congruence with a cultural community is what gives legitimacy to the political unit, what kind of legitimacy can come from a community that defines itself as plural? Can pluralism be the basis and the glue for a wider community explicitly imagined to support/legitimize the existence of a state? This research will therefore seek to understand plurinationalism as it relates to the idea of cultural community.

Prediction of ICU Readmission Using Clinical Notes

Justin Lovelace

Unplanned readmissions to the ICU result in higher medical costs and an increase in the likelihood of adverse events, extended hospital stays, and mortality. Machine learning models can leverage the large amount of data stored in electronic health records to predict these cases and provide physicians with more information about patient risk at the time of ICU discharge. Most prior work in this area has focused on developing models using only the structured data found in electronic health records and neglect the large amount of information stored in clinical notes. This work focuses on applying interpretable deep learning techniques to these notes to predict ICU readmission.

Room: MSC 2503

A Simulation Model for Procedural Improvement in Healthcare Settings

Douglas Fletcher

Lean is the set of managerial ideas founded on the idea of continuous procedural improvement, which have been successfully implemented in multiple settings from production floors to hospital settings to improve a host of procedural metrics. But while there has been much success in these implementation measures, the promises of lean remain unfulfilled due to piecemeal strategies for their implementation, a lack of training associated with the lean mindset, and cultural barriers inherent to healthcare. Some have even tried to implement models in terms of lean management, but previous models have overly complicated and unfocused on bringing stakeholders into the learning process. Thus there has been a call for evermore simplistic models as a way to validate and communicate the impact of lean techniques. We to create a game-based simple discrete event simulation model, based on the children's game, Cootie, that can be used to identify piecewise process improvement strategies and to educate process stakeholders in lean techniques.

Future Time Perspective and Goal Setting Among College Students: A Measurement for the Dimensions of Future Time Perspective

Enrique Lopez Ramirez

The perceptions of the future, including attitudes, beliefs, and actions toward it, have been formalized into a construct known as future time perspective (FTP). The purpose of this study is to determine if college students' demographics correlate with their FTP and if there is a likelihood that a goal is short-term or long-term based on FTP. The hypothesis of the researcher is that both will correlate to FTP. The theoretical framework of this research study includes FTP as understood and measured by the "Future Time Perspective Scale" (FTPS) by Husman and Shell (2008). It also includes the common view that a short-term goal is one that can be completed in less than a year, and that a long-term goal is a goal that takes a year or more to complete. Participants will be undergraduate freshmen (first-year) and senior (fourth-year) students enrolled in Texas A&M University contact via email in to participate in the online study. The study includes a questionnaire asking about demographic characteristics, a request to list the most important professional, academic, personal, and social goals the students have and the predicted length time it will take to achieve the goals, and the FTPS by Husman and Shell to measure FTP. This data will be used to test the hypothesis.

Oral Session 2: 10:15-11:15 AM

Room: MSC 2500

Computer Simulation of Dynamic Behaviors of Microtubule Protofilaments

James Edward Gonzales II

The purpose of this study is to explore and understand the behavior of microtubule protofilaments in a dynamic environment through molecular dynamics simulations. Microtubules (MTs) play a vital role in various cellular processes, such as: transport of materials within cells, cell structure and stability, and namely cell division. During normal cellular processes, MTs polymerize and depolymerize depending on the nucleotide present in the end tubulin, either guanosine triphosphate (GTP) or guanosine diphosphate (GDP). To understand the effects of the nucleotide state, molecular dynamics simulations will be performed, and the results analyzed to quantify the mechanical properties of MTs, and how those properties differ depending on chemical differences influenced by the change in nucleotide state. The simulations will be performed on Texas A&M's High Performance Research Computing machines. From the simulations, data collected will be analyzed using a state-of-the-art method developed in our lab. This analysis will provide the bending stiffness of the filament along a major and minor bending axis. Additionally, an analysis on the non-polar and polar bonds found between tubulin will be performed to see the chemical effect of the nucleotide state on the mechanical properties of MT protofilaments. From the results of this study, it has been shown that there is indeed a difference in mechanical properties which depends on the nucleotide state of the last tubulin. The hydrolysis of GTP to GDP alters the structure of the MT in small ways which change the chemical bonds present between tubulin. These changes in chemical bonds lead to the differences in mechanical properties present in the two conformational states of a MT protofilament.

Contemporary U.S. Foreign Policy in Afghanistan, Iraq, and Syria

Anna Marie Sasaki

In U.S. foreign policy after the Cold War, there have been various operations implemented in Afghanistan and Iraq, that has been proven to be either effective or ineffective in furthering U.S. goals, and are currently being implemented in Syria.

Examining the Impact of Service Interruptions on Social Groups During Natural Disasters

Natalie Coleman

Natural disasters place tremendous pressure on critical infrastructure systems by testing their service reliability under extreme conditions. System failures are inevitable during harsh events, and prolonged disruptions could pose a serious risk to the mental, physical, and emotional well-being of community residents. However, research has shown that the infrastructure service disruptions will not be experienced the same way by the sub-populations in the community, and socially vulnerable groups tend to suffer more from such disruptions. The research paper suggests that different social factors including income, race/ ethnicity, education, age, medical conditions, house type, homeownership, and years of residence could magnify the disaster impact. The objective of this paper is to identify the social factors most influential to the differences in the disaster impact due to the service disruptions. The temporal and physical context of this study were the transportation, communication services, water, and power outages during and in the immediate aftermath of Hurricane Harvey in 2017. The research concluded that specific social groups were disproportionately affected. The findings demonstrate the need to integrate the social dimensions in disaster mitigation and planning practices in order to make improvements on the current condition of the infrastructure systems to address inequalities in risks experienced by the residents due to natural disasters.

Room: MSC 2501

Effect of Varying Footwear and Foot Strike Pattern on the Internal Forces of the Knee and Achilles Tendon

Madeline Franke

The most common sites of running-related injury in athletes are the knee joint and Achilles tendon. Therefore, lower-extremity biomechanics is extensively studied in order to understand the factors that contribute to these injuries. The project objective is to investigate the effect of footwear-type and foot-strike pattern on patellofemoral contact and Achilles tendon forces. Foot-strike pattern has been shown to be a significant factor affecting internal forces in the Achilles tendon and knee joint. Additionally, other factors such as footwear type have been seen to alter gait. Investigating how these factors contribute to the internal forces runners experience would provide a solid basis to relate specific practices to injury types. Cadaver studies focusing on the patellofemoral joint and Achilles tendon have led to the development of mathematical models that help estimate these internal forces. This project will use these models in order to further explore how the forces are affected by footwear and foot-strike pattern. Body kinetics and kinematics will be investigated using primarily motion capture technology. It is expected that barefoot, forefoot strike runs will have the lowest patellofemoral contact and Achilles tendon forces.

Effects of Aryl Hydrocarbon Receptor on Tumor Progression in Presence of Low and High Fat Diet

Soroush Farsi

The epithelium is the main barrier to the external environment in the GI tract, and it is constantly exposed to different carcinogenic factors that could cause cancer in this layer. However, there are specific signaling pathways which respond to the presence of carcinogenic molecules inside the cells and help the cells to detoxify themselves from carcinogenic elements. Ligand-activated Aryl Hydrogen Receptor (AHR) is a transcription factor that controls the expression of a diverse set of genes². One role of AHR is preventing tumorigenesis through degradation of B-catenin and inhibiting the overgrowth of intestinal and colon cells¹. We measured the intensity of B-catenin in the nucleus and cytosol of epithelial cells of four different groups, + AHR and - AHR and high and low-fat diet, in order to compare cell proliferation differences among these groups. The highest level of tumor formation is expected in mice on a high fat diet which do not express AHR and lowest level of tumorigenesis is expected from mice on low-fat diet which express AHR.

Education and Obedience

Anna Snyder

Education can teach us either to think critically or to be blindly compliant. It impacts every aspect of society and can create either critical thinkers or obedient workers. I believe that our current methods of educating children do not foster the type of critical thinking we claim to foster. Rather, I argue that our current methods of educating children to be blindly obedient foster the groundwork for human horrors, such as genocide on the scale we witnessed during the second World War. I think that, while our natures do play a role in our likelihood to obey or not, it is our education that can bring us up either to obey blindly or to obey but of our own volition. In this sense, the literal future and the moral wellbeing of humanity depends on the formation of humans through education. In my thesis, I address several questions: Why do we obey? If our natures play a role in our tendencies to obey or not, how does education affect obedience in either a good or bad way? Ought we to obey? If so, when? In contrast, if there are times when we ought not obey, what creates that distinction? To answer these questions, my research focuses mainly on philosophy of education and human nature, and how the two are combined. Additionally, I rely heavily upon my original influence for my research, Stanley Milgram's Obedience Experiments, and what they reveal about human behavior. My research focuses on how we as individuals develop morally, what role education plays in the formation of our moral conscience and our ability to adhere to that, even if it means disobeying established authorities. My analysis of these experiments and philosophies of education will better help us to understand why people tend to obey orders even when those orders conflict with their own moral conscience.

Room: MSC 2502

How to Close the Gap between Communication at the Workplace and in the Engineering Classroom

Alaa Abdalla

This research looks at the communication tools and practices used in current engineering workplaces in Arabian Gulf multinational corporations, then it compares that to the set of skills the students gain upon graduating from the international branch campus of Texas A&M University located in Qatar. Previous research has found out that there is a gap and struggle that the recent graduates face when they join the workforce. In this project, survey and interview results will be used to come up with suggestions and ways that will better equip students with the needed communication skills and close that gap to make the transition easier. Communication skills were particularly chosen to be the focus of that research as it is needed in any field, and an important skill that students from different backgrounds should have to excel in their careers. Examples of communication skills that are targeted include technical writing, presentation skills, and intercultural communication. The outcome of this research will take the form of a list of recommendations directed at educational institutions, students and to companies on how each of them can improve.

The Genomics of Antler Size in Whitetail Deer

McKaela Autumn Hodge

The genotypic factors that affect antler size in whitetail deer are unknown. In this project, whole genome sequencing is being utilized to examine patterns of variation in whitetail deer individuals selected for below average, as well as significantly above average terminal antler size, from a closed breeding population. The loci found to be present with drastically different allele frequencies will be documented and functionally characterized. Any variation that is specifically associated with either the below average or the above average antler size population can be concluded to be the underlying genetic mechanisms resulting in the different phenotypes. This research will allow us to identify genes and genomic variation that influence antler size in whitetail deer in order to explore the uses of antlers in research, in industry, and in clinical settings. Antlers are unique, regenerative organs and it is important to understand the mechanisms underlying significant differences in antler growth rate and total antler size to find uses in science and medicine. There is great potential in using antlers as research models and this knowledge will improve our understanding of the control of phenotypic expression. Improving our knowledge of antlers would only improve our understanding of musculoskeletal disorders, cancer, and many other functions and disorders. The research, industrial, and medical uses of antlers are numerous, but efficient utilization can only be achieved after understanding the underlying, genotypic mechanisms.

Candles and Thorns

Reagan Ashley

My project is a 50-80 page fantasy novella, dealing in themes of courage, changing institutions, and interpersonal relationships. It is the story of Vas Pennery, a young farm boy whose quiet lifestyle is threatened when a death cult takes root in the sleepy village of Riversend. Vas Pennery seeks to take action against a cult that is heavily inspired by the reverence of Santa Muerte, a saint in Mexican folk Catholicism who has a strained relationship with Rome. Unlike other works in the fantasy genre, my creative artifact specifically utilizes the Butlerian, sensual creative writing technique. Additionally, my story blends high fantasy tropes and low fantasy realism with modern psychology and social science research. Major themes in my story include courage, the challenge society faces when institutions undergo a change during times of peace, and the interpersonal relationships and interactions of people suffering from depression, grief, and fear. The main problem I seek to solve is how interpersonal relationships are affected by institutional change, the nature of cults and the personalities drawn and repulsed by them, and how and why people have the desire to take action but the fail to do so. I will address these problems with literary fiction writing methods in a fantasy genre which combines key elements of high and low fantasy into, perhaps, a new subgenre altogether.

Room: MSC 2503

Molecular, Genetic, and Biochemical Analysis of the PhiKT Disruptin: A New Class of Lysis Proteins

Cody Martin

Phages are bacterial viruses. Phage lysis completes the infection cycle as it is the process of overcoming the barriers of the host bacterial cell envelope. The barriers of Gram-negative hosts are the inner membrane (IM), peptidoglycan, and outer membrane (OM). The final step of lysis in Gram-negative hosts is disruption of the OM, which is crucial for the release of phage progeny. Most phages have lysis proteins called spanins to disrupt the OM, but bioinformatic analysis indicates 13% of phages do not have spanin genes. Therefore, spanin-less phages must have an alternative to permeabilize the OM. PhiKT is a representative spanin-less phage that infects *E. coli*. Our studies show that the PhiKT gp28 supports OM disruption and is membrane-associated. Sequence analysis shows that gp28 is a highly cationic 56 aa protein. Based on structural predictions, gp28 appears to be helical and amphipathic. Similarly, cathelicidin antimicrobial peptides (AMPs) like LL-37 are small, cationic, helical, amphipathic, and membrane-associated. Based on these data, our model is that gp28 is a phage-encoded AMP. AMPs are known to be general membrane disruptors, and we have tested if gp28 has similar function. A preliminary kinetic assay using fluorescence microscopy has shown that expression of gp28 permeabilizes the IM before the OM. This is unprecedented for lysis proteins since a protein for IM disruption exists. An ongoing nonfunctional mutant screen is genetically characterizing the mechanism of membrane disruption. Localizing nonfunctional mutants within the host using fluorescence microscopy establishes which residues are functionally important. The results from these experiments can lead to the first genetically tractable AMP to describe these membrane disruption mechanisms.

GraphBLAS: Solving Graph Algorithms with Linear Algebra

Julio Maldonado

GraphBLAS is a C library written by Dr. Davis that allows users to easily represent graphs as sparse matrices. Using specified APIs for multiplication, addition, and maxing that can be used with masks and semirings, users can develop traditional graph algorithms in the language of linear algebra. Concluding that GraphBLAS is a more efficient and concise way of writing graph algorithms is important to academia as it'd introduce a new and quicker way for researchers and students to learn and write graph algorithms. The ability to write graph algorithms very quickly and being able to test those same algorithms will allow researchers to more quickly test what they're needing to do. Instructors will also be able to teach and explain these algorithms to their students in a way that they can easily grasp the material. In return, the students will get to learn the material in a new way and be able to test their understanding very quickly. My outcomes will further the validation and understanding of GraphBLAS as an alternative to regular graph algorithms. Furthermore, such graph algorithms will also allow for software developers in industry to write graph algorithms very quickly and apply them to various situations such as figuring out bots in Facebook and search results in Google. Kepner and Gilbert prefaced that graph algorithms "have become essential in controlling the power grid, telephone systems, and, of course, computer networks (xxv)", further proving how impactful a new way to compute these algorithms could be. Previous research on this topic conducted by Buluc and Gilbert listed how to approach and pseudo code of many different graph algorithms in the language of linear algebra. That research can be referred to gather information on how to better approach graph algorithms in GraphBLAS. We will be able to compare how easy and efficient it is to write such algorithms to the regular method using adjacency matrix or vertexes to test my research statement of GraphBLAS being a powerful and expressive way to develop graph algorithms.

Red House of Cards: Communist and Post-Communist Hungary As Political Religions

Christine Newberg

This analysis will explore and attempt to explain the effects of Hungary's Communist legacy in the context of Hungarian socio-political landscapes during and after Communism. For this I shall use Emile Durkheim's *Elementary Forms of Religious Life* to delineate a collective mentality or collective consciousness derived from religion and its impact on a societally shared understanding. Applying Durkheim's work on religion to Eric Voegelin's concept of political religion will further offer critical insight into how political life in the community is sacred and is maintained through specific symbols to defend an order of being. The discussion will thus extend into an analysis of the manner in which Communist and post-Communist Hungarian governments utilise principles of political religion to serve as a structurally and culturally unifying force within society. From exploring major themes of nationalism, propaganda, ideology, and history will emerge parallels between Communist and post-Communist governments which are increasingly becoming harder to ignore when observing the effects of a Communist legacy on contemporary Hungarian government and ideology. For this, I will use secondary data to apply classical theorists such as Durkheim and Voegelin to contemporary delineations of political systems and contemporary Hungarian political issues as part of a qualitative analysis.

Oral Session 3: 1:00-2:00 PM

Room: MSC 2500

LaneMapper: A Large City-scale Lane Map Generator for Autonomous Driving

Ankit Ramchandani

Autonomous vehicles require lane maps to navigate from the start position to the goal in a safe, comfortable and quick manner. A lane map represents a set of features inherent to the road, such as lanes, stop signs, traffic lights, and intersections. We present a novel approach to detect multiple lane boundaries and traffic signs to create a 3D city-scale map of the driving environment. We detect, recognize and track lane boundaries with multimodal sensory and prior inputs, such as camera, LiDAR, GPS/IMU, and prior maps, to assist autonomous driving. We detect and classify traffic signs from the image considering high reflectivity of LiDAR points and further register the locations of traffic signs in the world coordinate. We have also made our code base open-source for the research community to tweak or use our algorithm for their purposes.

Circadian Clock Control of Ribosome Heterogeneity

Rachel Porter

Circadian clocks are cellular oscillators that drive rhythmic gene expression and synchronize the physiology and behavior of an organism to the cyclical environment. While clock regulation at all levels of transcription is well understood, clock regulation of translation is an emerging area of study. Although ribosomes were once viewed as uniform cellular machines, recent findings have suggested this is not the case. Studies of ribosome heterogeneity have found variations in the composition of ribosomes, including changes in ribosomal protein composition. These differences exist between varying stages of development and between monosomes and polysomes. I hypothesize that such variations in ribosomal protein composition may also be found at different timepoints within the circadian cycle. Preliminary studies from the Bell-Pedersen lab in *Neurospora crassa* using crudely purified ribosomes suggested some ribosomal proteins may cycle in abundance within the ribosome. To confirm these findings and determine whether biological clocks regulate translational output through controlling ribosomal protein composition, I am isolating polysomes from timed tissues for structural analysis with cryogenic electron microscopy (cryoEM) and quantitation by MS. I have successfully isolated polysomes, and am currently working to optimize our protocol for preparing samples to be analyzed with cryoEM and MS. If clock regulation of the translational apparatus is found, I will investigate the physiological impact. I will perturb rhythmic abundance of candidate proteins to analyze the functional consequences. Ribosome profiling can be used to assess the effects ribosomal protein regulation on mRNA translation.

The Theory of the Demographic Transition and its Cultural Implications

Bryson Thomas Bassett

David Riesman conceptualized three distinct cultural groups called the Tradition-directed, Inner-directed, and Other-directed. These groups mark three distinct shifts in how humanity absorbed information starting with oral-tradition, which led to written language, which has since transitioned to the screen image. Starting with the tradition-directed whom Riesman described as "The society based on oral-tradition, with its dependence on the memory of elders, links people together in small tribal groups and in their families. These people may be nomadic, but they are not socially and psychologically mobile in the modern sense; they are led by folk tales and songs to identify with the tribe as it has been and will be, or possibly with a legendary golden age, but they are not incited to imagine themselves outside of its comforts and coherence" (Riesman 416 1950,2001). A shift occurs in society according to Riesman, when it transitions into a written society which he characterizes as inner-directed. Inner-directed societies are more mobile in both a geographic and a psychological sense. They are able to keep records and pass on the knowledge of posterity. Riesman characterizes this shift by saying "The bookish education of these inner-directed men helped harden them for voyages: they wanted to convert the heathen, civilize them, trade with them-if anyone changed in the encounter, it would be the heathen, while as they, moved about the globe or up the social ladder, remained very much the same men: The epitome of this was the Eng

Room: MSC 2501

iGhostrider: Infinite High Performance Streaming

Paul Rutherford

Recent technological trends have resulted in the creation, manipulation and storage of vast amounts of information. Effectively dealing with these data volumes requires scalable data computing capable of functioning at high performance and making use of large distributed computing systems. One of the most prominent frameworks for tackling this problem is MapReduce, which abstracts the process of parallelizing and processing a computation across a large dataset. Current open-source implementations of MapReduce, however, are lacking in key aspects: performance, efficiency, and size (or "bloat"). To overcome this challenge, new abstractions are necessary in order to provide the lightweight scalability and speed required. In particular, this research examines algorithms for a new infinite-stream abstraction called iGhostrider, which is no longer limited by the size of the virtual memory supported by the CPU or operating system. Besides having unlimited size, this architecture eliminates the kernel overhead needed for page remapping, which should make it faster than previous streaming abstractions under many streaming conditions.

The Impact of Enhancing Lymphatics In Murine Hypertension

Mary-Catherine Carlisle Clark

Hypertension is the leading risk factor for cardiovascular disease and stroke [1]. A portion of these patients exhibit SHTN with high cardiovascular risk and are more difficult to pharmacologically control. To improve the diagnostics and increase treatment efficacy, the mechanism of lymphatic expansion and Na⁺ retention within the kidney needs to be characterized [2]. Increased renal lymphatic density has shown to prevent HTN in mice when presented with a HSD [2]. Renal lymphatic expansion exhibits decreased Na⁺ retention in the kidneys and therefore is no interference with BP regulation [2]. A link between SHTN and macrophage and immune cell infiltration has been proposed [3]. The aim of this study is to identify the mechanism by which enhancement of renal lymphatics decreases the intensity or mitigates HTN in mice with HSD. This project will examine HTN with mice subject to L-NAME-induced SHTN or chronic HSD. The KidVD transgenic mouse line, which permits inducible kidney-specific lymphatic expansion, will be utilized to identify how renal lymphatic density correlates with urinary Na⁺ excretion, and sensitivity to hypertensive stimuli. Post-trial, the murine renal physiology, gene and protein expression, and Na⁺ transporter activation will be analyzed. Kidney lymphatics may thus prove to be a potential therapeutic target for patients afflicted with SHTN.

The Bracero Program: Oral Histories Retold, 1941-1964

Vanessa Guadalupe Fernandez

Much of the research done on the Bracero Program focuses on the policies and laws that made it possible. My project aims to humanize those policies, and let the history of the Bracero Program be told by the people who experienced it themselves, as well as account for the women who survived through it on their own. To tackle this project, I will use oral histories to give a voice to the lived experience of the Braceros, ethno-poetic translation to convey the emotions felt by the Braceros, and memory to account for the ways Braceros coped with what they lived through. My goal is to give Braceros a chance to tell their own history so their stories are not lost. On the rare chance that the Bracero Program comes up in history classes, the focus remains on the policies and economic benefit of having these men work during World War II- not the long hours they remained in the sun, the toll being bent over took on their backs, and the small remittances they would send to their family. My methods for this project include listening to oral histories from Braceros, their mothers, wives, and children, as well as using secondary source material to contextualize the effects the program had on Mexico's indigenous and lower class. This paper consists of five chapters that explore different aspects about the program through an ethno-poetic retelling of the Braceros' oral histories. Chapter one, Meaning of Bracero, dives into the emotions associated with that job title by the Braceros, and how they feel they are perceived by other members of society. Chapter two, Fumigation, focuses on the physical requirements and procedures Braceros had to meet in order to get into the program. Chapter three, Living, recounts the li

Room: MSC 2502

Effect of Topology and Relaxation on Correctness of Single-Source Shortest Path Algorithm

Ryan Garmeson

Distributed objects are vital in modern computing, facilitating the development of high-level applications. The common model for implementing distributed objects is linearizability, offering the illusion of a local, non-distributed object; however, linearization has long been known to be expensive, and there is increasing interest in finding ways to relax the notion of linearizability to reduce that cost. One such suggestion is in lowering the sequential specification of the data structure (called "relaxation") while keeping a linearizable implementation, maintaining the familiarity of linearizable objects while reducing cost. The current canon, however lacks methods for determining which applications would benefit from relaxation. To that end, we will investigate a specific case of relaxation and add clarity to this problem. We examine a relaxed priority queue used in a single-source shortest path problem. We focus on correctness of the resulting paths as a measure of "relaxability," examining the trend of relaxability on several graph types commonly used in this sort of problem. We are in the process of creating these results and analyzing them; this presentation will discuss the underlying work, hypotheses, and implications thereof.

Just Friends: Cyberspace, Ethics, and Politics

Andrew Todd Ramirez

The shift from face to face interaction to cyberspace, brought on by advancements in technology, has affected our understanding and demands of justice, especially as it relates to friendship. I claim that in this techno-mediated realm of communication, the concept of trust is our key to better understand how the just friendship is formulated. Just friends then, may result as the foundation from which political action may grow. It is through the understanding of trust, as it relates to justice and friendship, that we may uncover how this shift from face-to-face interaction to cyberspace has affected our search for happiness. For this comparison, my investigation starts with Aristotle's moral and political philosophy. An Aristotelian delineation of justice begins with the understanding that acting justly is not limited to the self, but requires another person to receive good done by one's own action. The framework of friendship outlined by Aristotle requires the same account of the good, both received and experienced. The combination of these two ideas results in a foundation from which virtuous political action may grow. As everyday life has increasingly become mediated through online interaction, relationships change, and so does justice, to the extent that it depends on these relationships. With the Aristotelian framework in place to understand how these concepts intersect, in face-to-face and in online communication, we may then examine the role that trust plays in both modes of interaction.

Modulation of the Endothelial Phenotype by Tgf- β 2 Signaling

Thao-Nguyen Pham

The development of solid tumors requires neovascularization. In contrast to blood vessels of healthy organs, blood vessels associated with tumors are poorly organized and leaky. However, it is poorly understood how microenvironmental factors modulate molecular mechanisms underlying the abnormal vascular phenotype. The objective in this project is to determine cellular changes elicited by transforming growth factor (TGF- β 2) that promote the transition of endothelial sheets from a stable/cohesive to a loosely organized, permeable phenotype. It is hypothesized that TGF- β 2 induces phenotypic changes consistent with endothelial-to-mesenchymal transition (EndMT). Cell culture experiments coupled with immunofluorescence labeling indicate change in cell morphology and patterns of protein expression/subcellular distribution when TGF- β 2-treated cells were compared with control, untreated endothelial cells. These results suggest that the TGF- β 2 signaling pathway could be targeted to prevent EndMT and the abnormal vasculature in growing tumors.

Room: MSC 2503

Phosphonate Functionalized Inorganic-Organic Hybrid Hydrogels for Bone Regeneration

Sarah Jones

Many bone regenerative scaffolds today rely on the presence of exogenous growth factors to induce the differentiation of mesenchymal stem cells (MSCs) into osteoblasts. However, growth factors must be used in extremely concentrated doses to be effective, which can lead to off-target responses and can be quite costly. Alternatively, a materials-guided approach, relying exclusively on the physical and chemical properties of the scaffold to guide cell differentiation, is desirable for bone regeneration. One promising method to impart osteoinductivity and bioactivity utilizes the incorporation of inorganics, such as Si, P, or Ca-containing materials. For example, our lab has reported enhancements in osteoinductivity and bioactivity with the presence of methacrylated star poly(dimethylsiloxane) (PDMSstar-MA) within a normally biologically inert poly(ethylene glycol) (PEG-DA) hydrogel. This technology has advanced into an interconnected, macroporous scaffold by utilizing fused salt templating and solvent induced phase separation (SIPS) fabrication techniques. Because phosphorus-containing materials are known to increase osteoblastic differentiation and facilitate mineralization, this study aimed to enhance this scaffold through functionalization of the PDMSstar-MA component with a phosphonate group. This was accomplished through the development and inclusion of a novel polymer: diacrylated polydiethyl(2-(propylthio)ethyl)phosphonate methylsiloxane (PPMS-DA). The distribution of PPMS-DA within PEG-DA hydrogels was measured and visualized, followed by measurement of the hydration and mechanical properties. Results provide sufficient evidence to proceed investigation into the mineralization and osteogenic capacity of these novel hydrogels.

The Coach-Athlete Relationship: The Impacts of an Athlete's Race/Ethnicity on Preferred Coaching Styles

Jacob Knostman

The quality of a coach-athlete relationship has been found to predict on field performance, as well as levels of academic self-efficacy, self-regulation, and aggression in athletes (Jowett, 2017; Nicholls et. al., 2017; Worthy, 2018). Previous research has also indicated that cognitive and learning styles are influenced by ethnicity, (Banks, 1988). Despite establishing that the quality of an athlete's relationship with their coach can have a profound impact for the athlete both on and off the field, and that there are differences between racial/ethnic groups in how they view and learn about the world, little is known about the impacts that an athlete's race/ethnicity may have on the effectiveness of different coaching attributes, styles, and/or techniques. This study aims to provide insight into this gap in knowledge by administering a survey to athletes at Texas A&M that will consist of a shortened version of the Leadership Scale for Sport (LSS; Chelludurai, 1980; Chiu, Rodriguez, & Won, 2016), which will ask about an athlete's preferences regarding their coach's approaches to training/instruction, democratic behavior, autocratic behavior, social support, and positive feedback. Also included in the survey will be short response questions that were formulated to discover any differences between racial/ethnic groups in coaching preference not covered by the LSS. We hypothesize that athletes of color will prefer social support and democratic behavior from their coaches more frequently than white athletes. By discovering if there are certain coaching attitudes/behaviors that athletes of color prefer, we hope to provide coaches with insight into how they can better establish a positive relationship with all of their athletes, leading to benefits on and off the field.

A Thousand Golden Yesterdays

Lewis William Edwards

How can the chaotic headspace brought about by trauma-induced dissociative disorders be effectively and accurately portrayed in creative fiction? "A Thousand Golden Yesterdays," a novella-length creative artifact, endeavors to find one answer to this question by depicting the unstable, rapidly deteriorating mental state of its protagonist, Logan Cox, through prose that continually shifts between first person, second person, and third person narrative points of view. This approach is one informed by research into dissociative disorders and the effects of physical and emotional abuse throughout one's formative years using academically relevant resources such as the DSM-V. Logan's mental deterioration is primarily brought about by his being asked to deliver a eulogy at his recently deceased father's funeral. As he travels from his home in Los Angeles, California to the site of the funeral in Houston, Texas, Logan experiences a series of traumatic flashbacks to moments of his father's abusive behavior toward him and finds himself beset by increasingly unsettling, surreal imagery in the present, culminating in a climactic, primal expression of Logan's rage and psychosis as he is finally called upon to give the eulogy. The primary purpose of the work beyond exploring methods of realistic portrayal of mental illness in fiction is to experiment with the idea that different points of view can meaningfully interact with and inform a character's mental state as they recount and recall different events, thus becoming a more significant symbolic component of the narrative as a whole.

Oral Session 4: 2:15-3:15 PM

Room: MSC 2500

Re-Creating the Sinking of the Edmund Fitzgerald

Jasmine Derry, Lauren Hammond, Marissa Harris, Yuan-Chi Lee, and Kiara Stewart

Over the course of the school year, we intend to create a short film centered around the sinking of the S.S. Edmund Fitzgerald. Up until this point, there has been thorough research in the conditions surrounding the sinking of the ship, as well as a single video-based recreation. However, this research remains to be properly visualized in a manner that is historically accurate, emotionally compelling and rendered photo-realistically. Depicting it accurately would do justice to the scientific feat of this storm and memorialize the memory of the ship and its crew. The main tool that we will use is Dr. Jerry Tessendorf's proprietary rendering software Gilligan, which is able to simulate oceans, waves, splashes, and mist with a high level of scientific accuracy. By pushing Gilligan to its limits, we can create a short film that, in the process of its creation, will be a deep dive into both the history of this ship and the technical process of creating a comprehensive film pipeline from scratch.

Framing Feminism: How Catholic Women Use Blogs to Promote Civil Discourse and Discuss the Push for Gender Equality

Morgan Knobloch

This study investigates how religious discourse about feminism influences how female Catholic bloggers present their identity online. Since the start of the third wave, the feminist movement has begun to embrace the concept of intersectionality, which argues that each woman's experience is unique because of her personal story. Intersectionality opened the door for women who may have previously felt excluded from feminism to reinterpret the movement according to their own beliefs. Using this as an opening, Catholic women took to blogging to share their own stories and ideas, thus creating the concept of Catholic Feminism. In posting on their blogs, Catholic women highlight the commonalities between their faith and feminism, giving other women insight as to how they can stay true to their religious beliefs while also pushing for the rights of women. Through blogging, Catholic women redefine what it means to be female in contemporary society and provide their readers with guidelines to live accordingly by establishing their online communities. While the concept of Catholic Feminism may have seemed like an oxymoron just a few years ago, serious blog conversations have made it into a reality. I argue that studying Catholic women's new media use demonstrates how religious teachings and secular concepts can actually complement each other and be used to promote civil discourse by offering new perspectives to otherwise contradictory ideals.

Determining the Role of Cryptochrome 1 in Photoperiodic Responses Using the Monarch Butterfly

Ashley N. Hayden

With a sequenced genome and genetic tools to knockout genes in vivo, the eastern North American monarch butterfly, *Danaus plexippus*, has become a unique model system to study the mechanisms behind seasonal responses. In particular, the monarch butterfly offers the opportunity to advance knowledge about a very strong seasonal response: animal long-distance migration. It is believed that the southward monarch butterfly migration is triggered through sensing a shortening day length, or photoperiod, an ability known as photoperiodic sensing. The molecular mechanism behind photoperiodic sensing remains unknown. Previous data has suggested that circadian clocks, or internal biological rhythms that cycle every 24 hours, are involved in this sensing ability. Since both circadian clocks and photoperiodic sensing rely on light input, it is possible that the light sensing protein of the circadian clock could be playing a role in sensing the changing photoperiod that triggers the annual monarch migration. This study sought to genetically dissect the role of blue light photoreceptor cryptochrome 1 (dpCry1) in photoperiodic sensing in the monarch butterfly by testing the photoperiodic sensing ability (or lack thereof) of CRISPR/Cas9-generated cry1 knockouts as compared to that of their wild-type siblings. Our data suggests that cry1 is involved in the photoperiodic induction of monarch migration, either through a clock-dependent mechanism or by being the photoperiod photoreceptor itself.

Room: MSC 2501

Development of Anti-fouling Materials for Blood-Contacting Devices

Kendrick Lim

The safety and efficacy of blood-contacting medical devices are hindered by thrombosis upon implantation in the body. Silicones and polyurethanes (PU) are commonly used for hemodialysis catheters and other blood-contacting devices. However, due to their hydrophobicity, they are susceptible to biological adhesion, including that of blood proteins and platelets that eventually result in thrombosis. Thus, the addition of a surface-modifying additive (SMA) into the bulk of both silicones and polyurethanes for increasing hydrophilicity and subsequent reduction of protein adsorption is being explored. These SMAs are poly(ethylene oxide) (PEO)-silane amphiphiles and include an oligo(dimethyl siloxane) tether, a PEO segment, and a cross-linkable triethoxysilane (TEOS) group. In addition to testing in silicone and PU systems, other key parameters were investigated, including solvent selection for film casting and structure of PEO-silane amphiphiles (e.g. ODMS length; with and without TEOS group). Using contact angle analysis, systematically prepared film compositions were evaluated for their ability to undergo water-driven surface restructuring to result in a hydrophilic, PEO-enriched surface. The results of this study will establish the role of solvent in successfully modifying silicones and PU with SMAs.

Cameras in the United States Supreme Court: Judicial Transparency & the Obligation Thereof

Harrison Richter

Literature Review: The sources utilized in this thesis each serve a particular function in relation to the theoretical framework. They are organized by the extent to which they contribute to the three dominant disciplinary approaches found throughout the work. The established literature referenced in the first section contributes to the historical summary of the Supreme Court's forward progression toward the public disclosure of its work. Many sources used therein are of the primary sort, as they are meant to portray contemporary accounts of the Court's steps as they occur in time. The sources used in the second section help to develop transparency as a demanded intangibility—a commodity of sorts. Hopefully, understanding transparency as a resource for the public will allow for the reader of this thesis to make sense of the concept's varying application in all parts of the federal government. In the third section, the sources used are distinct in that they are meant to help conceptualize popular sentiments regarding the Judiciary's role in relation to the elected branches. Identifying the public's stance on issues related to the Supreme Court itself is necessary before proceeding to any speculation regarding the consequences of allowing video cameras in the Court. This is because the consequences affect the public both directly and indirectly. In this final section, much of the literature also includes pre-fabricated ideas about what could potentially happen if the institution were to tolerate televised coverage of proceedings. In my own assessment, I am skeptical of the reasoning in positions for both the affirmative and the negative, but I ultimately side with those—and with others in part—whom I feel better represent my ideas regarding the Court's future. Thesis Statement: In our democracy (a constitutional republic) the value of transparency cannot be overstated, as it provides a monitorial means through which the electorate can ensure their interests are maintained by those who make decisions on their behalf. Nonetheless, whether the obligation of transparency should be taken to apply throughout the government coequally—and specifically, in the nation's highest court—has become subject to disagreement. Though the benefits of increasing transparency in the U.S. Supreme Court are indeed significant, doing so by permitting video cameras for court proceedings in an era of considerable ideological polarization may also yield unwanted consequences that should dissuade any implementation policy at this time. Theoretical Framework: To properly assess and respond to the debate regarding cameras in the United States Supreme Court, this work begins with a historical discussion, covering a near-comprehensive timeline of the institution's progression in public disclosure. This thesis then proceeds to balance the potential outcomes of camera implementation while simultaneously making sense of the societal context in which the debate persists. The idea of government transparency is a theme discussed throughout the work, as it is the fundamental demand that underlies the relevant debate. Project Description: This thesis endeavors to address the debate regarding whether video cameras ought to be allowed in the United States Supreme Court. Prior to joining the relevant discussion, I provide and explain the comprehensive history of the Court's steps toward increased transparency, beginning with the institution's inception. This section highlights the evolving role of transparency in the context of institutional independence—a context that persists today. The following section describes the role and degree of transparency in the elected branches of the federal government. It contrasts the obligation of disclosure in these branches with that of the Judiciary and also seeks to identify the propriety of selective disclosure in each of the three. Then, this thesis aligns its focus to the prospect of video camera implementation. I have chosen to dissect the positive and negative consequences that might occur should the Court lift the current ban. In the final section, I compare the consequences, then proceed to argue that the probable negatives cause concerns that should outweigh the potential benefits. However, I believe that camera implementation can happen without compromising the Supreme Court's ability to function properly, but only if society changes. In this section, I discuss the societal polarization that makes a tolerance policy so dangerous, and I detail the developments that must take place if the Court is to progress safely.

Using Nanofiber Elution for the Treatment of Surgical Site Infections with a Novel Antimicrobial

Morgan James Chapman

*****PATENT PENDING – ABSTRACT REMOVED*****

Room: MSC 2502

Novel Semi-Automatic Method to Optimize Multi-Lamp High Flux Solar Simulators

Arshad Mohamed Ali, Safer Hafeez, and Mohammed Hassan

Extensive research is being conducted on photon energy driven reactions which include wastewater treatment, H₂ production, and advanced material aging under diffuse or concentrated light. Solar simulators are a convenient tool for the latter research applications because they allow emulation of solar radiation under well controlled laboratory conditions. Most concentrated light simulators are comprised of multiple light sources with ellipsoidal /parabolic mirrors. Thus, they require accurate characterization of various system parameters such as peak flux and flux density distribution. They also require optimization to ensure the system can operate at its theoretical maximum flux and provide the necessary radiating energy. However, this process is either manual or semi-automated and demands tedious expert intervention. This study utilizes the High Flux Solar Simulator (HFSS) facility at TAMUQ comprised of seven short-arc xenon lamps of 6 kW each. We present intermediate results of our attempts to create an automated system used to optimize alignment of the light sources (four degrees of freedom each) given variable system parameters. An automated data acquisition program was developed which included image capture, target movement, flux readings, etc. The irradiance was then characterized using the flux mapping method using an in-house algorithm used to calculate flux parameters. Monte-Carlo ray tracing was used to generate training data. This data was used to train a supervised machine learning algorithm based on a typical convolutional neural network model. Finally the model was tested against the same Monte-Carlo ray tracing used initially. The proposed methodology is expected to facilitate initial deployment of HFSS.

Determination of Lysis Ability and Location of Suspected Tail Lysin Gp156 of Phage K Against Staphylococcus Aureus

Soren Grey Campbell

As the issue of bacterial antibiotic resistance becomes more prevalent, phage research and technology attempts to investigate and manipulate viruses to target and kill bacteria effectively with specificity. This study is an investigation into the product of gene 156 (gp156) of Phage K, to determine its location in the phage structure and the extent of its lysis ability. Through previous experiments with temperature sensitive (ts) mutants in our lab, we have determined gene 156 to be essential to the phage's survival, and through genome sequencing of Phage K's characteristically large genome, gene 156 is found to be located next to gene 157, a studied tail lysin gene, in the tail-structural model. This investigation will attempt to clone genes 156 and 157 as PCR products with specially designed primers into pETDuet-1, the chosen plasmid, in order to isolate and express these genes to further study their products' activity separately and in combination with each other. Running SDS-PAGE gels and zymograms with autoclaved *S. aureus* will aid in determining the size and lytic activity of gp156 to further confirm that it is a lytic enzyme, and its association to the tail structure using Mass Spectrometry. The conclusions from this study would be beneficial in future studies of phages related to Phage K and potentially inform bactericidal alternatives to antibiotic resistant *S. aureus* and beyond.

How Do Contemporary Socialization Techniques Affect Childhood Development?

Madison Weber

Suicide rates have risen dramatically among children in the United States. Additionally, children are increasingly diagnosed with ADHD, depression and various indicators of stress. These problems are typically approached through the perspectives of psychologists, educators, and medical doctors, but not sociologists. As a result, society's role in these social problems among children has been neglected. My study will apply the sociological theory of David Riesman as set forth in his widely acclaimed analysis of American culture, *The Lonely Crowd* ([1950] 2002). I will be analyzing archival data on suicide, depression and mental illness among children and compare this data with various time periods in American history that Riesman sociologically analyzed. I will relate this data to dramatic social changes in American history since 1950 pertaining to the influence of media as well as social media, the role of parents and grandparents in raising children, the impact of the Internet and other social networking sites on socialization and personality development. The key feature of my study will be an application of Riesman's well-known theory to new data that he could not have foreseen at the time he published his book. The importance of this approach is that it fills in the role of society in social problems in an otherwise reductionist approach taken by psychologists and non-sociologists.

Room: MSC 2503

Flexible Transparent Electrodes based on Stable High-Performing Metal Nanotrough Networks

Megan Dawkins

Flexible, transparent electrodes can be used in many applications, such as wearable electronics, flexible touch screens, and semitransparent solar cells. Researchers have successfully created stretchable, bendable, and uniformly high-performing transparent electrodes using metal nanotroughs, copper nanowires with protective coatings, and hybrid structures of graphene-gold nanotrough networks. However, the cost of gold, silver, and other stable, high-performing metals is of concern for large-scale implementation, and less-expensive metals such as copper will oxidize or destabilize when exposed to air, high temperatures, or humidity. This research focuses on achieving high electrical and optical performance at a lower fabrication cost by sandwiching copper nanotroughs between thin layers of a protective metal oxide. The nanotroughs are fabricated by electrospinning water-soluble polymer nanofibers across a ring, then sputtering copper onto of the fibers and dissolving away the polymer to leave a mesh of trough-shaped copper wires. The mesh forms an electrode which is then coated in a thin layer of metal oxide to protect it from its environment. This research tests the transmittance, sheet resistance, and bendability of the transparent electrodes produced. Their properties are expected to near or equal those of transparent electrodes made by expensive metals and reduce the cost for other commercial applications.

Mysticism in Science Fiction: Tropes of Transcendence in Philip K. Dick, Stanislaw Lem, and Ursula K. Le Guin

Anna Rogers

Science fiction is a genre steeped in the tradition of mysticism. Non-fiction writings such as Aldous Huxley's *The Doors of Perception* and Philip K. Dick's *Exegesis* reveal the preoccupation that some of sci-fi's greatest authors had with the idea of the transcendental experience. This preoccupation with the mystical experience, however, was not limited to the non-fiction writings of science fiction authors, and can be read in their fictions as well. Using an understanding of mysticism provided by Evelyn Underhill's *Mysticism: A Study of the Nature and Development of Man's Spiritual Consciousness*, this project seeks to examine how certain science fiction tropes are conducive to mystical experience for those both inside and outside their fictions. Readings to be examined include selected works by Philip K. Dick, Stanislaw Lem, and Ursula K. Le Guin.

Stable Isotope Analysis from Cushion Peatlands as Proxies for Paleoclimate in the Tropical Andes

Julia Hillin

Peatlands have been utilized as sources for paleoclimate data for many years. Previous studies have established that peatland cores can be used as archives of a region's climate through analysis of carbon, oxygen, and hydrogen stable isotopes. However, this method has primarily been applied to Sphagnum moss deposits found in high latitudes. To our knowledge, a single study has looked at applying this technique to tropical peatland systems using *Distichia muscoides* (Juncaceae), the dominant peat-forming species in the Peruvian Andes. The tropical Andes are understudied as a whole in their potential as archives of past climates. In order to improve regional data, we obtained surface samples of *Distichia muscoides* from six sites at various elevations surrounding Mount Ausangate in the Cordillera Vilcanota, southeastern Peru. Our hypothesis is that the oxygen isotopic composition of plant tissues will correlate with altitude (proxy for temperature), while the carbon isotopes will be sensitive to local moisture variations. To control for other environmental parameters that might contribute to isotopic fractionation, two sites were intensely sampled, allowing us to analyze samples along a broad hydrological gradient. For each sampling site, we analyzed two samples (five vs. ten leaves), which were replicated. For sites with multiple surface samples, we selected ten water table depths at relatively equal intervals and followed the same sampling strategy. Samples are currently being analyzed using isotope-ratio mass spectrometry. Assuming our hypothesis is true, *Distichia*-dominated peatlands could become important archives for paleoclimate reconstructions across the region, greatly improving the data for the region.

Oral Session 5: 3:30-4:30 PM

Room: MSC 2500

Feasibility and Acceptability of Point-of-care HIV Screening in Community-based Dental Care Settings

Hannah Christine Balcezak

Introduction: The dental setting is a largely untapped venue to identify patients with undiagnosed HIV infection. Yet, uptake of rapid HIV testing within the community-based dental care settings remains low. This study will seek to better understand the community-based education experiences of fourth year dental students and how these experiences might influence their willingness to promote point-of-care HIV screening in community-based dental care settings in the future. Objectives: The overall objective of this feasibility study is to develop an HIV prevention health education program for dental students that will increase their knowledge about HIV/AIDS and promote positive attitudes about point-of-care HIV screening, which will include the following for patients who test positive: ordering the appropriate confirmatory lab tests and linking patients to HIV care providers. Methodology: A systematic intervention development process will be used to develop an HIV prevention program for dental students. Key stakeholders (dental faculty and students) will be engaged in the intervention development process. Between October and December 2018, we will conduct a needs assessment to inform the systematic intervention development process. Results: A broad literature review over the scope of this project was obtained with the following search strategy: (dental care OR dentist OR dental office*) AND (underserved OR underserved population* OR population*) AND (HIV OR human immunodeficiency virus). Results on the participants of dental students have yet to be reported and will be done in an additional progress report. Conclusions: The conclusion has yet to be written as the progress of this project hasn't reached this point in its' timeline.

The Recent Expansion of Invasive *Tubastraea coccinea* Throughout the Gulf of Mexico and its Relation to Oil and Gas Platforms

Zakary C. Derouen and Miranda R. Peterson

Invasive species have large economic and ecological impacts, including native species replacement, function modification, and altered community structure. Despite this, invasive marine species are relatively understudied. The orange cup coral, *Tubastraea coccinea*, is the first scleractinia to invade the Western Atlantic. The coral is shown to have negative effects on native reefs, killing and overgrowing corals within 5 cm. The mode of dispersal ranges from ship hulls and mobile oil/gas platforms to ocean currents. *T. coccinea* has been spreading to natural reefs within the Gulf of Mexico and threatening native corals. Our objective is to document the recent range expansion of *T. coccinea* throughout the gulf coast and use this information to test the accuracy of a model by Carlos-Junior et al. (2014), to identify the influential factors affecting the current distribution, and to project the potential range of invasion. To accomplish our objectives, we will specifically obtain and organize *T. coccinea* occurrence records and associated environmental data and develop a species distribution model. Considering the threat that *T. coccinea* presents to native reefs within the Gulf of Mexico, it is important to be able to track and predict its distribution, as well as identify potential factors facilitating its invasion.

The Human-UX/UI Relation

Hannah Fowler

How do increasingly pervasive combinations of user experiences and user interfaces (UX/UI) subtly redefine our society's values? In this paper, I will specifically look at the values of success, community, and efficiency. Beginning with Ihde's framework of human-technological relations, I will articulate how embodiment, hermeneutic, alteric, and background relations take form through certain components of UX/UI, e.g. navigation and iconography. Following this, Peter-Paul Verbeek's mediation theory and its moral implications, derived from Ihde's post-phenomenological analysis of technology, will serve to show how UX/UI mediates our interaction with the world; through this mediation we can find a moral dimension that UX/UI has in itself. Considering the human-UX/UI-world relation and its moral significance will aid in showing how components of UX/UI lend themselves to depicting success, developing relationships with others, and ensuring efficient means of tasks in a world where time management is necessary for progress. Furthermore, knowing that UX/UI has such a great influence on our society calls for an awareness in ethical design by creators of such technology and places a responsibility on them to consider the consequences of future UX/UI and its effect on human nature.

Room: MSC 2501

The Prevalence of Anaplasma Spp. Infection in Blood Samples of Puerto Rican Cattle

Roukaya Mabizari

Anaplasma spp., the causative agent of Anaplasmosis in bovine species, is a rickettsial parasite that is transmitted through tick-vectors. The species of Anaplasma that are known to infect cattle are Anaplasma centrale, Anaplasma marginale, and Anaplasma phagocytophilum. Of the three, A. marginale and A. phagocytophilum infections are usually the most significant and acutely detrimental to the health and production of the cattle population. Once infected, individuals remain carriers for life. This study aims to evaluate the prevalence of the various strains of Anaplasma spp. in blood samples of Puerto Rican Cattle. Collaboration with the USDA Cattle Tick Fever Research Lab provided our team with extracted DNA from Puerto Rican Cattle blood samples. Using conventional polymerase chain reaction (PCR), the primers 16SANA-F and 16SANA-R were used to amplify the 16S rRNA gene region in 198 cattle-DNA samples. After the samples were screened for positive Anaplasma spp., the positive amplicons were then sequenced and analyzed using the "Basic Local Alignment Search Tool" (BLAST) for the various species. The analysis of these samples will allow for better understanding of the diversity of the parasite in the tested Puerto Rican area and may serve as a paradigm for future research that may promote ecological control of Anaplasmosis and formation of effective preventive techniques.

Can Empirical Course Information Affect Student Outcomes?

Jonathan Tillingahst

Grade inflation is a problem at universities, students are receiving higher grades and studying less. Researchers believe that grade inflation may be due in part to students selecting more leniently graded classes. We will perform a randomized control trial in which we provide students with a tool that visualizes empirical grade information of classes at a large public university. Visualization viewership is monitored and outcomes and demand are linked to individuals through a unique student ID number. Following treatment, we predict students will alter their class portfolio to raise their anticipated semester GPA.

Technology and Terrorism: The Effects of Cell Phone Coverage on Terrorism

Ashali Chimata

The spread of mobile technology and coverage has had transformative effects, and most current literature focuses on the positive effects of this technology; it holds people accountable, facilitates democracy, and encourages transparency. More recently, there has been research done on the relationship between mobile phone availability and violent conflicts. However, there has yet to be research done on the link between cell phone coverage and terrorism. Moreover, most research does not control for other characteristics of weak and failing states that may contribute to terrorism. I will investigate this link using data from the START terrorism database and Collins Coverage by Harper Collins Publisher. I contend that cell phone coverage helps terror cells overcome collective actions issues and create diaspora networks, and this will lead to more terror activity. I also hypothesize that the effects of cell coverage will be more pronounced in states where the technology rapidly improved and in those that score above a 90 on the Fragile State Index. This research can help states identify problem areas, understand the technology terror groups use, and maintain a monopoly on violence.

Room: MSC 2502

Supporting Design Instructors' Evaluation Processes through Analytics

Aaron Perrine

This project investigates if and how we can use interactive computing to support design instructors' evaluation of students' projects. Currently, instructors often encounter difficulty in performing evaluation, such as regarding time management and consistency. Often, design problems can be solved a variety of different ways. Grading rubrics may not provide clear cut means for point distribution. Our preliminary research indicates that instructors sometimes perform relatively subjective analyses, which may also require more time. My research involves development of an interface to incorporate design analytics with the intention of aiding instructors in grading design creativity. The analytics will incorporate logging data collected during users' interactions with a live media curation technology probe. Research in the field regarding creativity metrics has defined objective metrics that may be incorporated in design evaluations. Furthermore, research regarding feedback processes has identified processes that allow students to not only improve their work, but also internalize instructor feedback, such that it promotes students' self-regulation and improves their overall design processes. This investigation will employ qualitative data analysis through user interviews to identify certain aspects of instructors' activities, including monitoring, evaluation, and feedback that may be streamlined. Hopefully this project can identify what will help instructors directly understand and measure effects of pedagogical interventions in the classroom].

The Vill Chronicles: Prohpecy

Allyson Nichole Bains-Sanchez

Kepua is a freshly made creation with a borderline-destructive curiosity that leads her to explore the entirety of the world around her. In *The Vill*, there are two sides, the Dark and the Light, neither filled with any specific good or evil, but with life that is able to coexist and thrive. In her first attempt at exploring the Dark, she comes across a creature that would rather stay unseen, and is saved by Atrien, a disgruntled and untrusting young woman who seems to have a personal stake in Kepua and her sudden visions of a time beyond them. In the process of understanding herself and her visions, Kepua befriends other Creations, building the first community in *The Vill*, and learns that there is only so far that curiosity can take you before there are severe consequences. The artifact builds on the concepts of self-identity and cultural identity, how those two play together to develop a sense of self within a community.

Rhetoric and Climate: Organizational Influence on Public Policy Related to Hurricane Harvey

Joseph Enrique Trujillo

Anthropogenic climate change has caused the world to adapt to drastic changes since the Industrial Revolution. As we approach the critical years of consequences from the dynamical phenomenon, public policy formation has failed to adapt to our changing climate. This study focuses on a specific case study in the coastal region after Hurricane Harvey devastated the area on August 25-29, 2017. An extensive analysis of local policy decisions prior to the cyclone will be evaluated to see whether the metropolitan areas of Houston was truly prepared for such a calamity. Furthermore, a proposed solution will be offered to mediate catastrophe if this type of event were to ever happen again.

Room: MSC 2503

An Efficient External-Memory Sorting Algorithm

Gabriel Stella

The MapReduce computation framework, introduced by Google, is a powerful system for large-scale computations. However, it isn't very efficient. In this project, I aim to improve upon one specific part of the problem: external memory sorting. I will implement an efficient, optimized sorting algorithm based upon Dr. Loguinov's virtual memory streams. Starting with a basic algorithm for a recursive sort, I will add various optimizations until the program runs as efficiently as possible, constantly testing for correctness and speed. The final program should be a significant improvement upon previous external-memory sorting algorithms.

It Happened Again: Remembering Genocide through Memoir

Madison Elspeth Imiola

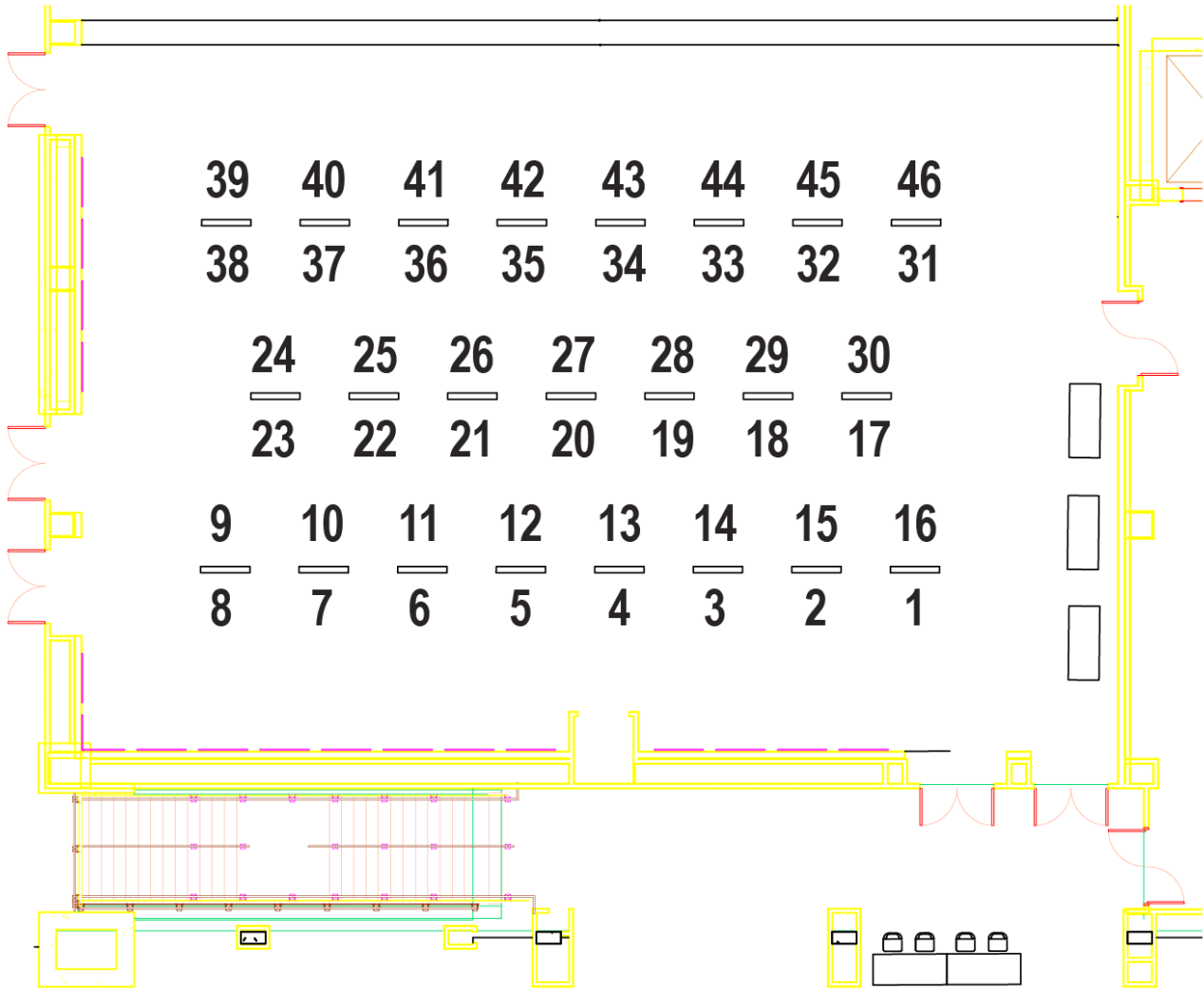
What are the techniques with which an author of life writing covering the topics of war, genocide, or political distress can combat the compassion fatigue, apathy, and general indifference their readership may face while reading about these topics? By examining memoirs, diaries, and letters written by people who lived through the Bosnian War (1992 "" 1995) and its immediate aftermath, I will answer this research question and examine how, in a world in which continuous turnover of the news cycle means that seemingly nothing has staying power, an author must employ strategies in their writing in order to combat the difficulty of grabbing a reader's attention and holding it long enough to make a difference or get a point across. Special attention will be paid to examining such strategies as the importance of knowing versus not knowing, the impact of visual materials (photographs, graphic memoirs, etc.), an author's purpose in writing, life writing as a survival strategy, and the importance of paying attention to the tragedies of other people "" and recognizing when we fail to do so. The research project also focuses briefly on unsuccessful strategies in order to re-emphasize those that are successful and to create insight as to why, as readers, we require successful strategies in order to make us respond to that which should already grab our attention simply due to the nature of the topic. The research project is complemented by a creative component that calls attention to the ethical and moral implications of paying attention to genocide and tragedy that occurs around the world by detailing my own experience as a reader of life writing on such topics.

Teaching and Learning Abroad: A Comparative Case Study of Programs

Sarah Crawford, Jasmine M. Vela, and Laura Woodson

As discussed in "Towards a Research Agenda for U.S. Education Abroad" in 2015 and in other studies on transformative learning, research can be used to encourage the proliferation and continuation of study abroad programs, particularly for preservice teachers. This research study seeks to address how students define transformative experiences within study abroad programs in the College of Education and Human Development. This study employs Mezirow's transformative learning theory, critical reflection, and high impact educational practices. This study is centered around determining what justifies an education study abroad program as being transformative for students. By comparing different study abroad programs, we intend to uncover commonalities as well as differences with the intention of using them towards strengthening future programs.

Poster Session Map



**STUDENT PRESENTER AND
ACTIVE LISTENER CHECK-IN**

Poster Session 1: 10:00-11:00 AM

MSC 2300 A-B

Posters 1-10

Poster 1

A Spatial and Temporal Analysis of Texas Bays and Marine Species

Fiala Emiko-Mae Bumpers

Temporal and spatial analysis of marine species distributions within the Gulf of Mexico is important in recognizing trends as to how their population dynamics change. Recognizing these trends can help fisheries and bay managers take precautionary action to better manage species important to a system and prevent biodiversity loss. This paper explores (1) the spatial variability between the Upper and Lower Laguna Madre bay systems and its effects on seagrass species distribution; (2) how the abundance of fish and invertebrate species across all Texas bays are changing over time and space. Species observation data collected by TPWD for 10 bays in the Gulf of Mexico; over 35 years (between 1982-2016); across three sampling methods (gillnet, bag seine, and bay trawl); for over 1200 species of fish, invertebrates, and vegetation were analyzed in the R Studio Programming environment. SOMs were created to determine differences in environmental variables between the Upper and Lower Laguna Madre. Linear regression and related analysis were performed on the fish and invertebrate species observation data to determine their changes across bays (space) and over time. The findings for this study will allow for more accurate species distribution trends to be recognized than previous studies, and allow for the exploration of the use of SOM tools in marine species distribution analyses.

Poster 2

An Implantable Glucose Sensor Comprised of Fluorescence Assays and a Self-Cleaning Hydrogel Membrane

Bradley Schott

An implantable continuous glucose monitor (iCGM) is necessary in order to monitor blood glucose levels of diabetic patients throughout the day to keep glucose levels within a safe range. We propose that implantation of a glucose sensing assay into a biocompatible hydrogel membrane will result in an iCGM with a reduced foreign body response that allows for longer functioning periods and decreased inflammation. The hydrogel membrane has already been proven to exhibit anti-biofouling capabilities to limit the amount of fibrous encapsulation, extending the lifetime of the sensor. We propose to house a fluorescent glucose sensing assay within the membrane to eliminate the need for an electrical system within the body to measure glucose levels, thus decreasing the implantation size of the device. This project will evaluate the ability to fully encapsulate two different liquid glucose-sensing assays developed in Dr. Gerard Cote's lab and Dr. Michael J. McShane's Lab. We will test the encapsulation of the assay within the membrane to ensure there is no leaching, as well as test the ability of the assay to accurately determine glucose levels when housed within the membrane. We expect the sensor to not be altered by the hydrogel membrane and to function effectively.

Poster 3

Analyzing the State of Computer Vision Algorithms via Robustness, Degeneracy, and Recognized Flaws

Jonathan Weishuhn

One of the most vocalized applications of computational interactivity today stem from our biological sense of perception, both in its promise for automation and heeding of its still prevalent weaknesses. Computer vision, as it is known, is a rapidly growing sub-field of computer science that creates use out of visual input utilizing various vision models and algorithms. Naturally these models and algorithms vary widely in terms of correctness, robustness, and degeneracy, especially when operating under disparate environments and conditions. Many publications explore the goal of developing new and robust vision models or algorithms, but less so explore the comparisons between those that already exist. The purpose of this paper is to detail the performance of Visual SLAM with other modern computer vision models (such as PTAM, ORB-SLAM, DSO, LSD, etc.) to produce a standard by which full comparisons may be drawn for both disparate environmental and conditional datasets. It is hoped that this paper will inform others in academia of the current state of computer vision models and help determine when the use of one model should be preferred over another given a certain environment and/or operating condition.

Poster 4

Authenticity and Liking: Who do we Find Authentic?

Adam Cole Garcia

Subjective authenticity is the feeling that one's actions align with his or her true self (Sedikides, Slabu, Lenton, & Thomaes, 2017). Research has shown that people tend to view the true self as both inherently good and positively valenced (Newman, Bloom, & Knobe, 2014; Christy, Kim, Vess, Schlegel, & Hicks, 2017). For example, people believe that if someone changes for the better, they become more like their true self (Bench, Schlegel, Davis, & Vess, 2015; DeFreitas, Cikara, Grossman, & Schlegel, 2017). Morality is also positively linked to liking (Hartley, Furr, Helzer, Jayawickreme, Velasquez, & Fleeson, 2016). Specifically, if people perceive that someone is highly moral, there is a higher chance that they will like that person compared to someone they perceive as less moral. While perceptions of authenticity and liking are both related to morality, research between perceptions of authenticity and liking is limited. Preliminary research in our lab suggests that liking is a significant predictor of perceptions of another person's authenticity (Kelley, Schlegel, Hicks, & Kim, manuscript in prep). The current study extends these preliminary findings by exploring whether the relationship between authenticity and liking persist when controlling for other possible predictors, such as extraversion, positivity, or power. We predict that the higher a participant reports liking a person, the higher they will rate that person's authenticity. We also expect this relationship to work over and above any other possible predictors.

Poster 5

Building a Better Machine Learning Hardware Accelerator

Jacob Sacco

As machine learning is applied to ever more ambitious tasks, higher performance is required to be able to train and evaluate neural nets in reasonable amounts of time. To this end, many hardware accelerators for machine learning have been made, ranging from ASICs to CUDA code that runs on a conventional GPU. GPU and FPGA based accelerators have seen more success than ASICs due to the ease with which the design can be tweaked or revised, but still suffer from latency resulting from the interface between the processor and the accelerator (generally PCIe). The purpose of this paper is to build a hardware accelerator on Intel's Heterogeneous Architecture Research Platform, which includes a Xeon processor and Arria 10 FPGA on the same mainboard, which share access to common memory. This should significantly reduce latency and increase throughput. This accelerator is expected to at least match the performance of a typical machine learning library implementation on a GPU, and will hopefully significantly exceed it.

Poster 6

Cellulose Nanocrystal-Bonded Carbon Nanotubes/Polymer Filaments: Creating Ultra-Strong 3D Printed Parts with Multifunctionality

Mia Carrola

The manufacturing of polymer filaments with carbon nanotubes and cellulose nanocrystals is used to create 3D printed parts with improved delamination strength along with added thermal and electrical conductivity. The addition of cellulose nanocrystals (CNC) allows for the dispersion of carbon nanotubes (CNT), which allows for the material to enhance the properties of the ABS filaments and resulting 3D printed objects. The manufacturing method to produce the filaments includes the dissolution of ABS in acetone, ball milling of the resulting nanocomposite, and extrusion of filaments for 3D printing. The filament was used to print samples for tensile testing, 3 point bend testing, TGA, SEM, and DMA tests.

Poster 7

Characterizing the Compressive Strength of Spray-freeze-dried Ceramic Granules

Benjamin Graybill

In binder jet sintering operations, having a high bulk density of the green part is necessary to achieving a sintered component with a low porosity content. One method to increasing this bulk density is to apply a sufficient load to crush the raw material being used, while the green part is being manufactured. In order to apply the correct load to the raw material during fabrication, the strength of the raw material must be first identified outside of processing conditions. In this study, spherical Alumina particles with a porosity above 60 % will be evaluated for their compressive strength. The Alumina particles are manufactured through a process called spray-freeze-drying, in which the resulting particles are extremely spherical in their geometry and have evenly distributed porosity. The compressive strength of both individual particles (70 "“ 200 Åµm in diameter) as well as bulk alumina particles will be tested. The former will be tested using a nanoindenter system while the latter will be tested using a standard universal testing machine with a custom fixture. The compressibility of the powder is function of both the individual and bulk powder strength. With this relationship, a function finding force needed to effectively crush a thin layer of powder (like the one spread during fabrication) is derived.

Poster 8

Coupling of Ocean Acidification and Oxygen Depletion in the Gulf of Alaska

Calie Payne

Abrupt deglacial environmental changes are recorded in the North Pacific including the expansion and strengthening of the Oxygen Minimum Zone (OMZ). Within the OMZ where dissolved oxygen is depleted, the CO₂ concentrations are enriched, which increases ocean acidity and poses additional challenges to ecosystem function [Paulmier et al., 2011; Davis et al, 2016]. Paleoecological analysis of fossil organisms preserved in marine sediments provides a useful tool when understanding past environmental conditions and the effects present-day OMZ expansion will have on ecology. Marine sediment samples from cores within the modern OMZ in the Gulf of Alaska provide an excellent record of oxygen variability and associated changes in sea floor communities as we observe an ~4,000 year low-oxygen event during the last deglacial (18-14 kya). Here I will test the hypothesis that ocean acidification also varied in the OMZ as oxygenation changed by comparing the oxygenation history with size-normalized shell weights of foraminifera with carbonate shells. Size-normalized shell weights should decrease due to carbonate dissolution when ocean acidification is stronger and is often used as a proxy for carbonate ion concentration. My research will use three species, one planktonic foraminifera (*Neogloboquadrina pachyderma*), and two benthic foraminifera (*Uvigerina peregrina*, and *Epistominella pacifica*). I will compare the size-normal shell weights to existing geochemical proxies for low-oxygen over the past 20,000 years.

Poster 9

Developmental Study of *Lucilia Cuprina* at a Constant Indoor Temperature

Lauren Gagner and David Sohn

Forensic entomology is the scientific study of arthropods and their developmental stages to aid in legal investigations. *Lucilia cuprina*, along with a few others, is a scavenger and a primary colonizer of carcasses. These blowflies are forensically relevant and are commonly used to calculate postmortem interval (PMI) and time of colonization (TOC) to aid in medicolegal death investigations. In this study, *L. cuprina* were taken from existing colonies and raised to the next generation. Four trials were conducted under a constant temperature of 25°C.

Poster 10

Economic Mobility of Low-Wage Workers in the United States

Kyle Spears

Mobility literature in economics examines the distribution of earnings in a workforce. That research is motivated to better understand how workers can rise or fall in the distribution of earnings. However, with new and more detailed forms of data, researchers can now look at wage mobility, which is more specific than just earnings mobility. Wage mobility is relevant since future wage prospects of an individual impact their present decisions. The data come from the Survey of Income and Program Participation Gold Standard File (SIPP GSF), which links individuals to their wage history, work history, education level, and other detailed variables. This project examines the wage mobility prospects of young adults who experience low wages while surveyed in the SIPP. The goal of this project is to lay the foundation for the wage mobility of low wage young adults, which is a niche in economics with limited research. Alongside building an underlining estimate of the long-run wage prospects of low-wage workers, this project aims to evaluate the economic behaviors and choices of the individuals that make up the low-wage cohort.

Posters 11-20

Poster 11

Effects of Lithium Carbonate on Feather Damaging Behavior in Parrots

Elizabeth Cruser

Can lithium carbonate be used to treat neurotic feather damaging behavior in Quaker Parrots (*Myiopsitta monachus*)? Feather damaging behavior, the intentional removal of feathers without a biological need to do so (i.e., lining a nest, breeding display), is a compulsive behavioral issue seen frequently in captive parrots. Feather damaging behavior can become neurotic and may eventually result in self-mutilation or "skin picking." Like any neurosis, excessive preening is likely triggered by a range or combination of factors, including chronic stress, anxiety, boredom, poor nutrition, pain, or parasitism. I aim to investigate whether I can reduce or eliminate neurotic feather damaging behavior in known "pluckers" in a large colony of Quaker Parrots. I will offer 6 birds free choice access to a lithium carbonate solution while tracking lithium carbonate intake, feather plucking, and feather regrowth throughout the study.

Poster 12

Exploring Automated Deep Learning Solutions For Improved Noise Tolerance in Hardware Implemented Neural Networks

Jeffrey Cordero

AutoML techniques provide solutions for automatically improving performance in deep learning models. This research investigates possible autoML improvements that can aid in the development of noise tolerant hardware neural network (HNN) architectures. It focuses on noise resistant data storage and transfer schemes allowing neural network models to be built as dedicated hardware. This will help negate performance losses such implementations would experience due to Gaussian noise commonly present in standard computer hardware. Most of this research involves the development of novel analog error correcting codes to correct signal perturbations caused by noise. As well, novel binary error correction methods are investigated for the sake of completeness, validating improvements against the analog error correction solutions. Preliminary results demonstrate remarkable improvements for the analog error correction techniques on smaller models, with testing of binary codes as well as larger networks planned in the future. If successful, this research would enable the development of dedicated neural network hardware with far smaller power consumption, space, and cost requirements than standard deep learning approaches which require powerful GPU resources. It will also provide insight into whether autoML techniques can provide a valid approach to the development of such noise tolerant neural network architectures in the future.

Poster 13

Generation of RPA3B Knockout Mutants in Arabidopsis thaliana Using CRISPR/Cas9

John Fatora

Replication Protein A (RPA) is a heterotrimeric single stranded DNA binding (SSB) protein. RPA has functions in DNA metabolism and meiosis (1). Specifically, the subunit RPA3 helps give structure to the heterotrimeric complex, allowing the RPA1 subunit to bind to DNA in order to perform various reactions involved in DNA replication and repair. To further characterize the activity of RPA3B, knockouts will be generated in Arabidopsis thaliana using CRISPR, a gene editing technology that has become widely used recently.

Poster 14

How the Rise of Prejudice at the Household Level has Impacted the Migrant Farm Industry

Carlee Crocker

This study aims to establish a relationship between prejudice towards Latin American immigrants and outcomes in the migrant farm industry, such as farm income and employment levels. Using regression analysis with STATA, it aims to determine the correlational relationship between the level of prejudice, measured using Google Trends Data, and outcomes in the Migrant Farm Industry, collected from the US Department of Agriculture. In order to establish an argument for a causal relationship, the regression design used was an instrumental variable one, with an indicator variable for whether there had been a Trump rally located in the state in the prior week to serve as a quasi-random instrumental variable. The data collected over the course of this study came from several sources, including the Google Trends Database, Donald Trump's campaign website, and the US Department of Agriculture's website, which has archived annual data from farms dating back to 1940. After running an instrumental variable regression, I expect to find statistically significant results suggesting that changes in the levels of prejudice cause changes in outcomes in the Migrant Farm Industry. More specifically, increasing prejudice towards immigrants, is correlated with a statistically significant decrease in the employment numbers of migrant farm workers, suggesting that a negative attitude toward immigrants stops some portion of immigration. Additionally, increasing prejudice towards immigrants will also lead to a decrease in the income of the farm earned through the sale of crops.

Poster 15

Impact of Microplastics on Soil Health: Soil-water Retention, Shrinkage and Holding properties

Lindsey Pressler

While microplastics in the ocean have been heavily studied, their impact on soils have not. Current research suggests microplastics are just as prevalent in freshwater and land as in the ocean and should be considered a pollutant due to the potential hazardous effects. Once in the soil, the chemicals in the plastics, or even the plastic particles themselves, can be taken up by plants. Understanding whether or not microplastics and their additives change the soil's ability to retain water is a fundamental step towards determining the critical level of microplastics in cropland. This study reviews the effects of microplastics on the water retention and shrinkage and swelling of soil. Samples were collected from the A&M bioapplication field where sewage sludge has been applied, as sludge is a major vector of microplastics into soil. Samples were tested in the pedostructure characterization lab for soil-water holding properties. Next, the amount of microplastics in the samples were quantified using gravimetric separation and sieving. Due to the changes microplastics create in density and charge from accumulated chemicals, it is predicted that soils with microplastics will have a lower water retention than the controls.

Poster 16

Impact of Polymer Architecture on PCL-DA/PLLA Semi-IPN Properties

Kelly G. McKinzey

Autographs are the most common way to treat cranio-maxillofacial (CMF) bone defects; however, difficulty in shaping and fitting the rigid grafts into bone defects with complex geometries results in poor osseointegration. The Grunlan group has previously addressed this issue with their thermoresponsive shape memory polymer (SMP) bone tissue scaffolds, which upon exposure to warm saline ($T > 55^{\circ}\text{C}$), can be easily press-fitted into irregularly shaped defects. The SMP scaffolds are based on a poly(ϵ -caprolactone) diacrylate (PCL-DA) network, and interconnected pores are introduced via solvent casting particulate leaching (SCPL) fabrication. Recently, poly(L-lactic acid) (PLLA) was incorporated into the PCL-DA network as a semi-interpenetrating network (semi-IPN), and was shown to both enhance modulus and to accelerate degradation towards matching the rate of bone neotissue formation. Thus far, the scaffold materials have been based on linear polymers; this work aims to explore the effect of changing to a star architecture. Star polymers are known to have different properties and interactions than their linear counterparts, so their substitution into the scaffold is expected to yield tunable properties, particularly in terms of degradation profiles, but mechanical and shape memory properties are also of interest.

Poster 17

Surface-Enhanced Raman Analysis of Underlying Colorants on Re-Dyed Hair

Isaac Esparza

In the field of forensic sciences, hair is just one of the many types of evidence that can be found at a scene. Hair evidence is one of the most common types of evidence, yet analysis is subjective and is interpreted by an analyst, adding in bias to the outcome of the analysis. By applying Surface Enhanced Raman Spectroscopy (SERS) to the analysis of dyed hairs, forensic hair analysis can become more than just a subjective comparison between two samples and can help include or exclude individuals from being present at the scene of a crime. This alone shows the importance and need for more advanced hair analysis methodology in the field of forensic sciences. In order to remove the subjectivity from forensic hair analysis, the application of surface-enhanced Raman spectroscopy (SERS) is effective and nondestructive. Through this technique, we have shown that SERS can be utilized to identify hair dyes on a single strand of hair, detect underlying dyes that are present when a sample of hair has been dyed multiple times, and what kinds of dye were used.

Poster 18

Inverse Amphiphilic Polymer Lubricant Additive to Sequester Water in Engine Oil and Increase Oil Efficiency in Machineries

Mona Fattahi

Corrosion at metal surfaces in engine components remains a challenge in machineries, due to water contamination that is prevalent in engine oil. Impurities, such as naphthenic acids and other corrosive molecules that are formed by oxidative reactions involving water and oil lubricant at high temperature, react with metal surfaces and gradually corrode the engine, leading to a decrease in energy efficiency, short engine lifespans, frequent repairs and high costs of maintenance. This work aims to tackle this issue via the development of amphiphilic bottlebrush polymers for use as protective lubricant additives that would be capable of lubrication by an outer shell and water sequestration into an internal core. The amphiphilic bottlebrush polymer framework is being constructed by using reversible addition-fragmentation chain-transfer polymerization to produce norbornenyl-functionalized macromonomers, followed by their ring-opening metathesis polymerization and chemical modification. A variety of techniques, including nuclear magnetic resonance spectroscopy, Fourier-transform infrared spectroscopy and size-exclusion chromatography, are being employed for composition, structure and size determination. In future work, the polymers will be investigated for their ability to sequester water, enclose metal nanoparticles and decrease friction between metal surfaces.

Poster 19

Plant Functional Traits of Carapa guianensis, A Widespread Tropical Tree, Adapted to Local Climate Conditions at Two Elevations in Costa Rica

Manuel Flores

Tropical rainforests are among the most biodiverse ecosystems in the world. However, plant species occurrence are highly dependent on localized topography, elevation, and climate. Convergent evolution has been studied extensively to identify key plant traits that vary along those gradients, which contributes to a greater understanding of how species adapt to climate variation. This project investigated leaf physiological and anatomical trait variation within a select tropical tree species, *Carapa guianensis* Aubl, which thrives in a wide range of elevations and climates within Central and South America. At two sites in Costa Rica, four leaves were sampled on each of three sample trees of *C. guianensis* growing at approximately 500 m (Texas A&M University Soltis Center) and 900 m elevation (Pocosol Biological Preserve), in which we measured leaf net photosynthesis and stomatal densities. We further assessed the relationship of net photosynthesis across a range of light intensities to determine the photosynthetic optimums and minimums of trees occurring at contrasting elevations. We found that stomatal density was higher at decreasing elevations, possibly as a means to compensate for less frequent cloud coverage and differences in climate (air temperature and solar radiation). Furthermore, *C. guianensis* trees located in lower elevations had higher net photosynthesis rates (P_{gmax}) than trees sampled at higher elevations, after accounting for differences in leaf temperature. These findings suggest that lower elevations with higher light intensity can significantly drive critical plant processes. Hence, further experiments are needed, not only to explore plant functional traits in species adapted to occur across wide ranges of elevations, but climatic changes that drive them, especially in our current global scenario in which tropical forests are expected to have higher temperatures and longer dry periods.

Poster 20

Silencing Nociceptors Using DREADDs to Reduce Neurogenic Pain from Spinal Cord Injury

Robert Adkins

A new chemogenetic treatment for pain inhibition in the peripheral nervous system will be tested using a spinal cord injury model. This experiment is important because many spinal cord injury patients experience chronic pain in their limbs, even after they have lost all motor function. The pain can range from a mild tingle to a constant stabbing, burning pain. The pain arises after spinal cord injury when a miscommunication forms between the pain neurons and the brain. The goal is to silence these miscommunicating pain neurons using a new virus. The new virus being used contains designer receptors exclusively activated by designer drugs (DREADD). These receptors silence neuron activity when they bind to an inert ligand that is injected into the rat. The virus has been tested in a paper by another group. The virus has not yet been tested in a spinal cord injury model. This experiment builds off of their research by silencing nociceptors in a rat spinal cord injury model. The injection method was optimized to increase viral infection rates. Once it was confirmed that the DREADD works, it was tested in a spinal cord injury model. We predict that silencing nociceptors early after spinal cord injury will reduce long-term pain outcomes.

Posters 21-31

Poster 21

Testate Amoebae Communities Sensitive to Soil Moisture in Mountain Fens

Alexis Liann Lemos

Minerotrophic peatlands are widespread ecosystems that could be used more often as paleoecological and paleoclimatic archives. However, they have received much less attention than ombrotrophic peat bogs, resulting in very limited information pertaining to their microbial communities. In spite of this, a few studies from Europe have suggested that testate amoebae assemblages from fens could be used as proxies for soil moisture. Here we contribute to this effort by providing a new study from a mountain fen located in the Sibbald Research Wetlands in the Rocky Mountains of Kananaskis Provincial Park, Alberta, Canada. Our goals are to (1) quantify the relationships between testate amoebae communities, environmental parameters (pH, water table depth, soil moisture, conductivity, trace elements), and vegetation, (2) identify the key controls on testate amoebae distribution, and (3) develop a transfer function to be used in mountain fens of the region and potentially beyond, given the cosmopolitan nature of testate amoebae taxa.

Poster 22

Textbook Problem Dependency Web

Joseph Martinsen

This thesis looks to tackle a problem that arises after a textbook has been written, and published. To customize the book for a particular audience, it may be desirable to reorder some of the chapters. However, there may be dependencies among the chapters, examples and exercises which make it very tedious to rearrange the order of not only the chapters but also the associated problems. Given a textbook with chapters A, B, C where the material in B and C depend on A but not each other. Suppose the original order is A, B, C, and some of C's problems utilize of information from chapter B as well as A. If we wish to reorder the chapters as A, C, B then the new order is acceptable in terms of content dependencies but some of the problems from C need to be moved to B. I believe this process of reorganizing chapters, sections, and problems can all be automatized utilizing a dependency tree built and managed within a graph database that the user will be able to directly interact with utility's and tools for easy navigation, modification, history tracking and updates. This is simply a tool for one to interact with their data.

Poster 23

The Effect of Hydrogel Stiffness on the Differentiation and Activity of Adipocytes

Emma Kate Glenn

Fibrosis occurs when the extracellular matrix (ECM) is deposited excessively, causing tissue damage and decreased function. Adipose tissue fibrosis has been identified as a driver of insulin resistance in obesity and the degree of fibrosis correlates with metabolic health. This project seeks to determine how varying hydrogel stiffness affects the differentiation and function of adipocytes. These effects will be studied to suggest a model to mimic fibrotic tissue similar to that in chronic adipose tissue inflammation due to obesity or lipedema, as well as possible clinical applications through tissue engineering. Previous tissue engineering approaches have utilized polymers for the purpose of adipose differentiation, but have not gone further to assess if the cells are biologically active. Similarly, studies have not assessed the impact of the matrix on both brown and white adipose tissue. This project utilizes a gelatin-based matrix reinforced with magnetic nanoparticles that permits tight control of matrix stiffness without varying matrix composition, concentration, or porosity. Primary adipose stem cells from both white adipose tissue (WAT) and brown adipose tissue (BAT) will be seeded, differentiated, and assessed for their differentiation, insulin sensitivity and lipid handling over a range of matrix stiffness. This project is intended to provide insight on the best conditions to model healthy adipocyte growth, and to identify how fibrosis specifically impacts adipocyte biology.

Poster 24

The Effects of EtO Sterilization and Polydopamine on Pcl-PLLA Scaffolds

Christopher Houk

The current gold standard for repair of cranial bone defects is an autograft procedure which, while having its advantages, lacks proper fitting and is limited by irregular geometries. A regenerative approach to cranial bone defects are self-fitting shape memory polymers (SMPs) tissue scaffolds which are capable of complex geometries and conforming to fit of the defect. Poly(ϵ -caprolactone) (PCL) is a widely studied SMP with few disadvantages such as slow degradation rates (~1-2 years) and lack of osteoconductivity. Thus, in order to improve upon these properties, poly(L-lactic acid) (PLLA) is included as a semi-interpenetrating (semi-IPN) component within the PCL-diacrylate (PCL-DA) network forming a semi-IPN network, wherein PCL-DA is chemically crosslinked while PLLA is independently embedded within the network. Extensive work in the Grunlan Lab has reported on the properties of these semi-IPN SMPs and current studies have entered the animal testing phase. Furthermore, in order to promote cell adhesion and aid neotissue formation, scaffolds are coated with polydopamine. After fabrication, scaffolds undergo ethylene oxide (EtO) sterilization prior to implantation. In this study, crystallinity, shape memory behavior, and mechanical properties of SMP scaffolds treated with and without EtO sterilization will be tested and evaluated. Based on work presented by Gisela C.C. Mendes et. al, EtO sterilization should allow the material to retain desired functionality without negatively impacting desired properties.

Poster 25

The Effects of Resiliency on Downward Counterfactuals

Cody Elkins

After a negative event, an individual often thinks counterfactually (i.e., generates thoughts about what might have changed the outcome). Current psychological research suggests that counterfactual thoughts after a trauma are adverse to mental health. However, this does not take into consideration the resiliency of an individual. A two-part experiment was conducted to examine whether individuals with higher resiliency scores generated more downward counterfactuals. Part 1 was an online survey in which participants answered questions from The Connor-Davidson Resilience Scale (Connor & Davidson, 2003). Part 2 asked participants to recall a traumatic life event and write about it. Afterwards, participants saw the following prompt: "If the traumatic event had not occurred, then ___ (blank was filled in by participants)." The statements generated were then presented back to the participants who were asked to self-code the counterfactuals as either upward (describing a better outcome) or downward (describing a worse outcome). Resilient individuals tend to handle adverse situations better than people who are low in resiliency. Therefore, better understanding their thought process is important so resiliency can be strengthened in others. Since counterfactual thinking occurs after significant negative events, understanding how resilient individuals use this to their advantage is an important skill that could be taught to others. It was hypothesized that greater resiliency would predict more downward counterfactual thoughts generated. However, the correlation between these two variables was not significant ($r = 0.93$, $p = 0.362$).

Poster 26

The Evolution of Ideas about Sports Through Medieval Literature

Lauren Gonzalez

The purpose of this research is to understand how societal ideas surrounding sport have evolved from the time of Sir Thomas Malory's *Le Morte d'Arthur* in the fifteenth century to more modern adaptations of his work by T.H. White and Marion Zimmer Bradley in the twentieth century, comparing the works to present-day sport theory. No secondary sources have taken into account sport as a whole, in any of these three works, failing to explore the portrayal of athletes, spectatorship, and the evolution of sport's social significance. By examining the way these factors are described in Malory's work and comparing the descriptions to the accounts of sport in White and Bradley, conclusions will be drawn about what ideas surrounding sport have evolved, remained the same, been created, or have been lost based on present-day sport theory.

Poster 27

The Lasting Anthropomorphic Effects of Gender Affirmation Practices

Fatimah Bouderdaben

The goal of this research is to study the effect that medical interventions relating to gender affirmation practices have on the physical growth of a human body. This research will consist primarily of a literature review of studies relating to the change in bone growth of an individual who has used hormone therapy or puberty blockers. First, I will survey research on growth and development of the skeleton in adolescents not treated by hormone therapy. Then, I will look at expected changes to growth caused by implementing hormone therapy at different ages. By compiling the research done on the differing effects of these practices, I hope to better define how the age of therapy initiation may shape final skeletal shape in transgender individuals. This could be extremely helpful in a forensic context for identifying transgender remains, estimating age at death of transgender remains, and stature of unidentified transgender decedents. Thus, the focus of this research is on lasting effects of transgender hormone therapy that could be evaluated after death from the skeleton. This is extremely important in today's current climate, as transgender individuals are dying at higher rates. It is becoming increasingly more likely that forensic anthropologists will encounter a case involving transgender skeletal remains. It is important to prepare for these instances and this research aims to be the first step in that direction.

Poster 28

The Threat of Psychographics

Akhil Thadani

Psychographics is the study of how peoples' social media history can reflect their personality. Through it, researchers are able to assign several personality identifiers to a person based off a single "like". This paper primarily will deal with the ethical appraisal of psychographics as a form of targeted advertising as well as its use as mass public persuasion. In the process, I will examine whether or not, or to what extent, psychographics violates consumer autonomy based off of an established framework. I will evaluate the different ways that this technology is being implemented and the ethical differences between them, focusing particularly on its use in a political context.

Poster 29

Understanding the Role of Awe in Religiosity

Marcus Chur

Religion gives people a core set of beliefs and values. Studies have shown that there is a strong positive relationship between a person's self-perceived meaning in life and their religion. Thesis Statement: Religious people are more successful in satisfying their need to accommodate new information associated with awe experiences, and therefore experience less fear, an orientation towards awe, and increased certainty in their worldview as compared to non-religious people. Theoretical Framework: For our research, we will be conducting an experimental study. We will manipulate the experiences of awe compared to a controlled condition. We will assess fear after the manipulation. Participants will complete a measure for religiosity too. Project Description: The purpose of the study aimed at comparing the differences between how religious and non-religious people experience Awe. The study's sample included X undergraduate students from a southern university enrolled in an introductory psychology course. We predicted that religious people who experienced awe would report a greater meaning in life.

Poster 30

Wireless Glucose Sensor on Paper Substrate

Christopher Evan Wright

Millions of people around the world require access to reliable glucose sensors. While commercial sensors are widely available, they are quite expensive for both insurance companies and for patients. This is due to the high cost of fabrication and the materials used for the sensing enzyme and the agents used to mask the sensor from the immune system. As more patients are diagnosed with conditions, such as Type 1 Diabetes, that require access to reliable glucose sensors, the need for less expensive sensors increases dramatically. The goal of this project is to create a reliable sensor using highly repeatable and low-cost techniques. In addition, the sensor should operate with precision in the acceptable margin for patient use, which is within 20% of the actual glucose level. If the device can be made using low cost printing techniques, an antenna can be fabricated as well to reduce the cost even further. The chosen method to do this is to use a paper substrate and silver nanoparticle ink to print the connections for the sensor. As for the sensor, glucose oxidase (GOx) is used as the enzyme to convert the concentration to an electrical signal, immobilized using the nanoparticle ink. To deposit the GOx, an ink is also created that will mix with the nanoparticle ink and deposited on the sensing area. The expected result of this research is to develop a low-cost, high-throughput process of creating a glucose sensor that can be reliably used to track glucose levels in patients.

Poster 31

Zero-shot Learning with Novelty Detection and Word Semantics

Nathan Brockway

With the world depending more on technology and the rise of automation, the need for fast and efficient machine learning techniques is essential. Zero-shot learning is the best method for machine learning since it is based on figuring out what new data means. This technique is important because humans learn in this way. People know innate categories of items such as animals, cars, and plants with which they use to learn new specific examples of those things such as an octopus, Koenigsegg, or *Dionaea muscipula* (Venus flytrap). This project will combine image and textual information to categorize pictures much like a child seeing a new item for the first time and then asking for a description of that object. Many different and similar styles of zero-shot learning exist and some are even used on a small scale; however, a major reason they are not widely used is due to their lack of development. Most zero-shot algorithms depend on object focused data relying on an object to be present in a sample. However, this type of data does not exist in the real world where sometimes there is no specific object or many specific objects. This paper proposes and demonstrates techniques on how to process complicated real-world data for use in machine learning designs. The zero-shot learning approach trained and tested on this data uses a relatively unique approach combining computer vision techniques of standard zero-shot learning with novelty detection and word embedding natural language techniques.

Poster Session 2: 3:00-4:00 PM

MSC 2300 A-B

Posters 1-10

Poster 1 | Academy of Undergraduate Researchers Across Texas, Texas A&M University

Using Nanofiber Elution for the Treatment of Surgical Site Infections with a Novel Antimicrobial

Morgan James Chapman

*****PATENT PENDING – ABSTRACT REMOVED*****

Effects of Parabacteroides distasonis Gavage and Ketogenic Diet Administration in a Carcinogenic Murine Model of Colorectal Cancer

Camilo Anthony Gacasan

Colorectal cancer (CRC) is the second leading cause of cancer related deaths in the United States. Interindividual differences in genetic background result in a complex and dynamic system between the gut microbiome and variable phenotypic response to diet as it relates to CRC risk. Previous research from our laboratory investigated CRC susceptibility in an azoxymethane (AOM) murine model using FVB/NJ (FVB) and C57Bl/6J (B6) mice fed a ketogenic (high fat, no carbohydrate) American (high fat, high carbohydrate) or standard (moderate fat, moderate carbohydrate) mouse chow. Tumor multiplicity was dependent on both strain and diet with a four-fold increase reported in FVB mice fed ketogenic diet relative to those fed standard chow. This response was not observed in FVB mice fed the American diet or in B6 mice on any of the three diets. A subsequent study that investigated the physiological response to diet in multiple genetic backgrounds revealed a decrease in the abundance of the bacterial species *Parabacteroides distasonis* in FVB mice fed a ketogenic diet. This established an emphasis on the interaction between variable response to diet, gut microbiome and further implications to gut health. To further investigate this relationship in FVB mice we are using an AOM-induced carcinogenic model on FVB mice fed a ketogenic diet supplemented with a biweekly gavage of *P. distasonis*. A droplet digital PCR and nested PCR assay will be used to quantify the absolute and relative abundance of *P. distasonis* respectively in fecal samples from several time points before and after the initiation of diet and administration of AOM. Ultimately, we aim to determine the relationship between *P. distasonis* and CRC tumorigenesis, which will lead to a further understanding of the etiology of CRC.

Poster 3 | Academy of Undergraduate Researchers Across Texas, Texas A&M University

Elucidating the Structure of Cancer-relevant Neo-epitope/MHC Complexes Toward Targeted Immunotherapy

Karissa Yamaguchi

Major Histocompatibility Complex (MHC) Class I molecules alert the immune system that a cell is infected by displaying peptides to the surface of the cell. If a T-cell recognizes a specific peptide/MHC complex, it mediates antigen-specific programmed cell death of that cell. Thus, T-Cell Receptor (TCR) engineering is an attractive approach for targeting cancerous tumor cells without inducing broad toxicity to patients. Peptide/MHC complexes must be characterized to design and fine-tune engineered TCR for therapy. Since multiple MHC complex classes exist, characterization of each class is necessary for all patients to benefit. This study aimed to elucidate the structure of a common human MHC (termed HLA-A*01:01) with three cancer-relevant neo-epitopes mutated peptides found in cancerous cells. In this study three neo-epitopes implicated in metastatic cancers were studied: NRASQ16K (implicated in melanoma) and ALK9mer and ALK10mer (both found in neuroblastoma). Only two were able to be characterized using biophysical techniques. The ALK10mer was characterized through crystallography and X-ray diffraction. NRASQ16K was isotopically labeled and in vitro refolded for further 3D Nuclear Magnetic Resonance characterization and computational modeling with Rosetta. Through the validation of these structures, the binding mechanism of neo-epitopes to MHC complexes may be predicted. These predictions may then be used in the Rosetta to bypass the need for extensive biophysical characterization, expand the neo-epitope/MHC repertoire and accelerate the process of TCR engineering. Key words: Nuclear Magnetic Resonance, NMR, crystallography, computational modeling, immunotherapy, T-cell, cancer

Poster 4 | Academy of Undergraduate Researchers Across Texas, Texas A&M University

Songs of the Dying Swan

Ryan Ansley Malia Randle

My research objective is to find out how the depictions of the god(s) within classical Latin source texts and the early English adaptations of the tragic love story of Aeneas and Dido ranging from the 14th to 16th century frame the way we perceive the actions and character of the mortals it concerns. The purpose of looking at the relationship between the depiction of divinity to the perception of the human characters within the story of Aeneas and Dido before and across the English Reformation is to see if there is a notable shift in more Catholic to more Protestant sentiments and undertones across this period of time.

Poster 5 | Academy of Undergraduate Researchers Across Texas, Texas A&M University

Strengthening Elastomers Through Double-Network Design

Oscar Gonzalez

Polymers have a plethora of uses and are everywhere around us. However, unfilled polymers suffer from poor mechanical strength. A common strategy used to increase the mechanical strength of polymers is to add fillers, such as zinc oxide and carbon nanotubes, in the polymeric matrix. Consequently, the filler causes the loss of transparency and prevents the polymer from being used in many situations. Molecular redesign of the network that enhances the mechanical strength but also preserves the transparency is therefore desirable. In this work, we investigate a double network (DN) elastomer that exhibits improved mechanical properties while preserving its transparency. The synthesis of the elastomer follows a procedure similar to the DN hydrogels that were rigorously investigated by Gong et al. Improving the mechanical properties of elastomers, while maintaining transparency, opens new avenues where it can be incorporated in various fields, i.e. aerospace, electric industries, and bioengineering.

Poster 6 | Academy of Undergraduate Researchers Across Texas, Texas A&M University

Re-Creating the Sinking of the Edmund Fitzgerald

Jasmine Derry, Lauren Hammond, Marissa Harris, Yuan-Chi Lee, and Kiara Stewart

Over the course of the school year, we intend to create a short film centered around the sinking of the S.S. Edmund Fitzgerald. Up until this point, there has been thorough research in the conditions surrounding the sinking of the ship, as well as a single video-based recreation. However, this research remains to be properly visualized in a manner that is historically accurate, emotionally compelling and rendered photo-realistically. Depicting it accurately would do justice to the scientific feat of this storm and memorialize the memory of the ship and its crew. The main tool that we will use is Dr. Jerry Tessendorf's proprietary rendering software Gilligan, which is able to simulate oceans, waves, splashes, and mist with a high level of scientific accuracy. By pushing Gilligan to its limits, we can create a short film that, in the process of its creation, will be a deep dive into both the history of this ship and the technical process of creating a comprehensive film pipeline from scratch.

Poster 7 | *Guest Presenter:* Academy of Undergraduate Researchers Across Texas, University of Texas

Activity During the 80-minute Uptake Time Affects Off-target Binding in Tau PET Scans (18F-AV-1451)

Christopher Apgar

Aggregation of tau is one of the hallmarks of Alzheimer's disease (AD). The positron emission tomography (PET) scans using tau-specific tracers, such as [18F]AV-1451, are now able to identify in vivo tauopathies in the brain for AD. One possible factor we observed with [18F]AV-1451 is the off-target uptake outside of the brain that is close enough for bleed-in effects. These areas include the meninges, cortical bone, and jaw muscles. Another feature of [18F]AV-1451 is the latent scan time with a long 80 min uptake time. During this uptake period it is standard protocol to release participants until it is time for imaging, which they would do various activity before the actual PET scan. In this study, we conducted a post-scan survey asking their mental and physical activity during the 80-minute uptake time and investigated if any of these activities correlated with the off-target tau uptake inconsistencies. The off-target regions of interest (ROIs) were measured in standard uptake value (SUV) with set standards of ROI by two independent experimenters showing average of 0.98 intra-class correlation efficiency. Our results showed several behaviors correlating the off-target tau SUV and among them sleeping positively correlated with off-target tau SUV, walking negatively correlated. Our preliminary findings showed that prior to and during the 80-minute release certain behavioral decisions contribute to the off-target tau inconsistencies that could bleed into the brain areas. In the future a more critical review of the current standard protocol for [18F]AV-1451 scans must be taken so there are reduced off-target inconsistencies resulting in more accurate diagnosis.

Poster 8 | *Guest Presenter:* Academy of Undergraduate Researchers Across Texas, University of Texas

Developing Model Substrates to Characterize the Effect of Degron Arrangement on Degradation by the 26S Proteasome

Erin Choi

The 26S proteasome is the primary machine that controls degradation of damaged and misfolded proteins. Substrates are targeted to the proteasome through ubiquitin tags, and degradation is initiated at an unstructured region, or tail, within the substrate. The geometry of the substrate plays an integral role in substrate selection. Substrates with optimal geometries have the unstructured region reach into the proteolytic pore of proteasome which results in affective degradation. Substrates with poor geometries have unstructured regions that do not reach the proteolytic pore which leads to little to no degradation. Substrates were made with varying alpha-helix spacers, from 0 amino acids to 70 amino acids, between the ubiquitin tag and initiation tail in order to test which geometries are affectively degraded by the proteasome. Degradation was measured by detecting fluorescence from a fluorescent domain that is within each substrate. The results showed that degradation of the model substrates depend on the geometry of the substrate where optimal degradation peaked at the alpha-spacer with 30 amino acids.

Poster 9 | Guest Presenter: Academy of Undergraduate Researchers Across Texas, University of Texas

Establishment of Cotton Recycling Systems for Solid Waste Reduction and Fashion Sustainability Enhancement

Becky Phung

This study investigates the challenges associated with textiles recycling by integrating students' learning and participation in campus-scale cotton recycling initiative; conducting lab research on the cotton recycling process, creating fashion design studio for using recycled cotton fabrics, and conducting a marketing study on potential commercial cotton recycling networks. Phase 1 of this study, which began last semester, included establishing and managing the student-led Textile and Apparel Recycling Campaign (TARC) on campus, gathering data on collected textiles, and conducting student outreach on textiles and fashion sustainability. In Phase 1, the researchers partnered with a local household goods recycling company, Simple Recycling, as the conversion of cotton into functional regenerated cellulose fiber (new rayon) will be explored in a later phase of the research. Textile collection bins were established in 3 dorms and the building housing the textiles and apparel department. A total of 37.4 kg of textiles were collected in 2.5 weeks. Larger dorm size did lead to increased amount of collected textiles. Collected textiles were largely in reusable rather than disposable condition, and they were also largely created from fiber blends rather than pure 100% fiber content. Most collected items consisted of either 100% cotton or cotton blends. Problems associated with textile recycling include confusion of textile recycling bin for other forms of waste, signage confusion among students, and lack of awareness of textiles knowledge among students. Research will continue into the current semester and compare an all-female and all-male dorm to each other.

Poster 10 | Guest Presenter: Academy of Undergraduate Researchers Across Texas, University of Texas

IgG Immune Complexes Inhibit Naïve T Cell Proliferation and Diminish Memory T Cell Cytotoxic Potential

Justin Mirazee

Posters 11-20

Poster 11 | *Guest Presenter:* Academy of Undergraduate Researchers Across Texas, University of Texas

Investigating the Correlation between Action Prediction and Social Responsiveness

Kelsey Mumford

Large racial disparities exist in the screening and subsequent diagnosis of children with Autism Spectrum Disorder, with minority children being diagnosed on average 1-2 years later than their White peers. In this experiment, I investigated whether social responsiveness was correlated with action prediction ability to determine whether this area might hold potential for screening tool development surrounding an ability that was not previously analyzed in children. For the experiment, 20 pairs of subjects played a game touching one of two targets. The “Attacker” in each scenario was told via headphones which of the two targets to touch and the “responder” responded to the attacker’s movements. The responder wore a camera on her head which recorded the attacker during the game. Later, research participants came into the lab and watch the recordings of these subjects playing the game. For some of the videos, we removed all frames before the attacker picked up his or her finger and replaced it with the start frame to see if this removal of early movement cues affected how fast they could predict the action of the attacker. We also administered the social responsiveness scale to participants, which is the scale currently used in ASD screening and diagnosis. Ultimately, we found that removing those early movement frames made the participant take a significantly longer amount of time to predict which target the attacker would touch. When I compared the difference in reaction times caused by removing those early frames to the scores of participants on the social responsiveness scale, I found there to be a non-significant negative correlation. This means that for individuals who scored higher on the scale, indicating more features of ASD, they experienced less of a delay in reaction time when those early movement cues were removed. This suggests that those who showed more features of ASD were less able to use that early movement information to predict the following action of the attacker in the cooperative social condition.

Thermal Model of Infrared Cloud Monitor, as part of the Extreme Universe Space Observatory on a Super Pressure Balloon

Zoe De Beurs

The University of Chicago Infrared Cameras will play an integral role in the Extreme Universe Space Observatory aboard a Super Pressure Balloon (EUSO-SPB2). EUSO-SPB2 will be the first instrument to detect ultra-high energy cosmic rays through particle showers from above [1]. Ultra-High Energy Cosmic Rays (UHECRs) are extremely energetic particles which constantly bombard the earth from all directions. Cosmic rays can have energies ranging from 10¹⁸ to 10²¹ eV, making them the highest energy subatomic particles known to exist [2]. At these immense energies, UHECRs embody the high energy frontier of the cosmos. Aboard EUSO-SPB2, the University of Chicago infrared cameras will serve as cloud monitors to define the detector size, ultra-high energy cosmic ray event rate, elemental identities, and ensure proper energy calibration. To monitor the altitude and coverage of clouds, the infrared cameras need to be at a stable temperature. Located in the stratosphere, where temperatures range from -40°C to 40°C, the University of Chicago Infrared Camera required a sophisticated thermal model and control system. We sought to develop this control system using heat conductivity tests, thermoelectric simulations, and highly emissive coatings. We found that the coating of the outer surface affects the temperature most significantly. Theoretically, the coating could reduce the temperature to -20°C, diminishing the need for Peltier cooling devices and hyperconductive heat pipes. In future work, we will further test the thermal emissivity and solar absorptivity of highly emissive barium sulphate coatings. Ultimately, this will allow us to compare the experimental values to the theoretical values and refine our thermal model. Further refinement will allow the infrared cameras to serve aboard EUSO-SPB2 and ultimately give us insight into potential cosmic accelerators of the most energetic subatomic particles known to exist.

References

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Implementing Vr Systems for Insight into Water Desalination Plant

Sofian Mohammed Ghazali, Aisha Hussain, and Muhammad Zaid Kamil

This research is to identify the effectiveness of using Mixed reality (MR) tool as a teaching method for students. The goal of this project is to show that MR can be incorporated as a significant form of learning for students. This study aims to identify whether the VR/AR tools can be used as a technique to enhance student learning. The project will allow students to have hands-on and immersive experience resembling components to give a Desalination plant. In our research, we developed a virtual model of the Desalination plant in Unity and used scripts to make the plant interact with the user. We identified and selected the drag and drop feature to be used in our application due to its ease and high interactivity that engages the students' learning when building the virtual desalination plant. In addition; we have identified the benefits of digital data collection; for example, the use of machine learning to analyze and evaluate the student's headset interactivity compared to the traditional observatory method. We are incorporating a Digital assistant that can foster student learning. It allows students to analyze, evaluate and create structures that allow for a well-rounded learning experience. In our application, users will be assigned to play a puzzle game comprised of arranging the different components of the desalination plant. There will be descriptions and hints appearing that allow the user to play the game. The student is responsible for placing the different system components in correct locations for the water treatment process to begin. The impact of our teaching method is not to eliminate classroom learning but to provide alternative learning solutions for students. It will also be useful in the industry-level as it allows professionals to perform certain procedures as many times as they want safely to acquire the necessary skills in real-world systems. As of now, students can get to play the game at the conference, but evaluation of data using digital assistant is still under progress and should be ready by the end of the UGR timeline.

Poster 14

Maritime Cyber Security: A Case Study of AIS Data in Commercial Maritime Shipping in the Gulf of Mexico

Sarah Hamrock

Cyber security is a problem within the maritime industry because of the introduction and continuous implementation of technologies, including automation and digitization of processes among others. This consequently adds new vulnerabilities within ports, ships, offshore rigs and submersibles systems. As a result, recent number of incidents, such as the most notable hacking of Maersk's systems, show that commercial shipping has taken a more reactive than proactive approach. Compared to other industries, the maritime sector does not employ centralized monitoring of information flow through traffic controllers, like aviation. This means that any device using Internet of Things (IoT) can transmit and receive information that is captured and shared for various (unknown) purposes. This is the case with Automatic Identification System (AIS) data that has proliferated. Are IoT and AIS hampering security? How safe and secure is this? Why should commercial maritime companies care? To answer these questions, analysis is conducted in two steps. First, we apply the risk assessment methodology provided by U.S. Coast Guard to map the threats, vulnerabilities and consequences of AIS data proliferation in commercial maritime shipping. Second, a monitoring system is applied to map the threats based on a dual authentication process.

Poster 15

An Order Independent Solution for Combining Skeletal Models

Luke Witt

Skeletal tracings are a compact and efficient way of storing large amounts of data and are particularly useful for analysis in the world of Biotechnology. One of the largest issues with skeletal tracings is that most of the tracing algorithms available rely on a large number of dependent variables that can drastically change the result. Due to these inconsistencies, it can be difficult to determine an accurate representation of the original data. A possible solution for more accurately representing a given data set would be to take multiple tracings of the same data, produced by different tracing algorithms or with altering parameters, and perform an analysis on these sets to create an average model. The average model would allow for access to additional information such as a degree of certainty that is associated with each branch based on the variance of the original tracings. This will give the viewer a more in depth understanding of the original set of tracings as well as the resultant model that was achieved. In the past few years, there have been a few advancements concerning combining skeletal tracings, but none of them have concluded with an order independent solution. Without order independence, the resultant model could change based on the order that the algorithm analyzes the individual tracings. In our current research, we have been able to preprocess the data so that it is susceptible to geometrical and topological analysis and have developed a method for geometrically analyzing and combining the original tracings. The geometrical analysis uses a modified K-means clustering algorithm to combine geometrically similar poly lines representing individual branches of the tracings. The topological analysis is a topic that is in ongoing research.

Poster 16

Application of Multi-tonal Complex with Optical Coherence Tomography Imaging System for Vibrometric Analysis of Inner-ear Structures

John Kyle Cooper

Currently, research is being conducted on single tone sound transduction within the auditory portion of the inner ear, the cochlea. The study of cochlear mechanics in large rodents has provided important insight into cochlear function. Additionally, multi-tone stimuli can provide a new perspective in vibrometric analyses. Therefore, the proposed study was aimed to test the recent implementation of multitone calibration into an existing python program, PyVib2, which was used during Optical Coherence Tomography (OCT) imaging experiments for vibrometric analysis of the structures in the inner-ear. Within PyVib2, the multi-tone stimulus program will be executed in conjunction with the OCT B-scan program for full vibrometric analysis. This research resulted in the further development of the PyVib2 program and the acquisition of insightful image data of structures of the human inner-ear, which was collected using the OCT imaging system.

Poster 17

Average Case Analysis of Selected Distributed Algorithms

Gerald Hu

Distributed algorithms are important for managing systems with multiple networked components, where each component operates independently but coordinates to achieve a common goal. Previous theoretical research has produced numerous distributed algorithms but primarily uses mathematical proofs to yield theoretical results, such as worstcase run times. However, less research has been done on how these algorithms behave in practice, such as average-case run times. This paper will describe the empirical behavior of selected distributed algorithms in a realistic environment, using the language DistAlgo to implement and simulate each algorithm. We focus on results such as average-case running time, and which theoretical bounds can be relaxed in practice. The first algorithm CCREG emulates a shared register in a system with continuous churn using a message-passing model, building on previous work that placed bounds on churn. The second algorithm concerns leader election in a network with dynamic topology, modifying prior work to allow for arbitrary topology changes. The third algorithm concerns clock synchronization in a system with Byzantine failures, improving on earlier work by using a more realistic model of faults.

Poster 18

Civil Society and Democracy in Post-Communist Eastern Europe

Reagan Spexarth

This project seeks to address the impact of civil society on the quality of democracies in post-communist Eastern Europe. Recently, many of these countries have witnessed some degree of democratic backsliding. However, the presence of a strong civil society may help prevent new backsliding and allow for countermobilization and pushback against the backsliding that has already occurred. My paper will be looking directly at the relationship between civil society and democratic backsliding in post-communist Eastern Europe in order to test the defensive and stabilizing capacities of civil society. If this theory holds, then there should be decreasing levels of democratic backsliding among countries with stronger, more active civil societies. I will be using statistical programming in R to evaluate the Freedom House democracy index and the V-Dem civil society indices in order to quantitatively test this hypothesis.

Poster 19

Conservation Action Plan of Xenomys Nelsoni (Magdalena Woodrat)

Lois-Anna Voelkel

Xenomys nelsoni (Magdalena Woodrat) currently classified as Endangered A2c under the 2018 International Union of Conservation Nature (IUCN) Red List; needs proper reassessing and a conservation plan to fulfill the objectives of the newly formed Small Mammal Specialist Group (SMSG) of Mexico. Of the 263 small mammal species (Rodentia and Eulipotyphla) that are found in Mexico, 63 are considered endangered according to the parameters of the Red List. This species is an endemic species in the tropical dry forest, currently threatened by habitat destruction (Arroyo-Cabrales et al. 2017) with a 50% reduction in population size. The collaboration of Texas A&M SMSG and the SMSG of Mexico at the Mexican Small Mammal Assessment, Prioritization, and Conservation Planning Workshop, has created guidelines to propose and develop restoration efforts protect populations of both *X. nelsoni* and other species that co-occur within the area of distribution. Through this research, there will be a more comprehensive determination of the status of this species, ideas regarding the planning and managing of a captive breeding program, and the development of public awareness and efforts for habitat protection (Lacher et al. 2018).

Poster 20

Creation of Interactive VR Application That Supports Reasoning Skills In Anatomy Education

Amber Ackley and Karla Chang Gonzalez

For our creative work thesis, we are developing a VR (Virtual Reality) Program that allows a user to view and interact with muscles and nerves of a canine leg. Using an industry-style pipeline, we are working to develop anatomically accurate models of canine muscles, which will then be textured, rigged, and animated for use in an educational virtual reality platform. The end goal of the project is to create and measure the efficacy of a visually dynamic experience for the user, allowing them to generally explore canine limb anatomy, and to specifically visualize deficits in muscle movement, produced by user interaction with the canine nervous system. This tool will explore the possibilities of Virtual Reality and seek to improve upon existing methods of higher-level anatomy education. Traditionally, higher level anatomy education is taught through the use of cadaver dissections, two-dimensional anatomical diagrams and didactic lectures. However, these traditional methods of teaching anatomy have many limitations and are not enough to build a visual-spatial understanding of anatomical structures. Virtual reality is a strong tool that allows students to directly manipulate anatomical models in a three-dimensional space. While the literature has been filled with VR applications that aim to fill this need, many existing tools offer only a static model for the user to explore by rotation, adding and subtracting layers, and viewing labels to learn about the anatomical structure. We seek to increase the level of dynamic interaction that the user has, by allowing the user's touch of the models to change the animation and movement of the three-dimensional models in their environment. Our expected outcome is a VR learning tool that has potential for further exploration in higher level anatomy education. Our creative work employs the methodologies of "art-based research". Art based research can be defined as the systematic use of the artistic process, the actual making of artistic expressions as a primary way of understanding. The project will be iteratively created while working with content experts, specifically anatomy experts from Dept. of Veterinary Sciences at Texas A&M University. Implementing anatomy education using virtual reality and developing a universal pipeline for asset creation allows us the freedom to dynamically build on our application. This means that our tool can accommodate for the addition of new muscle and nerves. By continuing to develop our virtual reality application in future works, we can expand the breadth of knowledge a user can gain from interacting with our application.

Posters 21-30

Poster 21

Differences in Cognition and Physiology in Calorically Restricted Mice During Aging

Sophie Nader

Age-related cognitive decline is a major health concern today and is associated with annual health care costs of billions of dollars. Although extensive research has focused on cognitive impairment and drug treatments, no therapies are currently available. This project will investigate whether intermittent fasting (IF), a form of caloric restriction, affects cognition across aging. Recent studies have enumerated that the beneficial effects of caloric restriction and exercise on overall health during aging. We will use both young and aged mice and alternate day ad libitum feeding for 4 weeks as a model of caloric restriction. A combination of experiments will be conducted to evaluate cognitive abilities (Barnes Maze, a spatial learning task, and hippocampal field potentials, a measure of synaptic transmission). All of these measures will provide data that will be used to compare the levels of impairment between young and aged mice. The importance of learning about the effects of caloric restriction across aging can provide direction for how to investigate mechanisms to reduce cognitive impairments.

Poster 22

Differences In Resource Allocation Between Post-mating Male and Female Olive Ridley Sea Turtles (*Lepidochelys olivacea*)

Nicole Guentzel

Olive ridley sea turtles (*Lepidochelys olivacea*) are one of seven endangered sea turtle species. During their reproductive season these turtles migrate great distances to mate and lay eggs. Poor nutrition before this migration can result in fitness costs including skipped breeding years, longer inter-nesting intervals, and fewer eggs. Therefore, more information on nutrition is needed to better understand its impact on reproduction in wild populations. New techniques for evaluating nutritional state have provided useful results in other sea turtles species and are considerably less invasive than traditional techniques. This study tests two techniques, ketone body analysis and subcutaneous fat ultrasound, to determine if they can provide useful information about resource allocation and nutrition in Olive Ridleys. If successful, these newly validated techniques should help identify differences in the nutritional physiology of wild males and females. This project may thus provide valuable information to improve sea turtle conservation, as there is no nutritional data currently available to inform conservation policies to manage prey species at breeding grounds in Costa Rica.

Poster 23

Effectiveness of Ankle Strengthening using Pilates Reformer vs. Balance Board to Improve Balance in Dancers

Chloe Bergeron, Madeleine Dardeau, Olivia Gerwing, and Danielle Schraer

This study was conducted to analyze the alignment of various collegiate dancers' ankles in order to strengthen the muscles surrounding the ankle joint and improve balance. We conducted our research using a pre and post test using the Star Excursion balance test and the Stork test. Participants from the Texas A&M dance program that have not had any lower extremity injuries in the past six months were randomly assigned to either the Pilates intervention group, balance board intervention group, or a control group who continued their regular training regiment. The participants met three times a week for five weeks to go through the intervention exercises. After the intervention period, a post test was conducted to collect data from the same tests used for the pre test. We predicted that the balance board group would have the greatest improvement because the exercises were fully weight bearing and challenged their balance more than the reformer group.

Poster 24

Esterases *iroE* and *fes* Participate in the Protection of Salmonella Against Oxidative Stress

Sandhiya Ravichandran

We know how Salmonella reacts to oxidative stress¹, however we are unsure of the role the esterases *iroE* and *fes* play in these oxidative environments. Previous work by our lab has showed that the ABC-type multidrug efflux pump MacAB plays a significant role in the protection of Salmonella against oxidative stress¹. The MacAB pump is the only ABC-type drug efflux pump found in Salmonella and has been clearly linked to the virulence of Salmonella. It is also clear that that the MacAB pump has functions other than antibiotic resistance and plays a role in the protection of Salmonella in environments with oxidative stress. Yet, the mouse model used in those papers appears to only measure the survival of the animals and do not quantitate the colonization of the $\hat{\imath}''\text{macAB}$ mutant compared to its parental strain. We have seen that supernatant from wild-type organisms exposed for great amounts of time to peroxide will eventually rescue the growth defect of the $\hat{\imath}''\text{macAB}$ mutants in the H₂O₂. Therefore, to understand the role of the $\hat{\imath}''\text{macAB}$, *iroE* and *fes* in Salmonella's resistance to oxidative stress we will measure the growth rate of mutant strains deficient in $\hat{\imath}''\text{macAB}$, *iroE* and *fes* in the presence of H₂O₂ through growth curves.

Poster 25

Evaluating the Statewide Effects of Hifa Waivers on Alcohol Abuse/Dependence and Illicit Drug Use

Caroline Lee

In 2010, the ACA was signed into effect by former President Obama. The act had the intention of expanding Medicaid and making healthcare more affordable and accessible for Americans by drastically overhauling previous U.S. healthcare regulation. Although the magnitude of the changes proposed by the ACA were one-of-a-kind, the concept of healthcare expansion was not unique to the ACA. Back in 2001, the Bush Administration gave states the ability to expand healthcare coverage on their own terms through the HIFA Demonstrative Initiative. The initiative allowed states to pay for their healthcare expansion by rolling back healthcare package benefits and increase sharing costs. Using HIFA waivers, a total of eight states increased health care coverage. With this change, more people in these states now had health care coverage, which meant that in theory, more people had access to mental and behavioral health services. To determine whether these HIFA waivers have caused a significant change in the prevalence of illicit drug use and alcohol abuse/dependence, NSDUH prevalence estimates for states with HIFA waivers were compared to states without said waivers. These estimates are tracked over a four-year timeline to analyze whether there is marked long-term difference associated with healthcare expansion. According to these figures, there is evidence to suggest that the Bush Administration's HIFA waivers had (no/mixed/clear) effects on (only alcohol abuse/ only illicit drug use/ both alcohol abuse and illicit drug use) numbers.

Poster 26

"Quia Similia Similibus Applaudant": Visual Variations of Genesis 3 in the Medieval Mind

Sarah Emily Trcka

In the Late Middle Ages, a twelfth-century French theologian Petrus Comestor wrote his Biblical paraphrase entitled *Historia Scholastica* (c.1170) which subsequently became one of the most circulated texts of the time. In Comestor's approach to the book of Genesis, he describes the serpent in the Garden of Eden as having "a maiden's face, because like applauds like". When it comes to medieval visual reproductions of Biblical stories none are depicted more than the lore surrounding the first man and woman and their fall from grace. Considering the influence of Comestor's writing his description of the female-headed serpent unsurprisingly splintered across Europe inspiring artists and other theologians across a wide array of secondary iconographic and literary sources. In this thesis, I will examine how the woman-headed serpent shaped visual representations of Genesis 3 and in turn influenced the thought surrounding the culpability of Eve and women as a whole in the creation of sin. My scope is limited to the texts and images only concerning the serpent as having the head of a woman and therefore will exclude notable reworkings of the narrative including texts such as John Milton's *Paradise Lost*. To accurately determine how to examine the nebulous thought around sin, women, and evil in the late middle ages leading into the renaissance I have structured my argument around prevailing gendered ideas of the time such as the Eve-Mary pairing as well as how variations in woman-headed serpent illustrations point blame at Eve as an individual or to the female sex in general.

Poster 27

Joint Source-Channel Coding using Machine Learning

Inimfon I. Akpabio

Most modern communication systems rely on separate source encoding and channel encoding schemes to transmit data. Despite the long-lasting success of separate schemes, Joint source-channel coding schemes have been proven to outperform separate schemes in applications such as video communications. As a result of inherent limitations in joint encoding schemes, such communication networks experience inevitable dips in performance in the presence of channel abnormalities (e.g. fading channels, bad weather, etc.). The task of this research is to develop a Joint source-channel coding scheme that mitigates some of the limitations of current joint coding schemes. My research will attempt to leverage recent advances in machine/deep learning techniques to develop resilient schemes that do not depend on explicit codes for compression and error correction but automatically learn mapping schemes for source signals.

Poster 28

Liquid Crystal Self-assembly of Nanorods and Nanoplates

Sasha Maria George

Cellulose is the most abundant naturally available polymer and its fibrillar and nanocrystalline forms are currently active areas of research for their bio-mimicking photonic structures. There is always a demand to find new distinguishing features that could help economize products and make them more affordable. The special helicoidal assembly of rod-shaped cellulose nanocrystals is particularly interesting in that it can serve as a chiral dopant. Observing and learning about the interactions of the cellulose nano-crystals (CNC), derived from cellulose along with other liquid crystal such as Zirconium phosphate can help us gain a deeper understanding into the characteristics of CNC as a liquid crystal and hence help us think of its future applications. Rod shaped Cellulose Nano Crystals (CNC) show a chiral nematic phase in aqueous suspensions whereas a hexagonal platelets of inorganic material - zirconium phosphate - show nematic phase in their aqueous suspensions. In this project, the phase behavior of the colloidal composite system consisting of CNC and ZrP will be studied. It is hypothesized that CNC will guide the platelets to assemble into helical structures which will be a novel discovery in the field of colloidal self-assembly. Under the application of external electric field, this novel phase is expected to show unwinding of helix.

Poster 29

Machine Learning for Raga Identification in Indian Classical Music

Pranati Chinthapenta

Indian Classical music consists of "Ragas". Ragas are combinations of notes in a particular order. There are 72 combinations of these notes that form the 72 parent Ragas. While Western music also has notes that go with the songs, it differs from Indian music in the rules that Ragas set to a specific song. For example, if someone was to perform a song in Raga #1, they must stick to the notes that are present in that Raga. Otherwise, it is no longer Raga #1. While imposing rules, Ragas also provide a lot of complexity and creativity to the artist. The artist needs to create impromptu variations while staying within the Raga's boundaries. The proposed methodology is to use Signal Processing techniques to obtain the feature vector for the ML algorithm and then use this to classify the Ragas. First, Discrete Fourier Transform (DFT) graphs are obtained. These graphs need to be normalized. The feature vectors are obtained and these consist of smaller, 2 coordinate vectors. One of the coordinates is the time at which the frequency changes and the other coordinate is the frequency that it is changing to. This then turns into an Approximate Nearest Neighbor problem where each of these vectors is plotted on a 72 coordinate plane since there are 72 parent Ragas. The Machine Learning algorithm then learns to recognize how close the vectors are to each other and classifies them into groups while outputting the name of the Raga. This method can be extended to any new Ragas that are developed.

Poster 30

Magnetic Gears for Drivetrain Reduction in Wind Turbines

Ellen Dangtran

The objective of this research is to do analysis on magnetic gears for the application of Magnetic Continuously Variable Transmissions (mCVTs) on wind turbines. Wind turbines convert the kinetic energy of wind into electrical energy. A primary component of the wind turbine is the gear box. Currently, mechanical gears are used in the gear box; however, there are several issues with the physical contact required to transfer power between the shafts, such as wear-and-tear, heat, and misalignment. Magnetic gears are a solution to many of these problems as they function without contact and are not as severely impacted by misalignment. Requiring bidirectional converters for the control rotor, harnessing wind at a wide range of wind speeds, and increasing speed while holding torque, are all desirable features of an mCVT for wind turbines; however, they each require a larger and more expensive power electronics converter in the drivetrain. A two-axis testbed and a magnetic gear prototype is designed to test the impact of misalignment and air gap variance. Solutions to reducing the size and cost of the power electronics considered in this research include: only using unidirectional converters on the control rotor, lowering the required voltage, and using optimum gear ratios, and only harnessing wind above certain wind speeds. The data from the prototype shows the efficiency of the magnetic gears at varying air gap and misalignments and is evidence that the magnetic gear is a viable replacement for mechanical gears. Matlab data is collected to compare wind speed to the output power, analyze power lost with the bidirectional converter, and review power to gear ratio relationships. The cost and benefit of each solution is considered based on the data collected.

Posters 31-40

Poster 31

20th and 21st Century Climate Change's Impact on East Asia Monsoon and Renewable Energy Resources

Zonghui Li

This research aims to identify what is the impact on renewable energy resources, specifically for solar energy availability. By analyzing data and building models of precipitation, cloud cover and solar radiation over the last 30-50 years in China, not only on the area that directly impact by Eastern Asian Summer Monsoon (EASM) which southeastern China is, but also on other parts of China and countries in East Asia, this research is able to find out the change's impact on solar energy, like a larger area of cloud cover, more extreme weather, and lower solar radiation will likely produce less solar energy. This research also compiles the locations of current and planned solar energy programs and focus analysis on the area with those programs. In the end, this research will show what climate change's impact on EASM means for solar energy in China and predict this change in the future.

Poster 32

Mixed Signal Circuits Optimized for Machine Learning

Oluwaseyi Moronfoye

The aim of this project is to develop customizable hardware that can perform Machine learning tasks. Machine learning is the science of leveraging advance statistics and data mining to "teach" computers how to recognize patterns and perform tasks without direct human instructions. Circuits optimized for machine learning using mixed-signal inputs will be able to act as a dedicated hardware for performing conventional computational tasks required in learning systems; improving both efficiency and. The hardware will be comprised of an array of neurons, an activation-function block at the output of every neuron, and a back propagation protocol for every layer. The use of both digital and analog inputs will provide us with a means for not only for faster computations but also more intuitive results. The project will focus on answering the question: If and how we can implement an "efficient circuit that use both analog and digital inputs to train a device to learn patterns from data.

Poster 33

Modulation of Transforming Growth Factor β^2 -induced Endothelial-Mesenchymal Transition by Nck

Thuy Tien Tran

In humans, fibrotic disorders, such as atherosclerosis and tissue fibrosis, are known to have an endothelial-to-mesenchymal transition (EndoMT) induced by transforming growth factor β^2 (TGF- β^2) as one of the main driving forces of these disorders. Nck, a family of adaptor proteins, are involved in cardiovascular morphogenesis, but the role it plays in TGF- β^2 -induced EndoMT is yet to be known. To study the role of Nck, human umbilical vein endothelial cells (HUVEC) are treated or untreated with TGF- β^2 for either 48 or 96 hours. Expression levels of Nck, EC markers and mesenchymal markers (MC) of the collected cell are determined through western blots. The anticipated outcomes and results of the research will give answers to the hypothesis of Nck family stimulating EndoMT due to signals from TGF- β^2 . The findings of how Nck factors in TGF- β^2 -induced EndoMT will hopefully be useful for therapies against cardiovascular morphogenesis.

Poster 34

Performance Analysis of Artificial Intelligence Workloads

Rejath George

Artificial Intelligence (AI) has become an integral part of our day-to-day lives. The applications of AI range from Virtual Personal Assistants to Medical Diagnosis. For any AI application to be successful, it needs to be perfectly trained first. This requires a large set of data to be involved in training an AI application. While this large set of data helps an AI application in accomplishing its goal, it imposes immense pressure on the underlying hardware. Two major areas of concern involving the data set are storage and efficiency at which they are processed. The efficiency of an AI application can further be disintegrated into the efficiency of the algorithm employed and the efficiency of the underlying hardware. Although many researches have been conducted on resolving the storage problems and improving the efficiency of the algorithms involved, little light has been shed on improving the efficiency of the hardware (Jia et al., 2017; Morgan, 2018; Plattner & Zeier, 2011). This research concentrates mainly on this area. The aim of this research is to analyze the performance of the AI workloads and identify the bottlenecks with respect to both hardware and software.

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Poster 35

Physical Activity for People With Autism Spectrum Disorder

Sarah Tiner

People with disabilities are significantly less physically active than are people without disabilities. There is significant research on the benefits of physical exercise for people with a disability, but little is focused on specific disabilities, such as Autism Spectrum Disorder (ASD). The purpose of this study is to look specifically at how physical activity (PA) affects those with ASD. Through use of the social ecological model to survey nurses on how likely they are to recommend PA for people with ASD, the importance of including it in the lifestyles and community of ASD can be seen. By using Qualtrics, a high volume of data can be recorded from nurses on the societal, community, relationship, and individual factors that affect PA opportunities can be obtained. By looking at the benefits/detriments of PA, existing and future community programs can be improved for those with ASD. I believe that PA will have many benefits for persons living with ASD, and that these benefits will provide basis for improvement in future and existing PA opportunities. The theoretical framework of this study stems from the fact that people with disabilities are significantly less physically active than are people without disabilities. The purpose of this study is to look specifically at how physical activity (PA) affects those with ASD.

Poster 36

Research Ethics and Sexuality: The Influence of Personal Ideologies

Erica S. Lohmann

The purpose of this study is to determine the degree to which participants maintained their original ideologies after being exposed to a synopsis of an unethical experiment. The study primarily screened for anti-gay prejudices in participant responses with the intent to determine if another's sexuality influenced the participant's view on the ethicality of the experiment. Participants were asked to complete a preliminary set of questionnaires to determine their background knowledge on unethical experiments and attitudes towards science. They were then requested to complete the second part of the study where they were exposed to a condition of the unethical experiment and administered additional questionnaires. The second set of questionnaires were designed to reassess their attitudes towards science and obtain information on their views of the LGBT community. This study focuses on the Tearoom study and how the knowledge of another's sexual identity could potentially influence an individual's opinion on whether an unethical experiment is justifiable or not. I hypothesize that support for victims involved in unethical research will decrease when they are a part of the LGBT community and will increase when the victim is heterosexual.

Poster 37

Sodium Magnetic Resonance Imaging for Evaluation of Duchenne Muscular Dystrophy

Edith Valle

Duchenne Muscular Dystrophy (DMD) is a genetic disorder that affects 1 in 3500 males around the world. This disorder is caused by lack of dystrophin and is characterized by progressive muscle degeneration and weakness. It has been reported that increased levels of ^{23}Na concentration may play a role in the degeneration of muscle. For this reason, evaluating abnormal sodium concentration levels may provide valuable information pertaining to disease progression and/or treatment efficacy. To address this need, a custom double-tuned birdcage coil was designed and constructed to evaluate sodium concentration levels in muscle tissue phantoms using MR imaging. The coil was constructed with an outer high-pass coil configuration for ^1H (200.07 MHz) and an inner lower-pass coil configuration for ^{23}Na (52.93 MHz) for a 4.7 T scanner. Bench measurements were taken to evaluate the performance of the coil at both resonant frequencies. B_1 field was found to be homogenous at the center of the coil and the isolation between channels was found to be -25 dB for ^1H and -30.9 dB for ^{23}Na . The loaded and unloaded quality factors of the coil were evaluated using a phantom that mimicked the loading properties of diseased tissue. The loaded and unloaded quality factors of ^1H were 351.1 and 359.9, respectively. The loaded and unloaded quality factors of ^{23}Na were 293.9 and 300.7, respectively. These results show that the birdcage coil has highly homogenous B_1 fields for both ^1H and ^{23}Na over the region of interest.

Poster 38

Source-to-Source Transformations for Parallel Optimizations in STAPL

Brian Kelley

Programs that use the STAPL C++ parallel programming library express their control and data flow explicitly through the use of skeletons. Skeletons can be simple parallel operations like map and reduce, or the result of composing several skeletons. Composition is implemented by tracking the dependencies among individual data elements in the STAPL runtime system. However, the operations and dependencies within a compose skeleton can be determined at compile time from the C++ abstract syntax tree. This enables the use of source-to-source transformations to fuse the composed skeletons. This reduces STAPL runtime overhead by simplifying the explicit dependency graph. It also allows the compiler to inline the composed work functions and optimize them as a single unit. We present a Clang compiler plugin that automatically performs this transformation on compose skeletons, and demonstrate its ability to improve performance.

Poster 39

Strain Typing of Trypanosoma cruzi in the Southern United States

Cassidy Gillum

Chagas disease, caused by the protozoan parasite *Trypanosoma cruzi*, is endemic in Latin America and has also been documented in the United States. The disease has a wide range of symptoms, ranging from acute, cold-like symptoms, to chronic afflictions of the heart and gastrointestinal systems. While treatment options are available for humans, a low percentage of infected individuals can access and afford these treatments and no antiparasitic treatments are approved for dogs. *T. cruzi* has a large amount of genetic diversity. Seven strain types, TcI-TcVI and Tcbat, have been identified, with geographic distribution varying with the region. In South America north of the Amazon, TcI dominates, while TcV and TcVI dominate south of the Amazon. TcI and TcIV are the main strains of Central America and have also been previously identified in the Texas, yet there is little research attention on the strains in other regions of the southern United States. The goal of this project is to characterize the *T. cruzi* parasite genetic strain distribution across the southern US. The DNA from the gut tissue of the Triatomine vector ('kissing bug'), collected through Texas A&M University's Citizen Science Program, was analyzed using PCR assay to identify the presence of *T. cruzi*. Then, a PCR assay with probes for the strain types was used to identify the strain type of positive samples. A geographic map of the southern United States was created to illustrate the distribution of the strain types found in the sample.

Poster 40

Sub-channel Activation of the Navasota

Dion Webster

Anastomosing rivers are multichannel systems characterized by containing a definitive main channel and semi-permanent sub-channels that intertwine with the main channel in their planform. This semi-permanence of the sub-channels is largely associated with their flows that have generally been assumed to be fed by overbank flows from the main channel. The Navasota river on the coastal plains of Texas is an anastomosing river with ephemeral anabranches dependent on main channel over bank flow. This study determines the river stage at which the main channel becomes laterally connected to 3 anabranch channels by surface water. The study site of the Navasota River and its floodplain that lies downstream of U.S. Geological Survey gaging station 08110800 (intersection with Old San Antonio Rd) and continues downstream 32 kilometers. Lateral connections between the main channel and sub-channels are determined using a two-dimensional hydrodynamic model that was developed using a LiDAR-based digital terrain model and calibrated/validated using acoustic and topographic surveys conducted in the field. The riverine landscape of the Navasota River shelters high levels of ecological diversity and surface water connections within a river reach can impact the overall health and evolution of riverine ecosystems. This work provides a case study to promote knowledge of the inundation patterns and flow dynamics of anastomosing geomorphology and water resource management applications within the study reach and upstream of the study site to help mitigate flooding hazards and help manage the riverine ecosystem.

Posters 41-43

Poster 41

Synchronous Handheld Spectrometer

Jocelyn Leon

Due to the high prevalence of bacterial infections and increasing antibiotic immunity, a handheld synchronous spectrometer capable of detecting the ratio of live/dead bacteria in-situ within minutes will be designed and constructed. Synchronous fluorescence spectroscopy coupled with principle component analysis has shown the ability of recording and displaying the ratio of live/dead bacteria within minutes.

Poster 42

Wireless Infrared Power

Joseph Harris

We propose to create an infrared beam using infrared LEDs and lenses to power devices wirelessly. All electrical devices we use today are limited by either being hardwired or using batteries to power them. This technology can eliminate the need for devices to be constrained by wires or battery life. There are similar technologies that are currently being brought to market, but they use laser technology. The use of lasers makes the technology more dangerous and costlier. By using LEDs and lenses we expect to make the cost of the unit less expensive and safer for everyday use. The unit will be comprised of a transmitter and a receiver. The transmitter will be mounted in an upper corner of a room and detect the receiver once it enters its range. The transmitter will then direct the infrared beam towards the receiver and start transferring power. If the infrared beam is broken and the receiver no longer receives the expected amount of power the transmitting beam will be stopped. This safety feature will ensure there is no stray infrared radiation being beamed around the room.

Poster 43

Construal level, Self Knowledge and Academic Motivation: Knowing Why You Pursue Your Goals Promotes Academic Motivation

Lara Andres

This study will be based on the interaction between two theories that describe how individuals conceptualize their goals (Action Identification Theory and Construal Level Theory) and constructs that address the understanding of the self (Self-Knowledge) these theories will be studied to investigate their impact on academic motivation. The relationship between the level of goal construal and academic motivation will be mediated by self-knowledge. The level of action identification that an individual has will moderate the correlation between construal level and self-knowledge. Both Construal Level Theory and AIT theory identify how actions are seen as having either high-level or low-level identities. How we conceptualize our actions can impact our self-knowledge and, in effect, our level of self-knowledge has a powerful role in motivation (specifically academic motivation). Self-knowledge is different from self-concept because self-knowledge is a broader understanding of ourselves while self-concept is a dynamic understanding of ourselves provided through our actions that change from our interactions and comparisons with others. The aim of this study is to examine the mediating effect that self-knowledge has on the relationship between construal level and academic achievement. This study will be conducted as a computerized study, through manipulation of construal level and questionnaires of a reverse coded version of self-knowledge including a newly created measure of authenticity, a measure of autonomy and an academic motivation scale. Results found that there was a significant relationship of certain types of self-knowledge as a mediating variable between construal level and academic motivation.

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