UNDERGRADUATE RESEARCH SCHOLARS *Symposium* 2018

L|A|U|N|C|H Undergraduate Research

ABSTRACT BOOK

Memorial Student Center (MSC), Texas A&M University

9:00 AM-4:30 PM

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Oral Session #1 | 9:00-10:00 AM
MSC 2500-2503

	Oral Room #1 MSC 2500	Oral Room #2 MSC 2501
9:00-9:15		*Megan Culler*
9:15-9:30	*Joseph Edward Castillo*	*Dakota Plesa*
9:30-9:45	*Victora Elizabeth Chavez*	*Tyler Wiener*
9:45-10:00	*Open Q+A*	*Open Q+A*

Mantled Howler Monkey (*Allouata palliata*) Tree Use in a Small Rainforest Fragment in Northeastern Costa Rica

Joseph Edward Castillo
Texas A&M University, College Station

Due to the destruction of tropical rainforest habitats, primate populations are forced to modify their behaviors from undisturbed states to survive emerging anthropogenic pressures. Rainforest habitats in the New World are especially in danger, due to continued mass agriculture that occurs near or in primary habitat ranges. Activity budgets can be useful in obtaining behavioral data to understand how non-human primates behave in anthropogenically disturbed habitats. Mantled howler monkeys (*Allouata palliata*), which are widespread throughout Central America, provide a useful study sample due to their ease of observability. As a sexually dimorphic species, they may also possess sexually distinct behaviors in terms of their habitat preference. Using focal animal sampling, 33.5 hours of data was collected on a population of mantled howler monkeys in a small rainforest patch in NE Costa Rica. DBH and notes of the surrounding canopy cover of trees which were rested or fed in by individuals were also taken. This preliminary study found that mantled howler monkeys preferred to rest and feed in large trees with high canopy cover, however females had a slightly higher rate of exhibiting these behaviors in smaller trees than males. This may be a result of parental care, as females spent more time near juveniles, who tended to be more active and spent time in smaller trees.

Oral Room 1: MSC 2500 | 9:15-9:30 AM

Comparison of the Impact of CeO2 Nanomaterials on the Soil-water Holding Properties of Three Different Types of Soils: A Pedostructure Characterization Approach

Victora Elizabeth Chavez
Texas A&M University, College Station

Water and food security are pressing issues worldwide as the agriculture currently consumes more than 70% of the global freshwater to feed the current population. Since population and therefore the demand for food and clean water is increasing, non-conventional water reuse has taken a lot of attention recently. However, the impact of the reused water is still being researched. A widely used variety of engineered nanomaterials (ENMs) have been used in industry and end up in our wastewater treatment systems and therefore the environment. Studies previously conducted focused only on the implication of the nanoparticles on the plant rather than the soil. Understanding how the ENMs affect the soil aggregates will help better evaluate the soil-water holding properties, the soil health, and the soil functionality. In my research, the soil-water holding properties will be identified based on the soil aggregates structure (pedostructure approach). My research will study how a specific nanoparticle (NP): CeO2, can alter the hydro-structural properties of three different soil types: loamy fine sand, clay loam, and clayey soil. The research outcomes will contribute to better irrigation management practices as well as soil and water conservation practices.

Oral Room 1: MSC 2500 | 9:30-9:45 AM

Sensor Verification for Cyber-Physical Models of Power Systems

Megan Culler
Texas A&M University, College Station

Traditional security measures for large-scale critical infrastructure systems have focused on keeping adversaries out of the system. Models can account for natural errors in the system, but fail to analyze the possible consequences of an intruder who gains access to the system and makes changes that may or may not be flagged as unsafe actions. As traditional power networks develop into "smart grids" with more and more points of contact with the internet, the current models become insufficient for simulating attacks and predicting how the system will respond. This paper presents techniques for sensor verification and cyber-physical modeling and analysis on bulk power systems, and how they can be applied to identify compromised signals and sensors. We develop a novel scoring system to indicate how trustworthy a given signal within the system is based off of previous work in the cyber-accessibility of a component, the physical damage that could happen if this component were compromised, and a real-time analysis of the responsiveness of the component to known perturbations in the system. This score will allow operators to see in real time if a sensor may be compromised by a malicious intruder, even if the system has not yet encountered a fault or entered an unsteady state.

Oral Room 2: MSC 2501 | 9:00-9:15 AM

A Novel Approach to Power for Consumers: Platform for Retail Plan Evaluation

Dakota Plesa
Texas A&M University, College Station

Energy is one of the most hotly discussed topics of the modern age. One segment of these discussions is devoted to the environmental impact of energy production and consumption. The second segment of this discussion pertains to the markets for energy. These markets are highly-varied between different areas of energy and power: oil and gas is highly sophisticated and driven by a variety of market pressures, while power generation and distribution are less so. This research will focus specifically on the power generation and distribution space. In Texas, homeowners and other buyers of power from the grid are able to choose from many retailers. These retailers have policies and pricing structures that are highly nuanced and varied, and while all this information is made publicly available, it is hardly accessible to the average buyer. This research would develop a platform that allows for a consumer to easily select the optimum retail power plan based on their location, consumption, and a variety of other factors.

Oral Room 2: MSC 2501 | 9:15-9:30 AM

Using Machine Learning Algorithms and Driver Performance Data to Detect and Differentiate Types of Distraction

Tyler Wiener
Texas A&M University, College Station

The research area surrounding the detection of distracted driving is growing in relevance and importance as systems such as navigation and entertainment displays become more common in vehicles. These systems introduce sources of distraction for drivers. For these systems to be safe and effective, it is necessary to provide means to detect driver distraction and respond appropriately. The aim of this project is to use machine-learning models to develop an algorithm that can accurately detect driver distraction in a simulated driving study. The inputs to these models are: driver performance (e.g. speed, acceleration, brake force, steering, and lane position) and driver physiology (e.g. heart rate, breathing rate, and skin conductance) and the outputs are predictions for various modes of distraction including sensorimotor, cognitive, and emotional distraction. These modes of distraction were induced via a secondary task performed by the drivers in the simulated study. We believe that relationships exist between driver performance and driver physiology that can be used to detect not only whether a driver is distracted but also what type of distraction the driver is experiencing, thereby eliminating the need to confirm distractions through other means such as cameras. Initial results of machine learning methods such as neural networks gave less than ideal performance, with an average prediction accuracy of 30%. We are investigating the reasons for such results and are exploring other machine learning methods as well. Ultimately, the ability to detect and differentiate modes of driver distraction can be used by in-vehicle information systems to understand how best to respond to a driver's particular state as well as mitigate potential consequences of distraction.

Oral Room 2: MSC 2501 | 9:30-9:45 AM

Oral Session #2 | 10:15-11:15 AM
MSC 2500-2503

	Oral Room #1 MSC 2500	Oral Room #2 MSC 2501	Oral Room #3 MSC 2502	Oral Room #4 MSC 2503
10:15-10:30	*Emily Bost*	*Harrison Froeschke*	*Kevin C. Larson*	*Sarah Catherine Porter*
10:30-10:45	*Cesar Lopez-Carrasco*	*Madeline Jones*	*Taif Mohamed and Shaikha Al-Qahtani*	*Sarah Brooke Raines*
10:45-11:00	*Abigail Dowd*	*Dhananjay Khanna*	*Annie McHale Montgomery*	*Thomas Step*
11:00-11:15	*Open Q+A*	*Open Q+A*	*Open Q+A*	*Open Q+A*

Impact of Photo Narratives on Reflection and Learning Retention

Emily Bost
Texas A&M University, College Station

Cultural heritage describes our way of life. It comes from previous generational traditions and incorporates our current constructed and natural environments, and tangible artifacts. Photovoice is a social action research process (Wang, 1999) by which people identify, represent and enhance their community through specific photographic techniques. The photo narrative process, derived from Photovoice, combines photography and narrative expression about artifacts important to one's way of life. A desired outcome of photo narratives is to help learners reflect on their personal cultural heritage through personal photographs and narratives of artifacts central to their way of life. Thus, the purpose of this study is to explore effects of the photo narrative process on students' intercultural learning in agriculture. Archival data will be collected from students' photo narratives (i.e., course assignments to illustrate one's cultural heritage via photo and text) in two agricultural study abroad programs. Kress and van Leeuwen's (2001) concept of visual social semiotics will be used to analyze data. The photo narrative process may be a valuable educational technique in many agricultural disciplines. The combination of image and text empowers learners (Kellock, 2011) and deepens information retention (Temple & McVittie, 2005) through expressive communication and reflection.

Oral Room 1: MSC 2500 | 10:15-10:30 AM

Criticality Stacks Implemented Via Kernel Frequency Governor for Power Savings in ARM Mobile Architecture

Cesar Lopez-Carrasco
Texas A&M University, College Station

Mining how to adapt frequency in order to maximize performance while optimizing energy consumption is the objective of DVFS. DVFS has been complimentary in mobile architectures because their frequency ranges are small and workloads have only recently started taking advantage of multithreading. Nonetheless, recent optimization in mobile processor manufacturing methods have led to a tendency similar to Dennard Scaling which has resulted in Modern mobile processors increasing their performances up to speeds similar to their PC counterparts while having a constant power consumption. This change requires a more proactive way to set per core frequencies in order to increase performance while maintaining power consumption. A combination of Scalability and Criticality Stacks is a novel approach that has been tested to achieve these goals in simulation. A real testing will be implemented via via the modification of the Linux Kernel and the testing through synthetic benchmarks in order to verify the real behavior of these concepts.

Oral Room 1: MSC 2500 | 10:30-10:45 AM

Design and Implementation of a Fully Distributed Caching Algorithm on an NDN-Based System

Abigail Dowd
Texas A&M University, College Station

ICN (Information Centric Networking) is a new method of storing and accessing data which focuses on the content itself rather than the IP (Internet Protocol) address where the content is stored. ICN enables both in-network caching and name-based data retrieval [2]. This allows for better usage of edge cloud resources, giving the user a faster response time as some data requests and services may be handled locally [5]. NDN (Named Data Networking) is a specific type of ICN which locates and delivers content based on the associated data name rather than using the source or destination host addresses [4]. For NDN to be most beneficial, we need to implement efficient caching algorithms that consider the needs of many users in a network. To address this need, we have developed a caching algorithm for an NDN network in a tree topology. It is fully distributed and makes storage and eviction decisions at each router based on the number of hops needed to retrieve the data and the popularity of the data at that router. The total number of hops taken by all data during the testing period will determine the algorithm's true cost. We will test our algorithm using an NDN testbed and compare its true cost with LRU (Least Recently Used) under the same conditions.

Oral Room 1: MSC 2500 | 10:45-11:00 AM

Photographic Diagnosis of Pecan Leaf Disease

Harrison Froeschke, Robert Michael Fowler, and Seth Burchell
Texas A&M University, College Station

Ever since Texas Governor James Stephen Hogg in 1906 requested that a pecan tree serves as his headstone and that the nuts of the tree be distributed to make Texas a "Land of Trees," pecans have been a big part of many Texan's identities. So much so did Texans love pecans that the pecan tree became the official tree of Texas in 1919 in the context of the 36th Texas Legislature. [1] Fusicladium effusum, commonly called pecan scab, is the most economically impactful disease of trees in the southeastern United States. In 2013, there was an estimated 20-25 million pound loss of pecans due to weather conditions that allowed pecan scab to thrive. [2]. The fungus is a problem for pecan growers as it reduces both yield and profit. Our work will aid researchers and farmers in identifying and monitoring pecan scab infections in their orchards by analyzing a photo of a pecan tree leaf taken by the user with a mobile phone. Having this tool will allow farmers to react faster to pecan scab, have a good idea of how much fungicide is appropriate to deal with the level of infection, and compare disease severity over the time the user has sampled the pecan leaves. [1] "FAQs."Texas Pecan Growers Association, Texas Pecan Growers Association, 2002, www.tpga.org/faqs.php. [2] Thompson, Clint. "Pecan Crop Hurt by Summer Rainfall."College of Agricultural and Environmental Sciences, University of Georgia, 8 Sept. 2017, www.caes.uga.edu/newswire/story.html?storyid=4934.

Oral Room 2: MSC 2501 | 10:15-10:30 AM

Estimation of Deepwater Horizon Oil Spill Effects on Population Dynamics of the Loggerhead Sea Turtle (*Caretta caretta*)

Madeline Jones
Texas A&M University, College Station

Deepwater Horizon (DWH) was the largest offshore oil spill in US history. The result was 87 days of constant oil and natural gas flow, which resulted in approximately 3.19 million barrels of oil being released into the ocean. Deepwater Horizon significantly affected the Gulf of Mexico and surrounding beaches, including threatened and endangered marine life such as the loggerhead sea turtle. Both federal and state agencies charged with overlooking U.S. natural resources conducted numerous assessment activities to quantify the adverse effects of oil and its consequences on wildlife resulting in a DWH Natural Resource Damage Assessment. Short and long-term effects to juvenile and adult loggerheads result from catastrophic oil spills, such include oil adhesion, over-heating, and oil ingestion which can lead to egg mortality, developmental defects, and impacts to the skin, blood, salt glands, and digestive and immune systems. Hence, I aimed to determine how the event of oil spills affected the population dynamics of loggerhead sea turtles. I conducted a thorough literature review to obtain the demographic data and developed a stage-structured population dynamics model for loggerhead sea turtles. I then used the model to quantify the potential effects of oil spills on the population of loggerhead sea turtles for the next decade.

Oral Room 2: MSC 2501 | 10:30-10:45 AM

Exploring Mainstream Natural Language Processing Techniques and Their Application to Computational Humor

Dhananjay Khanna
Texas A&M University, College Station

The purpose of this study is to document the creation of a software prototype that, given a subject, attempts to generate fact(s) about that subject in a human readable format. Said prototype builds on top of an existing Natural Language Generation (NLG) research project called SimpleNLG. The format selected is that of the Harper's Index, which is a list of facts in a rigid format published monthly by Harper's Magazine. The rigidity of the format makes it easier to generate than regular language. This combined with the socio-economic and political topics that Harper's authors usually touch upon makes it ideal for the study of Computational Humor, since it forces the reader to wrestle with their understanding of the world, a skill necessary to use and perceive humor. It is our hope that in creating this prototype, we can further the knowledge that goes into creating intelligent and adaptable computers that serve far more day-to-day applications in our increasingly technological world.

Oral Room 2: MSC 2501 | 10:45-11:00 AM

Comparative Analysis of Intracloud and Cloud-To-Ground Lightning Properties via Slitless Spectroscopy

Kevin C. Larson
Texas A&M University, College Station

Intracloud (IC) and cloud-to-ground (CG) lightning emission spectra were obtained from 32 lightning events across three thunderstorms via slitless spectrograph over College Station, Texas during summer and autumn 2017. After method verification via comparison of our obtained CG channels' properties with those found in existing published literature, our obtained IC flashes' emission lines are analyzed to find the physical properties of IC lightning. Channel temperature, particle density, and particle mass distribution are first calculated. Air plasma transport theory is then used to find electrical conductivity, electron thermal conductivity, and electron thermal diffusivity. These properties, along with channel data provided by the Houston lightning mapping array (LMA) Network and external radar, satellite and sounding field and model observations, are used to provide a statistically robust quantitative comparison between the physical properties of IC and CG lightning, with discussion on the possible causal factors of observed differences. Our results are lastly used to test the veracity of findings made by previous comparative studies of IC and CG lightning properties, and differences in results are discussed.

Oral Room 3: MSC 2502 | 10:15-10:30 AM

Simulation of Charged Particle Detectors for Future Upgrades of the CMS Experiment at the Large Hadron Collider

Taif Mohamed and Shaikha Al-Qahtani
Texas A&M University at Qatar

The Gas Electron Multiplier (GEM) is a gas based detector used to detect particles in high-energy physics applications. It amplifies signals related to particle interaction within a detector, and is a strong candidate to be installed in the Compact Muon Solenoid (CMS) experiment at the Large Hadron Collider (LHC) at CERN. This research aims to optimize GEM efficiency by comparing the effect of two different etching techniques-- double mask and single maskâ€"on the detector gain. In the double mask technique, a standard GEM foil is manufactured with photoresist laminations on the upper and lower copper layers. A new manufacturing process called the single mask was developed to improve detector gain. Better structural uniformity is attained in this case as only one of the copper layers are chemically etched. On the other hand, this results in an asymmetrical double-conical hole shape instead of the symmetrical one resulting from the double mask manufacturing process. In this project, we will explore the impact of different hole diameters on the GEM efficiency and gain by simulating detector conditions using HEED, ANSYS, and Garfield++.

Oral Room 3: MSC 2502 | 10:30-10:45 AM

Evaluation of Morbillivirus Exposure to Bottlenose Dolphins Following the Deepwater Horizon Oil Spill

Annie McHale Montgomery
Texas A&M University, College Station

Deepwater Horizon (DWH) blowout was the largest offshore oil spill in the petroleum industry's history. For a total of 87 days, approximately 3.19 million gallons of oil and natural gas seeped into the Gulf of Mexico. DWH altered the ecology and biology of the Gulf of Mexico and surrounding areas, including many species of endangered marine life and habitat quality. Following the oil spill in April 2010, an unusual mortality event occurred in the Gulf of Mexico in cetaceans, primarily bottlenose dolphins (Tursiops truncatus). Dolphin morbillivirus (DMV) was investigated to cause this event. DMV is a well-recognized paramyxovirus that causes dolphin deaths in the United States from acute viral pneumonia, viral encephalitis, or from fungal or bacterial infections from immunosuppression. Therefore, I aim to determine how the event of oil spills affects the exposure of bottlenose dolphins to morbillivirus. I will conduct thorough literature reviews to obtain the polymerase chain reaction (PCR) and serological analysis data for different age categories in order to develop a model to determine morbillivirus exposure in bottlenose dolphins. I will then use the model to quantify the effects of DWH on the morbillivirus exposure to bottlenose dolphins' population dynamics for the future 20 years.

Oral Room 3: MSC 2502 | 10:45-11:00 AM

The War on Dissent: Social Activism and the Rise of Mass Incarceration

Sarah Catherine Porter
Texas A&M University, College Station

Beginning in the 1960s, concerns about rising crime rates, urban rebellions, and political demonstrations across the United States prompted a shift towards *"*law and order*"* for many Americans. Federal and state policymakers alike embraced this spirit by enacting new legislation over the following decades which reformed sentencing procedures, distributed billions of dollars in federal funding, and employed new crime control methods that disproportionately targeted urban communities of color. Building upon the work of scholars including Elizabeth Hinton and Michael Flamm, who provide compelling research indicating that programs enacted under Democratic leadership in the 1960s established a foundation for mass incarceration, my work aims to take into account the context in which this legislation originated. Drawing in research from Zoe Colley and Dan Berger pertaining to the links that developed between the Civil Rights Movement and imprisonment, I intend to demonstrate how the surge in collective protest and urban rebellions during the period framed this punitive shift. By analyzing several specific pieces of legislation which exemplified this trend, and analyzing the social and political contexts in which they developed, my work seeks to understand the ways in which federal anxieties and attitudes that emerged in an era of social change and activism made lasting impacts on the criminal justice system.

Oral Room 4: MSC 2503 | 10:15-10:30 AM

Modeling and Evaluation of Received Signal Strength using Reconfigurable Antennas in Complex Urban Environments

Sarah Brooke Raines
Texas A&M University, College Station

Today wireless communication has become paramount to everyday life. The strength of these signals can be diminished over long distances, which can increase in highly urban environments where more obstacles will hinder the signal's ability to propagate in a straight path. The two types of antennas used today include fixed and reconfigurable antennas. With fixed antennas, the antenna is not expected to adjust itself outside of the bounds set within one fixed location and another. With a reconfigurable antenna the receiving and transmitting antenna location may change dynamically, requiring the antenna be capable of adjusting itself to maximize performance. This study will determine how living in an urban environment with complex obstacles will affect the signal path and strength of both fixed and reconfigurable antennas. To evaluate the effects of an urban environment the engineering quadrant and Academic Plaza of the Texas A&M campus will be simulated in a simplified CAD drawing using Wireless InSite (Remcom). The path of an autonomous vehicle through these areas will then be simulated to gather antenna strength 'measurements' for both fixed and reconfigurable antennas. This will be compared to experimental campaigns performed by other students to validate the simulations. The signal propagation can be mapped in the simulated campus and the measurements taken will be used to analyze how this path affects the signal strength with varying frequencies and paths.

Oral Room 4: MSC 2503 | 10:30-10:45 AM

Dynamic Quality of Service in a Software Defined Network

Thomas Step
Texas A&M University, College Station

Quality of service is a necessary function of today's networks. A proper quality of service ensures that packets are delivered effectively and fast. In traditional networks, quality of service has to be manually configured on each piece of networking hardware that it affects. This makes the process of implementing a quality of service in a network costly. Not to mention, that if part of the configuration is incorrect, or a mistake is made during the configuration, everything has to be redone on each piece of affected hardware. I will be exploring the effect of using a quality of service with a software defined network controller to tell all of the switches in a network how to handle certain flows of traffic. The main tool used here will be the OpenFlow defined queue. Queues and flow rules will allow a switch to control individual flows and the network resources that each flow consumes. Factors that will be looked into are the bandwidth usage of a flow, the latency, and the jitter. These are all looked at in traditional networks as well, but with a software defined network, the quality of service policies can change based on various events.

Oral Room 4: MSC 2503 | 10:45-11:00 AM

Oral Session #3 | 1:00-2:00 PM
MSC 2500-2503

	Oral Room #1 MSC 2500	***Oral Room #2 MSC 2501***	***Oral Room #3 MSC 2502***	***Oral Room #4 MSC 2503***
1:00-1:15	*Ella McIntire*	*Ashley Holt*	*Pedro Valent Riojas*	*Sydney Tippelt*
1:15-1:30	*Sarah Brown*	*Madeline Noelle Loftin*	*Sabeeha Tabassum and Jacob Beattie*	*Arshad Zaman*
1:30-1:45	*Lauren Camarillo*	*Open Q+A*	*Himank Yadav*	*Open Q+A*
1:45-2:00	*Open Q+A*		*Open Q+A*	

Self-representation and Gendered Resistance Identity of the Kaqchikel Maya

Ella McIntire
Texas A&M University at Galveston

The Kaqchikel Maya of San Juan Comalapa, Guatemala see the built world as a conjunction between the living landscape and internal life, where place and identity are negotiated. Local painters and interpreters who navigate this space are regarded with a similar reverence as healers and spiritual practitioners, particularly in the context of memorialization and cultural healing. This research evaluates one of two multi-panel murals in Comalapa created in 2006, focusing on how the women of the Comalapa self-represent their narrative in the wake of the 36-year internal armed conflict and genocide. I employ a Foucaultian look at power structures, paying particular attention to resistance identity as it is expressed in the mural's creation, considering that public memorials are used by marginalized groups to express their narratives as part of historical memory. Utilizing a feminist application of Derridean deconstruction to read the more recent of the two murals' narrative, I observe and evaluate the tropes of womens' experiences during the 36-year internal armed conflict, and how these experiences are used to guide the narrative of the space. This research is a part of the undergraduate scholars thesis *"*Healing Spaces: Memorial Expression in Guatemalan Genocide Murals and Museums*"*.

Oral Room 1: MSC 2500 | 1:00-1:15 PM

For What We Are: An Interactive Experience with a Bifurcated Perspective

Sarah Brown
Texas A&M University, College Station

Despite its abstract nature, animated short Blind Vaysha was nominated for an Oscar, even when competing Disney short Inner Workings - produced on a much higher budget - was not. Blind Vaysha told the story of a young girl, Vaysha, who saw the past in one eye, the future in the other, and therefore struggled to live in the present. At multiple times throughout the short, the screen would be split between these two views, each "eye" portraying its own perception of Vaysha's reality. Perhaps it was the novelty of seeing two worlds at once, but perhaps it was also the sensation of being placed in a unique perspective different from that of our own, that made this short so successful. Another piece of media that bifurcates the screen in a similar way is Google Play Music's Through the Dark, an interactive visual piece of a song by the same name. It tells the story of the songwriter's son undergoing leukemia treatment, showing a clear distinction between a light and dark perception of the story that can be manipulated by the viewer. Unlike Blind Vaysha, this case provided a sense of agency to the viewer, to the extent that one could control what they saw, but not influence the story or results in any way. Perhaps this concept of a bifurcated perspective could be pushed further into the realm of interactivity. This of course, urges the question: when provided with the ability to interact with the story itself, does a bifurcated perspective engage the viewer, or confuse them as they attempt to navigate the screen? This study predicts that by introducing the power of choice to the player when presented with a bifurcated perspective, the bond between the player and character will strengthen, and engage the player further in this new kind of experience.

Oral Room 1: MSC 2500 | 1:15-1:30 PM

Solitude: A Human Condition

Lauren Camarillo
Texas A&M University, College Station

In his collection of essays, The Labyrinth of Solitude, the Mexican philosopher, Octavio Paz states that, "Self-discovery is above all the realization that we are alone" (Paz 9). If, as humans, we are distinctly aware of our own inherent aloneness, then how do we explain the countervailing need to communicate with each other, either at the interpersonal communication or at the level of the symbolic, such as through literature? Through language, how do real people and fictional characters alike cope with the idea of being solitary animals? My project examines literature as a form of expression through which humans confront their solitude. By solitude, I mean the physical, mental, and emotional states of being alone. It is necessary to understand why humans have a need to communicate despite their fundamental solitude because it will give us insight into a basic human need for sociality. By analyzing how the state of solitude is confronted in literature by both American and Latino/a authors, we move one step closer to understanding our distinct humanity. In a time where American society is so divided, it is important to understand and recognize how individuals of different cultures confront their own solitude. For example, in Alone in America: The Stories That Matter, Robert Ferguson reasons that America's rampant individualism is "the answer as well as the problem to feeling alone"□ (Ferguson 5). Ferguson reasons that the natural isolation everyone feels is excused by the individualistic need to become self-made. But, as Ferguson writes, "the plight of the lonely is so insidious because it exists quietly in plain sight" (Ferguson 9). Since it is masked by individualism, the issue of solitude and alienation is often overlooked, especially in American literature.

Oral Room 1: MSC 2500 | 1:30-1:45 PM

A Shift in the Lysis Paradigm: How Phage PhiKT Breaks Free

Ashley Holt
Texas A&M University, College Station

Bacteriophages, or phages, are the viruses of bacteria. Spanins required for the last step in the phage lysis: the disruption of the outer membrane. However, a recent bioinformatic survey of over 600 phage genomes revealed that about 15 percent lacked a spanin gene. To address how phages without spanins disrupt the outer membrane, we chose to study phage PhiKT. Open reading frames near known PhiKT lysis genes were tested for the ability to disrupt the outer membrane during lysis. We identified gp28 as a hypothetical novel outer membrane disruptor. This gene encodes a 56 amino acid product with no homology to known spanin genes. Deletions and nonsense mutations rendered the gene incapable of supporting outer membrane disruption, and the gene complemented spanin defect in phage λ. In addition, the Gp28 protein associated with the particulate fraction of the bacterial cell after lysis, suggesting interaction with the membrane. According to these results, alpha helical predictions, and the large net positive charge of the protein, we propose that Gp28 may be similar to an antimicrobial peptide but with preference for the outer membrane.

Oral Room 2: MSC 2501 | 1:00-1:15 PM

Dislocation Studies on 8MM PDA Devices in Thin Wall Models

Madeline Noelle Loftin
Texas A&M University, College Station

The research objective of this study is to determine how varying forces and pressures of water can displace the PDA device (SMP foam loaded into the nitinol wire cage) within the thin wall model imitating the open valve between the aorta and pulmonary valve. The research will contribute to the ongoing study of displacement and pressure effects on the deployed device to be utilized in clinical trials. The device to be tested in this research will involve a prototype nitinol foam cage that uses shape memory polymer foams. There have been several design modifications to account for delivery size and foam capacity. Once deployed in water, the SMP foam expands to allow for occlusion of flow. The tests to be run will measure how difference in size of the cage and change in pressure will affect the stability and position of the device as a whole in the model.

Oral Room 2: MSC 2501 | 1:15-1:30 PM

Controlling Software and Optimization for Compressor Engine's Operation Under Variable Gas Compositions

Pedro Valent Riojas
Texas A&M University, College Station

What controller type and code must be implemented to ensure the operation of a natural gas compressor station engine stays within emission standards. The natural gas pipeline compressor stations power the transportation of extracted natural gas downstream. The engines that power these stations run off the natural gas being fed through the line. As fracking occurs to extract natural gas, the newly accessed natural gas deposits do not have a single level of chemical composition, as they would have in a natural gas reservoir. Thus, the engines that are fed the natural gas from areas that utilize techniques such as fracking must be able to adapt their operation to still run to meet emission standards and continue to move the natural gas. The controller to be designed must run the compressor station engines to meet emission standards and still provide enough power to pass the natural gas along the pipeline.

Oral Room 3: MSC 2502 | 1:00-1:15 PM

Over the Counter Liquid Bandage Application Results in Precocious Wound Closure Following Distal Amputation of the Terminal Phalangeal Digit in Mice

Sabeeha Tabassum and Jacob Beattie
Texas A&M University, College Station

CVS Liquid Bandage -- a "value brand" -- version of wound closure devices such as Dermabond -- following a distal, P3 amputation in mice initiates precocious wound closure; inducing a hypoxic microenvironment, and/or leading to reduced regeneration of the P3 digit. Previous research has shown that epidermal closure and a hypoxic environment are crucial in mammalian regeneration; this study looks to confirm and expand this knowledge and potentially lead to new discoveries through the use of different immunohistochemical assays: Hif1α, and Hypoxyprobe for hypoxia and EdU as a marker for cell proliferation. It is expected that the CVS Liquid Bandage will induce similar results to those produced by application of Dermabond: premature wound closure, creation of a hypoxic microenvironment, reduced degeneration and regeneration, and a similar expression pattern from the immunohistochemical assays.

Oral Room 3: MSC 2502 | 1:15-1:30 PM

Distributed System With Churn

Himank Yadav
Texas A&M University, College Station

The objective of my research project is to explore and reduce the gap between the low fault tolerance of our developed algorithm and the established lower bound for failure rate in the implementation of a read-write register for a distributed system with churn.

Oral Room 3: MSC 2502 | 1:30-1:45 PM

Assortative Mating in the Anopheles gambiae Species Complex

Sydney Tippelt
Texas A&M University, College Station

The Anopheles (An.) gambiae species complex includes several major malaria vectors, including An. coluzzii and An. arabiensis, as well as An. quadriannulatus, which is not considered a malaria vector due to its zoophilic feeding preference. In nature, An. gambiae species do not typically hybridize due to geographic isolation and differential swarming behavior. In areas where mixed swarms do occur, hybrid copulae are observed at a much lower frequency than would be predicted by random mating. In this project, we test female mate choice in three species (An. coluzzii, An. arabiensis, and An. quadriannulatus) in swarm compositions ranging from 100% conspecifics to 100% heterospecifics. Mosquitoes were sexed and sorted as pupae, and emerged adults were aspirated into experimental cages and given five days to mate. Insemination rates were determined via spermathecal dissections, and a species-diagnostic PCR of the spermathecae was used to determine the species identity of the inseminated females' mate. Our results demonstrate that swarm composition is not likely to influence female insemination ($p=0.1837$). However, An. coluzzii females in mixed swarms mated exclusively with conspecific males, which indicates a strong tendency to mate assortatively in this species. An. quadriannulatus females in a mixed An. coluzzii/An. quadriannulatus swarm were equally likely to be mated with conspecific or heterospecific males ($p=0.1306$), suggesting no preference for mating partner. Additional replicates are still being conducted in order to further examine these trends, including trials involving An. arabiensis. In the future, mating behavior in swarms with more varied male concentrations will also be tested.

Oral Room 4: MSC 2503 | 1:00-1:15 PM

A Maximum Likelihood Sequence Equalizing Architecture Using Viterbi Algorithm for ADC-based Serial Link

Arshad Zaman
Texas A&M University, College Station

Analog-to-digital (ADC) based serial link receivers have ability to perform equalization in digital domain and support bandwidth efficient modulation (i.e. PAM4 and Duo binary). Due to channel impairments in high data rates (high data rates are necessary for continued scaling of future computing system) ADC converters are becoming more attractive choice; however, power limitation of these receivers make front-end ADC design very challenging. By replacing traditional symbol-by-symbol digital equalizer with a maximum likelihood sequence estimator (MLSE) we can produce a more optimal equalizing architecture in terms of noise, and simplify the complexity of the design in the analog front-end. MLSE architecture have not yet been used in an ADC-based serial link because of its complexity and power requirements. Using Viterbi Algorithm, a systems level modeling of a sequence estimator can be done to reduce complexity of the front-end analog circuit, and define parameters for appending circuit blocks (i.e. analog equalizer, ADC, and clocking circuits). Although there are some trade-off between using a flash equalizer and Viterbi algorithm, the specification of the analog front-end circuits are optimized, using Matlab, to minimize drawbacks caused by Viterbi algorithm in the sequence equalizing architecture.

Oral Room 4: MSC 2503 | 1:15-1:30 PM

Oral Session #4 | 2:15-3:15 PM
MSC 2500-2503

	Oral Room #1 MSC 2500	Oral Room #2 MSC 2501	Oral Room #3 MSC 2502	Oral Room #4 MSC 2503
2:15-2:30	*Meghan Collier*	*Melanie Enriquez*	*Michelle Jonika*	*Blake Nelson*
2:30-2:45	*Jorge Vela de la Cruz*	*Marcell Harmati*	*Danielle Manley*	*Stephanie Sykora, Lauren Toler, and Courtney Michalsky*
2:45-3:00	*James Dietz*	*Dillon Jones*	*Open Q+A*	*Open Q+A*
3:00-3:15	*Open Q+A*	*Open Q+A*		

Recreating Evil: Morality in Adaptations of Beowulf for Children

Meghan Collier
Texas A&M University, College Station

Language and control in children's literature is a major topic of discussion within the field of children's literature. While the full extent of the effects of children's literature on shaping children's worldviews is unknown, there is stress on the importance of being aware of what values texts pass to children, particularly the more subtle values of which the author may not be aware he or she is creating. As an epic originally created for an adult audience that now has numerous adaptations for children, the epic of Beowulf has a unique opportunity to contribute to the understanding of this passing on of values. By examining how morality, with an emphasis on evil, is adapted for children from the original story of Beowulf, I plan to bring awareness to what has been altered in the children's versions in order create a story meant for children. This study of Beowulf will bring to light how subtle alterations can significantly change the message within a story, expressing much different ideologies than the original in some most likely unintended ways.

Oral Room 1: MSC 2500 | 2:15-2:30 PM

The Writing Process in L2 Spanish Students and Heritage Speakers: A Keystroke Logging Study

Jorge Vela de la Cruz
Texas A&M University, College Station

This study describes the use of the keystroke logging software Inputlog to examine different aspects of the second language (L2) writing process in two groups of university Spanish students in the United States, L2 learners and heritage speakers. Even though many studies (Montrul, 2012) have provided us with information about heritage speakers' grammatical competence, and the differences that exist between them and L2 students, there is still much to know in the field of pedagogy, particularly in the area of writing, which constitutes an essential aspect of heritage speakers' linguistic needs. That is, unlike L2 students, most heritage speakers in the United States have learned Spanish in informal settings, and they might have poor literacy skills (Benmamoun, Montrul & Polinsky, 2013). Even when heritage students can use Spanish fluently, they do not have explicit knowledge of how this language functions to convey specific meanings in different kinds of written texts, which is an essential aspect of literacy. This study applies keystroke logging to examine what characterizes heritage speakers' writing when compared to L2 learners'. Fifty L2 students and heritage speakers in two intermediate high Spanish classes in an American public university participated in this study. Both groups were exposed to the same kind of instruction. The participants' writing during production and revision was observed using Inputlog. The poster will present the preliminary results of the study, focusing on the similarities and differences that exist in the way in which these two populations of learners approach and complete the different stages of the writing process, and it will provide suggestions for further research and pedagogical interventions.

Oral Room 1: MSC 2500 | 2:30-2:45 PM

Choosing Forgiveness After Genocide

James Dietz
Texas A&M University, College Station

Though the nature of forgiveness is often uncertain, it is possible to forgive, even after having been the victim of genocide. I will form a theory of forgiveness from ancient and contemporary discussions on the philosophy of forgiveness. From there, I will use the Holocaust, the Rwandan genocide, and the Cambodian genocide as test cases to determine if my theory holds in cases of the extreme.

Oral Room 1: MSC 2500 | 2:45-3:00 PM

Sensing and Control for a Bio-Mimetic Reconfigurable Antenna System Based on Photosynthetic Attraction

Melanie Enriquez
Texas A&M University, College Station

This research discusses the concept of replicating biological processes through the use of self-configurable antenna patterns. Through non-linear gradient descent methods and the use of parasitic beam forming, it is proposed that a configured antenna can replicate the photosynthetic attraction of a plant through selective power pattern reception. For characterization purposes, it is necessary to create a microwave tuning circuit to collaborate with an adaptive 2-element yagi-uda antenna network. The two-element network will be used to characterize the parameters for maximum power potential, which will precede the introduction of multiple parasitic array elements and the concept of a reactively controlled directional array. Through multiple beam forming of elements, the centralized antenna will be forced to differentiate between varying power patterns. Circuit tuning and electrical characterization will allow for the centralized antenna to have a self-configurable response mechanism and allow for the ability to position itself for maximum power reception.

Oral Room 2: MSC 2501 | 2:15-2:30 PM

Improving the Mechanical Properties and Oxidation Resistance of Max Phases by Alloying with IIIa-Va Group Elements

Marcell Harmati
Texas A&M University, College Station

MAX phases are a new family of ternary carbides and nitrides that bridge the gap between the physical and mechanical properties of metals and ceramics. MAX phases, like their binary counterparts, are elastically stiff, good thermal and electrical conductors, and have relatively low thermal expansion coefficients. On the other hand, in contrast to binary carbides and nitrides, MAX phases are relatively soft, readily machinable, and exhibit thermal shock resistance and damage tolerance, like metals. Published reports on the creep resistances of Ti3SiC2 and Ti2AlC indicate that the MAX phases are good candidates for high-temperature applications, such as hot-corrosion-resistant turbine disk coatings. However, it is not yet fully understood to what extent the properties of MAX phases can be manipulated by solid solutions or by controlling the microstructure. This research project will involve the observation and characterization of the effects of alloying Ti2AlC and Ti3AlC2 with Bi, Ge, Sb, and Sn on the microstructural characteristics across the entire solubility range, and their mechanical properties and oxidation resistance. If successful, the effects of MAX phase solid solution alloying and its potential applications will be better understood.

Oral Room 2: MSC 2501 | 2:30-2:45 PM

Herpetofauna Surveys at an Urban Nature Sanctuary

Dillon Jones
Texas A&M University, College Station

Urban herpetology “deals with the interaction of amphibians and reptiles [herpetofauna] and humans with each other and their environment in urban or urbanizing settings” (Mitchell et al. 2008). Urban herpetofauna face habitat loss, degradation, and alteration from human expansion and intervention (Mitchell et al. 2008). Despite this, little research has been done in this field. Miller (2006) urges that human experience with nature is necessary for future conservation efforts and for the public to gain a greater appreciation for conserving biodiversity. Sanctuaries and parks are some of the few places that humans can interact with wildlife in urban settings. Edith L. Moore Nature Sanctuary is an 18-acre wooded preserve in Houston situated along Rummel Creek and is the headquarters for Houston Audobon. In order to gain a greater understanding of the herpetofauna located within the park, traditional survey methods were conducted from January 2018 to May 2018 and then compared to historical records and citizen science data. The results of this project will be used to inform Houston Audubon about the diversity of Herpetofauna within their park and to implement guidelines for preserving their ecosystem.

Oral Room 2: MSC 2501 | 2:45-3:00 PM

Genes as Markers of Sex for Forensic Entomology

Michelle Jonika
Texas A&M University, College Station

Sex chromosomes are of evolutionary significance and sex determination is an important assignment made during development, having some advantages and disadvantages. One advantage of sex determination is sexual dimorphism, which creates differences in physical traits as well as gene expression causing developmental disparity in males and females. Calliphoridae is a large family of insects, and contains the species Lucilia sericata (Diptera: Calliphoridae) (Meigen), Cochliomyia macellaria (Diptera: Calliphoridae) (Fabricius) and Chrysomya rufifacies (Diptera: Calliphoridae) (Macquart). These species have many uses and importance medically and economically, but a unifying significance is that they are all commonly used in forensic investigations. For forensic investigations, developmental data for species is used to predict time of colonization (TOC) estimates. Most calliphorids undergo transformer (tra) splicing to give rise to downstream sex-specific characteristics which can cause differing development in males and females of the same species. Using known primer sets for tra and doubles (dsx) and published transcriptomes for each species, genes for gene expression can be selected and interpreted sex-specifically, yielding more accurate data sets for species. For this reason, it is important to optimize a sex determination assay to aide in predicting more accurate TOC intervals for L. sericata, C. macellaria and C. rufifacies.

Oral Room 3: MSC 2502 | 2:15-2:30 PM

An Alternate Look at the Pacific Influence in the Peopling of the Americas

Danielle Manley
Texas A&M University, College Station

The focus of this research is to explore the possibility that Australasians contributed to modern indigenous South American populations during the time when the major peopling events of the Americas are thought to have occurred. This paper proposes a deep evolutionary connection between Oceanic and South American peoples, and challenges the idea that the Bering Land Bridge or passage along the coast of the Bering Strait was the only way that humans reached the Americas in the Late Pleistocene. To evaluate this question, published data in the fields of archaeology, linguistics, genetics, morphology, and ecology for both South America and Oceania are compared. Additionally, evidence from Australasia is presented to prove that long-distance sea migrations were feasible at the time of the peopling of the Americas, as they had been successfully completed nearly 40,000 years earlier in the peopling of Sahul, or modern day Australia and Papua New Guinea. The results suggest that while the major source population for living Native Americans was North Asia, the idea of a Pacific crossing should not be excluded.

Oral Room 3: MSC 2502 | 2:30-2:45 PM

Virtual Patching in A Software Defined Network Environment

Blake Nelson
Texas A&M University, College Station

A new design for virtual patching applications is presented for software defined network environments. Based on OpenFlow implementation, a software defined network can be programmed to intelligently detect threats and handle them accordingly. By implementing a virtual patching solution with the Floodlight OpenFlow API, these networks can detect malicious traffic before it reaches the vulnerable device, based on common signs like packet size or destinations of open but unused ports. A controller hosts an Intrusion Detection Service (IDS) on the network would track signs of malicious data, and scan incoming traffic for any of those signs. If a packet is reasonably suspicious, it is not allowed to continue on it's path, while all other traffic continues as normal. Because software defined networks are inherently programmable, a general solution can be put in place that network administrators can use to create virtual patching rules on the fly. This allows for vast flexibility and efficiency, which is critical when dealing with a live exploitation on the network. Experimental results for both the attack specific solution and the general, programmable solution have not yet been obtained.

Oral Room 4: MSC 2503 | 2:15-2:30 PM

Participatory Interactive Campaign Developed to Raise Awareness About Poverty in Our Community

Stephanie Sykora, Lauren Toler, and Courtney Michalsky
Texas A&M University, College Station

Those living in poverty are often misjudged as being the reason they are in their situation. Many people who do not deal with poverty believe that those who do live in poverty could have easily prevented their situation or can easily get out of it if they work "hard enough"; often creating an "us" and "them" mentality. Because of this misconception, most people do not know how extensive and how many people are affected by poverty. The problem is commonly ignored in Bryan/College Station, mainly on the college campuses in the area. One Step was created to address this misconception and bridge the gap between people who are affected by poverty and those who are not. By using interactive installations, social media, and an interactive website to put people in "the shoes" of individuals who live in poverty, One Step aims to create an emotional response and understanding in its viewers and nurture a relationship between individuals affected by poverty and students in Bryan/College Station.

Oral Room 4: MSC 2503 | 2:30-2:45 PM

Oral Session #5 | 3:30-4:30 PM
MSC 2500-2503

	Oral Room #1 MSC 2500	Oral Room #2 MSC 2501	Oral Room #3 MSC 2502	Oral Room #4 MSC 2503
3:30-3:45	*Grant Kirchhofer*	*Brittany Taylor Gardner*	*Cameron McCann*	*Claire Reue, Catherine Caprio, and Caroline Andrews*
3:45-4:00	*Camilla Adams*	*Abby Kimpton Jones*	*Taylor Nutt*	*Rebecca J. Roberts*
4:00-4:15	*Katherine Carbajal*	*Marla Martinez and Maryam Cheta*	*Kendra Andersen*	*Open Q+A*
4:15-4:30	*Open Q+A*	*Open Q+A*	*Open Q+A*	

Impossibility Proof of RMTP Algorithms with an Unknown Reordering Bound

Grant Kirchhofer
Texas A&M University, College Station

This research analyzes the reliable message transmission problem, or RMTP, with a different set of constraints than has been previously studied. The RMTP describes the task of simulating a reliable computer communication channel across an unreliable one. The unreliable channel exhibits undesirable behavior, including message loss, duplication, and reordering. The reliable channel exhibits none of these. Prior research has proposed an algorithm that solves the RMTP using bounded message counters when the channel exhibits duplication and bounded reordering, where the bound on reordering is known. This presentation studies a variation of that configuration with an unknown bound on reordering. Using formal logical and mathematical proofs, we show that under certain constraints, such an algorithm is impossible.

Oral Room 1: MSC 2500 | 3:30-3:45 PM

Minimum Wage and Time Spent Looking for Work

Camilla Adams
Texas A&M University, College Station

Minimum wage remains a topic of contentious debate. The ultimate goal of minimum wage is to raise the standard of living through a price floor on labor. We find that increases to the minimum wage adversely affect time spent looking for work. Time spent looking for work is a loss of potentially productive hours of employment. Using the American Time Use Survey (ATUS), a diary survey conducted by the Current Population Survey (CPS), we find the effects of minimum wage increases through difference-in-difference models and regression discontinuities.

Oral Room 1: MSC 2500 | 3:45-4:00 PM

Estimation of Anthropogenic and Catastrophic Effects of Florida Manatee (Trichechus Manatus Latirostris)

Katherine Carbajal
Texas A&M University, College Station

One of the most endangered marine mammals in the coastal areas of the United States is the Florida manatee (Trichechus manatus latirostris). The Florida manatee population has been increasing and decreasing since 1991 along the east and west coast of Florida, respectively, and has a present population of about 6,250. However, the populations have been dramatically fluctuating due to various anthropogenic factors. The major causes of manatee deaths can be broken down into five categories: watercrafts, crushed/drowning by flood gate or canal lock, entanglement, perinatal, and other natural factors (such as disease and natural catastrophe). Unfortunately, three among these five categories are associated with human. Hence, I aim to estimate and compare anthropogenic and natural catastrophic effects on the manatee population dynamics. I will conduct a literature review to obtain the basic demographic data and develop a stage-structure population dynamics model of the Florida manatee. I will use the data from the Florida Fish and Wildlife Conservation Commission synoptic surveys to calculate average mortality rates and a 95% confidence interval of those four scenarios including baseline, anthropogenic threats, cold stress, and perinatal effects. I will simulate each scenario with the worst, average, and better cases from each of their average mortality rates for the next decade.

Oral Room 1: MSC 2500 | 4:00-4:15 PM

Challenges Inhibiting Malaria Aid in the Democratic Republic of the Congo

Brittany Taylor Gardner
Texas A&M University, College Station

In the Democratic Republic of the Congo (DRC), an information gap exists between the existing malaria aid supply chain and an effective decentralized model that takes into account a more thorough view of the factors inhibiting supply chain effectiveness and efficiency, manifesting itself in problems ranging from difficulties in monitoring and transporting malaria commodities to quality assurance. The current method of supply chain design relies on imperfect information that neither accounts for the majority of challenges nor focuses on the holistic spectrum of issues, resulting in a narrowly-focused methodology that hinders effective aid. The aim of this research is to streamline humanitarian aid by eliminating the iterant data accumulation process of replicating existing research in order to factor in most known variables to determine a more compendious view of supply chain improvement in the DRC. Employing a qualitative knowledge-based interview with subject matter experts alongside a semantic analysis and literature review, this document aggregates the factors that inhibit, or increase the cost of, malaria prevention and treatment efforts within the DRC in an effort to create a comprehensive point of reference focusing on the distribution of effective aid. This research encompasses external and internal challenges juxtaposed with preventative and treatment measures, investigating the following issues: infrastructural aspects, financial aspects, health structure aspects, organizational aspects, political aspects, and socio-economic aspects. The results of the study demonstrate the interrelation between supply chain and non-supply chain issues effecting the malaria commodity supply chain and assist in creating a holistic approach to reduce malaria-related mortality.

Oral Room 2: MSC 2501 | 3:30-3:45 PM

Taxonomic Resolution Provides Greater Insight to Impact of Mass Mortality Events on Local Ecosystems

Abby Kimpton Jones
Texas A&M University, College Station

Mass mortality events (MME) impact local ecosystems where insects play a major role in recycling carrion. At what point in MME size (number of carcasses) will insects no longer be able to efficiently recycle the carrion? Selecting the appropriate taxonomic resolution will be critical especially when assessing arthropod community sensitivity to variably sized MMEs. A collaborative study examining an artificial MME using feral swine was conducted at Mississippi State University (MSU). There were five different densities of swine ranging from 24.9 kg to 725.7 kg. Different plots (1 km apart) were created based on density, carrion presence or absence (or nutrient additive presence), and availability for predators. Sticky traps were placed among the plots to collect insects and were replaced as needed (between 24 hours and 2 weeks). Collected traps were sent to Texas A&M University for identification of insects. Based on the different locations, the hypothesis is the diversity and richness of the arthropod community will not vary at each site over time regardless of taxonomic resolution. This experiment is continuing from spring semester 2017. This thesis will involve determining the most useful and practical taxonomic level to identify insects using the MME experiment. Based on previous literature, the best taxonomic level for identification will be family.

Oral Room 2: MSC 2501 | 3:45-4:00 PM

What Environmental Conditions do Testate Amoebae Prefer in the Peruvian Peatlands?

Marla Martinez and Maryam Cheta
Texas A&M University, College Station

Testate amoebae are a group of protozoa that live in aquatic environments such as peatlands, estuaries, and lakes, and their shells are often well-preserved in the sediments of these environments (Mitchell et al.). These organisms are useful in researching environmental, climatic, and hydrological change due to their sensitivity to environmental change, such as moisture and pH variability, which contributes to paleoclimatic reconstruction (Hendon et al.). Surface samples of soil were collected from six sites in the Peruvian Andes: Alta Condor, Basa de Condor, Don Pedro, Jampa, Quiletta, and Murmurani. The water table level, conductivity, and pH were measured at most locations where the samples were taken. Transfer functions are generated after finding a statistical relationship, or training set, between the testate amoebas and their environmental preferences. Transfer functions are a key component in paleoclimatology by establishing patterns between the tolerance range and preferences for each of the testate amoeba species. To our knowledge, we will present the first transfer function model for testate amoebae in the Peruvian Andes.

Oral Room 2: MSC 2501 | 4:00-4:15 PM

Assessing Effort Disutility in Decision Delegation Tasks

Cameron McCann
Texas A&M University, College Station

Literature Review: There is an ongoing debate in the field of engineering over different approaches to the process of delegation, two of which are requirements allocation (RA) and value-driven design (VDD). In the requirements allocation approach, requirements are used to communicate the desired outcome. In the value-driven design approach, certain values of the project are used to communicate the desired outcome. *Thesis Statement:* We expect individuals in the requirements allocation approach to have greater effort disutility than those in the value-driven approach. Furthermore, we predict that in the requirements allocation approach, individuals' effort disutility will increase after meeting the set requirement. *Theoretical Framework:* We draw on the economic principal-agent theory, like previous studies that investigated effort in a delegation context. *Project Description:* Participants played a computer game with a goal to receive points. Participants' were randomly assigned to one of two conditions. In the requirements allocation condition, the task was described by the need to meet a specified threshold; in the value-driven design condition, the task was described by the need to optimize. The game required participants to make multiple decisions at different difficulty levels with measurements over their effort being recorded throughout the experiment.

Oral Room 3: MSC 2502 | 3:30-3:45 PM

Locating Peace in between the Stanzas

Taylor Nutt
Texas A&M University, College Station

Abstract TBA

Oral Room 3: MSC 2502 | 3:45-4:00 PM

Navigation in Radio Frequency Landscapes using Autonomous Vehicles and Multiple Antenna Systems

Kendra Andersen
Texas A&M University, College Station

The purpose of the research project is to investigate the control and performance of omnidirectional, directional, and reconfigurable antenna systems in an autonomous vehicle which plans a route by determining way points which maximize signal strength. This will contribute to the development of an ecosystem of resources and tools which study the physical propagation of electromagnetic waves in complex environments and use them to engineer autonomous systems which maximize connectivity. More specifically, this project will develop a control strategy that examines signal strength at various frequencies for a given GPS location and determines what state a reconfigurable antenna should be in to maximize the received signal strength (RSS) of the vehicle. It is expected that the reconfigurable antenna will outperform omnidirectional and directional antennas.

Oral Room 3: MSC 2502 | 4:00-4:15 PM

Comparison of Autologous Platelet Releasate and Fetal Bovine Serum for In Vitro Expansion of Equine Bone Marrow-Derived Mesenchymal Stem Cells

Claire Reue, Catherine Caprio, and Caroline Andrews
Texas A&M University, College Station

In human and veterinary medicine, mesenchymal stem cells (MSCs) have major therapeutic benefits and are essential to modern research. MSCs are unique in their abilities to differentiate into osteoblasts, chondrocytes, or adipocytes. Fetal bovine serum (FBS) is commonly used as a media supplement to support the proliferation of MSCs in vitro. Although FBS provides growth factors, hormones, and other valuable benefits to the cells, it also fluctuates between batches, exposes MSCs to xenogeneic contamination, and grows increasingly more expensive. We researched an alternative to FBS called platelet releasate (PR), which contains platelet-derived growth factors that can be isolated from autologous or allogeneic blood plasma. We hypothesized that equine MSCs grown in 10% PR will have the same or superior proliferation and morphology as those grown in 10% FBS. MSCs were isolated from raw equine bone marrow, grown in media containing either 10% PR or 10% FBS, and cryopreserved for future use. During cell culture, the number of colony forming units, cell counts, growth rate, and confluence were documented. MSCs were scored on a 4-point scale based on shape, intact nuclei, and presence of vacuoles. MSCs were then compared between conditions and passages based on cell size. We saw that cells grown in PR senesce at passage two, exhibit a substandard morphology, and are larger than cells grown in FBS. At passage three, the MSCs grown in 10% PR displayed signs of osteogenesis. Since the MSCs grown in PR displayed a rapidly deteriorating proliferation and morphology, we concluded that PR is not an equivalent or superior substitute for FBS.

Oral Room 4: MSC 2503 | 3:30-3:45 PM

Temporarily Machiavellian: Performing the Self on "Survivor"

Rebecca J. Roberts
Texas A&M University, College Station

"Temporarily Machiavellian" examines the performance of self in reality television. This study demonstrates how contestants on "Survivor" manipulate and reinvent their identities in performance. Combining the disciplines of performance studies and social psychology, this study analyzes the hit reality television show, "Survivor." Using qualitative interviews with former contestants and close analysis of their conduct on screen, I have evaluated the behavioral performances and motivations of contestants and spectators. In addition, I have explored how these behavioral performances and motivations alter when the roles of contestant and spectator are combined. Reality television is an under-studied and under-theorized topic in the field of performance studies. Similarly, psychologists seldom use popular entertainment, like reality television, to examine how abstract psychological theories can be witnessed and performed in the real world. It is rare to find sustained overlap between performance studies and psychology in research. By using an interdisciplinary approach to analyze "Survivor," I have discovered many methods through which contestants manipulate their identity and justify their divisive behavior to themselves, other contestants, and audience members.

Oral Room 4: MSC 2503 | 3:45-4:00 PM

Total Body Irradiation With an Aluminum Compensator Fabricated Using Waterjet Technology

Madison Naessig and Soleil Hernandez
Texas A&M University, College Station

We propose the utilization of waterjet-fabricated aluminum compensators in AP/PA total body irradiation (TBI). Lead was substituted with aluminum to create a safer and more efficient compensator design, which was then constructed using SOLIDWORKS. Waterjet technology was used to fabricate the final prototype. To test the prototype's performance, surface dose information was gathered from an anthropomorphic phantom. From this information the uniformity of dose distribution was assessed and compared to that of current lead compensators to determine the efficiency of the proposed substitution.

Oral Room 4: MSC 2503 | 4:15-4:30 PM

Poster Session #1 | 10:00-11:00 AM
MSC 2300 A-B: Bethancourt Ballroom

Poster #	Presenter(s)
#1	Eleanor Miller
#2	Jose Torres
#3	Stephanie Wilcox
#4	Nicolas Fernando Moreno
#5	Joseph Pierre Anderson
#6	Dario Avendano
#7	Caralie Brewer
#8	Julia Carter
#9	Meghan Connolly
#10	Leslie Escalante-Trevino and Sneha Santani
#11	Savannah Fitzgerald
#12	Kaitlin M Foster
#13	Jacob A Freking
#14	Morgan Gable
#15	Hannah Guyton
#16	Yerania Hernandez
#17	Derrick Knox
#18	Diana Lau
#19	Mason Rackley
#20	Jackson Valencia
#21	Megan Metcalf
#22	Hyun Min Oh
#23	Advait Parulekar
#24	Zachary Ratliff
#25	Courtney Shrode
#26	Travis Stebbins
#27	Yumei Li

Interweaving Back-Propagation Neural Network with Sketch Recognition Software to Improve Education Efficiency

Eleanor Miller
Texas A&M University, College Station

The drastic improvements of technology in the past decade have yet to be implemented in the classroom due to the lack of simple software that non-computer science professionals can understand. This problem can be solved by creating generic software that can learn course material and aid students through sketch recognition software. If a subject has basic rules or guidelines that are followed for the application of the material, a back-propagation neural network can be trained to understand and adhere to these rules. The sketch recognition software component will determine whether a given input follows the rules. Back-propagation neural networks are machine learning algorithms. Sketch recognition software can correctly identify a given input and convert it to data the computer understands. A back-propagation neural network algorithm be implemented with sketch recognition software to provide a template interface for instructors to customize their course material to improve education efficiency in the classroom. A back-propagation neural network can be coded into a generic template suitable for any course material. Sketch recognition software can be utilized to evaluate attempts by students to apply the course material. This poster presents how to merge a neural network with existing sketch recognition software to provide a generic template that is easy for instructors to utilize for their specific course.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Static and Dynamic Characterization of Porous Carbon Aerostatic Gas Films

Jose Torres
Texas A&M University, College Station

The purpose of this research project is to advance the state-of-the-art of process gas lubricated bearings for land-based turbomachinery applications. The main goal will be to characterize experimentally the dynamic performance of aerostatic films using porous carbon material as the gas delivery system. Gas bearings provide a variety of benefits including eliminating the need for oil, reducing power losses, enabling high speed operation, and reducing equipment footprint. Gas bearing has been successfully used in small size turbomachinery, but implementation in larger machinery has proven difficult due to their limitations in dynamic performance and load capacity. For example, gas bearings are susceptible to air-hammer instability, a phenomenon in which the compressibility of the gas along with work being done on the journal by the pressure supply system creates a self-excited vibration frequency that can lead to bearing failure. The proposed experiments will aim at identifying stiffness and damping of porous carbon pads. The pads will be tested in a dynamic flat plate tester. Stiffness and damping coefficients will be presented as a function of excitation frequency and pressure ratio for multiple film thicknesses and inlet pressures. These results will be used to benchmark future predictive models and evaluate the feasibility of using porous carbon pads in radial gas bearings.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Hacking the Brain: Opportunities in Soft Wireless Bioelectronics

Stephanie Wilcox
Texas A&M University, College Station

Traditional techniques for the determination of neuron activity in cognitive function present several limitations on the comprehensive study of the brain. Conventional techniques require the tethering of experimental animals, limiting the variety of experimentation. Eliminating this restriction, wireless, in vivo platforms increase applications and improve capability. However, current devices are limited by size, weight, and wireless area coverage. In this study, a fully implantable, wireless, multi-channel optoelectronic system permitting both optogenetic control of neuronal activity and monitoring of cortical spreading in vivo is developed to mitigate these restrictions. Operating at wavelengths ranging from UV to blue, green-yellow, and red, the device developed utilizes microscale, injectable light-emitting diodes (LEDs) connected to subdermal magnetic coil antennas for optogenetic control.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Navigation in Radio Frequency Landscapes using Autonomous Vehicles and Multiple Antenna Systems

Kendra Andersen
Texas A&M University, College Station

The purpose of the research project is to investigate the control and performance of omnidirectional, directional, and reconfigurable antenna systems in an autonomous vehicle which plans a route by determining way points which maximize signal strength. This will contribute to the development of an ecosystem of resources and tools which study the physical propagation of electromagnetic waves in complex environments and use them to engineer autonomous systems which maximize connectivity. More specifically, this project will develop a control strategy that examines signal strength at various frequencies for a given GPS location and determines what state a reconfigurable antenna should be in to maximize the received signal strength (RSS) of the vehicle. It is expected that the reconfigurable antenna will outperform omnidirectional and directional antennas.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Spatial Characterization of Filament Architecture in Resistance Switching Devices

Joseph Pierre Anderson
Texas A&M University, College Station

The search for a memristive device for use in neuromorphic circuits has brought great interest to research regarding resistance switching devices (also known RRAM devices). These devices, which grow metallic filaments through an insulating material, presently have one major drawback: the electrical characteristics (namely on-state resistance) have a high level of variability from device to device which renders them unusable. Much of this variability can conceivably be attributed to the structure of the metallic filaments. This research presents a technique which allows spatial characterization of the filaments using atomic force microscopy, gaining a three-dimensional visualization of these filaments. This technique is then used to study the relationship between device formation parameters and filament structure. Parameters of interest include device crystallinity, forming voltage, and forming current.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Implementation of Autonomous Robot for Analysis of Phenotypic, Genotypic and Environmental Stress in Warming Chamber and/or Greenhouse Setup

Dario Avendano
Texas A&M University, College Station

The development of a cyber-physical system that can actively collect, monitor, and analyze phenotypic, genotypic, as well as environmental stress datain a warming chamber and/or greenhouse setup, can prove to be very beneficial forthe analysis of drought-tolerance responses of potato varieties during breeding trials. The Agri-Robot can monitor the field dynamically, and can capture and store infrared(IR) thermalimage and visible light image data.These continuously collected stress and response data can help for the development of an Image Analysis algorithm that will enable remote monitoring of an experiment. Furthermore, the same data can help derive reproducible genotype-environment-phenotype association for systematic understanding of plant drought-tolerance mechanisms.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

The Effect of Environmental Change on Polylepis pauta in the Ecuadorian Páramo

Caralie Brewer
Texas A&M University, College Station

Tropical tree ring analysis has been a rarity in the field of dendrochronology until recent years. Trees growing along the equator experience minimal limiting growth periods due to a lack of seasonality, and therefore do not produce consistent visible rings. In regions where aseasonality produces no dormancy period, it has been found that dry seasons mimic the limiting growth periods seen elsewhere in the winter (Poussart et al 2006). Stable isotope analysis has been proven to be effective for identifying these yearly dry and wet periods in tropical trees. This study aims to use this isotopic dating method to determine if stable isotope analysis is effective for the evaluation of annual growth patterns in the northern Andes, specifically in the high-altitude Andean ecosystem known as the páramo. If possible, this study also aims to determine whether environmental changes are affecting the growth of Polylepis pauta on both the dry and humid sides of Cayambe-Coca National Park in central Ecuador.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Additive Manufacturing of Bioinspired Bulk Gradient Structures to Enhance Mechanical Performance

Julia Carter
Texas A&M University, College Station

The research objective of this project is to investigate the effects of energy density-based process parameters on the resulting mechanical properties of stainless steel 316L built by a powder-bed additive manufacturing process. More specifically, we will to elucidate how the volumetric energy density imparted by the laser as well as the energy deposition rate, affects the hardness, porosity and density of the bulk material. For this, process parameters such as laser power, and the variables constituting the effective scanning speed will be changed, which effectively alters the energy density imparted onto the material. By conducting a systematic design of experiments, an understanding of the resolutions of properties achievable will be obtained. The resulting structures will be tested for hardness, density measurements, and undergo elemental analysis. By understanding the relationships of these mechanical properties as a function of process energy density, it will be possible to create tailored spatial mechanical property gradients. Bioinspired gradient structures will then be created and their mechanical (tribological and structural) performance evaluated.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Pharmacological Identification of a Calcium Release Channel in the Endoplasmic Reticulum of Plants

Meghan Connolly
Texas A&M University, College Station

Whenever we contract our muscles, we do so because there is an ion channel in the endoplasmic reticulum (ER) that releases calcium from the inside of â€‹the ER in response to an action potential. Plants do not have the genes for the animal calcium release channels, but they, nevertheless, release calcium from their ER. When Arabidopsis thaliana is subjected to photostimulation in the ER-chloroplast nexus, a calcium wave is observed in the cytoplasm of the cell. Our hypothesis is that an endoplasmic reticulum calcium release channel is responsible for this calcium wave. We hypothesize that gadolinium blocks at least one of the two suspected calcium release channels involved in the production of the calcium wave following photostimulation. We test these hypotheses by examining which part, if any, of the calcium wave, is inhibited by gadolinium.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Underwater Depth Perception Using Smartphone Sensors

Leslie Escalante-Trevino, Sneha Santani,
Texas A&M University, College Station

The purpose of this research is to create an application for smartphones with capable sensors that accurately measures depth and provides decompression sickness warning signals when used underwater. Mainly, the application will keep track of a diver's depth in relation to time passed underwater to pace a diver's ascent to the surface or descent from the surface so users avoid experiencing "the bends," or decompression sickness symptoms. Additionally, the application will display other necessary measurements and references useful to an underwater user. Current research that utilizes the barometer sensor in smartphones is conducted largely above water and is focused on sensing changes in pressure to measure changes in altitude. As smartphone technology is ever expanding, a wider selection of better sensors is included on new smartphone devices available to the public; this research would test these devices underwater. Divers can purchase and use dive computers to calculate their decompression ascent and descent automatically, however, their cost is not insubstantial, and casual users may often forego such equipment. This application aims to provide the foundation for a cost-effective solution, with additional features, for surface supported divers, free divers, and general shallow water diving.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Using an Ammonium Probe to Predict Ruminal Ammonia Concentrations

Savannah Fitzgerald
Texas A&M University, College Station

This study examined the possibility of developing a prediction equation for ruminal ammonia through comparing ruminal ammonia concentrations to ruminal ammonium levels. Ruminal ammonia concentrations were measured the standard way, using a catalyzed indophenol colorimetric reaction, and ammonium levels were measure using the HQ440D Laboratory Ammonium (NH4+) Ion Meter Package with ISENH4181 Ion Selective Electrode from HACH. In addition to these base measurements, the pH of each sample was measured to determine if the acid/base equilibrium was the driving factor behind the relationship. The ammonia concentration and ammonium concentrations were compared to determine what type of relationship there is between them in a ruminal environment. Based off of the initial data points the relationship between ruminal ammonia and ammonium appears to be linear. Since the ruminal ammonia levels are so low, 1-12 mmol, the pH does not appear to have any effect on the relationship. Based off of the data collected thus far, it will be possible to create a prediction equation for ruminal ammonia based off of the ammonium levels. This will be useful as taking the measurement with a probe and plugging into a prediction equation is much faster than the catalyzed indophenol colorimetric reaction, and in the long run it will be more cost effective.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

The Price of Acceptance: Socioeconomic Status as an Indicator of College Students' Comfort Levels Toward Individuals with Intellectual and Developmental Disabilities

Kaitlin M Foster
Texas A&M University, College Station

In recent years, many opportunities have opened for students with intellectual and developmental disabilities (IDD), such as inclusive postsecondary education programs (IPSE) that aim to improve opportunities for these students in and out of the classroom. Our research team used a campus-wide questionnaire of 1,273 students at Texas A&M University regarding inclusion in postsecondary education for students with IDD. We focused on specific responses from undergraduate students. We used family's combined household income as a proxy for socioeconomic status to answer the following question: Is socioeconomic status a predictor of college students' comfort levels towards individuals with intellectual and developmental disabilities? I will share my findings and implications about the socioeconomic status of students and how their comfort levels might shape the extent to which individuals with disabilities would succeed in and resources that should be allocated to the programs.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Computer Vision Control for Phased Array Beam Steering

Jacob A Freking
Texas A&M University, College Station

This system proves a concept for a wireless access point that uses image identification and tracking algorithms to automate the electronic control of a phased antenna array. A Python framework using open source image processing and machine learning libraries was developed for determining the position of a target with a depth-sensing camera. This framework provides the position information to an array of micro-controllers, which then electronically adjust the phase of the signal, controlling the direction of the main beam of the phased array. A series of experiments was conducted to evaluate the identification, tracking, and control capabilities of the system. Finally, a full system demonstration was conducted to benchmark the wireless performance, study the trade-offs in performance for complexity, and compare the connectivity to the current standard in multi-antenna access points.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

A Genetic Screen for High-Copy Suppressors of the Growth Defect of Saccharomyces cerevisiae set1 Null Mutants under Histidine Starvation Conditions

Morgan Gable
Texas A&M University, College Station

Previous research has indicated that the Set1 protein is a protein methyltransferase associated with transcription in yeast cells. However, the mechanism by which Set1 is involved in the transcriptional process remains unknown. Current research in the Bryk lab suggests that monomethylation of the gene plays a crucial role in the recruitment of RNA polymerase II, a role previously not suggested. Studying the effect of genetic suppressors could potentially uncover clues to the role of SET1 in the transcription mechanism, providing more information on transcription, a ubiquitous process in prokaryotic and eukaryotic organisms. One expected outcome is that the SET1 gene and the ATR1 gene, a pump that removes 3-aminotriazole from cells, will be identified in the proposed suppressor screens. Another expected outcome is that genes that work in processes that involve Set1 protein in wild-type cells will be identified in the suppressor screen. These genes when over-expressed will either bypass the need for Set1 or replace Set1 function by interacting with a non-functional Set1 protein.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

The Impact of Organizational Communication, Management, and Politics on the Development and Demise of NASA's Shuttle Program

Hannah Guyton
Texas A&M University, College Station

Literature Review: By surveying a variety of literature investigating and analyzing the tragic incidents of Shuttle Columbia and Challenger and works that articulate management practices and political policy related to NASA, I will construct an assessment of NASA's organizational communication successes and failures. I also intend to evaluate literature reporting on the time between and after both tragedies. This assessment will culminate in findings that can be applied to other high-risk organizations such as SpaceX, Boeing, and United Launch Alliance. *Thesis Statement:* While there were some efficient and effective practices in place at NASA throughout the Shuttle years, there were many flaws and inadmissible errors that enabled disaster, including the normalization of deviance, patterned informational dependencies, and too high a degree of acceptable risk. *Theoretical Framework:* With a thorough understanding of the Classical Perspective of Organizational Communication and Management, including Max Weber's Bureaucratic Theory and Henri Fayol's management principles, I will analyze existing research and records regarding NASA's internal management and communication structures and external political influences upon the organization. *Project Description:* There is a wide array of literature available critiquing NASA's performance throughout its decades as an American institution and the number publications grows considerably after Challenger and Columbia exploded. My research will refer to these reports in order to propose a series of strategies that other organizations could employ to avoid failure and achieve triumph.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

EnviroScape: Coping with Stress Using Implicit Biofeedback Application

Yerania Hernandez
Texas A&M University, College Station

The purpose of this study is to develop a biofeedback mechanism that will help a user reduce their state of stress and analyze if the biofeedback application provides a "relaxed" state for the user. Most biofeedback mechanisms are disengaging and require complex equipment to participate in order to receive proper evaluation on stress levels. Therefore, an interactive biofeedback application has been developed in order for the user to be alerted when they are in a "stressed" state, which will be determined through breathing rate (BR) and breathing pattern signal. These measurements will also be taken with everyday gadgets that the user applies in their daily life, such as wearable technology. Unlike previous research, the biofeedback game application, named Enviroscape, is not focused on providing levels of difficulty or time constraints, but instead it focuses on providing a soothing nature type of environment with no specific purpose in order to focus their attention on the scenery and distract them from their current stressful state. This will result in helping analyze and discuss the effects of a non-competitive video game on stress levels, the user's ability to reduce their stress levels, and the long-term effect of the user's ability to recognize signs of stress.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Modeling An Interference-Tolerant LIDAR system

Derrick Knox
Texas A&M University, College Station

LIDAR -- essentially laser radar -- is a key technology in the emerging field of autonomous vehicles. It allows the vehicle to detect any obstacles around it and calculate its distance from them, which allows it to build a real-time map of its surroundings. Issues arise, however, when multiple LIDAR-equipped vehicles are on the road at the same time, as their transmitted lasers may strike other vehicles' receivers. This interference gives the receiving car a faulty view of its surroundings, which could be dangerous if the LIDAR is being used to help control the car. Our research team found a way to mitigate this issue, using a pseudo-random algorithm to vary the time at which the laser are sent. This spreads the laser energy around more, and makes it less likely to create a faulty detection in any cars that may accidentally receive it. My work on this project was to create a software model of this algorithm to assist with the creation of this hardware, and then to test the functionality of this system in hardware using an actual laser system. To do this, I created and optimized a program in MATLAB for the software portion. Once that software portion was completed and tested to be accurate, the MATLAB code was converted to C code and installed on several FPGA laser drivers. These lasers will then be tested [this spring] in the real world to see if the experimental results matches the computer model data.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Reconfigurable Antennas Embedded in Structural Composites

Diana Lau
Texas A&M University, College Station

Broadband antennas are useful in many applications including satellite communications, navigation, radar, and radio. In this project, a broadband, reconfigurable antenna will be embedded in a structural composite for an autonomous vehicle. The antenna will use solid state reconfiguration mechanisms (RF PIN diodes, RF MEMs, and varactors) to reversibly configure the directional and polarization properties of its radiation pattern. Reconfigurable antennas will allow the antenna to accommodate changing operating requirements. In addition, the antenna geometry will be a derivative of an aperture-coupled microstrip patch antenna to simplify the fabrication process. The antenna will be designed using ANSYS Electromagnetics Desktop software and optimized in simulation by changing the dimensions of the antenna and the offset of the feedline. The use of stacked patch antennas will be used to help broaden the bandwidth. The prototype antenna will be fabricated and tested using a network analyzer and an anechoic chamber. The experimental and simulation results will be analyzed, and the design process will be reiterated to achieve the best electromagnetic performance. The expected outcome of the project is to fabricate a reconfigurable antenna with the most straightforward pathway to embedding it into a structural composite.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Electron Beam Processing for Egg Products

Mason Rackley
Texas A&M University, College Station

This research explores electron beam processing of eggs and its impact on their functionality as an ingredient in processed foods. Electron beam processing (EBP) has been recognized as an alternative to traditional sanitizers for the inactivation of Salmonella typhimurium and Escherichia coli cells in raw foods. While this technology has potential applications in the egg processing industry, little is known about how EBP may affect the functional properties of eggs and the textural properties of the finished product. Eggs exposed to 3 KGy of radiation were used to produce standardized recipes of meringue, custard, and mayonnaise. Several qualities including pH, gel firmness, foaming capacity, viscosity, and LAB color were measured and compared to foods made with non-irradiated eggs as a control. This study seeks to understand the textural changes associated with EBP-treated eggs and the possible benefits or detriments of this technology for the egg processing industry.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Role of Mediator Complex in Ethanol Tolerance in Yeast

Jackson Valencia
Texas A&M University, College Station

The mediator complex regulates gene expression by integrating signals from a diverse range of factors and relaying them to RNA polymerase. As an essential regulatory actor, it is expected that many sequences of the mediator would be highly conserved across species. However, some differences would likely evolve due to varying physiological needs of organisms. Prior work in Dr. Park's lab on the Saccharomyces cerevisiae model system identified a region of putative significance for ethanol tolerance, Med8 139-172. The present study extends the prior investigation to address steric and sequence concerns by furthering understanding of structure/function relationships in the Med8 subunit.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Design, Synthesis and Characterization of Peptide-guided Nanomaterial for Cancer Targeting

Megan Metcalf
Texas A&M University, College Station

In this project, the research focuses on the design, synthesis and characterization of peptide-guided nanomaterials for cancer targeting. Specifically targeting cancer cells is much more efficient than non-targeted treatment because it decreases side effects and permits stronger treatment without as heavy of a risk of harming normal cells. Peptide sequences recognizing target proteins on the membranes of cancer cells were synthesized. The purity and sequence of the peptides was analyzed. To introduce enough flexibility for target binding and extra functionality, peptides will be further modified with linker molecules. Several metal-organic frameworks (MOFs) were synthesized to determine their ability to encapsulate anticancer drugs. The goal is to link peptide sequences to appropriate MOFs to build a peptide-guided delivery system with increased specificity for cancer cells.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Linkage Between INPP5E and O-GlcNAc and Their Role in Regulation of Ciliogenesis

Hyun Min Oh
Texas A&M University, College Station

Primary cilium is a microtubule-based transport with directional motor control on ciliogenesis (Badano, Mitsuma, et al. 2006). In a recent study, ciliary defects are known to associate with wide range of human disorder such as Bardet-Beidl syndrome (BBS), Oral-Facial-Digital syndrome (OFD1), Alstrom syndrome, Meckel-Gruber syndrome, and Joubert syndrome (Badano, Mitsuma, et al. 2006). Various proteins involved in ciliogenesis has been uncovered, however, regulation of its trafficking machinery still remains elusive. The protein of focus in this research is inositol polyphosphate 5-phosphatase E (INPP5E). In their study of ciliogenesis, Xu et al. noted that the absence of INPP5E serves as a key regulator in initiating ciliogenesis (Xu, Zhang, et al 2016). In the other study, O-Linked β-N-acetylglucosamine (O-GlcNAc) has been negatively correlated with polymerization of cilia (Ji, Gu, et al. 2010). I want to investigate whether there is linkage between O-GlcNAc and INPP5E in regulation of ciliogenesis. Because O-GlcNAc acts on serine/threonine region of proteins, there is a possibility that the conserved region of INPP5E, PVS, may show signs of O-GlcNacylation on its serine site (Ji, Gu, et al. 2010). The understanding of mechanism that lies behind ciliogenesis may provide ways to control diseases caused by cilia defect, also known as ciliopathies.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

The Significance of Extreme Values in Clustered Data

Advait Parulekar
Texas A&M University, College Station

A search to find data similar to a query will always result in a best match. It is our goal to determine the significance of such a match in the context of the density of the data locally around the query point, particularly in the case that there is some clustering in the data. We do this in the context of matching amino acid triplets to aid the discovery of peptidomimetic compounds to perturb protein-protein interactions. The triplets are parameterised into a lower dimensional space optimised to retain RMSD as Euclidean distance. We find density-based clusters in this data and relate that to particular secondary structure characteristics. The approximate local density at each query point is computed, and kernel density estimation is used to extrapolate the density over the whole space. Further, an analysis of smoothness of the densities is conducted, partially to inform the choice of parameters in the clustering algorithm, and density calculations. Finally, we use a Weibull distribution to model the extreme values in an effort to get a p-value for a match.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Black-box Testing Mobile Applications Using Sequence Covering Arrays

Zachary Ratliff
Texas A&M University, College Station

Covering arrays have proven to be highly effective in detecting software bugs in what is known as combinatorial testing. In software systems that operate via a series of interactive inputs e.g. button clicks, a covering array composed of sequences of events can be used. This research examines the effectiveness of using sequence covering arrays to discover software bugs in mobile phone applications. Analysis of the distribution of t-way interactions between events in event sequence bugs provides insight into the practicality and usefulness of using this combinatorial testing method. From a developer's perspective, employing these methods can contribute to finding this particular class of bugs early in the software development process, saving the developers time and money without sacrificing effectiveness. However, an attacker may also leverage these techniques to discover previously undetected bugs as a means to exploit the system. This method can be particularly useful for attackers in that it is often simple to determine events in interactive software, even in black-box environments where internal knowledge about the source code is absent. Mobile applications running on popular operating systems such as Android and iOS are generally very interactive and therefore susceptible to these types of bugs. This project involved analyzing hundreds of reported software bugs in various mobile applications, developing a new research tool for measuring sequence coverage in existing test suites, and using these combinatorial methods on various Android mobile applications.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Incorporating Electrospun Fibers into Ultra-Strong Hydrogels

Courtney Shrode
Texas A&M University, College Station

Hydrogels are hydrophilic polymer networks that exhibit high biocompatibility due to their high water content. In applications such as musculoskeletal repair, their main limiting factor is their relatively low mechanical strength. By increasing mechanical strength and toughness, the application range of these hydrogels can be widened. In order to achieve this goal, Grunlan et al.1 has reported ultra-strong, double network (DN) hydrogels. This is done by creating a tightly crosslinked, 1st network hydrogel comprising of 1.5 M 2-acrylamido-2-methylpropane sulfonic acid (AMPS). After this single network (SN) gel is cured under UV light, it is then soaked in a 2nd network solution of 10 wt% acrylamide (AAm) and 2 M N-isopropylacrylamide (NIPAAm) and cured to form a loosely crosslinked 2nd network. This creates a final DN hydrogel with two interpenetrating networks. These DN hydrogels exhibit improved mechanical properties than their SN hydrogel counterparts of each network, with a compressive strength ~ 25.8 MPa and a compressive modulus ~ 1.2 MPa. When attempting to improve the mechanical performance of any material, reinforcement is a practical option that is often employed. This principle is proposed here: incorporation of electrospun PCL fibers into ultra-strong hydrogels to further improve their mechanical properties. Electrospinning involves an electric field generated between a capillary tip filled with a polymer and a metallic collector. This charges the polymer inside the tip of the capillary, until a jet of polymer whips out to form fibers on the collector. In this case, a mesh plate collector will organize the PCL fibers into a mesh pattern. Then PCL fibers will be integrated into a double network hydrogel to act as reinforcement to improve mechanical properties.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Methods for Redirecting Viewer Gaze in Seated Virtual Reality Experiences

Travis Stebbins
Texas A&M University, College Station

Virtual reality (VR) allows for immersive and natural viewing experiences; however, these are often focused on users standing and physically moving about a space. Seated VR applications must be appropriately designed to facilitate user comfort and prevent sickness. Our research explores different methods for redirecting a viewer's gaze in a seated VR experience and evaluates the effectiveness of each method. The research attempts to answer the question: what methods are most effective at redirecting viewer gaze in a seated virtual reality experience? The research is important because the results will prove useful in the development of future virtual reality experiences. As VR becomes more widespread and affordable, it is important that we understand the tools that are available for overcoming some of VR's limitations. From the research, we expect to discover which methods prove most effective at redirecting a viewer's gaze in a VR experience. We expect that techniques that employ slow, smooth motion will produce the most desirable results. Metrics for effective results are derived from user comfort, sickness, and overall preference. The results of this research will further the understanding of how to effectively develop content for virtual reality systems.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Human Behavior and Privacy-Preserving Interactive Record Linkage

Yumei Li
Texas A&M University, College Station

When integrating heterogeneous data, human interaction is important for cleaning and standardizing data as well as resolving ambiguous linkages. However, exposure of certain information in the database to people can pose a privacy risk, and simple encryption may negatively impact the accuracy of the linkage results. To balance privacy risk and accuracy in semi-automatic linkage methods, the proposed research investigate how to best incorporate a budget system into the incremental design used in the Privacy-Preserving Interactive Record Linkage framework. We designed a variety of interfaces and evaluate each of them to find the optimal interface for a budget system that can facilitate best record linkage decisions with only necessary information disclosed. This research will evaluate how each budget system interface influences users' response accuracy, completion time and amount of information disclosed. We expect that the interface that implements privacy budget system with limited budget to have the best overall result on users' response accuracy, completion time and amount of information disclosed.

Poster Session 1: MSC 2300 A-B | 10:00-11:00 AM

Poster Session #2 | 3:00-4:00 PM
MSC 2300 A-B: Bethancourt Ballroom

Poster #	Presenter
#1	Dillon Jones
#2	Cora Drozd
#3	Sarah Claye Epperson
#4	Camilo Anthony Gacasan
#5	Jay Elliott Garza
#6	Karissa Yamaguchi
#7	Chris Apgar
#8	Joy Youwakim
#9	Stephanie Jeanneret
#10	Thomas Dougherty
#11	Tess Johnson
#12	Christy Attaway
#13	Ryan Campbell
#14	Jared Eichner
#15	Miryan Guadalupe Jara
#16	Michael Taylor Saulnier
#17	Anna (Angie) Cisneros
#18	Cameron Criswell
#19	Chandler Dawson
#20	Rachel Dedas
#21	Madeline Flanagan
#22	Courtney Renee Guidry
#23	Hanzhi Guo and Cassidy Shaver
#24	Tawfik Hussein
#25	Dillon Knox
#26	Drew William Koeritzer
#27	Faith Kramer
#28	Daniel Olivier Lewis
#29	Evan Loehr
#30	Jacob Mink
#31	Madison Parks
#32	Sergio Pineda
#33	Vinathi Polamraju
#34	Abigail Roth
#35	Helen Francis Sanchez
#36	Lauren Sanders
#37	Chloe Shay
#38	Emily Tranchina
#39	Victoria Wei and Kevin Nguyen
#40	Avery Young
#41	Jialu Zhao
#42	Hea Keoun Jeon

Herpetofauna Surveys at an Urban Nature Sanctuary

Dillon Jones
Texas A&M University, College Station
Academy of Undergraduate Researchers Across Texas

Urban herpetology “deals with the interaction of amphibians and reptiles [herpetofauna] and humans with each other and their environment in urban or urbanizing settings” (Mitchell et al. 2008). Urban herpetofauna face habitat loss, degradation, and alteration from human expansion and intervention (Mitchell et al. 2008). Despite this, little research has been done in this field. Miller (2006) urges that human experience with nature is necessary for future conservation efforts and for the public to gain a greater appreciation for conserving biodiversity. Sanctuaries and parks are some of the few places that humans can interact with wildlife in urban settings. Edith L. Moore Nature Sanctuary is an 18-acre wooded preserve in Houston situated along Rummel Creek and is the headquarters for Houston Audobon. In order to gain a greater understanding of the herpetofauna located within the park, traditional survey methods were conducted from January 2018 to May 2018 and then compared to historical records and citizen science data. The results of this project will be used to inform Houston Audubon about the diversity of Herpetofauna within their park and to implement guidelines for preserving their ecosystem.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Pre-College Philosophy: Its Implications for American Democracy in the 21st Century

Cora Drozd
Texas A&M University, College Station
Academy of Undergraduate Researchers Across Texas

The link between education and democracy is a central development in political philosophy. In perhaps the first work on political philosophy, the Republic, Plato rejects democracy in favor of meritocracy. His belief is that the majority are unfit to represent themselves in politics. Rather than deliver equitable education, Plato would sooner arrange society to prevent the ignorant majority from ruling. Socrates similarly recognized democracy’s potential to become a tyranny of ignorance when its citizens are not oriented towards self-examination. Yet his attempt to cultivate intellectual virtues among Athenians was a futile one; his public questioning resulted in his death sentence, as Plato documents in The Apology of Socrates. Socrates’ execution reflects a complex that is pervasive throughout human history -- fear of bringing our values into question. Even in 21st century American democracy, our difficulty in addressing protests suggests that we are ill-prepared to confront unpopular speech and ideas. This is ironic for a democracy that grew from a revolution fought to protect a plurality of ideas. Unless civil discourse and intellectual virtues become integrated into American society, then we fail to live up to our democratic ideal. In this paper, I argue for the integration of philosophy into K-12 education using the political thought of Thomas Jefferson to support my view. One of the great progressive thinkers in our history, Jefferson framed democracy as a process that should continue incessantly -- and be met with widespread, progressive education. I argue that philosophy, through representation of diverse viewpoints, collective search for truth, and commitment to progress, fosters this kind of education essential to democracy. I discuss the implications of pre-college philosophy in our digital information age, and I use my experience doing philosophy with children to instantiate the ways that pre-college philosophy might resolve our democratic shortcomings.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Litigating Women: The Path to Intermediate Scrutiny in the American Supreme Court

Sarah Claye Epperson
Texas A&M University, College Station
Academy of Undergraduate Researchers Across Texas

In the 1970s, the Supreme Court pronounced a new test for laws that treated the two sexes differently. This test, known as "intermediate scrutiny," was stricter than the Court's usual standard (the "rational basis" test), but not as stringent as the test used for cases involving racial distinction (the "strict scrutiny" test.) This work tracks and analyzes the jurisprudence in the Supreme Court that led to the implementation of intermediate scrutiny, particularly as the test applies to sex-based challenges in equal protection litigation, through examining different cases and a key litigator. These are Muller v. Oregon; Goesaert v. Cleary; and multiple of (now-Justice) Ruth Bader Ginsburg's cases for the Women's Rights Project at the American Civil Liberties Union, including Craig v. Boren. Muller and Goesaert demonstrate how the Court employed the rational basis test in sex-based discrimination cases during the first half of the Twentieth century. The barrage of cases brought to the high Court by the Women's Rights Project detail activist and litigator Ruth Bader Ginsburg's efforts to persuade the Court to establish a test specifically for evaluating these cases. Craig explains the monumental case that finally convinced the Court to pronounce intermediate scrutiny. Together, these cases provide a cohesive narrative of the jurisprudence and socio-cultural history that clearly articulated the path to intermediate scrutiny.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Administration of Parbacteroides distasonis in the Attenuation of Colorectal Tumorigenesis in a Carcinogenic Murine Model of Colorectal Cancer

Camilo Anthony Gacasan
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Academy of Undergraduate Researchers Across Texas

Colorectal cancer (CRC) is the second leading cause of related deaths in the United States. Interindividual differences in genetic background results in a complex and dynamic system with implications on the gut microbiome and differing phenotypic responses especially as it relates to CRC risk. Previous research from out 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 background 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 used the AOM-induced carcinogenic model on FVB mice fed a ketogenic diet supplemented with a biweekly gavage of P. distasonis. The absolute abundance of the bacteria will be assessed via an optimized droplet digital PCR of the fecal matter for initial, midpoint, and final time points. Upon necropsy, tumor load of mice receiving the experimental gavage will be compared to the control mice. Ultimately, we aim to determine the relationship between P. distasonis and CRC tumorigenesis, which will lead to a further understand of the etiology of colorectal cancer.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Size Characteristics of Electrosprayed Polyethylene Glycol Beads in Scaffolds

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Submersion Electrospray involves the injection of a polymer solution with photo-initiator into an immiscible liquid under an electric field. This document will reveal the changes in size and yield percentage of Polyethylene Glycol beads created with submersion electrospray and UV light photo-polymerization. The varied physical parameters include: polymer chain weight, intensity of the electric field applied, cross-linker used, cell adhesive incorporated, the distance from the syringe to the electrical grounding ring, the flowrate from the syringe, and the gauge size of the syringe. Once size from each physical parameter was characterized, bead sizes from 0.712mm to 0.217mm were used in scaffolding to see their effects on permeability and retention of PBS during degradation.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

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

Karissa Yamaguchi
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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)—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.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

The Chronic Effects of Traumatic Brain Injury (TBI) on Newborn Neurons and Radial Glial Astrocytes

Chris Apgar
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Academy of Undergraduate Researchers Across Texas

Traumatic brain injury (TBI) is a widespread epidemic with severe cognitive, affective, and behavioral consequences. TBIs typically result in a relatively rapid inflammatory and neuroinflammatory response. A major component of the neuroinflammatory response is astrocytes, a type of glial cell in the brain. Astrocytes are important in maintaining the integrity of neuronal functioning, and it is possible that astrocyte hypertrophy after TBIs might contribute to pathogenesis. The hippocampus is a unique brain region, because neurogenesis persists in adults. Accumulating evidence supports the functional importance of these newborn neurons and their associated astrocytes. Alterations to either of these cell types can influence neuronal functioning. To determine if hypertrophied astrocytes might negatively influence immature neurons in the dentate gyrus, astrocyte and newborn neurons were analyzed at 30 days following a TBI in mice. The results demonstrate a loss of radial glial-like processes extending through the granule cell layer after TBI, as well as ectopic growth and migration of immature dentate neurons. The results further show newborn neurons in close association with hypertrophied astrocytes, suggesting a role for the astrocytes in aberrant neurogenesis. Future studies are needed to determine the functional significance of these alterations to the astrocyte/immature neurons after TBI.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Landfill Farming: Curbing Loss of Arable Land and Increasing Food Security

Joy Youwakim
University of Texas at Austin

This research project is focused on land optimization, with an interest in food security and economic growth. Our objective is to combat the loss of arable land due to urbanization by making use of spaces that will continue to exist, like landfills. We have successfully grown produce atop a landfill in Austin (owned jointly by the Texas Commission on Environmental Quality and the City of Austin Municipal Solid Waste Department) to test for feasibility of consumption. We successfully grew radishes, lettuce, cantaloupe, cucumbers, bell peppers, calendula flowers, and green onions, and the produce tested negative for heavy metals, Listeria, and Salmonella. We are also using differential equations to construct a heat model in order to test if the heat of the landfill will affect produce growth. The test site has a potential growing space of 330 acres. The landfill is covered, so there is one foot of clean soil between the waste and our small plot. Being able to provide this much land for food production can potentially lower hunger issues and increase the food and economic security for the people of southeast Austin, Del Valle, and other spaces across the U.S.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Competition and Forgetting during Context-based Episodic Memory Retrieval

Stephanie Jeanneret
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Academy of Undergraduate Researchers Across Texas

Recent memory models highlight the importance of contextual information for remembering episodic events (Polyn et al., 2009). A consequence of binding event memories with their context is that contextually related memories can interfere with the retrieval of targeted memories, leading to retrieval-induced forgetting (RIF) of the competing memories (Anderson et al., 2000). A model built to explain this effect describes a non-monotonic "U-shaped" relationship between memory activation and changes in memory strength (Norman et al., 2007). Specifically, competing memories that activate to a moderate degree (vs. low or high activation) are more likely to be weakened and subsequently forgotten. However, the factors governing whether and how memories will activate and compete during retrieval are not well understood. Here we test the hypothesis that events experienced closer in time will be more likely to compete and later get weakened during the memory retrieval process. Various forms of multivariate pattern analyses of fMRI data were used to track memory reactivations of previously learned objects in the ventral visual cortex during a context-based cued-retrieval task. Preliminary results indicate that manipulating temporal distances during encoding did not systematically bias the degree of memory reactivation during context-based retrieval. However, we did find a non-monotonic relationship between reactivation strength of a memory during context-based retrieval and recognition performance: competing memories with the highest degree of reactivation (regardless of temporal similarity) were associated with lower subsequent memory performance. These results suggest that reactivation of contextually related memories during retrieval can trigger incidental forgetting of those memories. To strengthen our results, we are working to combine data from multiple subjects to improve the sensitivity of item-specific neural decoding by clustering objects based on semantic information in order to predict functional brain activity. These results will provide new insights into how the details of our environment during learning shape both what we remember and what we forget from our experiences.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Bluetooth and Building Performance

Thomas Dougherty
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Academy of Undergraduate Researchers Across Texas

This semester's work in Professor Zoltan Nagy's lab focused on developing a stable way to collect information from the commercially available Switchmate wall mounted switch. Work was also done to create an appropriate way to inter- act with this switch, activating the motor to switch the lights on and off. This data will later be used by a learning agent to build an appropriate prediction system of user interaction.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

The Clinical Utility of Self Disclosure of Adults and Children Who Stutter

Tess Johnson
University of Texas at Austin
Academy of Undergraduate Researchers Across Texas

This poster presentation will review a series of studies that examine the effects of self-disclosure as a strategy to decrease negative perceptions children and adults have of people who stutter. Additional information will be provided regarding the nature of the statement (i.e., neutral or apologetic) and how it affects listeners' perceptions. Clinical implications including gender biases, prior exposure with stuttering and the distinctions in the most effective self-disclosure statements will be discussed.

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Riparian Vegetation Susceptibility to the Wind and Flooding Impacts of Hurricanes

Christy Attaway
Texas A&M University, College Station

I will determine how woody riparian vegetation of the Mission River floodplain within the study site has been impacted by Hurricane Harvey. Based on my preliminary research, the area was hit with intense winds and flooding and I expect that it could have weakened the roots of larger woody vegetation and reduced their ability to stabilize their respective crowns. Along with the impacts to the roots, other impacts such as the snapping of trunks and limbs are also highly likely. Moreover, there is an overall "browning"□ of woody vegetation likely due to the combined influences from stripping of leaves from wind, flooding, and possible salt spray carried by the hurricane (Hansen, 2017). A recent study on the dominance and distribution of woody riparian species on the Mission River found that Ulmus crassifolia, Celtis laevigata, Ehretia anacua, Vitis mustangensis, Acer negundo, Carya illinoinensis, Fraxinus berlandieriana, and Quercus virginiana are the most important species based on diameter at breast height (dbh) measurements (Davis and Smith, 2013). I aim to answer my research question utilizing the data from Davis and Smith (2013) collected and establish more information about the status of ecological systems after hurricanes or similar disturbances.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Autonomous RF Data Collection with Software defined Radio

Ryan Campbell
Texas A&M University, College Station

The collection of large amounts of RF data in the field is often tedious and narrowly focused. This work seeks to ease this process by investigating the use of a number of technologies for the collection of this data. Specifically, Software Defined Radio (SDR) has benefited from the development of enabling technologies in recent years that have made it cheaper and more accessible. In addition, autonomous drones have seen a meteoric rise in popularity. These two technologies are combined to provide an autonomous means of investigating multi-band and wide-band wireless networks improving both the volume and speed of data collection.

Poster Session 2: MSC 2300 A-B | 3:00-4:00 PM

Examination of Murine Tumors by Histopathology to Determine Whether Varying Levels of Epidermal Growth Factor Receptor Inhibition Prevents Spontaneous Tumor Occurrence

Jared Eichner
Texas A&M University, College Station

Epidermal growth factor (EGF) receptors are ligand-activated proteins found on the cellular membrane that lead to cell proliferation and inhibition of apoptosis. However, when EGF is overexpressed, tumor growth and resistance to apoptosis is significantly more prevalent. Based on previous research, it is known that there is a strong correlation between EGF overexpression and certain types of cancers, specifically intestinal polyps and colorectal cancers. Multiple studies have confirmed the ability of EGFR inhibition to hinder spontaneous tumor occurrence. This research differs from previous studies by providing additional specificity and histopathological analysis of the spontaneous tumor occurrence in a large murine sample of four genetically distinct strains to better simulate a variable human population. Such specificity includes, but is not limited to, the number, type and severity of the tumors that did occur and whether the concentration of the drug is correlated to a reduction in tumor occurrence. Such information will broaden the discussion of EGFR's role in tumor treatment.

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Social Environment And Self-Management Behaviors Among African Americans Diagnosis With Type-2 Diabetes

Miryan Guadalupe Jara
Texas A&M University, College Station

Introduction: In 2010, the following Texans adults reported being diagnosed with type 2 diabetes (T2D) African Americans (16.6%) had the highest prevalence followed by Hispanics (11%) and Whites (8.2%).Minority groups in Texas lead in rates of risk factors for T2D. Social support has been found to be a strong predictor of self-management behaviors that include dietary adherence, physical activity, glucose testing, and taking medications. The objective of this research study is to examine the relationship between social support and diabetes self-management behaviors among African Americans and be able to create health initiatives to improve their overall health status. *Methods:* Once approved by IRB, audio-recorded interviews will be held. They consist of participant demographics, social support, general health status, co-morbidities and index disease, and self- management patterns. The study will take place in the College Station/Bryan, Texas area. Participants will be self-identified as African Americans, 50 years or older, English speaking, diagnosed with T2D, and able to provide informed consent. *Data:* Quantitative data is entered into SPSS v21 and qualitative data transcribed. The relationship between social support variables and diabetes self-management behaviors will be analyzed. *Results:* The data in the interviews and photographs demonstrate three main themes: dietary behaviors, neighborhood characteristics and sociocultural factors amongst African Americans with T2D and their self-management behaviors, including the barriers and facilitators they face. *Conclusion:* Recommendations to improve health outcomes for Africans Americans with T2D in Brazos County would include developing infrastructure in rural areas, quality of food and preparation and education.

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Influence of Vehicle Make on Accuracy of Real-time Road Anomaly Identification

Michael Taylor Saulnier
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As road infrastructure in the United States is aging, road anomalies such as cracks, potholes, and other abnormalities are becoming much more prevalent. Currently there is no real-time understanding of the conditions of roads, thus we developed a machine-learning algorithm developed and trained to identify road conditions in real time based on data collected by smartphones. Since there are a multitude of different vehicles on the roads, creating a classification algorithm that can work regardless of the vehicle type is incredibly important. Doing a comparative study on the effectiveness of the machine learning algorithm from vehicle to vehicle will provide a baseline for future development of a universal algorithm that uses crowd sourced data from cell phones to allow for real-time awareness of changing road conditions and provide a way to identify and fix them quickly.

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Optimized Image Processing with Digital Light Processing Technology

Anna (Angie) Cisneros
Texas A&M University, College Station

Mid-Infrared spectroscopy can be used to detect chemical compounds with applications in bio-imaging, environmental chemical detection, and the petroleum industry. There are currently methods, which use active sensing algorithms and mid-infrared spectroscopy to determine a wavelength needed in order to preform chemical identification in a bio-chemical sample. Digital Light Processing (DLP) technology allows for precise light source control. A tunable detector can be used to control the area of the sample which will be illuminated, allowing for quick time scanning on the sample. The current analysis methods capture images using expensive mid-infrared cameras, which require complicated image analysis tools. This paper expands upon the current analysis methods to simplify the image processing techniques. The algorithm I have developed is the first step in detecting patterns and spatial differentiations using techniques, which will allow for a quick computation time. By using DLP technology and a tunable detector to develop a scanning imaging technique, the first steps can be taken to hone in on the data in a given sample image and avoid time spent processing areas with no relevant data. This will allow for feedback data from a simple algorithm to limit the amount data the detector will capture, only gathering data necessary to analyze for chemical composition.

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Understanding Plant Cell Death With "Bak to Life" Screens

Cameron Criswell
Texas A&M University, College Station

As sessile organisms, plants often need to activate a sophisticate immune system to evade pathogen infections. However, an uncontrolled activation of defense pathways can have extremely damaging effects to the host. Many elements that control these events are still unknown. Defense receptors like BASSINOSTEROID INSENSITIVE 1-ASSOCIATED RECEPTOR KINASE (BAK1) and SOMATIC EMBYOGENESIS RECEPTOR KINASE 4 (SERK4) are a vital part of plant defense, growth and development. When they become suppressed, it can lead to defense over-activation and cell death. My research will focus on finding suppressors of cell death caused by silencing BAK1 and SERK4 with virus-induced gene silencing (VIGS) on Arabidopsis knockout collections. My research will also provide insight into the understanding of BAK/SERK4-mediated cell death and how plants activate defense without causing massive cell death. Likewise, this research may impact the future of crop production by genetically modifying the plants for maximizing defense without detrimental defect. I wish to show that *"*bak to life*"* (btl) mutants have reduced cell death phenotype compared to wild type plants, when BAK1/SERK4 are silenced. Assays such as trypan blue staining for cell death and H2O2 production by DAB staining will also be performed to confirm the cell death suppression.

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Teaching Salaries and Inequality: An Expected but Not Seen Outcome

Chandler Dawson
Texas A&M University, College Station

This research project looks into a specific endogenous intervention in Texas in 1999, where the Texas legislature passed an across the board salary increase for all teachers of $3000. The goal of this research is to use the intervention to help explain certain education indicators, specifically ones dealing with education inequality. Previous research in this field has primarily looked into the opposite relationship, as there is strong evidence to support that low-income schools have often paid a compensating wage differential to teachers. However, the statewide salary increase has offered a unique opportunity to study how teacher salaries affects things like education inequality. As such, the project's findings support that increasing teacher salary has a positive effect on reducing education inequality.

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Nanocomposite Bioink for Additive Biomanufacturing

Rachel Dedas
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In the medical field, there is a growing need for tissue replacements that are able to mimic the native structure and function of failing human tissues. 3D bioprinting is a manufacturing technique with the potential to fabricate patient-specific scaffolds for tissue engineering applications. Current bioinks consist of materials that lack shape-fidelity and modulatory abilities. These issues necessarily need to be resolved in order to accurately mimic and sustain a functional human tissue. Bearing this in mind, there is a clinical need to develop scaffolds that are able to recapitulate the native properties of human tissues. Nanocomposite bioinks provide a tunable platform by altering concentrations and molecular weights of bioink components. An ink composed of gelatin methacrylate (GelMA), poly(ethylene glycol) diacrylate (PEGDA), and nanosilicates permits for control over scaffold swelling, compression, and degradation, therefore permitting the fabrication of scaffolds that mimic the patient tissue's innate structure. GelMA contains RGD domains that permit for cellular interactions, allowing for structure remodeling. Higher concentrations of GelMA in the bioink allow for increased cell interactions and limit overall swelling of the construct. PEGDA is a bioinert material that can modulate bioink mechanical properties through its molecular weight. Nanosilicates, through their unique structure, promote shear-thinning and recoverability of the bioink throughout the printing process, permitting for the fabrication of high fidelity structures. As a result, this novel nanocomposite bioink is a promising solution to the current lack of a high-fidelity, modulatory bioink.

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The Effect of Creativity on Emotions and Psychological Well-Being

Madeline Flanagan
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Engaging in creative behaviors may lead to increased positive emotions and enhanced psychological well-being. An association between creativity and positive affect, satisfaction with life, meaningfulness, and self-esteem is apparent from existing literature. The purpose of this study is to expand upon previous studies on creativity by further examining the relationship between creativity and certain aspects of psychological well-being to determine whether performing a creative task leads to improved well-being. It is predicted that engaging in creative behaviors stimulates the brain and leads to increased level of positive emotions and feelings of satisfaction and meaning. The relationship between creativity and well-being could have implications for improving the overall mental health and happiness of all individuals. Another study examined brain mechanisms of social creativity

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Sediment Profiles and Hydrological Implications Following Hurricane Harvey for Mission River in Texas

Courtney Renee Guidry
Texas A&M University, College Station

New and continuing research within recent years has provided volumes of insight into the past, present, and projected states of the Texas coastal region, its ecosystems, climate patterns, and human population. The Mission River in Texas and its surrounding geographic area are an important component to this area of research with regards to its hydrological regime and underlying influences, including potential factors of disturbance such as land use and cover, impacts from flooding events, and high-magnitude tropical cyclones. The design of this study consists of two major components: (1) perform sediment/soil core sampling for physical properties with an emphasis on soil texture to determine the agreement with previously-sampled data provided by the Natural Resources Conservation Service Soils Database (SSURGO); and (2) infer the environmental factors that have attributed to any changes in soil texture and other physical properties. Changes in the sediment profiles of the Mission River are expected due to the observation of such influences in the geographic area following the previous survey, including land use and cover alterations from human activity, frequent flooding, and impacts following the recent impact of Hurricane Harvey in September 2017.

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Extending Internet to Powerless Areas

Hanzhi Guo and Cassidy Shaver
Texas A&M University, College Station

Thesis Statement: Design a system/device that can provide internet to areas that do not have reliable power or cellular coverage. *Project Description:* The purpose of this research is to test the viability of extending the reach of the internet to rural areas that do not have access to consistent electricity or cellular coverage with a device that can provide internet without connection to a power grid. Many people in developing countries currently do not have access to the internet. If this research is successful, we will be able to supply developing countries with reliable internet access which will potentially improve education, infrastructure, and the economy.

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Investigating the Effects of Shear Stress on the Protein Expression of Lymphatic Endothelial Cells (LECs)

Tawfik Hussein
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The lymphatic system plays three main important roles: Its cells are primarily responsible for the immune response of the human body, it represents a separate circulatory system, and it is involved in the transport of select nutrients from the digestive system to the circulatory system. All of these functions rely on the generation and regulation of the lymph flow along the lymphatic network. Any malfunction in the flow within the lymphatic network could potentially lead to an anomaly in the body as whole. Moreover, any imbalance within the fluid reabsorption of the interstitial fluid could lead to edema, which is a common problem worldwide. The lymphatic vasculature also as a conduit for cancer metastasis. Despite the extensive study of the effects of shear and stretch on blood endothelial cells (BEC), very little study of the effects of the same forces on LEC has been published. So far, in vitro studies of LECs have not considered physiological shear stress waveforms or effects of combining shear and stretch. Our approach is to conduct shear-stress studies with a more realistic approach. We will, furthermore, study the effect of shear stress on a lymphatic vessel and observe its impact on gene expression in lymphatic endothelial cells to better understand their impact on the lymphatic network. We expect the results from these studies of LEC response to physiologically-relevant mechanical forces to inform understanding of the mechanoregulatory mechanisms of lymphatic contraction and flow, potentially identifying targets for therapeutic intervention in cases of lymphatic dysfunction.

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Applications of Machine Learning for Real-time Road Anomaly Identification

Dillon Knox
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Infrastructure degradation is becoming a vast, wide-reaching problem in the United States, and a lot of interest is being paid to finding ways to intelligently distribute taxpayer money when addressing the issues. This paper investigates the use of smartphones to classify various road anomalies by using on-board sensors, including accelerometers, gyroscopes, and a cameras. Having such a relatively robust sensor array in a ubiquitous device allows for crowdsourcing of data collection, and makes mapping large road networks that are prevalent in the US much more feasible. Specifically, this paper will propose a novel machine learning algorithm that can identify and differentiate between four different classifications of road anomalies, as opposed to the binary approach (using thresholding) that has been employed in similar studies. Additionally, this approach will be able to classify anomalies by severity, as well as provide an estimate of overall road roughness using the International Roughness Index (IRI). This data will paint a much better picture of the overall condition of road than similar methods, and will allow preventive maintenance to be performed, potentially saving time and money.

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Evaluating Reanalysis of Vertical Cloud Structure across a Stratocumulus to Shallow Cumulus Transition Using CloudSat-CALIPSO Observations

Drew William Koeritzer
Texas A&M University, College Station

Stratocumulus clouds play an important role in the global energy balance. Thick layers of stratocumulus clouds over the subtropical oceans gradually thin and transition into shallow cumulus clouds as they traverse from higher latitudes towards the equator. Since these clouds are so widespread, they have a significant radiative effect by reflecting solar radiation, which helps control the cooling of the climate system. The main goal of this investigation is to quantify how well atmospheric reanalysis products simulate this transition by comparing them to observational data, and to attempt to identify what physical parameters lead to reanalysis-observation differences. This study is expected to evaluate the accuracy of reanalysis products in simulating this cloud regime transition when compared to observational data, and diagnose the source of any errors representing the transition within the reanalysis. Specifications and data assimilation procedures are unique to each reanalysis, and the output from each is explored in detail to gain a more thorough understanding of the limitations of each product. Understanding errors in model representations of a process as important as this transition is to the global energy balance will allow us to utilize reanalysis products with greater awareness of their limitations, which will enhance the integrity of atmospheric studies in a time of changing climate.

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Deep Sea Corrallium Sp. In The Northwest Hawaiian Islands Basal Diameter-Colony Height Curve and Colony Height-Age Curve

Faith Kramer
Texas A&M University, College Station

In the Northwest Hawaiian Islands different seamounts have been subjected to various levels of fishing impacts. For our purposes we are going to survey three specific seamounts on the Island chain reflecting a multitude of anthropomorphic influences (no fishing, fishing abandoned 30 years ago, and current fishing). The goal is to ascertain the recovery rate of the deep sea coral, Corrallium sp., by comparing the population structure of the seamounts within the three different treatment types. In-situ photos will be taken at various locations and the software photoQuad will be used to make fast, reliable and relatively inexpensive measurements of the Corrallium sp. at each site. The images that are taken and the measurements gathered will culminate in a basal diameter to height curve and a colony height to age curve. These findings are vital to discovering the recovery rate of these keystone habitat builders which are biodiversity hotspots on seamounts in the deep ocean. Knowing the rate of recovery after damage by anthropogenic activities that contact the seafloor is paramount to high seas conservation and management efforts.

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Investigation of Carbon Nanotube Dispersions in Zirconium Oxide for Improvement of Mechanical Properties

Daniel Olivier Lewis
Texas A&M University, College Station

The goal of this project is to investigate the effects of carbon nanotube (CNT) dispersions in Zirconium Oxide ceramic on overall mechanical properties. Specific objectives include investigating how to uniformly disperse different CNTs within Spark Plasma Sintered (SPS) Zirconium Oxide composite specimens. The purpose is to determine the impact of CNT length, diameter, and weight fraction on its role as a reinforcement material in sintered Zirconia for improving toughness. This study will also determine CNT configuration effects on the surface friction and wear rate. The addition of CNT is expected to positively impact the toughness of the Zirconia composite, hindering crack propagation by acting as a randomly oriented crack propagation suppressor. Additionally, CNTs being similar to graphite powder (a dry lubricant), should make the composite exhibit a lower frictional coefficient and reduced wear rates. The resulting specimens will be characterized using an electron microscope. Their mechanical performance will be evaluated through hardness, micro-tensile/bending tests, and impact tests. The tribological performance will be analyzed though scratch tests. The results of the tests will be compared with those of pure Zirconia. This study is expected to shed light on aspects of CNT dispersions in sintered Zirconia to improve its toughness and tribological performance.

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Measurement & Investigation of Adiabatic Shear Banding-induced Ti-6AL-4V Chip Morphology & Process Characteristics

Evan Loehr
Texas A&M University, College Station

The research objective of this project is to measure and investigate the ultra-high frequency aspects of adiabatic shear banding (ASB) during the Ti-6Al-4V chip generation process through the use of a piezoelectric-based dynamometer and accelerometer-based multi-directional force and acceleration sensing systems. For this, a coupled force-acceleration measurement system will be first assembled and calibrated. Then, an experimental design of machining tests will be conducted to elucidate the relationships between ASB-induced machining force/acceleration components and the resulting chip morphology and process characteristics. This understanding is expected to help generate strategies to control ASB geometry and characteristics by suitably altering the process parameters such as machining speed, feed and cutting depth. These will be validated through further machining tests to show productivity improvements.

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Reliable Memory Storage by Natural Redundancy

Jacob Mink
Texas A&M University, College Station

Non-volatile memories are becoming the dominant type of storage devices in modern computers because of their fast speed, physical robustness and high data density. However, there still exist many challenges, such as the data reliability issues due to noise. An important example is the memristor, which uses programmable resistance to store data. Memristor memories use the crossbar architecture and suffer from the sneak-path problem: when a memristor cell of high resistance is read, it can be mistakenly read as a low-resistance cell due to low-resistance sneak-paths in the crossbar that are parallel to the cell. In this work, we study new ways to correct errors using the inherent redundancy in stored data (called Natural Redundancy), and combine them with conventional error-correcting codes (ECCs). In particular, we study data stored using convolutional codes, and use natural redundancy to verify if decoded codewords are valid or not. We use an efficient algorithm to search for a list of most likely codewords, and choose a codeword that meets the criteria of both natural redundancy and the ECC as the decoding solution.

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Interactions of Binge-Drinking Behavior in College Students and Executive Function

Madison Parks
Texas A&M University, College Station

We are looking at the connection between executive functions and binge drinking in college students. We believe that students who binge drink have decreased executive functions, which controls most behaviors, notably self-control. Finding and demonstrating the link between executive function and binge drinking could lead to a greater understanding of why people binge drink and the steps to identify people with a greater risk of becoming binge drinkers. Participants are asked to fill out a demographics questionnaire, the Student Alcohol Questionnaire, and then complete a battery of tasks, including Number Letter, Local Global Shape, Letter Memory, Keep Track, Anti-Saccade, and Stroop. We expect to find that students who score high on the Student Alcohol Questionnaire will perform worse in tasks made to single out the executive functions than those who score low on the SAQ.

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A Fully Implantable, Miniaturized NFC Platform for Neurosurgical Biomedical Devices

Sergio Pineda
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Hydrocephalus occurs when excessive quantities of cerebrospinal fluid (CSF) accumulate in the ventricles. Current treatment of the condition involves implanting a cerebral shunt, composed of an inflow catheter originating at the site of the obstructed ventricle, a valve, and an outflow catheter that drains the excess fluid into the peritoneal cavity where it can be safely reabsorbed or excreted. This method of treatment is crude and subject to many complications including, but not limited to, infection, blockage, and over-draining. Therefore, the flow of CSF out of the ventricles and into the abdomen must be carefully monitored. Unfortunately, there is currently no effective and non-invasive means of doing so. Here we present the design and assembly of a prototype for a wireless, fully implantable, miniaturized NFC-based device for monitoring and interrogating shunt function. Such a platform would, ideally, allow for real-time, wireless monitoring which will serve to inform the patient and their care-providers of abnormalities in shunt performance and allow them to take appropriate measures before further complications can occur.

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Novel, Conserved RNA Secondary Structures in MHV-A59, BCoV, and MERS-CoV

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Betacoronaviruses are a subgroup of viruses in the family Coronaviradae known to cause an array of diseases in humans and animals. In this study, we aim to determine the RNA secondary structures of Mouse Hepatitis Virus, strain A59 (MHV-A59), the best studied betacoronavirus, and closely related betacoronaviruses, BCoV and MERS-CoV to identify novel, conserved secondary structures within their genomes. To accomplish this, we infected HRT-18 cell cultures with BCoV. Upon viral clarification and titration, we obtained virus titers between 1.0 and 1.42x10^7 pfu/mL and purified BCoV via differential and sucrose density gradient centrifugation. Subsequently, we extracted the viral RNA and reacted it with SHAPE-MaP reagent 1-methyl-7-nitroisatoic anhydride (IM7) which probes for and forms adducts with conformationally flexible ribose 2'-hydroxyl groups in the RNA. The derivatized RNA is reverse transcribed in the presence of Mn++ causing misincorporation at adduct sites. This induces mutations in the cDNA transcripts which are incorporated into a cDNA library. Thus, deep sequencing of this cDNA library provided us with an avenue to create relatively accurate RNA secondary structure models using Shannon entropy and pairing probability models. High-confidence regions, characterized by low Shannon entropy and low SHAPE reactivity, were selectivity visualized. The folding model generated by SHAPE-MaP is generally consistent with a previously published model of the BCoV 5' and 3' cis-acting regions. Moreover, a potentially noteworthy pseudoknot was revealed ~ 900 â€“ 1550 nucleotides downstream from the 5' UTR. Further studies are being conducted to complete SHAPE-MaP analysis of MHV-A59 and MERS-CoV and initiate comparative analysis.

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Assessment of Degradation for Porous PCL-PLLA Semi-IPN Shape Memory Polymer (SMP) Implants for Cranial Defect Repair

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Within cranial bone defect treatments, autografts remain the current gold standard for best healing outcomes. However, if the defect is of a unique or non-uniform shape, this process proves difficult and often requires additional surgeries. In this work, a regenerative engineering approach will be pursued with a porous, shape memory polymers (SMP) scaffolds which can *"*self-fit*"* into a defect while maintaining important properties for healing (e.g. osteoconductivity, robustness, degradability, etc.). Poly(Îµ-caprolactone) (PCL) is an extensively studied SMP, but, alone, it is limited in bone repair due to its relatively low modulus and slow degradation rate. To improve these properties, our group reported non-porous SMPs comprised of a semi-interpenetrating network (semi-IPN) of cross-linked PCL diacrylate (PCL-DA) and poly(L-lactic acid) (PLLA).[1] The bulk semi-IPNs exhibited improved mechanical properties and accelerated degradation over PCL-DA controls, and porous semi-IPN scaffolds have initially shown great potential. While the degradation behavior of non-porous films has been extensively studied, that of the final implantation-ready scaffolds has not. Since a scaffold that degrades concomitantly with tissue repair can enhance regeneration, highly-controlled, well-understood degradation properties are essential. Here, we seek to investigate the degradation behavior of PCL-PLLA semi-IPN SMP implants under both in vitro conditions, to closely simulate in vivo performance, and accelerated conditions, to compare with previous findings and to efficiently evaluate effects on supporting properties.

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Exploring the Relationship Between Impulsivity and Shame and Guilt-Proneness

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The emotional experience of shame is characterized by negative self-evaluations, while guilt is characterized by negative behavioral-evaluations. Previous research has found shame to be the more maladaptive of these *"*self-conscious" emotions due to its association with various health-risk behaviors. This study investigated the relationship between impulsivity and shame and guilt-proneness in a population of undergraduate students. Whether this relationship predicts behavioral internalization or externalization was also examined. Students from the Texas A&M Psychology subject pool completed behavioral and self-report measures of impulsivity, shame-and guilt-proneness, and behavioral tendencies. Statistical analyses were conducted to determine whether individuals who are highly impulsive differ from others in their tendencies to experience shame or guilt following moral transgressions.

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Spatial User Interface Design Research

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Anatomy is an essential part of human and animal science education. However, students often have a hard time mentally visualizing the three dimensional body. In reality, students spend most of their time memorizing anatomical terms shown in two dimensional graphics in a textbook especially since the majority of the learning material is presented in a flat medium. Recently virtual reality applications have been developed to support many areas of education. However, there are not many anatomy-based virtual reality applications that are readily available. Current anatomy applications are still based on traditional learning materials, meaning most of them do not provide an effective user interface for a new learning environment. Effective user interface design is extremely important when creating an application focused on learning. If the application's interface is misleading, the user will either incorrectly learn the information or stop using the application altogether. For this reason, our research is centered around the question "how can user interface design in virtual reality applications support learning and engagement?". Our finalized interface will be implemented in Anatomy Builder VR, an application that allows users to assemble a human/canine skeleton to learn comparative anatomy. We will investigate how our design impacts user's anatomy learning experience. Because these challenges have yet to be thoroughly investigated, our research is simultaneously challenging and groundbreaking, as we must pave the way ourselves.

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Reconfigurable Antenna Beamforming Network

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The objective of this research project is to design, fabricate and test an RF distribution manifold and control circuit for a multi-port reconfigurable antenna system. The design will allow phase shifting and switching of the antenna.

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Structure-based Drug Discovery Against Caseinolytic Proteases ClpP1, ClpP2 and AAA+ ATPase ClpC1 from Mycobacterium Tuberculosis

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Antibacterial drug resistance is a major factor in the increasing rate of failure to successfully treat diseases such as tuberculosis (TB). The World Health Organization estimates that in 2015 a total of 10.4 million new cases of TB were diagnosed. Of which, 480,000 cases were resistant to standard first-line therapies - isoniazid and rifampicin - called multidrug-resistant TB (MDR-TB). A subtype of MDR-TB has resistance to more aggressive chemotherapy treatments that comprise the second line of TB drugs. This subtype is called extensively drug-resistant TB and constitutes 9.5% of MDR-TB diagnoses. Currently, nine drugs are in the final stages of clinical trials to treat all forms of TB. The discovery and optimization of antibiotics against the causative bacteria - Mycobacterium tuberculosis (Mtb) is greatly needed. Genomic studies of Mtb have revealed a multitude of new targets for antibiotic therapies. One such target is the caseinolytic protease complex (ClpP1P2) and associated ATPases (ClpC1/X). Using biochemical methods and high throughput screening (HTS) technology we characterized the inhibitory characteristics of thousands of compounds against the caseinolytic complex. We also optimized two powerful assays to monitor the activity of each protein in the caseinolytic complex. To complement this inhibition information, we grew crystals of the active ClpP1P2 complex. Future steps of this rational drug design project include crystallization of the ClpC1 complex and inhibitor soaking followed by X-ray crystallography to resolve the mechanism of inhibitors on a molecular level. This information can be used to make rational refinements to the structure of the inhibitor to increase its specificity, inhibitory characteristics and safety as a therapy for TB.

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Compatibility for Electronic Recommender Systems

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Recommending new items to users is an increasingly important research topic and recommender systems are used extensively in different applications varying across domains to recommend items from books to music. e-Commerce systems such as Amazon and Netflix depend on recommender systems to increase their profits by recommending products the consumers are interested in against other products. Current recommender systems recommend items based on two factors: user and items. For example, if a user buys a certain product, then the recommendation system will recommend similar products or products you have already purchased. For certain categories, the focus of compatibility relationship between products should be analyzed and used to recommend products to offer a complementary product, not just a similar product. Our research proposes that compatibility can provide more accurate recommendations versus traditional recommender systems. This is especially true for electronics, so we will focus our research on electronics initially, and given time, we will progress to other categories. Through compatibility recommender systems, we will define compatibility for electronics, create a model to identify compatible products in electronics, analyze large product datasets and their relationships, and create a method to provide analytics for our results with recommender systems. Furthermore, our research differs from current market recommendation systems in that we will propose a recommendation system focused on compatibility and efficiency of the systems to provide user results.

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Characterization of Clinically Isolated Clostridium Difficile Strain LC5624

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Clostridium difficile is a Gram-positive, anaerobic, spore-forming pathogen. Due in part to the highly transmissible spore morphotype, Clostridium difficile infections (CDI) frequently occur in cycles of relapse which are accompanied by progressively severe symptoms. Viable treatment options have not increased in proportion to morbidity, making investigations into individual strain phenotypes necessary in the pursuit of suitable therapies. The focus of this research was to characterize a recently identified C. difficile clinical isolate (LC5624). Assessments of growth curves and sporulation, germination assays, antibiotic minimum inhibitory concentrations (MIC), and analyses of genome editing by previously generated CRISPR-Cas9 plasmids have been compiled to form a complete physiological profile of C. difficile LC5624. Bridging a molecular understanding of laboratory physiology with levels of clinical disease severity serves to objectively aid scientific research leveled at eliminating this etiological agent, and increase the success of treatment techniques employed by medical professionals facing similar infection in patients.

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Extracting Dynamic Information from Video in Real Time

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Graphic processing units (GPU) play a major role in providing faster runtime with its parallel architecture. With hundreds of cores, GPUs help in accelerating the runtime of algorithms in various applications such as machine learning and image processing. In this work, we exploit the parallel computing capacity of GPU in video surveillance cameras. A fundamental task in video surveillance cameras is to capture sparse moving objects (foreground) in slowly changing background. A recent algorithm known as the Prac-Re-Pro-CS appears to be especially appealing from the performance viewpoint. However, the algorithm involves manipulations of large matrices and hence is very computationally intensive. The goal of this work is to achieve a real-time implementation of the PracReProCS algorithm by exploiting the parallel architecture of GPU.

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Control of Motility via Morphology Through 3D Printing

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Bacterial motility is a virulence factor that is responsible for colonization and infections. Recent research suggests that cell morphology plays a crucial role in determining the effectiveness of cell motility in host invasion. Whether evolution favors motility in certain cell morphologies and how morphology influences navigation in complex microenvironments such as human hosts remain significant open questions in the field of biophysics. These questions need to be addressed in order to prevent infections. To answer these questions, six commonly encountered human pathogens, that colonize widely different microenvironments in the human host, will be 3D-printed as artificial models. These species include E. coli, Salmonella s. v. enterica, H. Pylori, Vibrio Cholera, Psuedomonas Aeruginosa, and Proteus Mirabills, all of which are motile by the means of rotary flagella and are responsible for various illnesses. The artificial models will be tested in a tank of silicon oil, a viscous and viscoelastic fluid, to mimic the low Reynolds number environments. Their motility will be recorded with a fast camera to analyze swimming patterns. Successful future experimentation will provide insights into the evolutionary constraints that govern invasive behavior. Our efforts are anticipated to aid in the design of future therapeutics to combat bacterial infections.

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