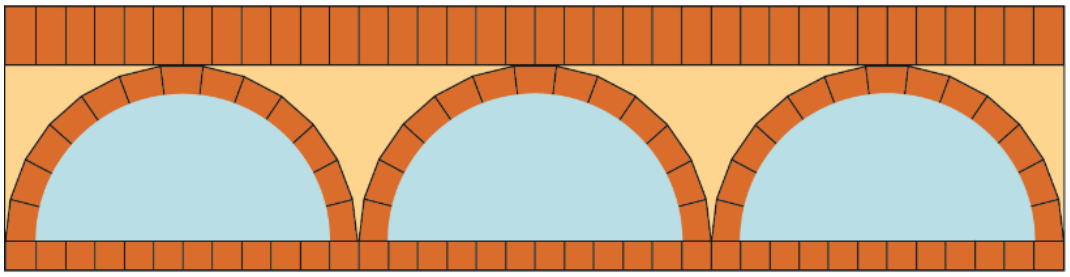

HONORS COLLEGE

The University of Texas at Arlington

Honors Research Symposium
Poster Presentation
Abstracts

November 15, 2019

YAHAIRA ARNEROS, INTERNATIONAL BUSINESS FRENCH

Opening French Doors: An Examination of French Business Executives' Perspectives on Work Disparities between American and French Work Cultures in the Dallas-Fort Worth Metroplex

Faculty Mentor: Charles Miller, J.D.

The United States is no stranger to hosting foreign business subsidiaries in our ever-growing international business world. As the US opens its doors to native French business executives, one asks how their culture perceives US workers and how to ensure that business relations between the two flow as smoothly as possible. Qualitative data was gathered from three native French business executives, in three native French subsidiaries in the DFW Metroplex. Data was gathered in face-to-face personal interviews conducted in French about disparities between French and American work culture. Similarities in perception of US work culture by the French were found including, but not limited to, possible coworker insincerity, an intense American corporate execution spirit, and stricter time restraints. Through assisted US cultural immersion for native French workers and proper French culture training for American workers, work relations can be strengthened to create a more successful work environment and improve work performance overall.

VALERIE ARRUDA, CIVIL ENGINEERING

Modeling the Effects of the Development of FM 156 on the Big Fossil Creek-West Trinity River Watershed

Faculty Mentor: Dr. Recep Birgul

Urban development increases the runoff created from a property, requiring analysis to ensure the watershed in question is not negatively affected and that adjacent properties are not adversely impacted. This study focuses on a Texas Department of Transportation project, which includes the widening and reconstruction of FM 156 in Saginaw, Texas. This project runs through a FEMA floodway, presenting challenges in the allowed scope of work. The focus of this study is to model the watershed using the hydraulic analysis software, HEC-RAS, and to design the proposed 4-lane roadway profile, including two bridges. This hydrologic and hydraulic analysis, along with economic and environmental consideration, shows the proposed roadway cannot be economically designed to pass the desirable design criteria, but can be improved from its existing condition. With right-of-way acquisition being a major constraint, the roadway was designed for the 10-year storm as to follow FEMA regulations and TxDOT criteria.

BASMAH ARSHAD, HISTORY

This Is Not That Dawn: The Partition of India, and After

Faculty Mentor: Dr. Joyce Goldberg

In August 1947, British India was divided into two independent states: India and Pakistan. Historians refer to this event as "the Partition," and acknowledge it as an incredibly violent event in which millions lost their lives and homes. The Partition has previously been analyzed through eye-witness accounts and statements given by politicians or other public figures. This project took that existing literature and built upon it using oral histories recorded during the mid-2010s by The 1947 Partition Archive organization and the Partition Museum located in Amritsar, India. These oral histories, tempered and molded by time, offered new perspectives on the Partition that provided for a deeper analysis on how the trauma of the Partition affected internal and external developments of India and Pakistan, from society and culture to national identity and foreign policy during the early stages of the Cold War.

AYLEEN ARTEAGA, BIOMEDICAL ENGINEERING

The Sustainability of Assistive Technology: Creating a Green Wearable Noise Sensor for People with Disabilities

Faculty Mentors: Dr. Georgis Alexandrakis

People with intellectual and developmental disabilities often lack vocal control, leading to a negative stigma in professional and social environments. Current Assistive Technology (AT) fails to provide people with disabilities with a wearable noise sensor that warns the user if his or her voice is too loud. A wearable noise device was created for the Community of Permanent Support Housing (CPSH), a non-profit that provides adults with intellectual and developmental disabilities with housing options in the Dallas-Fort Worth area. As the globe faces a plastic pollution crisis, many technologies use non-biodegradable or non-compostable materials. This wearable noise sensor was created out of polylactic acid (PLLA), a biodegradable material, with a concerted effort to minimize plastic waste while maintaining high durability, accuracy, and discreteness.

MIKKI BANDELARIA, KINESIOLOGY
Physical Activity Patterns among Undergraduate Colleges at the University of Texas at Arlington
Faculty Mentor: Dr. Rebecca Garner

The correlation between undergraduate majors/colleges and their corresponding levels of physical activity was investigated at the University of Texas at Arlington. The relationship between the two subjects of research was determined by the method of a survey, as inspired by the International Physical Activity Questionnaire (IPAQ). The IPAQ serves to analyze data through a series of questions that determine an individual's weekly average of vigorous to moderate exercise based on their job, major, leisure activity, and time spent sedentary. Pie charts and tables are presented to depict the survey's findings of undergraduate major, college, and times of physical and sedentary activity. The results indicate that although there is little correlation between undergraduate major or college and their levels of physical activity, the Colleges of Architecture and Business had the highest averages of vigorous and moderate activity, while the College of Engineering had the highest averages of sedentary activity.

BENJAMIN BARNETT, ELECTRICAL ENGINEERING
Solid-state Marx Generator Utilizing IGBTs and an Isolated Gate Driver System
Faculty Mentor: Dr. David Wetz

Marx generators are pulsed power generators useful for applications such as particle accelerators, agricultural food treatment, medical research and treatments, flashed x-rays, laser welding and ablation, and high-power microwaves. This type of generator is often high voltage, and provides short (nanosecond – microsecond long) pulses of power. Many well-documented designs utilize spark gap switches, but recent advancements in solid-state power electronics components like IGBTs make high-power transistor switching possible. Although limited to low voltage (<10kV) by the current transistor technology, there are clear benefits to this design, namely precise switching timing and RLC ringing reduction. The aim of this Senior engineering project was to build a five-stage solid-state Marx generator that can generate a 100us, 50V, 2500W output pulse. The design discussed in this work details implementation of IGBTs and isolated gate drivers to achieve this goal. The design has been demonstrated to generate such a pulse with experimentally acceptable losses.

MATTHEW BIGGERSTAFF, CIVIL ENGINEERING
Applying Smart Road Technology to Enhance the Safety and Sustainability of FM 156
Faculty Mentor: Dr. Recep Birgul

As part of a semester-long course, five senior civil engineering students were tasked with developing plans for the reconstruction of a two-mile stretch of FM 156 in Saginaw, Texas. Design efforts were made using fundamental principles learned during undergraduate coursework and standards given by various government agencies. However, these traditional methods oftentimes fail to incorporate or consider the latest smart road technology. To enhance the scope and design of the project, research was compiled from various case studies and peer-reviewed journals to determine the current smart road technology that can be integrated into the reconstruction of FM 156. Based on this research, multiple devices, including self-aware sensors for intelligent pavement monitoring and energy storage panels for power generation, were recommended for the final design. These recommendations are expected to improve the safety, reliability and sustainability of the roadway.

SANJANA CHOUDHARY, MECHANICAL ENGINEERING
Enhancement of Thermal Energy Storage Using Binary Nitrate Salt Mixture via Addition of Latent Heat
Faculty Mentor: Dr. Sunand Santhanagopalan

Due to the growing needs of energy consumption, green methods for energy storage/conversion are viable options for energy storage. Technologies like concentrated solar power (CSPs) plants use solar energy for thermal energy storage. Heat transfer fluids (HTF) transport the generated heat to reservoir tanks for storage and eventually to generate electricity from steam. In recent works, the inclusion of micro-encapsulated phase change materials (MEPCMs) in HTF is used to improve the thermal energy storage capacity of the HTF-MEPCM system. Phase change materials (PCMs) enhance the heat capacity due to their high latent heat. This research uses binary nitrate salt mixture as the PCM. Fourier-transform infrared spectroscopy (FTIR), differential scanning calorimetry (DSC) and XRD (X-ray diffraction) techniques were used to characterize the MEPCM. The MEPCM was stable up to 540 °C with latent heat of 220 J/g. The micro-encapsulation technique used has potential to be applicable to various salt systems.

JANE CLOUD, EXERCISE SCIENCE
The Role of Discrete Action Potentials in Sympathetic Vascular Transduction
Faculty Mentor: Dr. Paul Fadel

The sympathetic nervous system dynamically regulates blood pressure, primarily through the modification of peripheral vascular tone. Importantly, the quantification of resting muscle sympathetic nerve activity (MSNA) burst frequency alone does not account for the vascular smooth muscle contractile response, and ultimately the blood pressure response to MSNA (i.e., sympathetic vascular transduction). The Fadel Lab has developed a methodology to quantify sympathetic vascular transduction; however, the role that discrete sympathetic action potentials play in determining the vascular response to MSNA remained unclear. Therefore, our group explored the role of discrete action potentials through the collection of muscle sympathetic nerve activity measurements in five young healthy men. Subsequently, action potentials were extracted using a matched wavelet methodology and sorted into clusters based upon amplitude, latency and height. We tested the hypothesis that summated action potentials found in singlet MSNA bursts would be more likely to have unique action potentials when compared to doublet, triplet and quadruplet MSNA bursts of similar heights.

ATHARVA DANGE, PHYSICS
Sudden Storm Commencements Related to the Earth's Geomagnetic Field with Emphasis on the Precursor Signature
Faculty Mentor: Dr. Daniel Welling

All space physics deals with the relationship between the sun and the earth. The type of interaction—solar winds, flares, particles, mass ejections, radiations, plasma, and magnetic fields—determine the phenomenon observed on earth. Sudden Storm Commencements (SSCs) are unique high impulse disturbances in the Earth's magnetosphere characterized by an anomalous rise in the Dst index. Both hourly and minute time resolutions is utilized to compare deviations in value ranging from 10nT to 50nT. The goal is to study SSCs by analyzing satellite data and constructing simulations in order to be able to predict future such storms on Earth. The proper identification of a hypothesized 'precursor signature' of SSCs is predicted to increase accuracy of space weather forecasting. Methodology includes both magneto-hydrodynamical and magneto-statistical equations to analyze and infer the existence of the precursor signature. Accurate mapping of space storms will improve GPS connectivity, prevent widespread power failures and improve satellite communications system.

ALYSON EMERY, BIOLOGY
Species Delimitation of the Holbrookia Maculata Complex through Exome Sequencing
Faculty Mentor: Dr. Matthew K. Fujita

Holbrookia maculata is a phrynosomatid lizard whose native range includes the central and southwestern U.S. and central Mexico. This species is currently subdivided into eight different subspecies; however, there has not been a large-scale genomic analysis to determine the validity of these species boundaries. In this study, we are using exome sequence capture methods to quantify the genetic variation within and among subspecies in the *H. maculata* complex. Through field work and museum loans, we have collected samples from across the species' range, performed DNA extraction, prepared exome libraries using custom MyBaits probes, and will be processing the sequence data using bioinformatics pipelines to process genome-scale datasets. Our work will determine not only the species boundaries within the *H. maculata* complex, but also the evolutionary relationships among the species.

ARIA GREEN, PSYCHOLOGY
Physical Educators and Awareness of Impact: Weight Biases by Gender and Implications on the Well-being of Students
Faculty Mentor: Dr. Lauri A. Jensen-Campbell

Educators are considered primary socializers for children, meaning they have a significant impact on behavioral, academic and interpersonal development. Physical educators, particularly male educators, have been found to express persistent biases against students who appear or are labeled overweight. These shown biases can negatively affect child development; if educators are aware of their impacts, these negative effects could be prevented. This study looked for evidence on the relationship between influential awareness, expressed weight biases and gender of physical educators. Physical educators were asked to fill out a survey which included an influence awareness scale, demographics, personality measures and then reviewed fake student profiles which differed in BMI and health-related behaviors and answered questions to reveal any potential weight biases. Findings indicate that while teachers are aware of their influence on students, this may not give them the perception to withhold expressions of weight biases onto them.

ISMAEL GUZMAN-DIAZ, ECONOMICS
Zombie Firms and the Interest Rate Channel
Faculty Mentor: Dr. William Crowder

We investigate the interaction between interest rates and the prevalence of 'Zombie' firms. Zombie firms are relatively unproductive, insolvent firms, who remain in the market. The past several decades have witnessed a steady rise in the prevalence of these firms across advanced economies. Significant evidence now exists of their detrimental effects on healthy firms within their industries and on the economy as a whole through allocative inefficiencies and drags on productivity growth. This zombie phenomenon coincides with the long-term lowering trend in benchmark interest rates, providing a theoretical life-support mechanism through which zombie firms are nurtured. Using firm-level panel data from the Compustat-Capital-IQ database, we show that there exists a significant inverse relationship between interest rates and zombie firms. Presenting a challenge for conventional monetary policy as central banks are faced with a possible tradeoff between dampening productivity in the long term and invigorating it in the short term.

ZACHARY HOLLOWAY, ELECTRICAL ENGINEERING
Development of a Data Packet Driver for the iRobot Create 2 and the MSP432P401R
Faculty Mentors: Dr. Greg Turner

A driver was developed for the MSP432P401R microcontroller and the iRobot Create 2's data packets in the C programming language. The driver enables less experienced programmers to easily interface between these two devices without having to directly send, receive, and interpret byte data packets. This was developed using the Open Interface provided by iRobot that describes each of the Create 2's data packets, and the meaning of any data returned to the microcontroller. All communication between the two devices utilizes Universal Asynchronous Receiver/Transmitter, or UART. The driver is easily incorporated into any C project and offers functions that provides the full functionality of the Create 2. This could easily be altered to accommodate interface with any microcontroller with only minor modifications.

SEUNG AH KWAK, LINGUISTICS
Title: Is *scissors* made up of scissor and a plural marker?
Faculty Mentor: Dr. Naoko Witzel

This study tests whether complex words that are higher in frequency than their respective base words are decomposed into morphemes. While many current models of morphological decomposition agree that morphologically-complex words are decomposed into their individual constituents at some point during the processing of these words, some models argue that whether complex words are decomposed or not depends on their surface frequency, and that high frequency words are processed in their whole word form. Therefore, this study tests whether relative frequency between the morphologically-complex words and their stems affects these complex words to get decomposed using the masked priming technique. Given that there were somewhat equivalent effects of masked priming for higher and lower frequency complex word and its base (*clothes-CLOTH* and *clothing-CLOTH* respectively), it suggests that all complex words go through decomposition regardless of the relative frequency between the complex word and its stem.

ALI MOHAMEDI
Innovative Targeted Drug Carrier Assembly using Microfluidics
Faculty Mentor: Dr. Kyati Nguyen

Drug delivery is an essential part to treating patients, especially those who have cancer. While many treatments include conventional delivery of anti-tumor drugs through intravenous administration, a large growing field has come in the form of nano-scale drug carriers. In this project, we will show how the production of nanoscale, cancer targeted drug carriers can be automated through microfluidic devices. The device will include microchannels made from Polydimethylsiloxane (PDMS) material in a soft lithography process. Within these channels, the synthesis of antibody conjugated nano-liposomes (immunoliposomes), which can load anti-tumor drugs, present a potential therapy for cancer patients. While such feats have been achieved before, additional separation of non-conjugated and conjugated drug carriers has not been achieved before all in the same microfluidic device. In this project, we have developed a novel cost efficient and practical sized microfluidic device that is designed to synthesize and separate drug carriers.

JOCELYN RUIZ, NURSING
Mother and Baby
Faculty Mentor: Dr. Cheryl Anderson

The purpose of this study is to explore the frequency of perinatal depression and effects of depression on newborn outcomes among Latina adolescents. This is a secondary analysis study, which included total of 183 adolescent Latinas from John Peter's Smith Hospital at Fort Worth, TX. We found over one in five adolescents reported a neonatal complication. Edinburg Postpartum Depression Scale (EPDS) scores showed nearly 14% to have minor depression and 12.7% to have major depression. Weak associations were found between EPDS scores and gestational age, r= -.19, p=.02 and neonatal complications, r=.27; p=.02. Using logistic regression higher prenatal depression ratings were found to predict higher EPDS scores. This study is one of the few to explore a population of specifically Latina pregnant adolescents for perinatal depression and effects upon newborn outcomes. Additional insights on the Latina community could direct overall health goals and health expenses of the United States.

SANSKRUTI SHARMA, PHYSICS
Detection of Exomoons by Decametric Radio Emissions and Determination of their Habitability through Tidal Heating
Faculty Mentor: Dr. Zdizslaw Musielak

Over 4000 exoplanets have been discovered but most of them are unsuitable for life. With organic compounds being discovered on Saturn's moon Enceladus, exomoons have become hotspots for extra-terrestrial life. The strong tidal force of Jupiter has various effects on its moons. Large heat dissipation in Io creates an ionic atmosphere that interacts with Jupiter electromagnetically. As a result, Io emits characteristic radio emissions. Subsurface ocean is also created in Europa due to heat dissipation in its interior. Tidal dissipation is calculated for different cases for Galilean moons. Habitable zones for Io and Europa are determined by varying the semi-major axis of their orbits. Four exoplanets similar to Jupiter are selected. Io-like, Europa-like and Enceladus-like exomoons are simulated around each exoplanet and tidal dissipation is calculated. Based on these calculations habitable zones are estimated for these exomoons. Two candidates are also proposed for future detection of exomoons.

SOPHIE SOUEID, ELECTRICAL ENGINEERING
Driving the iRobot Create 2
Faculty Mentor: Dr. Greg Turner

With more engineering programs emerging for K-12 aged students, the demand for openly accessible and easily implementable coding projects has increased. iRobot is one of the companies supporting this new wave of innovators with their Create® 2 Programmable Robot, which can communicate to other devices via UART (universal asynchronous receiver-transmitter). While it would be beneficial to young STEM students if there existed an accessible way of commanding the Create 2® with powerful microcontrollers, there are not any available as most coding hobbyists use cheaper microcontrollers. Thus, for this project, I have built a driver library, which is a set of functions that allow for easy access of features or data of a system, for the Create 2® and powerful ARM Cortex MSP432P401R. The driver library consists of easy-accessible functions for all the commands listed in the Create 2 Open Interface documentation.

VINCENT WILLIAMS II, FILM AND VIDEO
A Prospective Exploration of Digital Design, Animation and Virtual Reality
Faculty Mentor: Bart Weiss, M.F.A.

The impression of youth, their sense of identity and belonging are themes commonly discussed in relation to mass media and societal structures across the globe. Both the risk expectancy and the innovative potential of virtual reality was hypothesized through a number of creative studies. Initially, interviews with developers and local creatives were conducted to establish a common understanding of existing virtual technologies. Studies in narrative storytelling were then utilized to develop concepts, scripts, and a directorial vision for the fictional story "The Years Before." A short proof-of-concept film that explores how creators may interact with near-future advancements in virtual reality. The decision to incorporate 2D animation was made with the aim to best articulate the expansive world that awaits future creators and innovators. In collaboration with artists, musicians, designers, and filmmakers, the work produced exaggerates current trends, technological developments and ultimately predicts how shared learning could change the world.