



HONORS COLLEGE

The University of Texas at Arlington

HONORS RESEARCH SYMPOSIUM PRESENTATION ABSTRACTS

APRIL 14, 2017

DESTINY ADAMS, CRIMINOLOGY AND CRIMINAL JUSTICE

Title: *How Media Today Influences Public Opinion on Black Victims and White Offenders with Regard to Race and Crime*

Mentor: Dr. Robert Bing, III

American media plays an integral role in modern society. In any given day one person may read news stories from newspapers, television, magazines and social media that all cover the same story from varying angles. This allows news stories to be sensationalized, and the effect it has on public opinion is extremely influential. Therefore, the media's reporting of crime oftentimes perpetuates stereotypes and biases towards certain races more than others. I conducted a content analysis of three black male victims and three white male offenders to examine whether or not a bias existed when it came to the media's coverage of how race factored into the story depending on who was the victim/offender. I found that despite the fact that the black males were victims and that white males were the offenders, the black males were marginalized as "thugs" and "criminals" whereas the white male's crimes were rationalized and questioned.

SHIVAM ARORA, ACCOUNTING

Title: *Application of Activity-Based Costing on Commercial Flights Operated by the US Airline Industry*

Mentor: Dr. Raghu Venugopalan

This study proposes a costing scheme for a typical commercial airline to determine the cost of a flight. It uses public data sources as well as discussions with personnel of a major US airline. A typical flight has some easily traceable costs called direct costs, but most of the costs attributable to a flight are not directly traceable to it and are called indirect costs. The allocation of these indirect costs is a challenging costing problem that impacts the accuracy of the cost of a flight, which is important for route profitability assessments made by airlines. To enhance the accuracy of cost allocation, the proposed scheme identifies traditional volume-based measures as well as Activity Based Costing (ABC) measures that drive the cost of a flight. It also identifies intermediate cost pools to which relevant costs can be assigned before they are allocated to a flight.

AMANDA AUGUSTINE, COMMUNICATIONS TECHNOLOGY

Title: *A Study of Communication Framing and Persuasion*

Mentor: Dr. Chyng-Yang Jang

Abortion has been one of the most contentious topics in our society. Opposing camps frame the issues in different ways to compete for public opinion and influence public policies. This study focuses on one of the latest exhibits of this long debate – the Supreme Court case *Whole Women's Health v. Hellerstedt*. Related press releases from 2013-2016 by the two actively involved organizations, the Center for Reproductive Rights (pro-choice) and Americans United for Life (pro-life), were selected for analysis. A coding schema was devised that helped to identify five main frames and eight sub-frames in these press releases. The results show that a main frame of Social Support was common for both sides; however, the Center for Reproductive Rights also embraced a Personal Story/ Experience frame.

ZACHARY BARNETT, MECHANICAL ENGINEERING

Title: *Application of Additive Manufacturing for Topology Optimized Aircraft*

Mentor: Dr. Raul Fernandez

Additive manufacturing allows engineers to attempt designs that were not possible in the past. New additive techniques can create parts by building layer by layer, as seen in 3D printing. Parts with complex curvatures and extremely detailed structures can be printed quickly and affordably. Complex structures often result from optimizing the part in a process called topology optimization, which is used to remove excess material yet still create a robust part. In this project, additive manufacturing and topology optimization were used to create an optimized aircraft wing and other aircraft components. This required researching materials, experimenting with thin-walled structures, and understanding the downsides of 3D printing. After many test prints and designs, my team has generated a printed wing joint, several printed fuselage stiffeners, and ready-to-print optimized models. Ideally, the optimized wing and the wing-fuselage joint will be printed soon.

SAYEM BHUIYAN, BIOMEDICAL ENGINEERING

Title: *Developing Methods to Characterize Lubricious Coating for Intra Ocular Lens (IOL) Delivery*

Mentor: Dr. Ashwin Nair

IOL is delivered into the eye during cataract surgery. This lens is folded, loaded into a cartridge and pushed down into the eye. When the lens comes out of the cartridge and reaches the eye, it unfolds. For proper unfolding, the friction between the cartridge wall and the lens should be minimum. This project focuses on developing methods that can be used to characterize how coating thickness can affect the uniformity of the coating itself. The more uniform the coating is, the less the friction should be between the lens and the coating. Because of the difficulty of testing on a narrow cartridge, a plank made of the same material as the cartridge is dipped into the lubricious coating using a dipping machine that we built. Thickness is controlled by changing the speed of the machine, and the coating is dyed to observe its uniformity.

JEFFREY CERVENKA, KINESIOLOGY

Title: *Force and Stability Analysis of Rehabilitated Anterior Cruciate Ligament Individuals*

Mentor: Dr. Mark Ricard

The anterior cruciate ligament (ACL) serves as a vital stabilizer for the human knee, yet it is one of the most injured ligaments in the body. While surgery and physical therapy can restore function to the injured knee, those who rehabilitate from an ACL tear may never regain their former performance capabilities. To better understand the influence of rehabilitation on ACL performance, this study evaluated strength and stability differences within the legs of 11 individuals who have rehabilitated from an ACL repair. Y-Balance Tests and a Biodex isokinetic dynamometer were used to measure knee stability and strength, respectively. No significant differences were found in the strength test measurements. Differences in Y-Balance Test composite scores ($-2.8 \pm 3.1\%$, $p = 0.014$) and maximal anterior reaches ($-2.8 \pm 2.4\text{cm}$, $p = 0.010$) were found to be significantly different. Consequently, both balance measurements in involved legs were significantly impaired when compared to uninvolved legs.

HOPE CLARK, ACCOUNTING

Title: *The Implications of Sustainability Reporting*

Mentor: Dr. Stephanie Rasmussen

Firms prepare sustainability reports along with their financial statements to disclose their nonfinancial information, such as their environmental, social, and governance (ESG) activities. The practice of sustainability reporting is growing as stakeholders care more about ESG issues. Researchers have studied the financial performance and sustainability reports of non-U.S. firms to determine if engaging in sustainability reporting enhances firm financial performance. To further understand this relationship, numerous measures of financial performance were used along with a calculated sustainability disclosure score for 2,367 U. S. firms to run a correlation and regression. Three of the nine financial performance indicators produced relevant results in the correlation, two negative and one positive. The regression analysis provides similar findings; however, the coefficient of determination, R^2 , was only 0.019. Unlike prior studies, this study finds only a weak relationship between the financial performance indicators and the sustainability disclosure score.

MICHAEL DEBELLEVUE, MATHEMATICS

Title: *Fractal Nature of the Fibonomial Triangle Mod p for a General Rank of Apparition*

Mentor: Dr. Dimitar Grantcharov

Pascal's Triangle forms the well-known Sierpinski Triangle fractal when divided by a prime number. The fibonomial triangle has been shown to exhibit similar behavior for certain primes. In this paper, we show that for primes p with one zero in the period of the Fibonacci sequence mod p , the recursion $\binom{n + ip^*p^m}{k + jp^*p^m} \equiv_p \binom{i}{j} \binom{n}{k}_F$ holds, and for primes with two zeroes in the period, $\binom{n + ip^*p^m}{k + jp^*p^m} \equiv_p (-1)^{ij-nk} \binom{i}{j} \binom{n}{k}_F$ holds. Using these relationships to check for divisibility shows that there are recurrent triangles of zeros of increasing size, which is responsible for the formation of a fractal structure. This substantially increases the size of the collection of primes for which a fractal structure is proven to exist, and the remaining case can be handled using the same methods we employ. We also describe the resulting fractals and compute their Hausdorff dimension.

ALYSSA DEQUEANT, CRITICAL LANGUAGES AND INTERNATIONAL STUDIES

Title: *Integration of Refugees in the U.S. and Germany*

Mentor: Sabine Harvey

Refugees are and have always been a global occurrence. When arriving in their new country, refugees go through cultural orientation and language classes. Organizations including Catholic Charities and the German organization Caritas are working with these new arrivals to help them integrate. To further understand the assimilation process of refugees and how organizations support them, an internship was conducted and the transition processes of refugees through Catholic Charities and Caritas were studied. Cultural orientation and ESL classes were observed to determine how refugees integrated. I aim to offer findings to understand and improve the process for all parties involved. My research will contribute to this knowledge by comparing and studying first-hand how the process and experience affects refugees and staff members of an organization. By comparing integration of refugees through Catholic Charities and Caritas, I intend to use the results to aid future refugee integration.

OGENNA ESIMAI, COMPUTER SCIENCE

Title: *Implementation of a Bluetooth Low Energy Feature for a Vehicle Tracking Device and a Discussion of Historical Context and Real-World Applications*

Mentor: Dr. Christopher McMurrough

Vehicle tracking is an important part of fleet management. The Sponsor, S&A Systems, Inc./FLEETWATCH, needed a device to account for vehicles arriving at and leaving a station while simultaneously obtaining information from the vehicles such as mileage. The Model 692 electronic hubodometer device is solid, sealed, and self-contained, including its power source. It is read by a gate reader to obtain vehicle information. Vehicle information is time-stamped and sent to a data collection system. The M692 is physically attached to a wheel of the vehicle. The M692 has a bidirectional radiofrequency communication system called Bluetooth Low Energy (BLE) that enables the M692 to receive information from a wheel sensor and transmit the information to the data collection system. The implementation of the BLE transmission feature was completed using the C programming language and CodeBlocks Integrated Development Environment version 13.12. The historical context and real-world applications of the M692 are addressed.

ADAM FOGEL, ARCHITECTURE

Title: *City Block Reconstruction – Downtown Fort Worth*

Mentor: Dr. Kathryn Holliday

After World War II, large portions of the American public began to move away from the city into the surrounding suburban areas. This was known as the Urban Crisis. Places like Detroit, Boston, and even Fort Worth had to deal with the devastating impact this crisis caused. Historians and Urban Planners have explored methods to counteract the Urban Crisis and create a successful urban environment. Four city blocks in Downtown Fort Worth have been digitally recreated and evaluated based on this criterion. This project focused on the location of the Fort Worth Water Gardens because the avant-garde aesthetics are a radical change from the traditional downtown blocks it replaced. Creating a model is vital because the study of architecture depends heavily on data visualization. A 3D model establishes the sense of place that those four blocks had and strengthens the argument for constructing the Water Gardens.

PRISCILLA GLENN, BIOLOGY

Title: *X-chromosome Gene Regulation in the Male Germline of the Beetle *Tribolium Castaneum**

Mentor: Dr. Jeffery Demuth

Meiotic sex chromosome inactivation (MSCI) is the process in which unsynapsed sex chromosome(s) are silenced during meiosis in spermatogenesis. Unlike mammals, where MSCI is well known, *Drosophila* male germline show significant chromosome-wide downregulation of X-linked genes but no evidence for MSCI. Likewise, sex chromosome regulation is still unclear within *Tribolium castaneum*. To investigate whether MSCI holds in male germline tissues, we compare microarray data from whole body tissues and germline tissues of both sexes. We find that X-chromosome gene expression in male germline is significantly reduced compared to the autosomes and to the X chromosome in somatic tissues. This clearly indicates that the normal balance of X to autosome expression (i.e. dosage compensation) found in somatic cells is not maintained in the male germline, but it is unclear whether the low level of expression also indicates MSCI or is residual expression from non-meiotic cells in our samples.

MEGHAN GRESHAM, PSYCHOLOGY

Title: *Personality and Well-Being in Psittacines*

Mentor: Dr. Scott Coleman

Parrots are popular pets due to their complex social behavior, intelligence, and long lifespan. Many captive parrots develop abnormal behaviors, such as feather plucking, which can result in illness and abandonment. This study investigates the link between personality traits, abnormal behavior, and subjective well-being (SWB) in four genera of parrots commonly kept as pets: Amazons (*Amazona*), African Greys (*Psittacus*), Cockatoos (*Cacatua*), and Macaws (*Ara*). Two volunteers, well acquainted with each parrot, collected data using an online questionnaire; however, data analysis is ongoing. Principal component analysis of 48 personality traits, used in human Big-Five Factor research, may reveal larger dimensions, such as extraversion and neuroticism. Phylogenetic comparisons that reveal stable differences between species may reflect evolutionary adaptation. If significantly correlated with SWB and abnormal behaviors, these measures will prove useful in predicting the health and well-being of captive animals and allow handlers to make husbandry decisions tailored to the individual animal.

CHRISTINA HAMILTON, NURSING

Title: *Contributions to Resilience – External Protective Factors and the Adolescent Birth Experience*

Mentor: Dr. Cheryl Anderson

Adolescent birth is an international health concern. Despite efforts to decrease the rate of adolescent births, America has the highest among developed nations. The focus of past research was risks for adolescent birth and its negative impact on adolescents. However, a positive birth experience has a positive influence on outcomes for mother and baby in adult populations. This cross-sectional study applied the resiliency framework to a convenience sample of mothers ages 13-19, to describe the influence of support, positive infant outcomes, childbirth class attendance, and prenatal care as external protective factors on a positive rating of the birth experience. Data was collected using a ten-point rating scale and individual questions on a demographic sheet. The data was then analyzed using descriptive statistics and the Spearman Rank Order Correlation Coefficient. Support from the father of the baby was found to be the most significant influence on adolescents' birth experience.

JADE HARRISON, ENGLISH

Title: *Technophobia and Colorblindness in Cinematic Science Fiction*

Mentor: Dr. Kathryn Warren

Many contemporary Americans believe racially-discriminatory attitudes and practices against minorities no longer exist and that we live in a post-racial era in which skin color does not determine an individual's social standing. However, although racism no longer presents itself in ways as obvious as during slavery or Jim Crow, it is still engrained in American society, but persists in obscure and sophisticated ways. This tendency for racism to morph can be seen in science fiction cinema as well, where issues of race may go unnoticed because the genre is not set in the ordinary world we live in. By analyzing contemporary science fiction films and television series depicting the intersection of humanity and posthuman technological beings in futuristic, seemingly post-racial societies, my study charts how the racist mindsets towards posthuman technologies seen in the science fictional world parallel racially-discriminatory attitudes and practices plaguing minorities in "colorblind" contemporary American society.

ISIOMA KASI-OKONYE, BIOMEDICAL ENGINEERING

Title: *Wearable Gesture Recognition System with Applications to American Sign Language*

Mentor: Dr. Ashwin Nair

American Sign Language (ASL) is the predominant sign language within deaf communities in the United States. Although deaf people communicate effectively with each other using ASL, interacting with the rest of the world remains a challenge. The goal of this project is to develop a lightweight, wearable, and cost-effective communication system for native ASL speakers, which can translate ASL into text or speech. The current prototype of this device is comprised of a set of extremely lightweight ring and fingernail-based sensors. This allows input, via hand poses/gestures, to be collected as the user makes various signs. The "sign" detection offered by the current prototype is for recognition of the ASL manual alphabet, which consist of 26 corresponding letters and signs. The prototype has successfully recognized letters "D" and "F". It has been determined that the use of embedded transparent ring sensors and accelerometers will allow detection of more letters.

JEPTOO S. K. KEMBOI, MATHEMATICS

Title: *Finitely Extended Poincaré Superalgebras*

Mentor: Dr. Dimitar Grantcharov

In physics, fields are physical quantities with specific values at each point in space and time. Theories describing the dynamics of a field are called field theories. In 1918, mathematical physicist Emmy Noether proved a significant result in quantum field theory by showing that if a system has a property that is symmetric, then there is a corresponding physical quantity that is conserved in time. Noether's work introduced a powerful way of understanding fields by studying the symmetries they possess. The Poincaré algebra describes all the symmetries of Einstein's relativity theory. One can extend the Poincaré algebra to incorporate those symmetries that describe intrinsic properties of a particle such as angular momentum. We study the irreducible representations of the finitely extended Poincaré superalgebra building the theory into a mathematical model that is useful in quantum field theory.

AMEERA KHAN, COMPUTER SCIENCE

Title: *Cloud Image Processing Service*

Mentor: Dr. Christopher McMurrugh

Cloud servers deliver a variety of services over the internet, and image processing software can provide users with multiple image-editing capabilities. When a cloud server is paired with image-processing software, images can be edited remotely without taking too much processing power from the user's personal computer. To allow users to reap the benefits of cloud-image processing, an open-source Application Program Interface (API) and web application were created and tested. The Agile software methodology was used to complete each task. Open-source image processing libraries were used during creation, and the cloud web server was installed at a remote facility. As a result, the API and web application were successfully created and can now be used by developers who need to integrate this software service. Overall, cloud-image processing can be used in situations in which local machines do not have enough resources available to process images.

KELLI LAHMAN, EXERCISE SCIENCE

Title: *The Effect of Caffeine on Work or Exercise*

Mentor: Dr. Judy Wilson

It has been reported that caffeine increases free fatty acid availability and respiratory muscle durability, which prolongs oxidation in order to save glycogen stores for later use in the workout. This delays feelings of fatigue. Therefore, caffeine ingestion was studied in order to determine if this supplementation made a difference in exercise performance. A cycle ergometer and a True One 2400 metabolic cart were used to determine oxygen consumption (VO_2) during endurance exercise. Seventy percent of the previously measured maximal exercise capacity was set as the workload in Watts (W) for the two submaximal tests using placebo and caffeine in randomized order. The average distance covered by the participants that consumed caffeine was 13.86 ± 1.7 kilometers, whereas the Tylenol (placebo) group covered less distance (12.56 ± 2.1 kilometers). The results of a two-tailed t-test indicated that the caffeine supplement did not increase distance significantly ($p > 0.05$).

ASHLEY LUTZ, BIOLOGY

Title: *Viral Immunity – A Picture of the Body's Response to Virus in Cells*

Mentor: Dr. Michael Roner

Viruses are a major source of disease in the human population. During infection, viruses can hide inside the body's cells and avoid detection and eradication by the host's immune cells. However, the human body has developed several different methods of fighting infections within its cells. This thesis examines the different modes of defense used against viruses during cellular infection, as well as some of the methods viruses use to avoid or subvert the immune system. The literature on immunological defense against viruses was reviewed in order to determine the different methods of defense the human body most often exhibits. While cytotoxic T-cells are most often used to kill virus-infected cells, most cells in the body have internal receptors that allow them to react to viruses in their cells and warn surrounding cells, which initiate their own defenses.

OLUCHI MADUBUIKE, NURSING

Title: *Facilitating Integration of Nigerian Nurses in a U.S. Hospital Environment*

Mentor: Dr. Deborah Behan

Little has been discussed about measures that can be taken to facilitate the successful integration of internationally educated nurses (IENs) into the American system. This study aims to identify approaches that can be taken to help aid the incorporation of Nigerian nurses into the American healthcare setting. With a total of 30 participants, data was collected via an online survey. After attending orientation/transitional programs, 90.91% of participants felt competent to provide safe patient care, 85.71% felt comfortable using hospital technological equipment, and 77.27% felt comfortable communicating with patients and medical staff. Results indicate that most of the professional adjustment needs of Nigerian nurses are being met after attending orientation. However, their cultural needs are not being addressed efficiently. Further research should focus on how culture sensitive mentorship programs developed for internationally educated nurses would impact the nursing practice of both the mentee and mentor.

RYMA MAHOUC, MARKETING

Title: *Marketing Strategy – Autonomous Car Industry*

Mentor: Dr. Jorge F. Jaramillo

With autonomous cars beginning their penetration into the consumer market, many consumers are uncertain of the implications this will have on them or their safety. Numerous companies and services such as Tesla, Volvo, Uber, Google, and Apple are finding new ways to market their prototypes to an already established industry. Although sustainability and efficiency are key points to market autonomous technologies, automakers need to strategize how they can better sell their evolving technologies in the established automobile industry. The central focus of this research is to analyze how current events in marketing can better be improved to strategize more effective communication to a somewhat reluctant customer base. Doing so would facilitate with customer acquisition. Strategically analyzing what causes speculation for consumers will allow marketers to better identify their niche of consumers to focus on as their target market, or potentially expand this customer base.

MISTY MARTIN, CHEMISTRY

Title: *Assessment of Bacterial Communities in Environmental Waters Using Matrix-Assisted Laser Desorption/Ionization Time-of-Flight – Mass Spectrometry*

Mentor: Dr. Kevin Schug

Groundwater is the main drinking water source in America. Hence, it is important to maintain its quality. A major concern is the possible contamination of groundwater from unconventional oil and gas drilling. The introduction of environmental stressors can contribute to the evolution of pathogenic microorganisms. Therefore, it is necessary to understand the impacts of contaminants on the groundwater microbiome. In this work, the microbiome of contaminated groundwater was characterized using MALDI-TOF MS. The bacteria were isolated using the membrane filter technique and cultured in selective media. Identifications were confirmed through 16S rRNA sequencing. Antibiotic susceptibility was determined. Twenty-five bacteria were identified using MALDI-TOF MS. Of these, over 90% matched the RNA sequencing results. Overall, samples exhibiting the highest levels of contamination appeared to facilitate the growth of pathogenic bacteria including, *A. hydrophila*, *B. cereus*, *P. aeruginosa* and *S. maltophilia*. These 4 were resistant to most of the antibiotics tested.

CHÈRE MASON, MARKETING

Title: *Social Media – Reasons Why People Have Lost Their Job Through the Use of Social Media*

Mentor: Dr. Lauren Brewer

Social media is a popular tool that is being used across the world; it is one of the main ways that we, as humans, communicate and express our ideas. Social media has made it possible for one person to communicate to hundreds or even thousands of people at once. Employees are being terminated/dismissed from their employers because of what they post or have posted on social media accounts. Google Scholar and research from credible websites and scholarly articles have been useful for collecting data; I decided to focus on cases within the last two to three years. I have learned that people have gotten fired more from postings on Facebook than on Twitter. In a few cases, I went even further and investigated what they did after termination. My research concludes that violations of employer policies, misconduct, and inappropriate social media use are all factors that could contribute to someone's termination.

JOHN-MICHAEL MCGEE, REAL ESTATE

Title: *Commercial Real Estate Valuation – Evaluation of Commercial Real Estate, Taking into Account Investor Sentiment and the Effect of Market and Property Cycles*

Mentor: Dr. Sriram Villupuram

Estimating the value of commercial real estate is most often done using the traditional evaluation model employed by the Appraisal Institute. *Commercial Real Estate Valuations: Fundamentals Versus Investor Sentiment* compares traditional evaluation models to an evaluation model that also includes investor sentiment. *The Effect of Market and Property Cycles* illustrates the substantial over- or under-pricing of commercial real estate that can occur when using only a trend analysis. This research will evaluate the flex portfolios of twenty-one industrial buildings using the traditional model, the investor-sentiments model, the cyclical model, and a new evaluation model that combines all three methods. This new model shows that the current way commercial real estate is valued can cause these properties to be seriously over- or under-valued.

ALEXIS MCMILLEN, EXERCISE SCIENCE

Title: *The Effect of Oxidative Stress on Cutaneous Vascular Function in Healthy African-American and Caucasian Adults*

Mentor: Dr. R. Matthew Brothers

African-Americans have known microvascular dysfunction, an indication of risk for cardiovascular disease. We hypothesized that acute pharmacological inhibition of superoxide can restore cutaneous microvascular responses. Male subjects (African-Americans n=4, age 23±2; Caucasians n=4, age 24±3) participated; African-Americans elicited higher mean arterial pressure (P=0.038), but no significant difference in flow-mediated dilation (P=0.952). Each subject was equipped with four microdialysis fibers, each site containing either Tempol (superoxide scavenger), Allopurinol (blunts NADPH oxidase), Apocynin (blunts xanthine oxidase), or Ringers (control). Each site had local heating elements and laser Doppler probes to measure percent cutaneous vascular conductance (CVC) max. A two-way ANOVA ($\alpha=0.05$) revealed significance in %CVC max and nitric oxide contribution between groups (P=0.008, P=<0.001 respectively). There was a significant difference at the control site (P=0.002), but other sites showed no significance. This suggests that reducing superoxide restores vascular responses in African-Americans and that oxidative stress contributes to microvascular dysfunction seen in African-Americans.

LISA MUELLER, BIOLOGY

Title: *The Antibacterial Properties of Six Derivatives of (+)-6-Aminopenicillanic Acid*

Mentor: Dr. Michael Roner

Antibacterial resistance is a growing concern among the medical community. Infections that previously were easily treated with antibiotic agents are becoming more difficult to treat due to excessive prescription of antibiotics, patients not completing their courses of antibiotics, and mutations in bacteria that are advantageous. Penicillin is one of the most common antibiotics with growing resistance. Six derivatives of the core of the antibiotic Penicillin were modified with various side chains and complexed with main group elements. Seven strains of bacteria will be challenged with these six derivatives using disk diffusion assays and optical density studies. Results are in the process of being collected.

SAMEERA MUQUEET, MICROBIOLOGY

Title: *The Role α -amino-3-hydroxy-5-methyl-4-isoxazolepropionic Acid (AMPA) Receptors in the Pathophysiology of Migraine Pain*

Mentor: Dr. Qing Lin

Migraine is one of the most common neurological disorders but remains poorly understood. It is characterized by severe, throbbing, headache and negatively impacts the quality of life of patients by causing attacks of debilitating pain. The mechanism by which migraines arise is not known, hindering the development of effective treatment options. However, recent studies have demonstrated activation of glutamate receptors in the trigeminovascular system in the pathophysiology of migraines. In particular, α -amino-3-hydroxy-5-methyl-4-isoxazolepropionic Acid (AMPA) ionotropic glutamate receptors have been implicated in the development of migraines. Therefore, glutamate receptors may serve as a potential target for pharmacological intervention and the development of novel therapies for migraine pain. This study aims to investigate the role of AMPA receptors in the pathogenesis of migraine pain. Western blot analysis was utilized to quantify the changes in AMPA receptor expression in mice that have been induced with chronic migraine pain.

NANG SU LWIN MYINT, ELECTRICAL ENGINEERING

Title: *Biosensing Applications of Potentiostats and Portable Bi-Potentiostat Design*

Mentor: Dr. George Kondraske

Doctors are in need of a real-time infection monitoring system for patients who have undergone surgery. There are many implantable biosensors that may be used to monitor a patient; however, the current instrumentation device is a commercial potentiostat which is too bulky and expensive. This work explores the applications of potentiostats in biosensing and proposes a design of a portable bi-potentiostat that is able to detect current in the sub-nanoamp range. By prioritizing the function of the potentiostat to detect the change of current from electrochemical redox reactions that take place in response to the stimulation of a triangular voltage wave, the design is more compact and consumes less power. The detection of the portable bi-potentiostat is comparable to that of a gold-standard commercial potentiostat. This design reduces the cost of hospitalization for the patient and prevents complications of a revision surgery since there is early detection of infection.

JONATHAN NUFABLE, ELECTRICAL ENGINEERING

Title: *Validation of a Wireless Body Balance Measurement Device*

Mentor: Dr. George Kondraske

Telemedicine is providing remote clinical services by real-time, two-way communication between a patient and their clinician. By eliminating the need for the patient to be physically present for examination, this opens a flexible range of applications to a variety of fields in not only medicine, but also medical research. One example is the examination of a patient's postural stability. However, most methods of observations involve visual observations. To alleviate potential variances between examiners and provide accurate readings of the patient's stability, a wireless Postural Stability Sensor Unit (PSSU) device is being developed. It will calculate a percentage stability from measuring the patient's roll, pitch, and yaw as they maintain a stable posture at different scenarios (eyes open vs. closed, both legs vs. left/right leg, etc.). The research will move into human testing through volunteers, and the calculated score will be compared to visual observations/scoring.

KIMBERLY ORTIZ, NURSING

Title: *Social Determinants of Health for Pregnant and Homeless Adolescents from the Early 1900's – Lessons for Today*

Mentor: Dr. Donelle M. Barnes

Little is known about the care pregnant, single girls received at the Berachah Home in Arlington, TX, from 1903 to 1935. In an effort to learn from the past, this study describes how pregnant and homeless adolescents were treated socially and medically between 1900 and 1935, and how this knowledge informs current policies for homeless adolescent women. Primary and secondary historical sources were analyzed from the archives at the University of Texas at Arlington, using the social determinants of health framework. Themes included financial dependence vs. independence, social stigma vs. self-esteem, social support vs. isolation, education, housing, and access to health care. As in 1903, today homeless adolescents need programs to reduce stigmatizing beliefs about them, to improve access to obstetricians, to create affordable housing, and to improve childcare. Further research on social and health outcomes of such programs would improve care for pregnant adolescent young women today.

AMANDA PLEIN, BIOLOGY

Title: *Role of the Gene *iorA* in Indole-3-Acetic Acid Degradation of *Bradyrhizobium Japonicum**

Mentor: Dr. Woo-Suk Chang

Bradyrhizobium japonicum is a nitrogen-fixing bacterium that forms a symbiotic relationship with legumes such as soybeans. The bacterium plays an important role in providing the soybean with usable nitrogen while the it receives photosynthetic products in return. *B. japonicum* strain USDA 110 can utilize phytohormone indole-3-acetic acid (IAA) as an energy source. It has been found that the *iorA* gene is up-regulated in response to IAA. A mutant strain of the bacterium, $\Delta iorA$, had the *iorA* gene removed in a previous experiment. To further investigate the effects of IAA on *B. japonicum*, both the wild-type and mutant strains were exposed to varying concentrations of IAA. The results show that the *iorA* gene allows for growth in IAA treatment conditions, but the growth was reduced in comparison to glycerol treatments. This suggests the *iorA* gene may provide an evolutionary advantage by allowing energy to be obtained from alternative carbon sources.

CAITLYNN REEVES, MICROBIOLOGY

Title: *Detection and Efficacy of Modified HMP as an Antibiotic*

Mentor: Dr. Frank Foss, Jr.

Phosphomethylpyrimidine (HMP) is one of the building blocks of thiamine, an essential nutrient in all cells. In bacterial cells, Phosphomethylpyrimidine kinase (HMPk) performs the function of phosphorylating HMP to HMPP which is subsequently combined with a thiazole moiety to form thiamine. The pyrimidine and the thiazole components of thiamine are synthesized separately in vivo. We set out to determine whether altering the pyrimidine component could hinder cell growth. Our findings suggest that some transition state analogs of HMP as well as some prodrugs of HMP successfully halt the growth of some bacteria.

NATALIE RUSSELL, SOCIAL WORK

Title: *Foster Care Redesign Initiative – Every Child Matters*

Mentor: Ericka Freeman

Thousands of children enter the child welfare system every year in Texas. As each year progresses, the foster care system continues to remain a complicated and involved process that requires multiple steps prior to a successful placement. CPS has become a broken system, leading to hundreds of foster parents who are inadequately prepared for the trauma that children in foster care have previously experienced due to abuse and neglect. Through the work of ACH Child and Family Services, Texas Department of Family Protective Services, and Our Community, Our Kids, significant work has been implemented to improve the lives of each child in foster care. As a result, Foster Care Redesign Initiative has been introduced in Region 3b of Texas and has been in operation for three years. While there is more work ahead, Foster Care Redesign has shown significant progress in increasing permanency outcomes and well-being of children in care.

WESLEY J. SALAZAR, HISTORY

Title: *Body as Culture, Body as Protest, Body as Politic – An Analyzation into the Use of the Body by Teresa Margolles*

Mentor: Dr. Benjamin Lima

The reader of this research should proceed with caution. This research will include images of slain children, women, and men that also includes blood, body fat, wash water from morgues, and many other human substances. My research will analyze the artist Teresa Margolles and how her use of the dead body is influenced by culture, protest, and politics. Margolles uses dead bodies in her pieces in order to create a dialogue between viewer and artist. Margolles wants viewers to begin a conversation about Mexico, and how the Mexican drug cartel has plagued the country with death. Margolles uses such shocking tactics because of the silence about Mexican violence and death. Margolles strives to share the strife of Mexicans worldwide. This research will survey three exhibitions by Teresa Margolles as well as investigate sociological concepts of Mexican realities in order to explain Margolles' use of dead bodies.

EYAD SHIHABEDDIN, BIOLOGY

Title: *Structure-Function Analysis of Zinc Knuckle-Like Motif of the R2 Long Interspersed Nucleotide Element*

Mentor: Dr. Shawn M. Christensen

R2 is a site-specific LINE that codes for single multifunctional protein with DNA binding domains, RNA binding domains, reverse transcriptase, and endonuclease domains. All LINE elements also encode a zinc knuckle-like CCHC motif of unknown function. I am studying the zinc-knuckle like motif of the R2 element. Site-directed mutagenesis was performed to produce point mutations within the zinc knuckle-like motif. The mutant proteins were expressed in bacteria, purified, and tested for protein-nucleic acid complex formation, DNA binding, and DNA cleavage activities using R2 protein bound to target DNA and assayed by polyacrylamide Electrophoretic Mobility Shift Assays (EMSA) and denaturing gel electrophoresis. Experiments show the mutants exhibit decreased endonuclease activity and change in protein-DNA-RNA complex conformation. Currently, results are consistent with either a reduced ability to bind to RNA or a reduced ability to engage in protein conformational changes required for the integration complex.

MARELIZE SNYMAN, BIOLOGY

Title: *The Effect of the Geological History of the Cyclades on the Pattern of Diversification in Vipera Ammodytes*

Mentor: Dr. Todd Castoe

The Cyclades are a group of islands found in the Aegean Sea. The islands have long been a popular research destination due to the interesting patterns of diversification found in the terrestrial animals that inhabit them. Even though these patterns of diversification have been researched, studies have failed to address the recurrent nature of this pattern or offer possible explanations for its occurrence. To further investigate this phenomenon, we performed ddRADseq on 38 samples of *Vipera ammodytes* from the Cycladic islands. After the sequences were processed, we performed a structure analysis and built a maximum-likelihood phylogenetic tree using RAxML. Our results indicated that there is a significant difference between the populations found on the northern and southern islands. Furthermore, we propose that this pattern of diversification is due to glacial and interglacial cycles that led to the continuous formation and disappearance of land bridges between the islands.

MATTHEW SPRADLIN, NURSING

Title: *Learning Preferences of a Multigenerational Nursing Workforce*

Mentor: Dr. Deborah Behan

Learning is an ongoing and never-ending aspect of every nurse's life. The nursing workforce can be difficult to teach due to the multiple generations. The purpose of our study was to determine how each generation preferred to receive their educational experiences so that training sessions could be more focused and effective in the future. We developed our own survey and distributed it via email to all nurses at a hospital in North Texas in order to determine their preferences for ongoing education. We found that there were some educational preferences all generations were equally fond of, such as receiving printouts of information and completing introductory classes. Other options such as smart phone use and learning before or after their shift were equally disliked. These similarities need to be focused on and used when developing educational experiences to help reach the different generations as best as possible.

SARAH SPRADLIN, NURSING

Title: *Nursing Discharge Education for the Baby Boomer Generation*

Mentor: Dr. Deborah Behan

The Baby Boomer Generation is the largest generation to come into the health care system, but there is a lack of research in the nursing field on their unique needs for health care education. A 13-question descriptive study was created to assess Baby Boomer patient preferences on nursing discharge education methods and factors affecting their learning in the hospital. The survey was completed by 30 patients at a south-central U.S. hospital. The findings demonstrated that the majority of patients preferred face-to-face interaction with nursing staff and handouts they can take home to refer back to once out of the hospital. Other technology-based teaching methods such as educational videos and cellphone apps were less desired. A key for future nursing education is to incorporate preferred methods in patient discharge education, perhaps through a designated nurse.

ABIRA SYED, INDUSTRIAL ENGINEERING

Project: *Developing an Auditing System for Cook Children's Rehabilitation Services*

Mentor: Dr. Jamie Rogers

The Audiology Department at Cook Children's Rehabilitation Services has an internal monthly auditing process that is skewing compliance rates. Since the selection of the patient charts for the audits are chosen subjectively, the audits have been discovered to be inaccurate and defeating the purpose of randomized audits. The objective of this project is to aid in the development of an accurate auditing system that brings value to the stakeholders at Cook Children's. To accomplish the given task, the Define, Measure, Analyze, Improve and Control (DMAIC) methodology will be used. DMAIC is a methodology utilized to solve business problems and to effectively execute and implement the desired solution. After analyzing the current process, gathering the Voice of the Customer (VOC) from stakeholders, and collecting time studies, the studies show the audiologist needs proper randomization of auditing patient charts and a larger sample size of patient charts to conduct monthly audits.

HALEY TURMAN, MECHANICAL ENGINEERING

Title: *Design of an Automated Vial Cleaning System*

Mentor: Dr. Raul Fernandez

Betran Laboratory is an evolutionary biology lab at UTA, and much of their research requires the growth of fruit flies in glass vials. As such, the researchers must clean thousands of glass vials per year, which is both a tedious and time-consuming chore. Therefore, the team was tasked with producing a vial cleaning solution to significantly decrease the time and effort spent on the cleaning process. Specifically, the team aimed to produce a system capable of cleaning a vial every 3.5 seconds. Additionally, the system was required to be portable and capable of operating Betran Laboratory's current location. To achieve these goals, several experiments were carried out in order to determine the validity of conceptual designs. Based on the results, a system utilizing a combination of high-pressure water and rotating brushes to clean the interior of the tubes was designed and constructed.

BRADLEY WABBERSEN, ELECTRICAL ENGINEERING

Title: *Comparison of Embedded Audio Signal Classification Methods Using Rule Based Algorithms and Artificial Neural Networks*

Mentor: Dr. George Kondraske

Accurate and efficient audio classification algorithms have significant applications in the modern world. Song recognition and speech recognition apps rely on complex audio processing software. Recent research in this field has focused primarily on the application of artificially intelligent systems to solve difficult audio processing problems where strictly rule-based algorithms would be untenable. The problem to be solved in this project is a much simpler binary classification scenario, but with a much smaller sample set than is typically used for neural network training as well as limited processing resources. It will be determined whether in such a scenario a neural network approach will still outperform a strictly rule-based algorithm. Each implementation is given identical sound samples to test against. Samples include a collection of desired and undesired sounds. Accuracy is measured as a percentage of how many test samples are correctly categorized.

BRITNEY WEBSTER, NURSING

Title: *The Relationship Between Arterial Stiffness and Functional Capacity in Cancer Survivors*

Mentor: Dr. Mark Haykowsky

Cancer is a leading cause of death in the United States. Due to preventative interventions, early screening and detection, and use of new treatments, the number of people surviving cancer has increased during the past three decades. A consequence of improved survival is that cancer survivors are at greater risk of dying of other causes, including cardiovascular disease as a result of unfavorable cardiovascular risk factors, sedentary deconditioning, and the adverse effects of cancer therapy. This study examined the relationship between arterial stiffness and functional exercise capacity in cancer survivors. The results showed no significant difference between functional capacity and arterial stiffness in cancer survivors compared to healthy age and sex-matched predicted values. Moreover, there was no relationship between functional exercise capacity and arterial stiffness in cancer survivors.

BRITTANY WRIGHT, PSYCHOLOGY

Title: *The Impact of Group Diversity on Performance Outcomes*

Mentor: Dr. Jared Kenworthy

Group creativity and collaboration are imperative in a society in which social networking and group business solutions are so prominent. However, one factor to consider is the possibility that both political ideology and diversity hinder group processes. The present research seeks to better understand large-group creativity as well as group relations regarding political orientation. Sixty participants were recruited through Amazon's Mechanical Turk system and were placed into groups of twenty. These groups completed a survey regarding political orientation, creativity, and a brief personality inventory. Participants were then asked to generate at least five unique ideas on environmentally sustainable practices and were instructed to facilitate conversation amongst other group members. Ultimately, the results indicated that there was a positive relationship between political orientation and novelty and there was a trending negative correlation between political ideas generated and political orientation. The present results are relevant because of the current political atmosphere.
