



HONORS COLLEGE

The University of Texas at Arlington

HONORS RESEARCH SYMPOSIUM PRESENTATION ABSTRACTS

APRIL 20, 2018

CRISTIAN ALMENDARIZ, MECHANICAL ENGINEERING

Title: *Improvement of the Form and Function of the AL5D Robotic Arm*

Faculty Mentor: Dr. Raul Fernandez

The University of Texas at Arlington Research Institute's Automation and Intelligent Systems Lab assigned the task of developing a multi-robotic framework to autonomously identify, sort, and deliver various objects to desired locations in a workspace. One main component of the framework is the AL5D Robotic Arm, which serves as the sorting machine. Analog servos actuate each joint of the arm and consequently limit its accuracy and repeatability. To mitigate these limitations, modifications were made on the existing hardware to allow for alterations to the robotic arm's control system. The AL5D showed improvement in the transient and steady-state responses with the application of a feedback loop to the electronic controller. Other alterations to the AL5D include: force sensing capabilities, position teaching, and a 3D printed cover for the joints and links. The functionality of the AL5D was improved to better reflect the current state of new industrial collaborative robots.

MARIA ARTILES-GONZALEZ, BIOLOGY

Title: *Histological Features of the Sound-Producing Apparatus of *Gonatodes Antillensis**

Faculty Mentor: Dr. Walter Schargel

Within the *Gonatodes* genus, the diurnal state is the common state for all but one of its members: *Gonatodes antillensis*. *G. antillensis* is also the only member of this genus known to be capable of vocalization. The ability to vocalize is a feature thought to be lost for this genus, and now regained. To further understand the evolutionary process that allowed this species to regain the ability to vocalize, histological preparations were made from the larynx of a male *G. antillensis* and from three other males belonging to three different species from the same genus, and not known to vocalize. These were: *G. humeralis*, *G. ligiae*, and *G. vitattus*. The histology of the larynx of the four species was compared using routine and special stains. The observations revealed striking differences between the four species, with *G. antillensis* having a remarkably differentiated laryngeal structure, which may account for its ability to vocalize.

SHRAVYA ATTRAVANAM, BIOMEDICAL ENGINEERING

Title: *Auto-IT ~ In-Vivo Blood Analysis System for Continuous Monitoring of Blood Analytes*

Mentor: Dr. Digant Dave and Dr. George Alexandrakis

There are thousands of surgeries performed every day. The majority of these patients require intensive post-care in order to monitor the blood analytes and ensure that the patient recovers after the surgeries. Most of the intensive post-surgical needs require continuous monitoring and testing of blood. This would require the need of a healthcare professional to be present all the time, which would be expensive and inconvenient. This leads to the need of this project: to create an automated blood monitoring system which would extract and analyze the important blood analytes. This project is to attach a motor to a 3-way stopcock which has the ability to send the IV fluids and extract blood. This would give us the ability to extract blood without the need of repeatedly inserting a needle into the patient.

MEHAK BHAT, BIOMEDICAL ENGINEERING

Title: *Creation of a Hydrogel for Diabetic Foot Ulcer Wound Regeneration*

Faculty Mentor: Dr. Kytai Nguyen

Diabetes Mellitus is one of the most prevalent diseases in the world and affects 30.3 million adults. Approximately 25 percent of the diabetes mellitus patients have a risk of developing diabetic foot ulcers, which are a huge cause of morbidity and hospitalizations. The compound, dubbed Nano-Aid, will be used to treat chronic diabetic foot ulcers and includes a specialized hydrogel loaded with modified silver nanoparticles. Xanthan and curdlan were combined to form the hydrogel and the silver nanoparticle surrounded by an outer layer of chitosan. The creation of the nanoparticle is followed by several studies that are required for FDA approval, which would be the focus of my presentation. Tests to characterize the nanoparticle show the therapeutic efficacy of the hydrogel system, as well as cytotoxicity and hemocompatibility. Then tests need to be performed in-vivo using an animal model to test for biocompatibility, biodistribution and therapeutic efficacy.

NICHOLAS BYRNES, PHYSICS

Title: *Study of Aluminum Using Coincidence Doppler Broadening Spectroscopy*

Faculty Mentor: Dr. Ali Koymen

Aluminum is an easily oxidized metal that can provide some valuable insight into the nature of positron-electron annihilation. In order to circumvent accidental analysis of the aluminum-oxide surface layer, our aluminum sample was biased to 20 kilovolts, allowing the positrons to penetrate the surface layer and annihilate within the bulk of the aluminum. The results we gathered allow us to compare pre-existing data to that collected by RS Brusa, who used aluminum as a standard in all of his Doppler-Broadened measurements. By comparing our results with Brusa's, we can confirm that our recently completed positron beam apparatus is functioning properly. This also allows us to better compare Copper and Graphene data previously collected with measurements available in the literature. This information will allow for further research into the topic of positron-electron annihilation in aluminum, such as possible correlations between plasmons and positronium formation.

DANIELA CHAVEZ GARCIA, MARKETING

Title: *True Marketing Leadership—Characteristics of the Ideal Marketing Leader Who Will Conquer the 21st Century*

Faculty Mentor: Dr. Lawrence Chonko

Marketing and leadership count with plenty of exclusive data, but no blend of such data has been well developed. Data are gathered on each individual concept and, by identifying the overlaps, intertwined to conclude with an ideal Marketing Leadership definition. Since this project focuses on what is necessary to succeed in the 21st century, surveys are conducted on students at the University of Texas at Arlington with the purpose of gathering leadership styles that represent anticipated preferences of the future. Furthermore, interviews are conducted to economically successful marketers and leaders. Their responses are analyzed thoroughly and compared to highlight similarities. All data is analyzed critically and grouped into the characteristics of what is considered the ideal marketer of the future. Key factors to success in Marketing Leadership in the 21st Century are identified and represented in a visual that is a simple and attractive model representation.

SANJARI CHELAWAT, ACCOUNTING

Title: *Airline Responses to Mandated Non-Financial Performance Disclosures*

Faculty Mentor: Dr. Nandu Nagarajan

Although the effect of improvements in non-financial measures (NFM) of performance on the financial performance of companies is still not fully understood, research has indicated that there is a positive relationship between NFM and financial performance of airlines. The Department of Transportation (DOT) mandates that some non-financial measures of airline performance, like percentage of on-time arrival of flights, be disclosed. Collecting and disseminating this information is not costless. Therefore, it is important to determine whether airlines respond to these disclosures. In this research paper, we investigate this issue by examining whether airlines ranked lower by the DOT in one period report improved results in the subsequent period, and whether such changes have any value implications. We expect the findings of this study to be of value to the Department of Transportation in understanding the impact of the mandatory disclosures of non-financial measures on airlines.

STEPHANIE DOLENZ, ANTHROPOLOGY

Title: *The Effect of Lumbosacral Transitional Vertebrae on the Fifth Lumbar Vertebra and First Sacral Body and Its Prevalence in the Osteological Collection of the University of Texas Arlington*

Faculty Mentor: Dr. Shelley Smith

Lumbosacral transitional vertebrae, or LSTV, is a congenital anomaly affecting the fifth lumbar vertebra and first sacral body. It is presented as sacralization, characterized by a caudal shift of fifth lumbar vertebra, and lumbarization, characterized by a cranial shift of the first sacral body. This research focused on the prevalence of LSTV in the osteological collection (overall and by sex), on nonmetric observations to describe the anomaly, and on metric observations to observe the effect of LSTV on bone. It was found that LSTV occurs in 20% of the sample. In addition, LSTV is more common in females and sacralization is more common than lumbarization. The areas affected by LSTV on the fifth lumbar vertebrae and first sacral bodies showed metric differences when compared to the control sample; however, there is not a distinguishable pattern. Overall, it appears that LSTV is highly variable in its expression on bone.

JEREMY DUBHROS, SOCIOLOGY

Title: *Deviance and the Divine Madness*

Faculty Mentor: Dr. Robert Young

Society is governed by a set of social norms and schemas. Deviance, or transgressing these values, usually results in a loss of social status or even possible stigma. However, there are situations in which the transgression does not negatively impact social status and may at times actually increase prestige and social power. Plato describes several such examples where the individual had abandoned rationality and should be considered insane, but where that madness was ultimately beneficial. He separated these forms of madness from 'common' madness caused by disease and argued that they were divinely inspired. Though often viewed in a classic context, careful examination reveals that Plato was describing traits that were not bound to Greek culture, and in fact occur across many cultures and time periods.

GENICHIRO FUJIOKA, NURSING

Title: *The Effects of Ultrasound-Guided Peripheral IV Insertion on Pain and Patient Experience*

Faculty Mentor: Dr. Deborah Behan

This study was conducted to investigate the use of ultrasound-guided peripheral intravenous (IV) insertion to minimize the pain patients experience with insertion. Two hundred and one adults were randomly assigned to have their peripheral IVs placed by ultrasound-guided insertion and insertion by the bedside nurse. Nurses assessed the pain the subject felt during the procedure using a verbal pain scale, and asked how the patient compared the procedure to the last peripheral IV that they experienced. There were significantly lower pain scores with the use of ultrasound-guided insertion and the number of attempts it took to successfully insert a peripheral IV with significantly fewer ultrasound-guided insertions. Additionally, there was a statistically significant correlation between insertion method and the experience of having an IV placed compared to previous IV insertions ($X^2=0.648$). Clinicians can improve the experience that patients have through ultrasound-guided peripheral IV insertion and limiting the number of attempts required.

ARNAV GARG, COMPUTER SCIENCE

Title: *Glovelet*

Faculty Mentor: Dr. Christopher Conly

The traditional computer mouse is unable to provide as high level of productivity and efficiency in workflow for 3D virtual objects as it provides for 2D virtual objects. With the rise in 3D virtual objects in Augmented and Virtual Reality technologies, the need for a more user-friendly and convenient user interface device is now an inescapable necessity. 'Glovelet' is a wearable glove that is designed to be used as a user interface device for 3D, as well as 2D, object movement. It is conceptualized to be lightweight, comfortable, and able to be worn for long periods of time. It has a minimalistic yet robust design. To achieve the maximum reliability and simplicity, it will normalize the data to best suit the user and apply multiple filters to catch false negatives and false positives. This will allow fewer possible points of failure in the design.

PRASOON GAUTAM, COMPUTER SCIENCE

Title: *Glovelet*

Faculty Mentor: Dr. Christopher Conly

A mouse has been the conventional user-interactive device for technology, but it can be a hindrance when used to control three-dimensional devices. Through Glovelet, my team and I seek to develop a wearable glove that can replace the traditional mouse with a more user-interactive and easy-to-use device. This would enhance the user experience by allowing users to use their hands to move objects, both two-dimensional and three-dimensional, on the computer screen; thereby, making the experience more intuitive for younger and older adults. From the beginning, the Glovelet will be designed to be light-weight, comfortable, and able to be worn for long periods of time without creating discomfort. Users will be able switch freely between using the Glovelet and typing on a keyboard, and even switching back to the more traditional mouse.

WADE GIRTON, JAZZ STUDIES

Title: *Arranging the Music of Billy Strayhorn*

Faculty Mentor: Dr. Dan Cavanagh

Billy Strayhorn was Duke Ellington's arranger for decades, and wrote much of his most popular music. Because he started his career as Ellington's protégé, his distinct compositional style was often assumed to have come from Ellington. After his death, his music experienced a critical reappraisal, and he was canonized as one of jazz's great composers. Because of this relatively recent change in his perceived stature as a composer, most of his works have not been reinterpreted or re-arranged as much as those of other prominent jazz composers. The goal of this project is to reinterpret Strayhorn's music in a modern jazz idiom while still retaining the essence of his music. The selections ("Chelsea Bridge," "Isfahan," "Johnny Come Lately," "Take the 'A' Train) represent the span of Strayhorn's career and some of his most important work. Recordings of both Strayhorn and other musicians will be used to inform the arrangements.

KALEN GOSS, LINGUISTICS

Title: *Improving Automatic Summarization for Low- and Moderate-Resource, Morphologically Complex Languages*

Faculty Mentor: Dr. Pete Smith

Resource-poor, morphologically complex languages are at a disadvantage in natural language processing tasks, such as automatic text summarization, due to their lack of available quality linguistic data. In 2017, researchers from the University of Bari introduced a language-independent automatic text summarization method built upon word embedding, which garnered international attention for its success. This thesis explores methods for improving this summarization method for resource-poor, morphologically complex languages by implementing additional preprocessing of the training data. Specifically, I gathered linguistic data from the German Wikipedia and tested whether stemming (the process of reverting a word to its root by removing the ending) the data before training the word embedding model improved automatic text summarization made with that model. The results showed that stemming only marginally improved the summarizations' ROUGE scores, but did significantly change the summary output; thus spurring a discussion on summarization scoring metrics, word embedding and the effects of stemming.

JARED HANES, NURSING

Title: *Shared Experiences of Dual-Minority Men Within Shared Decision Making Models—A Descriptive Comparison of Common Themes*

Faculty Mentor: Dr. Donelle Barnes

Healthcare providers can utilize the Shared Decision Making (SDM) model to help facilitate trustful communication and mutual decision making with their patients, especially with those who identify as a racial/ethnic minority and lesbian, gay, bisexual, or transgender (LGBT). A qualitative, phenomenological interview was conducted with six different patients, and participants were recruited from a local primary care clinic. Participants placed value on the quality of trustful communication with their provider. In order to have effective communication, these respondents felt that their provider should incorporate an objective and nonjudgmental approach towards their lifestyle practices. SDM can help develop trust and facilitate effective communication between a provider and their patient. Participants in this interview were comfortable discussing their lifestyle practices with their provider, and felt that they were more likely to trust their provider who was personable and open-minded to their lifestyle practices.

IAN HARRIS, MATHEMATICS

Title: *Study on the Flexibility of the Generalized Gamma Distribution When Applied to Model Building with Survival Data*

Faculty Mentor: Dr. Suvra Pal

When analyzing survival data, which involves such parameters as lifetime, censor rate, and covariates, we have several distributions to try to fit the study into a model. The problem with these distributions is that their parameter requirements are quite stiff and inflexible. That is where the more-malleable generalized gamma distribution comes in. Using R software, we performed a simulation study and compared different iterations of the simulated generalized gamma distribution data to models of the more-specialized distributions in a likelihood ratio test to show the rejection rates of different models. As the number of generated datasets increased, the rejection rates among different parameters grew larger whilst the model comparisons of the same parameter grew closer to a 5% rejection rate. We applied the generalized gamma distribution to a real dataset with unknown parameters. Although it did not fall into any special cases, it still fit in the generalized gamma distribution.

JOSIMAR HERNANDEZ ANTONIO, PSYCHOLOGY

Title: *Sex Differences in Cocaine-Induced Conditioned Place Preference*

Faculty Mentor: Dr. Linda Perrotti

Females demonstrate greater reactivity to cocaine-associated cues/environments than males. Previous studies report that this effect is partly mediated by estradiol. The purpose of the present study was to identify sex differences in cocaine-conditioned place preference; and determine if elevations in estradiol influence the development of cocaine-environment associations. To this end, intact adult male and female and ovariectomized estradiol-treated (and non-treated) rats were subject to a cocaine-conditioned place preference behavioral paradigm. Intact female rats demonstrated higher preference for the cocaine-paired environment than males. Intact female rats also showed a higher preference for the lowest dose of cocaine tested (5 mg/kg) while males did not. Ovariectomy prevented the development of cocaine-induced preference. Treatment of ovariectomized females with estradiol restored cocaine-induced place preference. These findings support the notion that females are more responsive to cocaine-associated cues than males and that this heightened response is due to their hormonal milieu.

NAWAL JOULANI, EXERCISE SCIENCE

Title: *The Relationship Between Body Composition and Cardiorespiratory Fitness of Female Collegiate Students with Similar Activity Levels*

Faculty Mentor: Dr. Judy Wilson

Body image is a huge problem in our society, and while people are being encouraged to “love their bodies,” it would also be reassuring if they were able to understand the science of their body and just how much one’s body composition affects their health. One way to measure someone’s fitness level, more accurately their cardiorespiratory fitness, is by calculating their VO₂ Max values. To further understand to what extent one’s body composition affects their fitness levels, ten collegiate students were placed in a Bodpod to measure their body composition in terms of body fat percentage and fat-free mass percentage. Following that, a maximal exercise test was conducted to calculate their VO₂ max values, which are an indication of cardiovascular fitness levels. The values of body composition and VO₂ max values were analyzed to find any correlation between the two components.

NIVEEN JOULANI, EXERCISE SCIENCE

Title: *The Relationship Between Body Composition Measures and Aerobic Cardiorespiratory Fitness in Female Softball Outfielders and Infielders*

Faculty Mentor: Dr. Judy Wilson

Researchers have found that the different positions in a sport can play a significant role in the internal proportions of the body. This work focused on comparing the body composition and cardiorespiratory fitness between softball infielders and outfielders. Body composition was taken using the Bod Pod, a machine that measures the body’s fat and fat-free mass; and cardiorespiratory fitness was measured as VO₂ max using the Bruce Protocol. Results found that infielders had lower cardiorespiratory fitness and higher fat mass. Overall, the position within the sport truly has an impact on the player’s fitness levels and body composition.

ALEXANDRA KESSLER, MECHANICAL ENGINEERING

Title: *Altair HyperWorks Design Optimization Guide—Topology, Free-Sizing, Shape, and Topography Optimization*

Faculty Mentor: Dr. Robert Taylor

Before the advent of computers, structural and mechanical engineers relied on a combination of tedious mathematics and trial and error testing to accomplish more optimized structures. This was time-consuming, costly work and did not yield optimal results. Now, in the 21st century with software such as Altair HyperWorks, the ability to solve optimization problems with computational algorithms using finite element analysis (FEM) has accelerated part analysis, revolutionized the way we manufacture components, and changed the way we handle the design process. This comprehensive guide covers the optimization software provided by HyperWorks and includes a breakdown of the methodology behind the four main optimization types in HyperWorks, specifically: topology, free-sizing, free-shape, and topography optimization. The guide covers these optimizations step by step as well as successful applications to this year’s Senior Design 3D Printed Aircraft Design Guide through topology and sizing optimizations.

HRISHABH KHAKUREL, MATHEMATICS

Title: *Statistical Analysis of Household Labor Supply—Education, College Power, and Earning Power*

Faculty Mentor: Dr. Christy Spivey

When looking at the historical trend in household labor supply, one can see that when husbands start earning more, their wives reduce their labor supply. In the last few decades, the number of wives who have attained a higher education has increased, and with this, the number of wives earning an income higher than their husband has also increased. Research, however, has not shown that husbands' labor supply has been significantly affected by their wives' wage increase. This study examines the labor supply of husbands and wives using their education attainment as a method to measure earning power. Conducting statistical analyses on the 2014-16 American Community Survey (ACS) data, this paper aims to examine the dynamic relationship between the labor supply decision of husbands and their wives, and whether or not there is a correlation between the husbands' labor supply and an increase in their wives' earning power.

TIFFANY KIM, NURSING

Title: *Service Learning Education Intervention—Survey of Knowledge on Parasitic Worms and Hand Hygiene in Northern Belize Adolescents Ages 10-18*

Faculty Mentor: Dr. Denise Cauble

In countries around the world, hygiene maintenance is an issue. This issue is complicated by factors such as deficient knowledge, poor implementation of hand hygiene, and minimal access to clean water or soap. Lack of consistent hand hygiene practices often leads to infections. The most prominent infection seen in communities of Belize is from parasitic worms. Hand hygiene and its effect upon infection rates by parasitic worms requires further investigation. My aim was to break down this issue by identifying if knowledge barriers on hand hygiene in relation to parasitic worm infections existed within this select community. This service learning project has been rewarding, as I have had the opportunity to implement an educational intervention in an international population that is highly impacted by poor hygiene practices and high infection rates by parasitic worms. I applied the principles of patient education to four communities in Northern Belize.

NICHOLAS LIRA, MECHANICAL ENGINEERING

Title: *Design and Production of a 3D Printed Aircraft*

Faculty Mentor: Dr. Robert Taylor

The production of a 3D printed aircraft requires a procedural design and testing process for reliable manufacturing. First, an aircraft model is created in Computer Aided Design (CAD) software or selected from available sources. In this study, a DG-1 model was chosen from OpenVSP; then the responsibility of production for the fuselage and wing sections was divided up into two teams. AeroSpac3D took the fuselage, and DS Wingsquad worked on the wings. Next, a stiffening structure was optimized for each section to resist stresses defined by bending, torsion, and tension. After optimization, the stiffeners are exported and projected on the original model in CAD software. The new model with a stiffening structure is then printed and the mechanical testing begins. In the testing phase, loads simulated in optimization are reproduced to understand the quality of the print and the max loads that exist before failure.

MARISSA LOPEZ, SOCIAL WORK

Title: *Health Literacy in Social Work*

Faculty Mentor: Dr. Regina Praetorius

Health literacy is defined as the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use information in ways that promote and maintain good health. Many studies have identified that there is a problem with health literacy among Hispanics in the United States. This research thesis explores why health literacy is a problem, the history of social work's role in health literacy, the Hispanic health literacy problem, social work's role in addressing it, and what health literacy looks like in a Hispanic country.

GREGORY LUKE, PHYSICS

Title: *Determining the Habitability of Exoplanets in Triple Star Systems*

Faculty Mentor: Dr. Manfred Cuntz

Understanding the habitability of exoplanetary bodies in triple star systems begins by observing the formation timeline of all involved objects and their interactions with one another. If an exoplanet is to maintain a lengthy relationship with multiple stellar components, it must possess favorable characteristics (i.e. prominent magnetic field) that can withstand the early formation and evolution of those components. Using the parameters of habitability known for Earth and habitable zone models, we can determine regions where single and combined stellar radiation do not inhibit biological growth. Results show approximately 38% of discovered triple systems are hierarchical in nature, and those that contain higher spectral types are less likely to provide habitable conditions due to intense stellar radiation. Furthermore, exoplanets in the habitable zone of a K-type single star or those in a circumbinary orbit around a binary of similar stellar radiation are thought to be the best candidates for habitability.

VAISHANAVI MIRAPURKAR, SOFTWARE ENGINEERING

Title: *Android Application to Assist the Autistic Community in Looking Up Public Places for Recreation*

Faculty Mentor: Dr. Christopher McMurrough

User Experience or UX is critical to the failure or success of a digital application in the market. Accessibility is one factor that influences UX design. Accessibility is the ability to access (i.e., use and/or interact with) a product or service. In the design context, accessibility means that a product or service should be able to be used by everyone, regardless of a person's physical, economic, or cultural status. A design can be regarded as successful only if it is accessible to any user, anywhere, and at any time. Since people with disabilities form one of the largest user groups in the world, UX designers must investigate some key areas of disabilities and follow certain principles and guidelines in order to make accessible designs for such users.

CHIDALU MOZIE, BIOMEDICAL ENGINEERING

Title: *Biomechanical Characterization of Neonatal Porcine Ventricular Septum*

Faculty Mentor: Dr. Jun Liao

Defects in the interventricular septum are the most common congenital cardiac defect in infants. The pressure difference between the two ventricles causes increased blood flow to the right ventricle, which leads to septal deformation. Given the difficulty of imaging the interior of the intact heart, the mechanics of this interventricular septal deformation have not been determined in situ. My project entails the creation a motor-controlled pressurization system to deform the neonatal porcine left ventricle for the characterization of the interventricular septal mechanical properties. The pressurization system is comprised by a motor-controlled piston pump, run by a personalized lab view program, that deformed the left ventricle at varying pressures. The corresponding displacement of the septum was characterized by tracking septal marker movement, calculating the equivalent biaxial strains (ϵ_X And ϵ_Y) and areal strain (ϵ_{areal}) using MATLAB, and plotting data curves of pressure vs ϵ_{areal} , pressure vs. ϵ_X , and pressure vs. ϵ_Y .

MURTAZA MUCKLAI, BIOLOGY

Title: *Analyzing Gene Conversion in Parthenogens*

Faculty Mentor: Dr. Matthew Fujita

Parthenogenesis is a type of asexual reproduction in which an unfertilized, typically female, gamete develops into a genetically identical clone of the mother. Gene conversion is the unidirectional transfer of genetic material from one DNA strand to another, that is from a donor strand to an acceptor strand; this mechanism is not expected to occur in parthenogens. This project determines whether gene conversion occurs in a few species of parthenogens. The 18S gene was first amplified via PCR, and the resulting amplicons were run on a gel to confirm successful amplification before sequencing. We found that 18S was genetically identical across species, and thus, will continue to examine additional genes for evidence of gene conversion.

ARIEL M. O'BRIEN, CHEMISTRY

Title: *Advanced Chemical Technologies—An Innovative Problem-Based Approach to Teaching Chemistry*

Faculty Mentor: Dr. Frank W. Foss

The Advanced Chemical Technologies (ACT) Program, led by Dr. Kevin A. Schug and Dr. Frank W. Foss, proposes an innovative approach to achieving a Bachelor of Science in Chemistry and Biochemistry for students at the University of Texas at Arlington (UTA). By quantifying the effects of the inclusion of research methods and problem/inquiry-based learning in the program's first-semester General Chemistry Laboratory through analysis of student test scores and survey responses, it can be concluded that the ACT program can be projected to achieve the goals of increased retention of students who major in Chemistry and Biochemistry by increasing comprehension and evolving student views on the nature of science through a community-based learning approach.

SAMANTHA OLIPHINT, ARCHITECTURE

Title: *A City Without a Center—How the Kessler Plan Prototype Caused Dallas to Lack Identity*

Faculty Mentor: Dr. Kathryn Holliday

How a city is planned and implemented impacts how people can connect with that place. Dallas is a city that has struggled with identity since its founding; it does not fit the typical "rules" that a successful city plan follows. The reason for this can be traced to its original city plan designed by George Kessler. Instead of using another's prototype, Kessler combined popular ideas at the time and made his own ideal city. Through a close reading of the Kessler plan for Dallas, site visits, and analysis of visuals, Dallas will be analyzed under its own lens. Rather than arguing if it is a good or bad city because it does not fit outside guidelines, Dallas will be compared against Kessler's ideal. It will become clear that the alterations he made to this prototype caused Dallas to fall victim to urban sprawl and lack a clear identity.

LEONEE ONYEKWERE, NURSING

Title: *New Graduate Nurses in Early Solo Flight—Nurse Managers Perspectives*

Faculty Mentor: Dr. Regina Urban

Nurse managers play an integral role in transitioning new graduate nurses (NGN) into competent nurses. Their roles include ensuring that NGNs are integrated properly into the workplace and having monthly check-ins to identify progress and setbacks with their transition to professional practice. This study explores the perspectives of nurse managers on the strengths and weaknesses of NGNs during their fourth to eighth month of experience working as a nurse. Five nurse managers were interviewed for this study at a location of their choice and the interviews were transcribed for analysis. They were asked about the strengths and weaknesses that they have observed in new graduate nurses. The results indicated that nurse managers see strengths in NGNs' ability to be connected to the unit and the environment, and shared a viewpoint that NGN weaknesses were a reflection that they were not yet finished with the transition to practice presented.

ASHLEY QUIMOD, COMPUTER SCIENCE

Title: *Training Darknet YOLO Object Detection Software for Use in an Industrial Setting*

Faculty Member: Dr. Christopher D. McMurrugh

Darknet YOLO is a real-time object detection program which makes use of a convolutional neural network during prediction, looking at an image only once (You Only Look Once) when predicting an object. This allows YOLO to work faster than other detection software which utilizes a classifier-based system. Tiny YOLO, the focus of this project, is a version of YOLO with a third of YOLO's convolutional layers used and runs with a higher frame rate at the cost of some loss in accuracy. Training YOLO is a simple yet time-consuming process which may not always yield the desired results when running predictions on additional images and video feeds. Maintaining high prediction accuracy is the primary challenge when YOLO is trained to detect objects in an industrial setting, but with time and familiarity with YOLO, the issue of low accuracy can be mitigated depending on how the datasets are created.

MOHAMMAD IMRAN RASHIK, BIOLOGY

Title: *Functional Study of Two Testis-Specific Nuclear-Encoded Mitochondrial Gene Duplicates in Drosophila Melanogaster*

Faculty Mentor: Dr. Esther Betrán

The fertility effects of lowering the amount of transcript (i.e., knocking down) of two testis-specific duplicated genes in *Drosophila melanogaster*, commonly known as the fruit fly, was studied. The first gene was cytochrome c distal (a.k.a CG13263). The second gene of study was cytochrome c1 like (a.k.a CG14508). RNA interference technology was used to knock down the genes. This was achieved in a single cross. In this cross flies were produced that carried the transgene expressing the yeast Gal 4 protein (driver) and the transgene producing the hairpin and small interference RNAs under the Upstream Activation Sequence (UAS) of yeast in the genome that Gal 4 targets. The progeny of these flies were obtained and crossed with a standard laboratory strain at 25°C and 27°C, and the number of progeny was counted. Males from the CG14508 and CG13263 knockdowns showed significantly reduced fertility at 25°C and complete sterility at 27°C.

RAEGAN RUST, ECONOMICS

Title: *The Economic Outcomes of Breastfeeding*

Faculty Mentor: Dr. Christy Spivey

Breastfeeding is related to numerous benefits for newborns and mothers. Juxtaposed with formula-fed newborns, breastfed newborns encounter less severe and lasting illnesses. Children who were breastfed throughout babyhood experience more benefits, such as a higher IQ, than individuals who are formula-fed. Also, fewer breastfeeding mothers experience illnesses tied to breastfeeding than women who do not breastfeed their newborns. Because the identification and management of these illnesses lead to higher medical usage, health expenses would be expected to decrease with effective breastfeeding advertisement. For these reasons, studies who correctly estimate the expenses and savings connected to breastfeeding would be useful for decision makers as they study breastfeeding-friendly programs. This thesis evaluates ideas central to understanding the medical economics of breastfeeding. Costs are summarized from the viewpoints of newborn and mother/father, health care payer and company. Increased breastfeeding is anticipated to lead to a substantial cost savings for the United States economy.

TANMAY SARDESAL, COMPUTER SCIENCE

Title: *Determining Hardware Setup to Train an Object Detection Model for Use in an Industrial Setting*

Faculty Member: Dr. Christopher D. McMurrugh

Darknet YOLO is a real-time object detection system that is used in this project. There are several versions of YOLO, all with their advantages and disadvantages. For the purpose of this project we will be using Tiny-YOLO-v2, which is a version of YOLO that is lightweight and performs fewer calculations, providing lower accuracy but higher frame rate. Tiny YOLO applies a single neural network to the full image, and then divides the image into regions and predicts bounding boxes and probabilities for each region. The goal was to run this object detection model on different hardware systems, ranging from a low-cost Raspberry Pi to two high-end Nvidia GPUs in SLI. Taking into account the trade-off between frame rate and cost of hardware, the best choice is to use Nvidia Jetson TX2.

CHANEL SASSOON, JOURNALISM

Title: *Comparing News Coverage of Richard Nixon and Donald Trump in Their First Hundred Days*

Faculty Mentor: Dr. Erika Pribanic-Smith

News values have remained the same since the inception of journalism; however, the ways we consume news and write stories have changed with the times. Print media, which used to be the main avenue of receiving news, has since been replaced with digital formats. Tumultuous times bring an influx of news stories, especially when they involve politics. Two of the most controversial presidents, Richard Nixon and Donald Trump, were the subjects of many news stories during their times in office. To further understand the way political news coverage has changed over the years, the author studied articles published within the first hundred days of each administration in *The Dallas Morning News* and *The New York Times*. A content analysis of 200 articles revealed several similarities in the way the newspapers covered each president, but also some striking differences. The differences could be attributed to the changing political and technological environments.

SWANGYA SAURAV, COMPUTER SCIENCE

Title: *Recognition of Fish and Coin in an Image and Performing Comparative Analyses to Deduce the Length of the Fish*

Faculty Mentor: Dr. Christopher Conly

Recognizing object in an image is a complicated task and combines a plethora of variables which differ substantially with a small deviation in the environmental conditions. Taking into account each of those variables and programming an object recognition for each situation is a difficult, if not impossible, task. However, using neural networks makes accounting for these variables easier, as it eliminates the requirement of human involvement in setting up the variables required to recognize the object in an image. The program consists of a training phase that optimizes the variables by analyzing the provided images with fish and coin. The neural network was trained on a dataset containing more than three thousand images. The classifier produced, as a result of the training, was able to accurately determine the coin and fish in the image more than 90 percent of the time.

ROMEKA SIDDQUI, BIOLOGY

Title: *Identification of the Facilitators of Mitohormesis in Caenorhabditis Elegans*

Faculty Mentor: Dr. Mark Pellegrino

Mitohormesis is the biological concept that a mild dose of mitochondrial stress has beneficial effects on an organism, leading to increased longevity. The following research questions were explored: what factors mediate mitochondrial stress-related longevity? What players facilitate mitohormesis? Specifically, what substrate(s) interact downstream of the stress-activated kinase KGB-1, homolog of mammalian JNK, to mediate mitohormesis? This study employed lifespan analysis using *C. elegans* that had each predicted KGB-1 interactor gene's function reduced by RNA interference (RNAi). For each RNAi strain, development and lifespan of *C. elegans* were monitored. Experimental worms were transferred to new plates daily to ensure that the same 100 subjects were being tested. A daily log of how many worms died/lived was recorded, and the resulting data was used to construct survival graphs. It was found that knockdown of *nog-1* and *eft-1* decreased longevity, meaning they play key roles in mediating mitohormesis by interacting with KGB-1.

TREVOR STULL, CIVIL ENGINEERING

Title: *Storm Water Quality Analysis of Holland Road Expansion and Extension*

Faculty Member: Dr. Andrew Kruzic

Storm water runoff has the potential to contain a high level of chemical contaminants that could harm natural ecosystems. These chemical contaminants can be somewhat controlled depending on the hydraulic structure constructed to convey the storm water runoff. When these hydraulic structures are used to control the water quality of the site, they are considered water quality management techniques. This project will analyze the effectiveness of different water quality management techniques and practices. This project will include a discussion of the governing design criteria for water quality management and the reasoning behind this methodology. This project will also include a discussion of several hydraulic structures and systems that aid in improving the water quality of storm water runoff. Finally, recommendations for a water quality management system will be made for this specific site.

JAYCEE WEBER, PUBLIC RELATIONS

Title: *The Trump Effect—Are Politicians Tweeting Like President Trump?*

Faculty Mentor: Dr. Mark Tremayne

The social media platform Twitter has become President Donald Trump's communication channel of choice, contributing to his unexpected win of the presidency. A study has revealed that his tweets usually fall under five categories: opinion, prediction, advice, promotion, and critique. This study examines ten senators' tweets from the Obama Era and the Trump Era to see if other politicians are currently adopting President Trump's tweeting style, seeing his success. A simple random sample of tweets from the senators were taken from each era. The results showed that there was an overall increase in tweets that fell into one of the five categories from the Obama Era to the Trump Era. The results also revealed that Democrats had the most tweets following his tweeting style. This suggests that President Trump has had an effect on political communication through Twitter, but additional research is needed to see if the impact is lasting.
