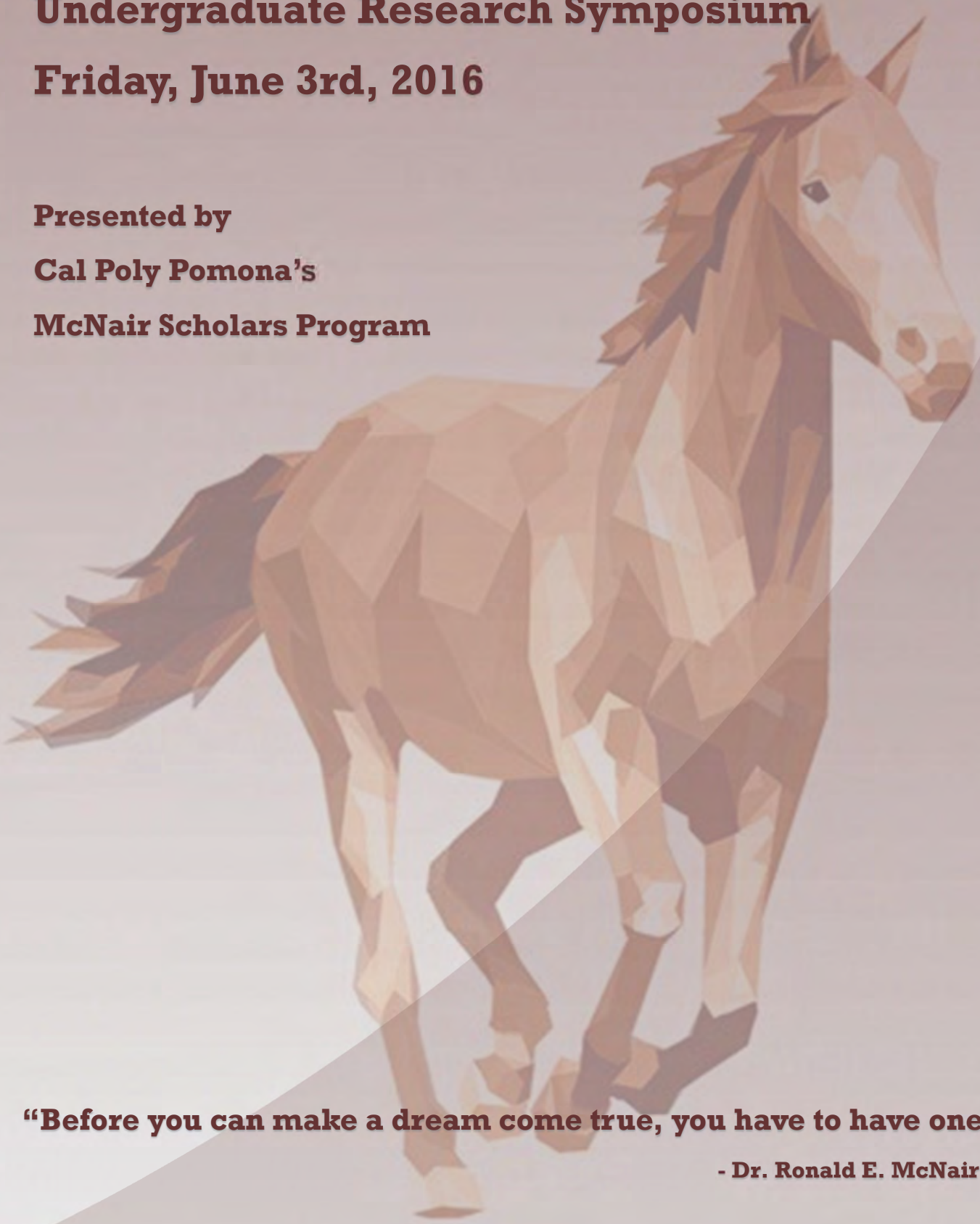
Seventeenth Annual
Ronald E. McNair Scholar
Undergraduate Research Symposium
Friday, June 3rd, 2016

Presented by

Cal Poly Pomona's

McNair Scholars Program



"Before you can make a dream come true, you have to have one."

- Dr. Ronald E. McNair

A Message From The Director

Dr. Winny Dong

Welcome to the Sixteenth Annual Ronald E. McNair Postbaccalaureate Achievement Program Symposium and Luncheon. I thank you for joining us in celebrating the achievements of our McNair Scholars, and I congratulate all the Scholars and Mentors for the wonderful presentations this morning.

The McNair Scholars Program has brought great distinction to Cal Poly Pomona, and the program continues to provide student Scholars with valuable research experience and encouragement that give them a distinct advantage when they undertake the demands of graduate school. The McNair Scholars Program has been a model for promoting academic success and for ensuring that underrepresented students pursue doctoral studies. Most of our Scholars hail from low-income, first-generation college backgrounds, and they have overcome economic, social, and cultural barriers on their academic journey. Few aspects of human endeavor are more stimulating than actions that nurture intellectual creativity among young individuals.

As Director of the program, I have had the privilege to interact with exceptional students, faculty, staff, and administrators. We are fortunate to have a wonderful staff and I am consistently awed and humbled by their dedication to the scholars.

I want to thank current and past McNair Scholars for continuing to demonstrate the power of moral integrity in their academic and personal lives, as they apply the virtues of enthusiasm, loyalty, cooperation, friendship, and industriousness. Since the inception of the program by Dr. Frank Torres in 1999, over 110 students have graduated with either a Master's Degree or Doctorate of Philosophy in programs across the nation.

Dr. Ronald E. McNair

McNair Scholars Symposium Program

Friday, June 3, 2016

Kellogg West Conference Center

Research Symposium—9:30 a.m. to 11:25 a.m.

Schedule of Oral Presentations

Hillside West 1

9:30 - 9:45	Marco Covarrubias
9:50 - 10:05	Berenice Monarrez
10:10 - 10:25	Jessica Galvan
10:30 - 10:45	Vanessa Baca-Carroll
10:50 - 11:05	Borman Quiñonez
11:10 - 11:25	Emilio Medina

Hillside Central 1

9:30 - 9:45	Asma Ayyad
9:50 - 10:05	Audrey Aday
10:10 - 10:25	Estephanie Muñoz
10:30 - 10:45	Marwa Mhtar
10:50 - 11:05	Hsien-Te Kao
11:10 - 11:25	Jessenia Tovar

Hillside West 2

9:30 - 9:45	April Aquino
9:50 - 10:05	Mark Alonzo
10:10 - 10:25	Vincent Moya
10:30 - 10:45	Glen Morrison
10:50 - 11:05	Su Yeon Kim
11:10 - 11:25	Christian Garrido

Hillside Central 2

9:30 - 9:45	Paul Navarro
9:50 - 10:05	Lilliana Ochoa
10:10 - 10:25	Luis Morales
10:30 - 10:45	Travon Dent
10:50 - 11:05	Isaac Guzman
11:10 - 11:25	Anthony Klaib

Away Scholars (Non-Presenting)

Dean Coco

German Lagunas-Robles

Sekani Robinson

Jessennya Hernandez

Scholar Abstracts and Biographies

Hillside West #1

Marco Covarrebias

Mentor: Dr. Pablo Arreola

Title: The Generation of 1959: Competing Visions of the Cuban Revolution

Abstract: Much of the scholarship on the development of the Cuban Revolution has focused on its relationship to Cold War tensions or the two most prominent figures of the revolution, Fidel Castro and Che Guevara. These two figures did indeed have the most power and influence over the course of the revolution, but the Cuban Revolution was not solely influenced and shaped by these two influential figures. Both during and after Castro's take over, there were prominent and influential secondary figures that played a significant role in the guerrilla campaign waged by the 26th of July Movement, the subsequent takeover of the government, and the policies of the revolutionary regime in Cuba. Figures such as Carlos Franqui, Haydee Santamaria, Camilo Cienfuegos, and Celia Sanchez among others held significant influence at different stages of the revolution. These secondary figures came from a wide range of socioeconomic backgrounds and had diverse influences and ideologies, yet were brought together for a common struggle. These secondary figures each had a different outcome as a result of their involvement in the revolution; some stayed close to the regime until death, others went into exile. This research looks to shed light on the similarities and differences of the Cuban revolutionaries and how that impacted them and the outcomes and trajectory of the Cuban Revolution itself. Although these secondary figures came together for a common cause, it was their differences that influenced their relationship to the Castro regime and their experience in revolutionary Cuba.

Biography: Marco Covarrubias is a student at Cal Poly Pomona majoring in History with a minor in Political Science. He previously attended Pasadena City College where he earned two associate's degrees. Marco is primarily interested Post-Colonial Latin American History and Politics, with emphasis on revolution and social movements, but also has a keen interest in grassroots political organization, social and environmental justice, and labor reform. After graduation Marco plans on obtaining master's degrees in public policy and Latin American Studies and later obtain a Ph.D. in Latin American History. Using his experience, Marco hopes to become an educator and start an educational and political resource center in his home neighborhood, Glassell Park.

Scholar Abstracts and Biographies

Hillside West #1

Berenice Monarrez

Mentor: Dr. Jack Fong

Title: An Integrative Outlook on Burn Survivors and Post-traumatic Growth

Abstract: In 2015, the National Fire Protection Association issued a report that revealed how every 2 hours and 41 minutes a civilian fire death occurs. Civilian fire injuries occur every 33 minutes nationwide and 1,298,000 fires in the U.S were reported in 2014. Every year the community of burn survivors is increasing and those survivors, after physically healing, must learn to cope with a new reality. This research explores the community of burn survivors. Most of the current written literature focuses on military personnel who experienced severe burn injuries or as educating material for burn injury specialist. Neglected by the social sciences, the community of burn survivors can help us understand why many develop an enthusiastic approach to life in spite of their experiences. The data, currently in the process of being collected, will help answer how non-military burn survivors transcend the title of a victim and embrace the label of survivor, allowing them to experience posttraumatic growth. By employing a qualitative research method based on content analyses derived from in-depth focus group interviews, phone interviews, along with analyses of online forums that attend to burn survivors and their narratives, this study aims to answer a key question: What coping mechanisms allow burn survivors to overcome adversity, especially if they've encountered body disfigurement, amputations and ample scar tissues as a result of their experiences?

Biography: Berenice Monarrez is a second year undergraduate student at California State Polytechnic University, Pomona studying Sociology and Social Work. In her previous years, she studied at Mount San Antonio College, and presently volunteers with numerous burn survivor organizations throughout the year. Her current research delves into the community of burn survivors, their vehement attitude and keenness for overcoming their adversity, especially if they've encountered body disfigurement, amputations and ample scar tissues as a result of their experience. Her aspiration is to obtain a Ph.D. in Social Psychology in order to acquire the necessary education needed to assist academically and through research her community on issues about social groups and the influence it has on individuals. Throughout the fall quarter of 2016, she will be applying to various universities in California and in other states.

Scholar Abstracts and Biographies

Hillside West #1

Jessica Galvan

Mentor: Dr. Mark Williams

Title: The Association Between Patient Demographics and Performance on the MacCAT-CA

Abstract: The MacArthur Competence Assessment Tool—Criminal Adjudication (MacCAT-CA) is a standardized assessment instrument used to assist with competency to stand trial evaluations. The MacCAT-CA consists of three scales that each measure distinct domains related to trial competency assessment: Understanding, Reasoning, and Appreciation. Many individuals who take the MacCAT-CA come from marginalized and lower socioeconomic backgrounds. Additionally, many individuals who take the MacCAT-CA likely have low levels of educational attainment. The current study was conducted to determine whether performance on the MacCAT -CA is related to demographic factors such as age, ethnicity, gender, and educational level. This archival research project examined patient files from a forensic psychiatric state hospital that serves an ethnically and diagnostically diverse patient population. The patient's files included basic demographic information as well as their assessment scores on the MacCAT-CA. Analysis of this data will be focused on examining whether there are group differences in MacCAT-CA scores across categorical demographic variables such as ethnicity and gender. Additionally, we will examine the correlations between MacCAT-CA scores and continuous demographic variables including education and age. The current number of MacCAT-CA protocols extracted from patient's files and inputted into SPSS is, n=112. The focus of this study is to examine whether or not the level of self-reported education will be significantly associated with performance on MacCAT-CA subtests, but that all other demographic variables will be statistically unrelated to MacCAT-CA scores. Our preliminary analysis revealed a statistically significant positive correlation (r = 0.4) between the MacCAT-CA Understanding subtest and self-reported level of education.

Biography: Jessica Galvan is a fourth year undergraduate student at, California State Polytechnic University, Pomona, who is studying Psychology. Before transferring to Cal Poly Pomona, she was a student attending Citrus Community College. Jessica currently volunteers at the largest hospital in the country, Patton State Hospital, where she provides cognitive therapy to patients. Her current research delves into the state hospital system where she is analyzing the relationship between demographical variables of patients at Patton State Hospital and their scores on an assessment, The MacArthur Competence Assessment Tool—Criminal Adjudication (MacCAT-CA), that examines for levels of competency to stand in trial. This fall she will be attending the University of Southern California where she will working hard to earn her Master's in Social Work. Her biggest life goal is to receive her Ph.D. in either Clinical Psychology or Social Work. Her career plan is to serve as a therapist at either a state hospital or prison.

Scholar Abstracts and Biographies

Hillside West #1

Vanessa Baca-Carroll

Mentor: Dr. Alejandro Morales

Title: Exploring the Interrelationships between School- Work- Life Balance among College Students

Abstract: In 2013 the 2011 US census reported that 71% of undergraduate students work. Not only are students working, many are completing internships, conducting research, and participating in school activities to become a competing candidate for graduate school and employment. Attending school full time, completing research, and maintaining a job may lead to a decline in GPA. In turn affecting the chances of being admitted into a graduate program. Thus, it is important to understand how college students navigate or balance the multiple roles they play. This study focuses on the school -work-life balance of undergraduate students at large commuter school in the West Coast of the US. We recruited 300 participants, 18 years old or older, all from different majors, socioeconomic backgrounds, and different employment histories. Three different five point likert scales will be used to determine the participants overall academic satisfaction, work-family balance, a modified version of work-family balance scale to measure school-family balance. Two seven point likert scales will also be used to find the participants life satisfaction, and satisfaction with work. Through a series of multiple regression, we are expected to see that those with better school-work life balance will have a higher GPA and greater life satisfaction. We also hope to find that students who are self-controlled and involved on campus will have greater school-work life balance. The results of this study will provide information on how to help improve the educational system for undergraduates, especially as they prepare to pursue a graduate education or join the labor force.

Biography: Vanessa Baca is graduating this spring with a degree in psychology from California State Polytechnic University, Pomona. Her research has focused on the current ability undergraduate students have to balance their school, work and personal life and the effect it has on their overall health. She hopes that her research will bring awareness to students needs. She also aims that the results from her research will demonstrate the basic need for overall balance and will be applied to students. Vanessa plans on acquiring her Masters in Business before pursuing her doctorate in Industrial Organizational Psychology. Her career goal is to develop and implement a new standard in business where the employees have the ability to successfully balance their various life aspects while maintaining a healthy lifestyle and understanding the necessity of their job.

Scholar Abstracts and Biographies

Hillside West #1

Borman Quiñonez

Mentor: Dr. Edward G. Bobich

Title: The Effects of Varying Concentrations of Juglone on the Germination and Seedling Success of *Brassica nigra, Carduus pycnocephalus, Hirschfeldia incana, Amsinckia menziesii, Deinandra fasciculate, Phacelia distans, and Pseudognaphalium californicum*

Abstract: In response to the drought many cities have started to stress to its residents the importance of conserving water (dpw.lacounty.gov), native plants from arid environments have been touted as a way to help individuals and municipalities can meet the water-use reductions imposed by the state. Most native plants will fare well when partnered with other native plants, especially those with which they are sympatric, but there are some plants that produce chemicals that are toxic to other plants. One such tree is *Juglans californica* (California Black Walnut), which, like other members of its genus, produces an allelopathic chemical known as juglone (5 hydroxy-1,4-napthoquinone; Cosmulescu et al. 2014). *Juglans californica* is a tree of a manageable size that would make a great addition to any native California landscape, but is often passed over due to the unknown effects that *juglone* may have on other species. The aim of the experiment is to identify companion plantings for *J. californica* by testing how the seed germination and seedlings of native plant species respond to exposure of different concentrations of *juglone* (Questad 2014). In particular, this research will study the following native and nonnative annuals that can co-occur with *J. californica* in the walnut woodlands of Southern California: (invasive) *Brassica nigra* (black mustard), *Carduus pycnocephalus* (Italian thistle), *Hirschfeldia incana* (shortpod mustard), (native) *Amsinckia menziesii* (common fiddleneck), *Deinandra fasciculate* (clustered tarweed), *Phacelia distans* (distant phacelia), and *Pseudognaphalium californicum (*California everlasting).

Biography: Borman Quinonez is a third year undergraduate transfer student at California State Polytechnic University, Pomona studying Biology, Botany, and Geographic information systems. Previously, he studied at Mount San Antonio Community college and received an Associate of Arts degree in Natural Science. Borman's current research involves plant chemical defense systems and their effects on plant competitors. Borman plans to receive his Ph.D. in plant ecology where he will be able expand the boundaries of his current field and incorporate the recent discoveries made in genetics. His short term plans include research in the anatomical, physiological, genetic, developmental and evolutionary components of plants. His long term goals include the attainment of a Ph.D. in order to create an interdisciplinary program that further joins the fields of botany and agriculture, and addresses the need to feed, shelter and clothe an exponentially growing number of humans.

Scholar Abstracts and Biographies

Hillside West #1

Emilio Medina

Mentor: Dr. Viviane Seyranian

Title: Can Nonverbal Behavior Mitigate Stereotype Threat?

Abstract: The stereotype threat involves experiencing judgment based on common stereotypes associated with one's group (Spencer, Steele, & Quinn, 1999). Research shows that it is associated with increased anxiety, which can lower test performance particularly for minority members (Beilock, Rydell, McConnell, 2007). High power posing is an expansive open posture, which involves spreading limbs and occupying large areas of space. Research has shown that this pose may help people to experience feelings of high power (Huang, Galinsky, Gruenfeld, Guillory, 2011), and may increase testosterone and decreases stress levels (Carney, Cuddy, Yap, & Carney, 2015). Since the stereotype threat is associated with anxiety, this project is hypothesizing that high power-posing can reduce the anxiety associated with the stereotype threat thereby potentially bolstering math performance. While research has sought various ways to reduce the negative effects of stereotype threat, no prior studies have examined the effects of changing one's nonverbal behavior as a way to mitigate stereotype threat. Therefore, this research has the potential to contribute to the literature on both power posing and stereotype threat reduction. Additionally, if the hypothesis is confirmed, power-posing may serve as a simple intervention to help mitigate the deleterious effects of stereotype threat, empowering women with a simple way to overcome the negative effects of stigmatization.

Biography: Emilio (Milio) Medina is a senior who is majoring in psychology with a minor in criminal justice at California State Polytechnic University, Pomona graduating in June 2016. He is as a McNair Scholar, Vice-President for Psi-Chi, a peer mentor for the Psychology and Sociology Department, a Bronco Tutor for the Learning Resource Center, and a residential advisor for the University Village. His experiences have lead him towards his research interests which include understanding well-being and meaning in life, therapeutic lifestyle interventions, and diversity issues in aging. Milio's current research is on changing one's nonverbal behavior (power-posing) to mitigate the negative effects associated with the stereotype threat. Ultimately, Milio plans to become a counseling-psychologist, serve people of diverse populations, and continue to do research on finding innovative techniques that can benefit both professionals and counselees in the helping professions.

April Aquino

Mentor: Dr. Shelton Murinda

Title: Methicillin-Resistant *Staphylococcus aureus* (MRSA) Prevalence in Mastitic Dairy Cows from San Bernardino County, CA

Abstract: This project is investigating the prevalence of MRSA (methicillin-resistant *Staphylococcus aureus*) in mastitic dairy cows from San Bernardino County, CA. Although there are many types of bacteria that cause mastitis in dairy cows, we are focusing on *S. aureus* because it causes roughly 30% of mastitis cases, which is inflammation of the udder in dairy cattle. This is of concern due to its economic and public health significance. Mastitis costs the U.S. dairy industry about $1.7-2 billion/year as a result of reduced milk production, discarded milk, and treatment, labor, and veterinary costs (Jones and Bailey, 2009). These mastitis-causing pathogens present a public health concern due to possible transmission of bacteria from mastitic cattle to milk. This is a larger concern in raw dairy products because pasteurization is meant to kill a majority of bacterial pathogens (Oliver, et al., 2009). The study includes isolating and culturing *S. aureus* from milk samples collected from dairy farms in Chino and Ontario. This study uses PCR to detect the presence of *Staphylococcus* genus-specific 16S rRNA and *S. aureus* species-specific nuclease (*nuc*) sequences and then targets the *mecA* gene to investigate resistance to the penicillin-type drug, methicillin. Most research suggests that there is a low prevalence of MRSA and that it does not pose a significant threat to the cow or to humans through consumption of raw milk products. However, comprehensive surveys of MRSA in livestock species are lacking in the United States. Thus, the results of this research should encourage further studies so that there may be an accurate representation of the incidence of MRSA on dairy farms in California and the rest of the country. This will determine whether MRSA poses a threat to consumers of raw bovine milk products.

Biography: April Aquino is an undergraduate at California State Polytechnic University, Pomona. She will graduate in June of 2016 and begin her Ph.D. program in the Comparative and Molecular Biosciences at the University of Minnesota. As an animal science major, her interest is in food safety and community outreach as it relates to large animal health. This overall interest was fueled by her involvement in the International Viscera Cooler Club and her research on mastitis. The club allowed her to learn about the meat industry and the importance of animal health prior to harvest. The mastitis research encouraged her to pursue a Ph.D. before attending veterinary school to continue research after her undergraduate studies. After earning her Doctorate in Veterinary Medicine and becoming an accredited veterinarian, April aims for a career in the USDA-FSIS as a Public Health Veterinarian.

Mark Alonzo

Mentor: Dr. Peter Arensburger

Title: Identification of the Genes that Regulate Silk Production in Spiders: A Computational Biology Approach

Abstract: The molecular basis of spider silk production is of broad interest because of its possible mechanical applications. For instance, dragline silk, which is produced in the major ampullate gland of certain spiders, has been found to be tougher than nylon and Kevlar®. However, even though there is research on the mechanical and structural properties of spider silk, the gene expression and regulation responsible for spider silk production remains largely unexplored. This project will try to identify the genes that regulate spider silk production by analyzing several RNAseq libraries from major ampullate glands of Lactrodectus hesperus. A de novo transcriptome assembly will be constructed from these RNAseq libraries using the program Trinity because neither species have fully sequenced genomes available. This transcriptome will be used to reference back the mRNA transcripts using the program BOWTIE2 in order to analyze their different levels of gene expression. Statistical analysis of the gene expression will be performed using the Bioconductor package. This analysis will provide insight into the genes that are either upregulated or downregulated during silk production in spiders.

Biography: Mark Ellie Alonzo is a senior Biology /Microbiology student with a minor in Chemistry at Cal Poly Pomona. He is a first generation college student, a community college student, and an immigrant who came here in the United States from the Philippines in 2007. He plans to pursue a doctorate in order to become a professor and a researcher. As a researcher, his interest lies in bioinformatics. His current research involves the determination of the genes that are possibly involved in manufacturing silk in spiders. As an aspiring educator, he was involved as a biology learning assistant for three quarters where he assisted lower division biology students in learning the fundamental topics of biology. He is also an ambassador for transfer students, advising them regarding the numerous opportunities that Cal Poly Pomona has to offer. He plans to continue supporting underrepresented minorities and transfer students as a college professor in the future.

Scholar Abstracts and Biographies

Hillside West #2

Vincent Moya

Mentor: Dr. Laila Jallo

Title: Particle and Bulk Level Characterization of Processed and Unprocessed Powders

Abstract: In the pharmaceutical industry, the flowability of a powder is an important consideration when producing a capsule or a tablet. Powders that have low or non-uniform flowability can aggregate and cause complications when ingested. Coating the powders with nanoparticles can alter their characteristics to eliminate these complications. This study examines powders like ibuprofen and ascorbic acid in combination with either a hydrophobic or hydrophilic coating. The particles were coated using a rotator that mixes the particles with silica coating and a milling machine that coats the particles. The flowability was quantified by measuring the bulk density of the powder with a hydrophobic or hydrophilic coating. Electrostatic testing was used to measure the effect the coating has on charge accumulation by the powders when it is being transported. Typical manufacturing materials like stainless steel, glass, and Teflon were used to simulate real world situations. Finally, the mass flow rates were measured as another quantifiable flowability indication.

Biography: Vincent Moya is a third year Chemical Engineering student with a minor in Mathematics at California State Polytechnic University, Pomona. His current research is on improving the overall flow of processed powders through a dry and continuous process. He is going to Northwestern University this summer for a REU in nanotechnology. He plans to obtain a Ph.D. in Biological Engineering and a Masters in Math Education. He plans to use his degrees to teach at a four-year university while continuing his research. He will be applying to graduate schools this upcoming fall and graduating spring 2017.

Scholar Abstracts and Biographies
Hillside West #2

Glen Morrison

Mentor: Dr. Erin Questad

Title: Investigating the role of soil phosphorus on the health and success of *Pennisetum setaceum*

Abstract: *Pennisetum setacuem* (Forssk.) Chiov., commonly known as fountain grass, is a perennial C4 bunch grass native to Africa. The species is widely naturalized or invasive outside of its native range. This project tests the novel hypothesis that the health of fountain grass is primarily tied to the availability of phosphorus in the soil where it grows. To test for differences of phenotype in different nutrient conditions, this study uses nutrient addition greenhouse experiment, wherein forty fountain grass individuals were assigned to one of four groups: added phosphorus, added nitrogen, added phosphorus and nitrogen, and a control group. To elucidate any pattern in the wild, field studies of soil nutrient extractions will be used to determine whether soil phosphorus availability is higher at sites where fountain grass is found as compared to nearby sites with no fountain grass. Finally, tissues from plants grown in the greenhouse experiment will be collected for tissue nutrient analyses in order to determine whether phosphorus is differentially allocated to the roots, leaves, and seeds, and whether there are any differences in phosphorus content among nutrient additions. Possible findings could shed light on the biology underlying fountain grass invasions and better inform the efforts of those tasked with managing non-native populations of fountain grass in the field.

Biography: Glen Morrison in a senior biology student at Cal Poly Pomona where he is an undergraduate researcher in the plant ecology research lab of Erin Questad, Ph.D. In his current research, Glen is investigating the role of soil phosphorus on the health and success of a widespread invasive grass species *Pennisetum setaceum*. In the summer of 2016, Glen will be conducting summer research at UC Riverside under the guidance of Amy Litt, Ph.D. where he will investigate the population genetics of *Arctostaphylos* (manzanita), a diverse genus of evergreen shrubs. After graduation, Glen plans to pursue a Ph.D. in evolutionary ecology investigating evolution in populations of introduced plant species.

Scholar Abstracts and Biographies

Hillside West #2

Su Yeon Kim

Mentor: Dr. Robert Talmadge

Title: Utilizing Immunohistochemical Staining Techniques to determine Muscle Protein Expressions in Transgenic Huntington's Disease Mice

Abstract: Huntington's disease (HD) is an inherited neurodegenerative disease that causes the degeneration of nerve cells in the brains of the affected individual. This results in motor, cognitive, and psychiatric disorders, impairing the individual's ability to move. Curiously, HD patients also develop muscle atrophy, weakness, and impaired muscular function, though there is no clear understanding of why this occurs. This disease currently has no cure. The purpose of this study will be to better understand the impairments in muscular function associated with Huntington's disease. Specifically, this study addresses the expression of specific protein (myosin heavy chain, MyHC) isoforms that are known to play an important role in muscle function in muscles from transgenic mice (R6/2 mice) that are genetically altered to display HD symptoms and wild-type (WT) controls. Our preliminary results demonstrate that the TA muscle from the R6/2 mice had a smaller proportion of fibers with MyHC-IIa in the TA muscle (18%) compared to the WT mice (31%). The R6/2 mice also had an increased combined proportion of fibers with the MyHC-IIb (51%) and MyHC-IIx (24%) compared to the WT fibers with MyHC-IIb (46%) and MyHC IIx (17%). These preliminary data suggest that changes in muscle fiber characteristics (myosin heavy chain composition) occur with HD and may contribute to muscle dysfunction in HD patients.

Biography: Su Yeon is a fourth year student majoring in Biology with an emphasis in Zoology and a physiology minor. Her current research looks specifically at muscle protein composition in mice with Huntington's disease. As she takes more upper division science courses tailored towards her physiology minor, she has become even more passionate about the intricacies of the human body. In the future, she plans to acquire an MD-Ph.D. and become a physician-scientist where she can gain the tools to learn to ask the right questions that can help further the research process and apply this to bettering our understanding of medicine.

Christian Garrido

Mentor: Dr. Ertan Salik

Title: Development of fiber optic biosensors for the rapid detection of Methicillin-Resistant *Staphylococcus aureus*

Abstract: Methicillin-resistant *Staphylococcus aureus* (MRSA) is known for skin infections and is potentially life threatening if not treated immediately. Its presence in livestock and farm workers suggest agriculture industries may have an impact in spreading the infection. Its methicillin-resistance, encoded by *mecA,* protects it from beta-lactam antibiotics. Current diagnostic techniques are very slow (48-72 hours) and performed only by trained personnel. This project is developing a rapid detection method for MRSA based on tapered fiber optic biosensors, which we have recently demonstrated for detection of binding between immunoglobulin-G (IgG) and anti-IgG. This method does not require any fluorescent labels and data acquired in real time allows rapid detection in less than 3 hours. MRSA is detected by a hybridization reaction between immobilized *mecA* probes (oligonucleotides) on the tapered fiber sensor surface and target complimentary *mecA* (prepared by heat-treatment and lysostaphin cell lysis of *S. aureus).* The protocol and the reagents used to bind *mecA* probes to the sensor surface were the same as the one used in our previous IgG-anti-IgG binding studies. Typical buffers used in hybridization reactions include sodium dodecyl sulfate (SDS) and standard saline citrate (SSC). In the preliminary experiments, this study found that both *mecA*+ and *mecA*- generated large sensor signals. This study hypothesized these signals were contributed by the reagents of the buffer and not the hybridization reaction. Through multiple control experiments, this project discovered removing the SDS from the buffer shows a difference in the sensor response to *mecA*+ and *mecA*-.

Biography: Christian Garrido is a Senior Biotechnology major at California State Polytechnic University, Pomona. He is a Ronald E. McNair Returning Scholar, NIH MBRS-RISE Intern, and former NSF UC Berkeley REU Intern. His research interests include gene regulation, functional genomics, and evolutionary developmental biology. Christian works in an interdisciplinary lab under Dr. Ertan Salik, Dr. Shelton Murinda, and Dr. Wei-Jen Lin in the Departments of Physics and Astronomy, Animal and Veterinary Sciences, and Biological Sciences at Cal Poly Pomona. His current research project focuses on the development of fiber optic biosensors to rapidly detect the MRSA superbug in real time using nucleic acid based detection. Ultimately, Christian is interested in working in the biotechnology industry in research and development of innovative treatments and therapeutics for cancer and rare diseases. Following graduation this spring, he will be attending Wright State University to pursue a Ph.D. in Biomedical Sciences.

Asma Ayyad

Mentor: Dr. Erin Questad

Title: Juglone Concentrations in Soil Underneath the California Black Walnut (Juglans californica) Throughout the Growing Season

Abstract: As the drought in California continues and natural landscaping with native species is becoming a preferred choice among gardeners and landscape architects, the search for native drought resistant species is on the rise. One native tree species that has great potential is the Southern California black walnut (Juglans californica); however, other Juglans species are known to release juglone into the soil and can interfere with the growth of neighboring plants. In order to better understand J. californica, a thorough study on the dispersal and effects of juglone in the soil could lead to vital information on how we can better utilize this tree. There has been an extensive amount of research done on J. californica's relative the eastern black walnut (Juglans nigra), but very little is known on our own native. In this study, we determine the soil conditions underneath J. californica, how these soil conditions could affect nearby plants, and how these conditions change during the growing seasons. The soil conditions measured in this study includes soil moisture, soil temperature, and juglone concentrations. Soil samples will be analyzed for juglone concentrations through high-pressure liquid chromatography (HPLC). With a better understanding on the soil conditions beneath J. californica, we can discover which species of plants are unaffected by the juglone produced by the tree and possibly begin to use this tree in landscaping and native plant restoration.

Biography: Asma Ayyad is a third year Biotechnology major with a minor in Chemistry at California State Polytechnic University, Pomona. Her research interests include interspecific competition, invasive species, and anthropogenic impact, as well as deepening her knowledge of ecology and conservation in general. Her current research project is on the quantification of juglone in the soil underneath the California black walnut to get a better understanding of the microclimate conditions of the soil in hopes of using this tree in landscaping and native plant restoration. This summer, she will be participating in the Ecology, Evolution, and Biology REU at University of Colorado at Boulder. Asma aims to one-day work in research to better understand the natural world, develop ways to improve the current state of the environment, and learn more on the complex interactions of life that shape the modern world.

Audrey Aday

Mentor: Dr. Viviane Seyranian

Title: Ability Uncertainty Among Women in Engineering: Can Wonder Woman Save the Day?

Abstract: Belonging uncertainty is a state occurring in academic settings when members of socially stigmatized groups are more uncertain of the quality of their social bonds and subsequently more sensitive to issues of social belonging (Walton & Cohen, 2007). Individuals experiencing belonging uncertainty may also experience ability uncertainty, or a sense of uncertainty regarding one's ability and competence in a given domain (Lewis & Hodges, 2015). One population that may be particularly discouraged by feelings of belonging uncertainty and ability uncertainty is women in engineering, given their underrepresentation in the field (Kokkelenberg & Sinha, 2010). This study aimed to determine whether undergraduate females in engineering report higher levels of belonging uncertainty and ability uncertainty than undergraduate females in other majors. Our results suggest they do. Based on data collected from 93 female undergraduate students at California State Polytechnic University, females from the College of Engineering (n = 24) reported lower levels of social belonging and higher levels of ability uncertainty than undergraduate females from the Colleges of Agriculture (n = 25) and Letters, Arts, and Social Sciences (n = 44). Our ongoing research seeks to determine whether higher levels of belonging uncertainty and ability uncertainty predict lower feelings of power among women in science and engineering. Furthermore, past research has demonstrated that simply posing in expansive postures for five to six minutes can increase feelings of power, decrease stress and anxiety, decrease cortisol levels, and increase testosterone levels (Carney, Cuddy, & Yap, 2010; Minvaleev, Nozdrachev, Kir'yanova, & Ivanov, 2004; Sherman et al., 2012). Our ongoing research additionally seeks to explore the effects of a nonverbal behavioral intervention (high-power versus low-power posing) on sense of belonging uncertainty and ability uncertainty. Preliminary findings and potential implications for academic achievement among women in science and engineering are discussed.

Biography: Audrey Aday is a fourth year undergraduate student of psychology at California State Polytechnic University, Pomona. Her research interests broadly encompass the field of social psychology, though she is a collaborator on research projects spanning the areas of sociology, education, and community health. Her current research project with the McNair Scholars Program seeks to understand how gender shapes sense of academic and social belonging in the engineering major at California State Polytechnic University, Pomona. In September, she will begin the M.A./Ph.D. program in social/personality psychology at the University of British Columbia under the research supervision of Dr. Toni Schmader. As a graduate student, she hopes to continue exploring the unique barriers facing women in STEM and encouraging young women in the community to become leaders of change.

Scholar Abstracts and Biographies

Hillside Central #1

Estephanie Muñoz

Mentor: Dr. Jose Aguilar-Hernandez

Title: The Militarization of Latina/o Youth

Abstract: The experiences of Latina/o youth who are planning to join military service or who are currently enlisted in the military will be investigated in this qualitative study. Tara Yosso's concept of critical race theory (CRT) provides the lens to investigate and analyze this study, which examines the pathways of Latina/o youth who deferred higher education to engage in military service. The study will trace the leading factors that have influenced these individuals to pursue military service instead of pursuing higher education. The study will analyze the educational trajectory of Latina/o youth with the purpose of showcasing how they have navigated through the educational pipeline. As the fastest growing population in the United States, Latina/o youth have become the most enticing group for the military to recruit. The U.S. Census reports that Latina/o youth made 20% of the recruiting market and it projected that by 2038 it will compromise 38%. This is significant because pursuing a postsecondary education should be the primary option of Latina/o youth, but enlisting in the military seems like the best option. Huber Perez addresses the persistent leaks of the educational pipeline that severely impact the educational attainment of Latina/o students in a recent study, "Falling Through the Cracks: Critical Transitions in the Latina/o Educational Pipeline." It is important to note that the educational attainment of Latina/o youth has improved; yet it continues to remain the lowest in comparison to other racial/ethnic groups. Perez notes that for every 100 Latina/o students, less than 63 will graduate from high school, less than 13 will earn a college degree, roughly 4 will earn a graduate degree, and 0.3 will earn a doctorate (2). This qualitative study will utilize a semi-structured interview method to capture the voices of Latina/o youth with the purpose of providing an extensive understanding of their experiences. Through their voices, the data collected will highlight the importance of acknowledging the experiences of Latina/o youth in order to identify the factors that prompt them to view military service as the only avenue for upward mobility.

Biography: Estephanie Munoz is a first-generation college student, a former community college student, and a future doctorate. She is the eldest daughter of two Mexican immigrants who have supported every step of her educational trajectory. For this reason, Estephanie recognizes the value of receiving an education and remains determined to reach her desired ambitions despite the difficulties that may arise. Estephanie began her higher education at Pasadena City College and will complete her Bachelor degree in English Literature and Language as well as her minor in Gender, Ethnicity, and Multicultural Studies at California State University, Pomona. Her current research pays particular attention to the low educational attainment of Latina/o youth who continue to defer a higher education and choose other pathways, such as military service. With a doctorate, Estephanie hopes to help students of all backgrounds, particularly Latina/o youth, pursue a higher education with the purpose of increasing the educational attainment.

Scholar Abstracts and Biographies

Hillside Central #1

Marwa Mhtar

Mentor: Dr. Jill Wenrick

Title: Impact of Western Dietary Pattern on Development of Incident and Recurrent *Clostridium difficile* Associated Disease: A Systematic Review

Abstract: *Clostridium difficile* is one of the many etiological agents of antibiotic associated diarrhea and is implicated in 15-25 percent of the cases. The organism is also involved in the exacerbation of inflammatory bowel disease and extra colonic manifestations. Due to increase in the incidence of *C. difficile* infection (CDI), emergence of hyper virulent strains, and increased frequency of recurrence in highly developed countries it has become important to assess behavior that could be exasperating the epidemic in order to provide preventative measures. While the disease is explained to be caused by overuse of antibiotics it does not explain why the disease is only emerging in highly developed countries. The hypothesis is that the western dietary pattern in conjunction with aggressive antibiotics over a long period of time is the primary cause for this nosocomial infection. The purpose of this study is to determine if the western diet combined with aggressive antibiotic regimen could be the direct cause and contribution to the *C. difficile* epidemic. If proven, this can be a risk factor testable by microbiologists in microbiome research. Also, preventive measures will be recommended to correct the behavior which in turn can success contain the current spread and reduce the occurrence of *C. difficile* in the future.

Biography: Marwa Mhtar is a pre-medical student graduating 2017 with a bachelor's of science in anthropology from Cal Poly Pomona. She is also a McNair Scholar, member of Pi Gamma Mu Honor's Society, and has consistently been on the dean's list every quarter. Her academic goal is to earn an MD/Ph.D. specializing in medical anthropology. She plans to combine her passions for culture, health, and humanistic studies to transform patient care. As a Syrian American she hopes to someday service the millions of Syrian refugees by organizing a desperately needed comprehensive care system for the region. Since she comes from an underprivileged background herself, she is dedicated to raising awareness of human rights struggles and the plight of refugees around the world.

Hsien-Te Kao

Mentor: Dr. Jennifer Switkes

Title: Epidemic of Human Mind and Behavior

Abstract: Humans are constantly making decisions every single day, and the majority of people's decisions are affected by preferences, likes or dislikes. A decision is the internal process of determining people's perspective toward an idea, and a response is the external behaviors associated with the decision. Human preference is the process that analyzes the strength between likes and dislikes and concludes a dominating preference. Human perspective mimics similar behaviors in dominating preference where human perspective is the result of human preference. When likes and dislikes are unbalanced, either likes or dislikes with stronger strength will generate a dominating preference. People's preferences are also affected by others' preferences when it is common that others give their opinions or one ask other people for their opinions on an idea. When the decision has influences from others, the strength of one's likes and dislikes can increase or decrease by others' responses, and an individual's decision will be affected by others' dominating preferences. Human perspective can be viewed as an infectious disease where people are affected by both positive and negative influences created by others' dominating preferences toward an idea. With the positive and negative influences from others, a person can develop two possible perspectives to an idea: positive and negative. Based on the connection between perspective and response, a person's perspective toward an idea can be predicted in respect to their response. This study looks at how the persistence of human perspective can be modeled using mathematical modeling and epidemiological concepts on the spread and sustainability of binary responses.

Biography: Hsien-Te Kao is a fourth year Mathematics major with a minor in Women's Studies at Cal Poly Pomona. His diverse educational background in mathematics and ethnic studies contributes to his unique perspective on human interactions. His research interests are complex systems modeling, networks, and data analytics in social phenomena. His current research project is on expansion of biological epidemiology concepts in terms of human mind and behavior. This summer he will be participating in the Mathematical Biosciences Institute REU at Ohio State University. Ultimately, Hsien-Te wants to become a researcher and professor who inspires other young scholars with his love of research and passion for higher education.

Jessenia Tovar

Mentor: Dr. Viviane Seyranian

Title: Charismatic Leadership Communication and Perception during a Crisis

Abstract: Leadership communication is the systematic transfer of meaning by which individuals influence others. To gain a better understanding of how leaders should optimally communicate during a crisis, it is important to analyze a leader's use of language. Research in leadership communication using the Social Identity Framing Theory reveals that using ingroup language helps a leader collectively identify with others and creates a way to unite others under a common group vision (Seyranian, 2013; 2014). Specifically, we examine how the use of ingroup ("we" and "us") and outgroup ("they" and "them") language during a crisis affects the perception level of a leader's charisma and effectiveness. Human participants will be recruited through Amazon Mechanical Turk, an online platform that provides users with unique work opportunities that require human intelligence. Each participant will be randomly assigned to read one of four speeches, which vary in language type and the presence of crisis. Then, participants will answer a survey featuring a Likert scale, a rating scale developed to measure attitudes directly (i.e. strongly agree to strongly disagree). A detailed analysis of participant responses will be used to determine whether leaders who use ingroup or outgroup language during crises will be perceived as more charismatic and effective. The implications of this research are to help leaders in society today improve their communication skills and tactics. This study will also expand the scarce literature on the effect of a leader's use of outgroup language during a crisis to influence followers.

Biography: Jessenia Tovar is the eldest daughter of a family of seven, a first-generation college student, and a future doctorate. She is currently a Senior Psychology major with a minor in General Management at Cal Poly Pomona. Jessenia is involved in the communities that she lives in. At her university, she serves as Vice President of Nuestra/o Latina/o Psychological Association and a Social Chair in the McNair Scholars club. In the community of Pomona, this is her second year serving as a Peer Mentor for Tri City Mental Health. Her research interests include leadership, motivation, and the experiences of people of color at the workplace. Jessenia will be applying to doctorate programs in fall 2016 and ultimately, plans to acquire her Ph.D. in Organizational Behavior.

Paul Navarro

Mentor: Dr. Subodh Bhandari

Title: Detecting Physical Plant Defects Using Aerial Imagery

Abstract: Unmanned aerial vehicles (UAVs), also known as drones, have many applications in this day and age, the applications for UAVs is to help make everyday life easier for society. This research about (UAV) applications is designed to benefit the agricultural field. UAVs with a camera attached and equipped with a code to process images can survey fields for the farmers detecting which crops need more care. With this idea research will be done as to which light spectrum gives the best feedback for detecting plant defects in the crop. The experiment will be carried out with a plant with a set defect, a camera that can see in all portions of the light spectrum, and an image processing code. The most efficient light spectrum is dependent on if the defect was detected and what percentage of the defects were found through image processing. Lastly, this research is intended to set the ground rule of which portion of the light spectrum is most efficient in detecting physical plant defects.

Biography: Paul Navarro is a second year transfer student studying aerospace engineering. His primary focus is within unmanned aerial vehicle (UAV) application for the modern day an age. His research includes using UAVs for precision agriculture, methane detection, and the exploration of cybersecurity in UAVs. He plans to enter the industry for a few years to familiarize himself with the current UAV technology. He will then continue to expand the use of that technology in his doctorate degree with an emphasis of controls.

Lilliana Ochoa

Mentor: Dr. Mehrdad Haghi

Title: Failure Criteria of FDM-Printed Parts

Abstract: Fused Deposition Modeling (FDM) is an additive manufacturing process in which molten filament of ABS (or other polymers) is deposited in a crisscross manner resulting in FDM-printed parts with anisotropic properties. Failure modes of FDM printed parts have been researched by previous students under Dr. Haghi, mainly focusing on the influence of raster orientation on ultimate tensile strength, maximum strain before failure, and Young's modulus of small ABS parts. In addition, small ABS and large polycarbonate tensile specimens were studied to research the edge effects experienced in FDM-printed parts. What remains to be tested further is the comparison of small ABS parts with large ABS parts in order to help clarify the influence of cross-section size on edge effects. The purpose of this research project is to establish further understanding of failure modes of small FDM printed parts, specifically edge effects in small ABS parts, and why there are significant changes in ultimate tensile strength and Young's modulus trends between 40 degree and 50 degree raster angles. Tensile testing of FDM-printed tensile specimens will be done to get data for UTS, maximum strain, and Young's modulus, and finite element analysis will be done for CAD models to analyze the predicted failure. The goal of this research is to establish a size guideline for edge effects to be negligible. In addition, determining the raster angle at which the sharp drop in UTS and maximum strain occur can help determine which raster orientation angles would be best for FDM-printed parts.

Biography: Lilliana Ochoa is an undergraduate Mechanical Engineering student with a minor in Physics at Cal Poly Pomona. She is planning to attend graduate school for Mechanical Engineering after graduating in spring 2018. As part of the McNair Scholars program, she is conducting research with her faculty mentor, Dr. Mehrdad Haghi of the Mechanical Engineering Department. Her project, "Failure Criteria of FDM-Printed Parts" studies the influence of raster orientation and part size on the mechanical properties of fused deposition modeling (FDM) printed parts. Additionally, she is the 2015-2016 Secretary for the McNair Scholars Club. Lilliana is also working on a Technology Assessment project for NASA Armstrong Flight Research Center. She is also the 2015-2016 Vice President of Communications for the Society of Women Engineers at Cal Poly Pomona. Previously, Lilliana has also tutored Mechanical Engineering and Physics courses and has been a Mentor to Mechanical Engineering Freshman for the Maximizing Engineering Potential (MEP) program.

Luis Morales

Mentor: Dr. Yong X. Gan

Title: Electrospun Nanofibers for Energy Storage and Conversion

Abstract: This study explores composite nanofibers that are manufactured through electrospinning for energy storage and conversion. The fibers will either be composed of a conductive composite or a ceramic composite, depending on application. For the ceramic nanofibers, their response to an external electromagnetic field is characterized to observe the heat generation in the fiber. In addition, this study will also measure the current passing through the fiber under the polarization of DC potential. For the conductive nanofibers, the electrical resistance and thermal conductivity of the material will be measured under the polarization of DC potential. Based on previous research, for the ceramic nanofibers, it is found that the fiber has intensive heating behavior when it is exposed to the electromagnetic field. The temperature increases more than 5 degrees in Celsius scale, only after 5 seconds of exposure. The current – potential curve of the ceramic nanofibers confirms the hypothesized dielectric behavior. Based on previous research, for the conductive nanofibers, it is found that the electrical resistance is increased as thermal conductivity is reduced; therefore there must be a compromise between those two. It is concluded that the conductive nanofiber's thermoelectric property is increased significantly compared to the bulk reference material. It is also concluded that the ceramic nanofiber has the potential to be used for hyperthermia-treatment in biomedical engineering or for energy conversions. Further research is currently being conducted to improve the efficiency of both, conductive and ceramic, nanofibers.

Biography: Luis Morales is a Senior Mechanical Engineering major at Cal Poly Pomona graduating in June 2016. His research interests include the development of material science, engine efficiency, combustion, and engine power cycle. His current research is on the development of composite nanofibers through electrospinning, in order to use them for energy conversion and storage. Luis' goal is to create ceramic nanofibers for energy storage, as well as conductive nanofibers for energy conversion; however, his objective does not stop there, these nanofibers can serve a great application in the Biomedical Engineering field. Luis is also part of the Cal Poly Pomona Formula SAE team, which is attending a competition in Hockenheim, Germany this summer.

Travon Dent

Mentor: Dr. Ha T. Le

Title: Bi-Directional Charging Functions for Electric Vehicles.

Abstract: Electric Vehicles (EV) are increasingly adopted by consumers in the U.S. and around the world. However, the EV draw lots of power from supply feeders for charging, leading to increased power losses in the power lines and depressed feeder voltages. The EV charging also interferes with normal operation of other motor-based equipment such as residential appliances. This study seeks a solution to mitigate the EV adverse impacts while improving its value for the owners. Specifically, the study investigates a technique to enable bi-directional charging (i.e. both charge and discharge) functions for the vehicles using AC-DC-AC converters, combined with a DC-DC link. These functions can create additional benefits for the EV owners. From the point of the power grid, EVs can bring benefits to ancillary services and compensation of the renewable energy sources intermittency. They can make use of the EV battery power for running other appliances when desired, such as for camping trips. Energy is stored in the electric vehicle during the night-when prices are low- and is withdrawn during peak time-when prices are high. Electric vehicles act like pump-storage units and allow vehicle owners to gain revenue from price differences. The bi-directional functions are also useful for the grid as the EV can inject their battery power to support the grid under emergency conditions.

Biography: Travon Dent is a first generation college student majoring in Electrical Engineering at California State Polytechnic University, Pomona. He developed an interest in electricity and electrical power early on after realizing how necessary it was for modern living and that not everyone has equal access to such a basic utility. His work in this field is integrally connected to both his interest in power transmission and renewable resources and his unique and nuanced understanding of the need for the equitable distribution of, and access to, electrical power. After graduation he has plans to continue his work at the graduate level in the pursuit of a Ph.D.

Isaac Guzman

Mentor: Dr. Subodh Bhandari

Title: Autonomous Path Planning System for Unmanned Aerial Vehicles

Abstract: An Autonomous Path Planning System for Unmanned Aerial Vehicles (UAVs), or drones, is crucial for UAVs to be commercially integrated into the National Airspace System (NAS). The Federal Aviation Administration (FAA) demands highly accurate Path Planning Systems in autonomy for UAVs to be safe to fly in the NAS. With the use of Automatic Dependent Surveillance - Broadcast (ADS-B) sensor "in" and "out," the position and velocity of the UAVs can be transmitted in real time. The ADS-B sensor "out" will allow UAVs to communicate with surrounding aircraft and neighboring ground stations, allowing for relative position and velocity data to be processed. This is crucial for collision detection and avoidance between UAVs in flight. The expected result will be a complete mathematical model of the aircraft that will be used for developing an obstacle avoidance algorithm for the UAV. This research will increase the level of UAV autonomy by allowing a more reliable and economical path planning system for the UAV to operate in the NAS.

Biography: Isaac Guzman is a Junior Aerospace Engineering major at California State Polytechnic University. His research interests include Unmanned Aerial Vehicles (UAVs), Aircraft Structure, Propulsion Systems, and Thermodynamics. His current research project is on the development of an autonomous path planning system for UAVs using Automatic Depend Surveillance – Broadcast (ADS-B) sensors which will increase the level of UAV autonomy. This summer he will be interning at Northrop Grumman in the aerospace systems sector. Ultimately, Isaac plans to work for NASA in the Thermo-Fluid Dynamics research and development sector creating more effective materials that can withstand high amounts of heat while being lightweight. He will be applying to Ph.D. programs after a few years of industry.

Anthony Klaib

Mentor: Dr. Todd Coburn

Title: Study of the Aerodynamic Effects of Dimples on the Fuselage of an Aircraft

Abstract: Modern society is characterized by its mobility and connectivity, and one of the facilitators of these trends is modern aviation. Not only do aircraft provide transportation to millions of people across the entire world, but they are also used in transporting valuable goods, contributing significantly to the world economy. However, modern jet-aircraft suffer from parasitic drag, which directly contributes to reduce fuel efficiency and increased operating costs. The purpose of this study is to analyze the aerodynamic effects of dimples on the fuselage of an aircraft in an effort to reduce the parasitic drag. The majority of research on drag reduction has been focused on the wings, with less attention being devoted to the fuselage. Due to its size, the fuselage generates skin friction drag and contributes significantly to the overall drag of the aircraft, therefore reducing its fuel efficiency. Previous studies have shown that dimples can reduce the overall drag of a body significantly; however, there have been no applications of dimples to an aircraft fuselage. By modeling an aircraft fuselage using a 3-D CAD program, a CFD analysis can be conducted to select an ideal dimpling pattern that results in the largest drag reduction. Using a 3-D printer, two aircraft models will be made: one without dimples and a second one with dimples. These two models will be subjected to a wind tunnel test in order to determine the coefficients of drag, lift, and pitching moment. Comparing the data from the two models would reveal if the dimpling resulted in any drag reduction.

Biography: Anthony Klaib is an aerospace engineering student at Cal Poly Pomona. His academic and research interests are aircraft structures and aerodynamics. He finds these two topics very fascinating and is interested in studying aero-elasticity; a relatively new field that studies the interaction between an aircraft's structure and its aerodynamics. He finds flutter to be especially interesting because this phenomenon can cause seemingly rigid and strong structures to behave very uncharacteristically, and resonate violently beyond the strength of the material. Anthony's interest in this field is the source of his desire to continue his education and obtain a Ph.D. in Aerospace Engineering from Caltech.

Dean Coco

Mentor: Dr. Zekeriya Aliyazicioglu

Title: Computer Vision Development for Hazard Detection in High-Powered Rockets

Abstract: In the field of high-power rocketry there are few applications involving computer vision and hazard detection. It is essential to be able to visually monitor the structure of the rocket so as to safeguard its electrical components throughout its flight. Computer vision has been adopted by many applications in recent years using image recognition techniques. They have been applied to license plate recognition in traffic cameras and facial recognition in social media applications. However, a common issue to arise in the application of computer vision is the high cost of computers, image processing software, and the system's portability capabilities. In recent years, computers have decreased in size while maintaining competitive computing power. Additionally, image processing software has become open sourced and available to researchers and hobbyist alike. This study focuses on the design of a computer vision system to detect hazards during the descent of a high-power rocket and live stream the video, with outlined hazards, to a ground station. This project addresses the concerns by utilizing a Raspberry Pi 2 as the computer for its compact size and 900 MHz processor, and the OpenCV, open source computer vision, library for its image recognition algorithms. The project's algorithm design focuses on: 1) image acquisition, 2) image analysis by means of contours, contour properties and other processing techniques, and 3) transmit a live stream video to the ground station with detected hazards outlined. Through the success of the project, related applications can further the research by utilizing the system to accomplish the task of altering the flight path of the high-power rocket away from the detected hazards.

Biography: Dean Coco is a third year undergraduate at California State Polytechnic University, Pomona who is studying electrical and computer engineering. Prior to attending Cal Poly, he studied at Citrus College where he participated in a rocketry-based research competition with the Citrus Rocket Owls. His current research focuses on the design of a hazard detection system for aerial vehicles alike, and its incorporation in high-power rockets. Dean plans to receive his Ph.D. in Computer Engineering for machine learning and/or artificial intelligence. He aspires to contribute to the future development of AI and its integration in everyday life. His short term goals include applying for graduate studies in and out of state. Some long term goals include returning to his community to promote higher education and developing an after school coding academy for youth with similar backgrounds to his.

German Lagunas-Robles

Mentor: Dr. Peter Arensburger

Title: Identification of DNA Transposable Elements in the Tasmanian Devil (*Sarchophilus harrisii*) Genome

Abstract: This project identifies and annotates potential transposable element candidates in the Tasmanian devil genome. Transposable elements (TEs) are special segments of DNA that can transpose within the genome when active. Even though TEs make up the majority of most genomes, they are relatively understudied. Their ability to transpose between nonhomologous sites can be problematic as they can change gene functions entirely if they happen to transpose into the translated regions of a gene. TEs have also been associated with causing cancerous environments in mammalian genomes. The Tasmanian devil (*Sarchophilus harrisii*) is being driven to extinction by a transmissible cancer known as devil facial tumor disease (DFTD). It is estimated that 90% of the wild population is affected by DFTD, whose origin is poorly understood. With the possible link of cancers and transposable elements, annotating the Tasmanian devil genome could provide clarification on the origin of DFTD. In order to identify possible TE candidates, various bioinformatics tools were used create a list of possible candidates. The list was parsed by running it through an automated pipeline three times at different evalues (5E-2, 5E-3, and 5E-6) to evaluate how likely the candidate was to be a real transposable element. As each run's evalue decreases, it is expected that the number of possible transposable elements on the resulting list decreases with it since the lower evalue result in a more selective list.

Biography: German Lagunas-Robles is a third-year Biotechnology major with an emphasis in Microbiology and Pathology at California State Polytechnic University, Pomona. His research interests include genomics, viral experimental evolution, and viral diseases. He is identifying DNA transposable elements in the Tasmanian devil (*Sarcophilus harrisii*) by using an automated pipeline. He is accomplishing this by writing PERL scripts to analyze data being output by various bioinformatics programs at different stages of the pipeline. This summer he will be attending RiSE at Rutgers University. German plans to pursue a career in academia, where he can continue his research as well as teach. He will be applying to Ph.D. programs in fall 2018.

Scholar Abstracts and Biographies

Away Scholar

Sekani Robinson

Mentors: Dr. Mary Danico and Dr. Erica Morales

Title: What's There to Cheer About?: How Cheerleading Affect the Identity of Black Girls

Abstract: While research on gender, race and sports/physical activities is prevalent, there are limited studies on how cheerleading plays a part in how black people negotiate cultural boundaries within predominantly white spaces. This research will focus and compare two adolescent cheerleading teams, one being a predominantly black cheerleading team and the other being a predominantly white/multi-racial cheerleading team. This research will view black cheerleaders accept and reject mainstream cheerleading by balancing and identifying their identity as a black cheerleader. The methodology for this study is field observations and participant observation. The analysis is framed using W.E.B. Dubois double consciousness and symbolic interaction paradigms that observe how cheerleaders socially interact with each other and negotiate cultural boundaries within a predominately white space. This study has found that race and class play a significant role on how the cheerleaders interpret their self-esteem and racial identity. The study also highlights observations of the microaggressions and stereotypes that are projected within the cheerleading institution. Through interactions and observations with the cheerleaders, this study has found that cheerleading is helping the girls on predominantly black cheerleading teams build their racial and ethnic identity by the style of choreography and the interactions with other cheerleaders of the same race and/or ethnic background.

Biography: Sekani Robinson is a fourth year Sociology major at California State Polytechnic University, Pomona. Her Current research involves observing how cheerleading affects girls of color's racial and ethnic identity. She currently still coaches cheerleading for youth within the Los Angeles County. She will be attending the University of California, Santa Barbara in the fall of 2016. At UCSB she will be working on her Ph.D. in Sociology with and emphasis in Black Studies. Sekani will focus on race and ethnicity (specifically Black Americans, Caribbean's and Afro-Latinos), sports, and youth within the inner city. She plans to become a Sociology professor and create a diversity ambassador program for major ballet companies to ensure racial equality.

Scholar Abstracts and Biographies

Away Scholar

Jessennya Hernandez

Mentor: Dr. Claudia Garcia Des-Lauriers

Title: Legal and Personal Perspectives on the American Foster Care System

Abstract: The Foster Care system is an institution aimed at successfully temporary care of under-aged children taken from or abandoned by their families yet it has produced varied outcomes in the children moving within it. Legal and bureaucratic administrations, from Congress to local leaders, create public policy in order to bring vulnerable children to a better and more satisfying state of living. Research on the personal experiences of ex-foster youth consistently produces negative recollections and troubling facts, specifically having to do with violations of youth's rights and a misregulation of public policy. This study questions the legal validity of the foster care system as an institution, the laws that are to be regulated within the institution, and then compares these factors to the personal experiences of foster care constituents in order to investigate the mentioned preceding negative recollections and troubling facts. Interviews, ethnographic observations, and survey collection will be conducted and used in order to distinguish what prominent legal dynamics affect foster care constituents the most. A detailed analyses of already existing scholarly works, legal codes and regulations, and other published materials will be used to identify conspicuous themes and main issues that administration and congressional leaders tend to stick to. The implications of this research are to help identify the source of the legal malfunctions within the system and better understand how to resolve them. This investigatory research, which incorporates an anthropological approach, offers a holistic understanding to social welfare, and specifically the foster care community.

Biography: Jessennya Hernandez is a senior at California State Polytechnic University, Pomona who is studying Anthropology and Sociology. In her previous years, she studied at Norco Community College and continues to volunteer and intern with numerous organizations and work as a customer service leader on campus. Her current research delves into the foster care system and the implications that it has on foster youth rights. She plans to receive her Ph.D. in Sociology where she can gain the tools needed to academically and socially benefit her community through professorship, research, and service. Her short term plans include researching for social welfare services and non-profit organizations in order to help revamp the current state. Her long term plans adhere to the promotion and advancement of higher education. During the fall quarter of 2016, she will be attending the University of Illinois-Urbana Champaign as a first year Ph.D. candidate.

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2015-2016 McNair Scholars

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About TRIO
And the McNair Scholars Program

The Federal Trio Programs (TRIO) **are Federal outreach and student services programs designed to identify and provide services for individuals from disadvantaged backgrounds. TRIO Includes eight programs targeted to serve and assist low-income individuals, first-generation college students, and individuals with disabilities to progress through the academic pipeline from middle school to postbaccalaureate programs.**

Designed to assist first-generation, low-income students and those who are underrepresented at the graduate and doctoral level, the program at Cal Poly Pomona was first funded in 1999. The Ronald E. McNair Postbaccalaureate Achievement Program is named for Dr. Ronald E. McNair, one of those who perished aboard the space shuttle Challenger January 1986.

The McNair Scholars Program at Cal Poly Pomona is a one– or two-year program designed to improve students' research skills and prepare them for entering graduate schools and advanced study. This education grant provides an internship opportunity for students to learn how to do research, present their findings at a summer symposium at the national conferences, and successfully apply for and enter graduate school. Through the efforts of the students themselves, the faculty mentors, and the program staff, these students can achieve their goals.

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