19th Annual
Pacific
Undergraduate Research & Creativity Conference
PURCC-2019

University of the Pacific
Stockton, CA 95211
April 16 – May 11, 2019
Program volume compiled and edited by
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Director of Undergraduate Research

Cover design by Alicia Muiños ‘19
PURCC 2019 Schedule of Events

Program

Senior Art & Design Exhibition  
Oral Session 1  
Oral Session 2  
Poster Session 1  
Poster Session 2  
Seminar in Opera Directing Stage Class  
Composer’s Club Concert  
SOECS Senior Project Day

Abstracts/Artist Statements

Senior Art & Design Exhibition  
Oral Presentation Session 1  
Oral Presentation Session 2  
Poster Session 1  
Poster Session 2  
Composer’s Club Concert Program Notes  
Bioengineering Senior Projects  
Civil Engineering Senior Projects  
Computer Science Senior Projects  
Electrical & Computer Engineering Senior Projects  
Engineering Management Senior Projects  
Mechanical Engineering Senior Projects

Student Presenter Abstract Index
PURCC 2019 Schedule of Events

April 16 - May 11

Chromaticity: Senior Art & Design Exhibition
Reynolds Art Gallery

April 27

Research Day

Oral Presentation Sessions
10:00 AM – 12:00 PM
12:30 – 2:00 PM
DeRosa University Center, Room 211

Poster Sessions
10:00 AM – 12:00 PM
12:30 – 2:30 PM
DeRosa University Center, Ballroom

April 29

The Seminar in Opera Stage Directing Class
6:00 PM
Faye Spanos Concert Hall

April 30

Composers Club Concert
7:30 PM
Faye Spanos Concert Hall

May 4

Engineering and Computer Science Senior Project Demonstrations
2:30 – 4:00 PM
School of Engineering and Computer Science
Chromaticity - Senior Art & Design Exhibition
April 16 – May 11
Reynolds Gallery

Where Do I Fit?
Daniella Mia Arostiguí Cabrera, Studio Art
Faculty Mentor: Jennifer Little, Art and Graphic Design

Compulsion
Rebecca Carlene Cooper, Studio Art
Faculty Mentor: Jennifer Little, Art and Graphic Design

The Vocitarium
Jason Jedrick Del Rosario, Studio Art
Faculty Mentor: Jennifer Little, Micheal Leonard, Art and Graphic Design

Vanity Planet Advertisements
Ashley E Johnson, Graphic Design
Faculty Mentor: Marie Lee, Art and Graphic Design

Closed Mouths Don’t get Fed
Jason Ramos Millner, Studio Art
Faculty Mentor: Jennifer Little, Art and Graphic Design

The World In 207 Pantones
Alicia Muinos, Graphic Design
Faculty Mentor: Marie Lee, Art and Graphic Design

Tipsy Hippy Wine by Ashbury Cellars
Julia Nguyen, Graphic Design
Faculty Mentor: Marie Lee, Art and Graphic Design
Chromaticity - Senior Art & Design Exhibition
April 16 – May 11
Reynolds Gallery

Design Allies
Kaitlyn Nimmo, Graphic Design
Faculty Mentor: Marie Lee, Art and Graphic Design

Choose Green
Monica Odeh, Graphic Design
Faculty Mentor: Marie Lee, Art and Graphic Design

The Perfect Score: A campaign to stop animal testing
Chloe J Read, Graphic Design
Faculty Mentor: Marie Lee, Art and Graphic Design

Can I Touch Your Hair
Daniel J. Thomasson, Graphic Design
Faculty Mentors: Marie Lee, Brett DeBoer, Art and Graphic Design

Celebration of Life
Leila Cassandra Valencia, Studio Art
Faculty Mentors: Jennifer Little, Daniel Kasser, Art and Graphic Design
Oral Presentation Session 1  
April 27, 10:00 – 12:00  
DeRosa University Center, Room 211

Flip the Script: Social Media and Communication Competence
10:00  
Benny Huynh, Communication  
Faculty Mentor: Qingwen Dong, Communication

The Curse of Eve: 700 Years of Traditional Misogyny Represented in Roman de Silence
10:20  
Diana Medina, English  
Faculty Mentor: Andreea Boboc, English

10:40  
Carolyn Lee, English  
Faculty Mentor: Camille Norton, English

“Write My Own Checks Like I Write What I Sing”: The Authorship and Independence of Female Singer-Songwriters in the Pop Music Industry
11:00  
Jennifer Morrow, English  
Faculty Mentor: Jeffrey Hole, English

Finger on Fast-forward: Transgender Literature and Theory from 1990 to Present Day
11:20  
Danielle Garrett, English  
Faculty Mentor: Jeffrey Hole, English
Oral Presentation Session 2  
April 27, 10:00 – 12:00  
DeRosa University Center, Room 211

Law and Literature: How U.S. Exclusionary Laws Shaped the Asian American Experience and Literature

12:30  
Ericka Wong, English  
Faculty Mentor: Xiaojing Zhou, English

Die schöne Melusine: Mendelssohn's Forgotten Overture

12:50  
Walter Stedman, Music History  
Faculty Mentor: Sarah Clemmens Waltz, Music History


1:10  
Erica Feasel, International Relations  
Faculty Mentor: William Herrin, School of International Studies

¡Viva La Raza! : The Bracero Program in California’s Central Valley

1:30  
Katelyn Getchel, History  
Faculty Mentor: Laura Gutierrez, History

2018 Summer Undergraduate Research Fellowship Project

Chirality-Induced Systematic Gas-Phase Acidity Alternation of Cysteine Polyalanine Oligopeptides

1:50  
Joshua Ho, Pre-Pharmacy  
Faculty Mentor: Jianhua Ren, Chemistry  
Graduate Student Mentor: Yuntao Zhang, Chemistry
Growth vs Reproduction in Female Túngara Frogs

**01B**  
Grace Song, *Biology (Pre dentistry)*  
Faculty Mentor: Marcos Gridi-Papp, *Biological Sciences*

Implications of Rising Temperatures on the Larval Development of the Túngara Frog

**02B**  
Aleena Khan, *Pre-Dental, Felicity Bao, Pre-Dental*  
Faculty Mentor: Marcos Gridi-Papp, *Biological Sciences*

Changes in plasma proteins and metabolites during fasting in elephant seals

**03B**  
Reeti Banerjee, *Pre-Dentistry, Anna Chang-Chien, Pre-Dentistry, Serena Ly, Pre-Dentistry*  
Faculty Mentor: Jane Khudyakov, *Biological Sciences*  
Graduate Student Mentor: Jared Deyarmin, *Biological Sciences*

Identification of a late acting gene in the hormogonium gene regulatory network of Nostoc punctiforme

**05B**  
Shadi Kurnfuli, *Biological Science, Marvin Kweon, Pre-Dentistry*  
Faculty Mentors: Douglas Risser, *Biological Sciences*

Characterization of HmpF, a novel component of the Hmp chemotaxis-like system that controls cyanobacterial motility

**05C**  
Thomas Harwood, *Biological Sciences*  
Faculty Mentor: Douglas Risser, *Biological Sciences*  
2018 Summer Undergraduate Research Fellowship Project
Acoustic Isolation of Calling Túngara frogs

Yun Jae Min, Pre-Dentistry

Faculty Mentor: Marcos Gridi-Papp, Biological Sciences
Graduate Student Mentor: Kelsi Navalta, Biological Sciences

Regulation of the Unfolded Protein Response by GADD34 and CReP

Louis Chen, Biological Sciences, Johnathan Ha, Biological Sciences, Jisoo Kim, Biological Sciences, John Lee, Biological Sciences, David Lotfizadeh, Biological Sciences, Ivy Lu, Biological Sciences, Jason Tran, Biological Sciences, Diana Wong, Biological Sciences

Faculty Mentor: Douglas Weiser, Biological Sciences

Triggers of Egg-Laying: Does Mating Call Attractiveness Matter?

Jenica Emerson, Biochemistry

Faculty Mentor: Marcos Gridi-Papp, Biological Sciences
2018 Summer Undergraduate Research Fellowship Project

Male Influence on Oviposition in Túngara Frogs

Nikki Parikh, Pre-Dentistry

Faculty Mentor: Marcos Gridi-Papp, Biological Sciences

Broadening host breadth in Adelpha butterflies from Costa Rica

Connor Soderstrom, Biological Sciences, Rylie Towne, Geological and Environmental Sciences

Faculty Mentor: Ryan Hill, Biological Sciences
Sage Advice: Don't Let Energy Development Impede Bird Reproduction

08B

Kevin Xu, Pre-Dentistry, Sweta Kumar, Biological Sciences, Long Dang, Pre-Dentistry, Michelle Ma, Pre-Dentistry

Faculty Mentor: Stacie Hooper, Biological Sciences

Characterizing the cellular composition of blubber tissue

08C

Eileen Abdollahi, Biological Sciences, Adriana Chan, Biological Sciences, Ayesha Soni, Biological Sciences, Alicia Stephan, Biological Sciences

Faculty Mentor: Jane Khudyakov, Biological Sciences

Graduate Student Mentor: Laura Pujade Busqueta, Biological Sciences

A Bioacoustic Analysis of Humpback Whale Social Calls

09C

Cheryl Chang, Biology, Serina Chen, Pre-Dental 3+3, Yasmin Desai, Pre-Dental 3+3, Adrian Lee, Biology, Riddhi Patel, Pre-Dental 3+3, Shayla Tran, Pre-Dental 3+3

Faculty Mentor: Stacie Hooper, Biological Sciences

Identification of genes required for typical hormogonium motility and cell morphology in the filamentous cyanobacterium Nostoc punctiforme.

10B

Jason Phen, Pre-Dent 3+3/Biology, Veronica Phen, Pre-Dent 2+3

Faculty Mentor: Douglas Risser, Biological Sciences

Regulation of GADD34 and CReP mRNA Expression in the Unfolded Protein Response

10C

Kirthika Giresh, Biological Sciences

Faculty Mentors: Doug Weiser and Lisa Wrischnik, Biological Sciences
Zebrasfish Rho kinase is required for proper midline development

11C Skyler Chu, Biological Sciences

Faculty Mentor: Douglas Weiser, Biological Sciences

Bloodfeeding Patterns of Culex tarsalis and Culiseta incidens in San Bernardino County

12B Anusha Murshed, Biological Science, Nuha Haque, Biological Sciences, Kristina Vu, Biological Sciences, Kimberly Narciso, Biological Sciences, Justine Beyer, Biological Sciences

Faculty Mentor: Tara Thiemann, Biological Sciences

Wat-er the Effects? How River Proximity and Season Affect an Insect Community

12C Alyssa Bonfoey, Biological Sciences

Faculty Mentor: Zachary Stahlschmidt, Biological Sciences

Can CRISPR Improve the Protein Secretion of Pichia pastoris

13A Joyce Choi, Pre-Dentistry, Caroline Chou, Pre-Dentistry

Faculty Mentor: Geoff Lin-Cereghino, Biological Sciences

Can potential mutant strains of the BGS13 gene lead to supersecretion of Pichia pastoris?

13B Huy Nguyen, Biological Sciences, Michelle Hahn, Pre-Dentistry

Faculty Mentor: Geoffrey Lin-Cereghino, Biological Sciences
Poster Session 1
April 27, 10:00 AM – 12:00 PM
DeRosa University Center Ballroom

Optimization of Expression of Basic Fibroblast Growth Factor in Pichia pastoris for Oral Wound Healing

13C
Nadia Amer, Biological Sciences, Tou Vue, Psychology, Colwin Yee, Biological Sciences
Faculty Mentor: Geoff Lin-Cereghino, Biological Sciences

Phylogenetic analysis of Corydoradinae catfish for the evolution of venom glands

14A
Youyoung Min, Biological Sciences, Nancy Seo, Biological Sciences
Faculty Mentor: Eric O. Thomas, Biological Sciences

Regional Variation in Childhood Malnutrition Associated with Staple Food Consumption: Evidence from Uganda

15A
Caroline Styc, Economics and Political Science
Faculty Mentors: William Herrin, Economics and Michelle Amaral, Economics

Structures and Energetics of B- and Y-Ions in Peptoid Fragmentation

16A
Joshua Ho, Pre-Pharmacy
Faculty Mentor: Jianhua Ren, Chemistry
Graduate Student Mentor: Yuntao Zhang, Chemistry

Tracking the Pathways of Peptoid Fragmentation

16B
Jasmine Shum, Biochemistry
Faculty Mentor: Jianhua Ren, Chemistry
Graduate Student Mentor: Yadwinder Singh Mann, Pharm. & Chem. Sciences
Poster Session 1
April 27, 10:00 AM – 12:00 PM
DeRosa University Center Ballroom

16C

Peptide Synthesis and Liquid Chromatography Mass Spectrometry Analysis
Celine Chandler, Biochemistry, Tieler Merel, Chemistry
Faculty Mentor: Jianhua Ren, Chemistry
Graduate Student Mentor: Michael Browne, Chemistry

17A

Correlating Knob-Socket Model Propensities with Alpha-Helicity and Stability
Kara Talbott, Biochemistry, Aaron Demoville-Rahimi, Biological Sciences
Faculty Mentor: Jerry Tsai, Chemistry
Graduate Student Mentors: Taylor Rabara, Chemistry, Melina Huey, Chemistry

17B

Knob-Socket Predictions of Alpha-Helical Stability and Structure
Anneroos Nederstigt, Biochemistry, Huy Pham, Biochemistry,
Nickraj Singh, Biochemistry, Cynthia Trinh, Biochemistry
Faculty Mentor: Jerry Tsai, Chemistry
Graduate Student Mentors: Taylor Rabara and Melina Huey, Chemistry

17C

Cricket life in the Anthropocene: Effects of heat wave and artificial light at night on resource acquisition and allocation in Gryllus lineaticeps
David Luc, Pre-Dental (Biology), Garrett Masuda, Pre-Dental (Biology)
Faculty Mentor: Zachary Stahlschmidt, Biological Sciences

18A

Species-specific Variation in Hematological Characteristics in a Snake Community
Garrett Masuda, Pre-Dental (Biology), Andy Byeon, Pre-Dental (Biology)
Faculty Mentor: Zachary Stahlschmidt, Biological Sciences
Investigation of the Binding of Aminoglycosides to c-Myc G-quadruplex DNA Using the FID Assay

**18B**


Faculty Mentor: Liang Xue, *Chemistry*

Graduate Student Mentor: Vanessa Rangel, *Chemistry*

**Binding of Flavonoid Derivatives to G-Quadruplex DNA Studied by Molecular Docking**

**18C**

Aaron Tran, *Biochemistry*

Faculty Mentors: Liang Xue, *Chemistry*, Qiao-Hong Chen, *Department of Chemistry, Fresno State University*

Graduate Student Mentor: Mandeep Singh and Vanessa Rangel, *Chemistry*

**A Knob-Socket Model of Amino Acid Sequence Changes on Alpha Helical Stability and Structure**

**20B**

Danielle MacArt, *Biochemistry and Spanish*

Faculty Mentor: Jerry Tsai, *Chemistry*

Graduate Student Mentors: Taylor Rabara and Melina Huey, *Chemistry*
Poster Session 2
April 27, 12:30 AM – 2:30 PM
DeRosa University Center Ballroom

Cockeyed Optimist: Social Relevancy of Oscar Hammerstein II’s Lyrics
01B
Taylor Carnes, Vocal Performance, Ethan Albala, Vocal Performance
Faculty Mentor: James Haffner, Performance Studies

Thermo-Mechanical Analysis of Sequential Bone Drilling with Applications to Osteoarthritis Treatment
02B
Justin Boetius, Mechanical Engineering
Faculty Mentor: JuEun Lee, Mechanical Engineering
2018 Summer Undergraduate Research Fellowship Project

Aggregation behavior for emergent magnetic tops
03B
Daniel Cesar Madera, Bioengineering, Sage Moreland, Bioengineering
Faculty Mentor: Joshua Steimel, Mechanical Engineering

Analyzing Water Quality of Produced Water in Kern County through Geochemical Modeling and GIS Mapping
05B
Emily Reynoso, Civil Engineering
Faculty Mentors: Mary Kay Camarillo, Civil Engineering, Daniel Jontof-Hutter, Physics

Nucleation Time Prediction of Selected Inorganic Salts during Reverse Osmosis Treatment of Produced Water in Kern County
05C
Stefanos Word, Civil Engineering
Faculty Mentor: Mary Kay Camarillo, Civil Engineering
Probing the Evolution of Galaxy Dark Matter Since Cosmic Noon

06B  Jack Lonergan, Physics and Applied Mathematics

Faculty Mentors: Guillermo Barro, Physics and Elisa Toloba, Physics

The World in 0’s and 1’s: Internet of Things Data Fusion and Sensor Interpretation

06B  Daniel Balerite, Computer Engineering, Jason To-Tran, Computer Engineering, Christian Villalobos, Computer Engineering, Celine Esteron, Electrical Engineering

Faculty Mentor: Fadi Muheidat, Electrical and Computer Engineering

From the Ground Up: Identification through a Floor based system

06C  Robert Hughes, Computer Engineering, Mason Lee, Electrical Engineering

Faculty Mentor: Fadi Muheidat, Electrical and Computer Engineering

Other Mentor: Lo’ai A. Tawalbeh, Texas A&M University

Gender Gap in Exercise Research in Individuals with Parkinson’s Disease

07B  Chandana Kothur, Bioengineering

Faculty Mentor: Preeti Oza, Physical Therapy

Benefits of Behavior: Exercise Enhances Perception of Physical Function Independent of Improvement Among Diabetic Patients

07C  Shabnam Behin, Psychology, Nathaniel Holmgren, Health & Exercise Science

Faculty Mentors: J. Mark VanNess, Health, Exercise, and Sports Sciences

Courtney D. Jensen, Health, Exercise, and Sports Sciences

Graduate Student Mentors: Cynthia Villalobos, Health, Exercise, and Sports Sciences, Alexis C. King; University of Illinois Champaign Urbana

Other Mentor: Paul D. Vosti, St. Joseph's Memorial Hospital
Utilizing A Novel Technique to Measure Biological Interactions

08B  Peter Hyatt, Mechanical Engineering
Faculty Mentor: Joshua Steimel, Mechanical Engineering

Widening the Playing Field: A Biomimetic Modeling System

08C  Erica Roy Ramos, Mechanical Engineering
Faculty Mentor: Joshua Steimel, Mechanical Engineering

Emergent Aggregation Behavior of Magnetic Top like Particles in Passive Solution

09B  Sage Moreland, Bioengineering, Daniel Madera, Bioengineering
Faculty Mentor: Joshua Steimel, Mechanical Engineering

Investigation on how students do their homework and knowledge retention

10B  Justin Lee, Bioengineering
Faculty Mentor: Binod Nainabasti, Physics

Mass-radius relationship of simulated two-layer planets

10C  Johnson Liu, Physics
Faculty Mentor: Daniel Jontof-Hutter, Physics
Architecture of Kepler’s Multi-Transiting Planet Systems  

11A  Kadri Nizam, Physics/Applied Math  
Faculty Mentor: Daniel Jontof-Hutter, Physics

Characterizing a large, far orbiting exoplanet with four smaller neighbors  

11B  Robert Ashby, Engineering Physics  
Faculty Mentors: Daniel Jontof-Hutter, Physics

Picoplatin Derivatives for Anticancer Drug Development  

12A  Ethan Liu, Biological Science, Evan Le, Biochemistry, Jane Ung, Biochemistry, Joanne Kim, Biochemistry, Dan Shao, Biochemistry  
Faculty Mentor: Qinliang Zhao, Chemistry  
Graduate Student Mentor: Chao Feng, Chemistry

Synthesis, Characterization and Reactivities of New HDAC Inhibitors  

12B  Dan Shao, Biochemistry, Jenny Zheng, Bioengineering  
Faculty Mentors: Qinliang Zhao, Chemistry, Xin Guo, Pharmaceutics and Medicinal Chemistry  
Graduate Student Mentor: Chao Feng, Chemistry, Yingbo Huang, Pharmaceutics and Medicinal Chemistry

Evaluation of cis-diamino-cyclohexane derivatives as potential chiral catalysts in enantioselective organic synthesis  

12C  Kelsey Wong, Pre-Pharmacy  
Faculty Mentor: Vyacheslav V. Samoshin, Chemistry  
Graduate Student Mentor: Carim Van Beek, Chemistry  
2018 Summer Undergraduate Research Fellowship Project
The Ultimate Monogamist: Exploring the Ubiquitination Activity of UHRF1

13A
Danny Luu, Biochemistry, Jenica Emerson, Biochemistry
Faculty Mentor: Joseph Harrison, Chemistry

Connecting Quantum Mechanics to Molecular Dynamics: Generating a Ligand Topology

13B
Andrew Parkins, Biochemistry
Faculty Mentors: Mike McCallum and Hyun Joo, Chemistry

Synthesis and Characterization of p-Coumaric Acid Derivatives and Determination of Radical Scavenging Potential

14A
Tre Andang, Biochemistry
Faculty Mentor: Andreas Franz, Chemistry
Graduate Student Mentor: Cate Simmermaker, Chemistry

What’s In It (for Students)? Magnetic Resonance Dewar Cross-Section for Classroom Demonstrations

14B
Ei Aung, Pre-Pharmacy
Faculty Mentor: Andreas Franz, Chemistry

An Evaluation of Group Behavioral Skills Training to Teach Members of Greek Letter Organizations to Free-Pour Standard Servings of Beer

15A
Justin Shindo, Psychology, Bailey Whitlock, Psychology
Faculty Mentor: Carolynn Kohn, Psychology
Graduate Student Mentors: Meagan Strickland and Margaret Brock, Psychology
Poster Session 2
April 27, 12:30 PM – 2:30 PM
DeRosa University Center Ballroom

Personal Control Beliefs and Memory in Aging: Mediation by Health and Lifestyle

15B
Mercedes Ball, Psychology

Faculty Mentor: Carla Strickland-Hughes, Psychology

Socializing More Linked with Better Aging Attitudes

15C
Kezhia Barba, Psychology, Lluvia Garnica, Psychology and Spanish (Lit. and Lang.)

Faculty Mentor: Carla Strickland-Hughes, Psychology

Are You Threatening Me? Responses to Age-Based Stereotype Threat

16A
Sebastian Getman, Psychology

Faculty Mentor: Carla Strickland-Hughes, Psychology

Don't Shy Away! Relations Among Activity Level, Gender, and Social Behaviors in Shy Toddlers

16B
Kajal Patel, Psychology with Honors

Faculty Mentor: Jessica Grady, Psychology

Graduate Student Mentor: Delaney Callan, Psychology

Don’t talk to strangers, or should you? Shy children’s vocalizations with parents and strangers

16C
Caitlin Reynolds, Psychology

Faculty Mentor: Jessica Grady, Psychology

2018 Summer Undergraduate Research Fellowship Project
"Leave me" or "Help me" - Are Parent Behaviors Associated with Child Boldness in Shy Toddlers?

17A
Andrew Leyva, Psychology, Stephanie Ascencio, Psychology
Faculty Mentor: Jessica Grady, Psychology
Graduate Student Mentor: Delaney Callan, Psychology

Do Women Represent Women? Feminist Theory in Political Representation

17B
Caroline Styc, Economics and Political Science
Faculty Mentor: Dari Sylvester Tran, Political Science

Measuring Regime Type

17C
Christopher Mitchell, International Relations
Faculty Mentors: Dari Sylvester Tran, Political Science

Exploring Structural and Political Constraints on Authoritarian Learning: Blaise Comporé’s Fall from Power in Burkina Faso

18A
Abigail Miles, Political Science
Faculty Mentor: Dari Sylvester Tran, Political Science

Analysis of the Impact of the Popularization of Uber on Drunk Driving in Densely Populated Counties, US

20A
Lauren Herbert, Geological and Environmental Sciences
Faculty Mentor: Michelle Amaral, Economics
**Detrital zircon sample preparation of the Jurassic Tuttle Lake Formation, El Dorado County, California**

20B

Emily Chiappe, *Geological and Environmental Sciences, Conc. Geology*

Faculty Mentor: Kurtis Burmeister, *Geological and Environmental Sciences*

**History of Groundwater Flow in the Southern Great Basin Inferred From Paleo-deposits**

21A

Katherine Andrews, *Geological and Environmental Science, Conc. Geology*

Faculty Mentor: Laura K. Rademacher, *Geological and Environmental Science*

Other Mentors: Yadira Ibarra, *Department of Earth & Climate Sciences, San Francisco State University*, Marty D. Frisbee, *Department of Earth, Atmospheric, and Planetary Sciences, Purdue University* Zachary P. Meyers, *Department of Earth, Atmospheric, and Planetary Sciences, Purdue University*

2018 Summer Undergraduate Research Fellowship Project
Seminar in Opera Directing Stage Class
April 29, 6:00 PM
Faye Spanos Concert Hall

All Kinds of People
Exploring Issues of Prejudice Through the Words of Oscar Hammerstein II

Written by Bruce D. Taylor
Music by Jerome Kern and Richard Rodgers

Faculty Mentor: James Haffner

Featuring members of the Pacific Opera Theatre Workshop Classes

Stage Director: Taylor Carnes
Music Director: Ethan Albala

ALL KINDS OF PEOPLE ENSEMBLE
Jorge A. Torrez
Hannah Lampkin
Paige Tucker
Kevin Iwai
Cruz A. González
Nicholas Davis
Raymond Gallo III
Justin Beasley
Rachel Ferreira
Katie Elson
Amanda Mikkelsen
Abigail Hernandez

Ethan Albala, piano
Composers Club Concert
April 30, 7:30 PM
Faye Spanos Concert Hall

String Quartet no. 2 "The Void"

Kevin Swenson (b. 1995)
Faculty Mentors: Andrew Conklin, Robert Coburn

Micah Vogel and Sabrina Boggs, Violin
Krista Swenson, Viola
Malcolm King, Cello

Whirlwhim

Brian Bui (b. 1999)
Faculty Mentor: Andrew Conklin

Shelbey Evans, Soprano Saxophone
Kyle Lesh, Alto Saxophone
Bryan Mah, Tenor Saxophone

Sine Teste

Peter D. Altamura (b. 1999)
Faculty Mentor: Robert Coburn

Monica Mendoza, Flute
Micah Vogel, Violin
Krista Swenson, Viola

On the Contrary

Wyatt Cannon (b. 2000)
Faculty Mentor: Robert Coburn

Mitchell Beck, Soprano Saxophone
Ryan Porter, Alto Saxophone
Matthew Loya, Tenor Saxophone

Semblance

Maya Balachandran (b. 2001)
Faculty Mentor: Robert Coburn

Laila Mameesh, Flute
Malcolm King, Cello
Diego Bustamante, Piano
Composers Club Concert  
April 30, 7:30 PM  
Faye Spanos Concert Hall

**Breath of Spring**  
Micah Vogel  
(b. 1997)

Faculty Mentor: Robert Coburn

*Ellie Lundberg, Flute  
Scott Pastor, Clarinet  
Tristen Collinsworth, Bassoon*

**Electric Dreamscape no. 1**  
Kevin Swenson  
(b. 1995)

Faculty Mentors: Andrew Conklin, Robert Coburn

*Sabrina Boggs, Violin*

**Talk to Me**  
Wyatt Cannon  
(b. 2000)

Faculty Mentor: Robert Coburn

*Wyatt Cannon, Computer (Max/MSP)*

**The Body Where I was Born**  
Kevin Swenson  
(b. 1995)

Faculty Mentors: Andrew Conklin, Robert Coburn

*Thomas Hubel and Kevin Swenson, Trumpets*
Bioengineering:

A Low-Cost Portable Electroencephalographic System for the Identification and Prevention of Microsleep Episodes
Kyle Poe, Morgan Trembush, Matthew Panesis, Alisa Matuska, Christopher Chuang
Faculty Mentors: Fadi Muheidat, Electrical Engineering. Jeff Burmeister, Bioengineering

An Improved Cooling System for Medical Tube Extrusion
Orion Capuyon, Jamie Anne Narciso, Haris Jebrini, Analynne Madrid, Serena Chu
Faculty Mentors: Jeffrey Burmeister, Bioengineering Joshua Steimel, Mechanical Engineering

Modified Walker to Lift a Late-Stage Dementia Patient
Ryan McVicar, Chandana Kothur, Isabelle Huynh, Giacomo Pacioni
Faculty Mentors: Jeff Burmeister, Shelly Gulati, Bioengineering

Civil Engineering:

A New Community Center for Stockton’s Growing Population
Gena Farley
Faculty Mentors: Camilla Saviz, Hector Estrada, Luke Lee, Scott Merry, Mary Kay Camarillo, Civil Engineering

Industry Mentors: Dino Kloth, Paul Schneider and Robert Norbutas, Siegfried Engineering, Adam Killinger, Geopier Foundation Company

District 108 Wetland Habitat Pump Station Project
Neil Irani, Muhammad Khan, Lillian Sam, Ethan Malonzo
Faculty Mentors: Mary Kay Camarillo, Scott Merry, Luke Lee, Camilla Saviz, Hector Estrada, Civil Engineering

Revitalizing Downtown Stockton One Building at a Time
Taneil Evans, Jeric Lagmay, Andres Muñoz, Marc Ney
Faculty Mentors: Mary Kay Camarillo, Hector Estrada, Camilla M. Saviz, Scott Merry, Civil Engineering
Industry Mentor: Doug Wagner PE; Wagner & Associates, Inc.
Sheltering the Homeless, Serving the Community: The Stockton Women & Family Complex
Travis Pazin, Gimelle Jacala, Staysha Delgado, Jake Smith
Faculty Mentors: Mary Kay Camarillo, Luke Lee, Hector Estrada, Gary Litton, Camilla Saviz, Scott Merry, Civil Engineering

Computer Science:

Alexa What's my schedule?
Ryan Su
Faculty Mentors: Osvaldo Jimenez and Shon Vick, Computer Science

BusMe: The Road to Better Public Transportation
Dominic Lesaca, Shane Duan, Gurkirt Heerey, Ali Noorani, Jesse Talamantes
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

Derelict Station: A 2D Game
Jack Thias, Clarissa Franke, Jacob Barajas, Alex Lee, Jake Anhaltzer
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

Find your roommate today!
Maxine Lien, Cynthia Phan, Brendan Ahdoot, Pranav Thirunavukkarasu
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

Get rich quick: Investing carefully to build wealth over time
Jesse Hill, Anthony Helou, Dorothy Luu, Noah Garner
Faculty Mentors: Shonn Vick and Osvaldo Jimenez, Computer Science

GrowME
Antonio Tran, Carmie Mach, Danilo Baledio, Minh Pham
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science
PacAuth: Because “just” a password isn’t enough
Sam Sabetan, Joseph Soares, Race Nelson
Faculty Mentors: Osvaldo Jimenez and Shon Vick, Computer Science

S.P.A.M. Fighting SPAM
John Kim, Alex Pelavin, Michael Myers, Nico Fasan
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

SecureVis
David Samuel, Michael Davis, Steven Melavic
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

TigAR: An Augmented Reality Map Application
Keely Canniff, Jamie Lynn Culilap, Naomi Nunis, Katya Sheth
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

Tiger Boards
Maximo Macchi, Sahibjit Gosal, Nathan Chica
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

Tricking NES games to run on laptops
Maxim Veligan
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

Wow! A Rhythm Game with a Fighting Element?
Jeffrey Wu, Aarondip Singh, Anthony Tran, Shawn Elpuz
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science

The F6 Fix
Mark Fraser, Jillian David
Faculty Mentors: Shon Vick and Osvaldo Jimenez, Computer Science
European & Computer Engineering:

Audio Loop Pedal
Dan Lim, Zech Miller
Faculty Mentor: Rahim Khoie and Cherian Matthews Electrical & Computer Engineering

Augmented Reality Bike Helmet
Ashwin Thiagarajan, Simrandeep Singh, Harnak Singh, Sohil Singh
Faculty Mentor: Rahim Khoie, Electrical & Computer Engineering

BAC App and Breathalyzer Device
Catherine Hsiao, Jason Kerins
Faculty Mentor: Rahim Khoie, Electrical & Computer Engineering

Strawberry Harvesting Robot
Crystal Beltran, Erin Dural, Christian Jemera
Faculty Mentor: Rahim Khoie and Elizabeth Basha, Electrical & Computer Engineering

Topo Drone
Michael Hsueh, Angel Tejada, Eric Nooteboom
Faculty Mentors: Rahim Khoie and Elizabeth Basha, Electrical & Computer Engineering

Engineering Management:

Compaction Test - Sliding Hammer Device
Wesley Gee
Faculty Mentor: Abel Fernandez, Engineering Management

Human Design for Decksweeper Sail of Class A Catamaran
Mackenzie Cook, Stella Rakhlina
Faculty Mentor: Abel Fernandez, Engineering Management
Engineering & Computer Science Senior Project Demonstrations

May 4, 2:30 – 4:00 PM
School of Engineering and Computer Science

Repurpose API with a Mission
Vanessa Villanueva, Jessica Huang
Faculty Mentor: Abel Fernandez, Engineering Management

Veteran Resource Center Renovation and Relocation
Emanual Rodriguez, Jeddidiah Mack
Faculty Mentor: Abel Fernandez, Engineering Management

Mechanical Engineering:

Affordable, Automated Inventory Storage and Retrieval System
Ivy Halog, Tyler Kuhn, Nikaansha Prasad, Trevor Speckman
Faculty Mentor: Kyle Watson, Mechanical Engineering

ASME Student Design Competition: The Pick-and-Place Race
Jeremy Clay, Natalie Giang, Doug Muller, Kevin Nijjar, Tyler Sutherland
Faculty Mentor: Kyle Watson, Mechanical Engineering

Automated, Adjustable Coffee Table/Work Desk
Abdulrahman Alshaker, Jack Dugoni, Ruben Raygoza, Christian Rodriguez
Faculty Mentor: Kyle Watson, Mechanical Engineering

Drone Equipped with Spray Paint Actuating Mechanism for Artistic Pursuits
Gerry George, Avi Graber, Zack Lent, Jesus Leon Calderon, Ivan Reynoso
Faculty Mentor: Kyle Watson, Mechanical Engineering

Electric Wheelchair Attachment
Matthew Lee, Kevin Lei, Kevin Malhiot, Anthony Perez
Faculty Mentor: Kyle Watson, Mechanical Engineering
Fabricating Varying Geometric Wind Turbine Airfoils to Analyze Flutter
Michael Nord, Jacob Ramme, Megan Waller
Faculty Mentors: Kyle Watson, Scott Larwood, Mechanical Engineering

Lifting and Leveling Cabinet Installation Device
Craig Chavez, Benjamin Conger, Brian Popish, William Rymers
Faculty Mentor: Kyle Watson, Mechanical Engineering

“Within Reach” Automated Shelf Lowering System
Emily Harris, Peter Hyatt, Jillian McKenzie, Erica Ramos
Faculty Mentor: Kyle Watson, Mechanical Engineering

World’s First Magnetic Gun Storage Solution
Jeffrey Aube, Alexander Hui, Ryan Woodford, Yuan Zhao
Faculty Mentor: Kyle Watson, Mechanical Engineering
Where Do I Fit?

Daniella Mia Arostigui Cabrera

Faculty Mentor: Jennifer Little

*Where Do I Fit* is comprised of black ink paintings of varying dilutions on Japanese Asarakusui ‘Ogura lace’ paper. These monochromatic ink paintings depict semi abstracted, dream-like representations of cultural symbols from my Basque and Latino cultural heritage. From each culture, I pair comparing and contrasting elements ranging from traditional dance clothing to symbolic animals. The use of translucence allows the subjects to be more hazy, thus representing a sense of uncertainty and an allusion to my memories of moments where these cultural symbols were used to question my place in those cultures. Making these subjects semi-abstracted allows the viewer to create their own narratives and draw their own conclusions on what they are seeing. Though the cultural elements may not be immediately apparent, the emotion tied to those symbols will be interpreted by the viewer through the expressive strokes and the haunting representation of them.

These paired images are a response to moments in my own life where I felt I had to choose between a Latino culture I was raised in and a Basque culture I was trying to adopt. I have always felt like I was never enough of one culture to perfectly fit in, and I feared that if I shared my whole identity, then I would be ostracized by the other culture. This series has allowed me to reflect on how culture plays a role in my identity as a whole and the experience of being in between two cultures. Building a series based on the experiences of being multi-cultural and not knowing where you fit could speak to other viewers who have shared these experiences. These pieces depict experiences of being caught between two very different cultures and trying to find where you can fit.

Compulsion

Rebecca Carlene Cooper

Faculty Mentor: Jennifer Little

*Compulsion* is a comic that follows the life of Nimi, a South Indian-American teenager who also happens to be a superhero. I have been interest in comics ever since I began reading webcomics in high school, and I have loved superheroes since I was old enough to form opinions. As a teenager, frustrated with the lack of representation I was seeing in mainstream media, I turned to independently created webcomics to find representation of marginalized groups. This desire to seek out content with positive representation (specifically LGBT representation) eventually turned into a desire to create content with positive representation of marginalized groups, which then led into the creation of *Compulsion*.

The characters and concepts in *Compulsion* were co-created by myself and my best friend, Maya. When Maya and I initially set out to create the world of *Compulsion* we decided we wanted to make a comic that follows a group of teenage superheroes who do not fit the classic mold of a typical superhero. Our goal with creating *Compulsion* was to represent groups that are underrepresented and to introduce people to identities they may not be familiar with in hopes of encouraging people to be more understanding and empathetic to people who are different from them. Specifically, we wanted to portray LGBT+ people of color in a positive, heroic light.

I made this installment of *Compulsion* by digitally illustrating the comic pages. While there is some initial thumbnailing and sketching done on paper, the majority of the work is done on the computer with a drawing tablet. My hope for the future of *Compulsion* is to continue creating short installments that can eventually be hosted online and published in the future.

The Vocitarium

Jason Jedrick Del Rosario

Faculty Mentors: Jennifer Little, Michael Leonard

The Vocitarium project aims to bring to life alien creatures from far-flung planets, through digital illustration. As an exploration into speculative lifeforms and creature design, the Vocitarium is fueled by both scientific research and unbridled creativity.

The main inspirations for the creature designs in the Vocitarium can be observed all around us. Animals have fascinating lives and appearances.
that serve as a creative fuel for this project. Creatures illustrated in the Vocitarium can range from relatively familiar, borrowing several traits from our own fauna on earth, to completely alien, having characteristics unlike that we have seen yet. For example, the “Skurak (Echovenator nyx)” takes on physical characteristics not unlike that of bats and hyenas, whereas on the flip-side, the “Gladiopod (Terrateuthis gladius)”, has traits that superficially seem mollusk-like in appearance, but are arranged in a way as to appear more alien. Creatures from prehistory are also utilized as inspirations, such as the design of the “Corpsefang (Necrosmilus lanius)” which is heavily inspired by Permian era synapsids and the ice age sabertooth tiger.

My creature illustrations are accompanied by detailed analysis and description of the creature’s size, habitat, and ecological niche. The descriptions and scenes of the creatures interacting in their environments serve to create a clear picture of the alien animals living on alien worlds, with some pieces depicting scenes from the creature’s day to day lives.

**Vanity Planet Advertisements**

**Ashley E. Johnson**

Faculty Mentor: Marie Lee

For my senior project, I created a series of advertisements for the beauty company, Vanity Planet based on the use of a metaphor. Currently, Vanity Planet advertises their products only on social media, with a targeted audience of women, aged 18-25. For my project, I wanted to expand their audience and reach out to a more diverse group of women that I felt were being missed. I strategically added these new ads to specific magazine genres: wedding, parenthood and women’s health. Each advertisement was developed for a particular magazine genre, targeting the population that would likely read the magazine. Thus, an advertisement featuring a baby was created for a women’s health magazine targeting those that may desire more youthful skin. Pearls were used for the wedding magazine. A lion metaphor was selected for a parenting magazine advertisement to suggest simple ideas for busy mothers, who need to “tame the mane”. Clean and simple designs, accentuated by witty yet familiar headlines help to make this little known company more of a household name.

**Closed Mouths Don’t get Fed**

**Jason Ramos Millner**

Faculty Mentor: Jennifer Little

Closed Mouths Don’t get Fed,” is a series that was inspired by my feelings of anxiety and depression as a college student. This series of water color paintings is a message to what me and others have been suffering throughout our time as young adults. Each painting illustrates emotion of sadness, hopelessness, and fearfulness. Just like music, I believe that art is a staple form of expression and is something that should be utilized to speak out on important issues such as this.

Water color is the best medium for this series as the fluidity and looseness of the liquid better translates emotions onto a canvas. Much like how emotions are uncontrollable, watercolor as a medium is as well which is why it is the preferred medium for illustrating my theme.

Ever since I saw the works by young contemporary illustrator Hieu Nguyen, also known as Kelogsloops; I fell in love with his approach to his own artworks. I found his watercolor techniques beneficial to how I want to express thoughts and feelings. His choice of colors and his applications of them was a great influence on what I want to express in my works.

Each painting in my series was meticulously planned out with different water color techniques in mind. I used salt techniques to add textures to the background and I found that lifting the canvas and letting gravity govern where the water color flows is a great way of conveying my overall theme. Allowing the water color to act on its own is a metaphor to how emotions act. I hope these paintings help me to work through these dark emotions in a way that is also cathartic for my viewers.
Senior Art & Design Exhibition – Studio Art - Artist Statements

The World In 207 Pantones

Alicia Muinos

Faculty Mentor: Marie Lee

As a foreigner studying in the U.S., I often find myself with the opportunity to travel at an international level. Traveling is a very active aspect of my life, either for pleasure or for necessity, I fly around the globe an average of ten times a year. Whenever I have the opportunity to jump on a plane, I love to visit new countries and learn about their culture and traditions. From a young age I was introduced to art and immediately took interest in studying art history, which later developed my fascination for finding the monuments and buildings that I had been reading about in school books. Because traveling and photography go hand in hand, I have always had an inclination for photography so as any artist, I do not go anywhere without my camera. As I grew older and started to explore the globe by myself or with friends, I always took it as my mission to capture every little detail of my discoveries so I could later show my mother, who is my biggest supporter for anything I do and a huge influence on my love for art. Something that almost always grabs my attention when traveling are the colors. It fascinates me to walk around a new European city and find all its hidden colors in architecture and nature alike. That is why I chose to compile some of my most colorful images into a booklet. I found it to be an underlying common denominator in most of my photographs and thought it was about time they saw the light.

Tipsy Hippy Wine by Ashbury Cellars

Julia Nguyen

Faculty Mentor: Marie Lee

Tipsy Hippy is a fictitious wine collection by Ashbury Cellars, a winery inspired by the Sixties hippie subculture of San Francisco. The Sixties was all about freedom and expression which inspired the bright, colorful, uplifting design of Tipsy Hippy. Poster artists during the sixties that worked in San Francisco included Victor Moscoso, whose work and color theory was a great influence on the design of Tipsy Hippy. The use of warped, illegible type and bright vibrating colors were a great appeal to the hippie subculture of San Francisco. Tipsy Hippy pays homage to this design technique while appealing to a contemporary audience. The colors of each wine bottle correlate to the flavors and notes of each varietal. I hope that the bright, vivid, design catches the eyes of audiences as they decipher the warped text on each of the posters and wine bottles.

Design Allies

Kaitlyn Nimmo

Faculty Mentor: Marie Lee

Design Allies is intended to support United States military personnel and their families by improving the success of their businesses through visual marketing. It includes a website, infographics, posters, cards, and promotional items to exemplify its potential function, brand, and marketing strategy. Circumstances such as deployment, relocation, and care-giving complicate employment for military families, affecting their quality of life. As a result, many spouses of servicemen have started businesses to supplement their income. Though this is financially beneficial, the struggle of balancing home duties while running an enterprise still exists. Branding, essential to any business model, can be especially difficult for those without training in marketing and design. This presents an opportunity for corporations and design students to relieve pressure by forming “alliances”, which will provide funding, create branding, and develop visual marketing on their behalf.

The strategy for Design Allies is to use visual marketing to encourage corporations, students, and military family businesses to join the organization. Corporations will be asked to fund paid internships, allowing collegiate designers to work for military spouse entrepreneurs at no cost to them. These three audiences will be reached by sending personalized letters to potential sponsors, installing posters in universities, and hosting tabling events with website demonstrations and postcard distributions. Upon joining Design Allies, members receive a gift: Design Allies dog-tags, a t-shirts or a ball cap.
My hope is that this project will promote greater prosperity for military families, provide invaluable internships for students, and establish credibility and respect for sponsoring organizations.

**Choose Green**

**Monica Odeh**

Faculty Mentor: Marie Lee

To encourage eco-awareness and eco-friendly practices, I have created Choose Green, an online advocacy group that connects wholesalers, businesses, and customers.

Many businesses — restaurants in particular — are creating a lot of waste, especially in the shape of styrofoam. To address this problem, Choose Green recognizes and promotes businesses that meet our “green standards,” and use eco-friendly products provided by our sponsor wholesale companies.

Joining Choose Green will help businesses and their customers become more eco-aware. Businesses will be awarded for joining by gaining access to discounted products and advertised benefits. They will be motivated to be part of a bigger voice in taking a step towards minimizing their waste. They will attract a new target audience, the eco-shopper. Overall, this will motivate businesses and consumers to be more eco-friendly, and more specifically to reduce the use of styrofoam.

Choose Green brand’s visual identity is flexible and can be applied in many ways. I have created an app, magazine ads, online advertisements, membership awards, a sample t-shirt and apron. I also designed materials promoting sponsorship opportunities for eco-friendly product companies.

For my app mock-up, I learned to use Adobe XD and created a functioning app prototype. One of the most unique processes I am getting to use in this project is wood burning. The award designs will be etched on wooden blocks with a laser printer. My inspiration for this project came from my own values and the eco-friendly lifestyle I try to live.

As a designer, I have used my skills in typography and communication design to encourage eco-friendly practices.

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**The Perfect Score: A campaign to stop animal testing**

**Chloe J. Read**

Faculty Mentor: Marie Lee

LUSH | 100 is a metaphorical, environmental campaign that prompts consumers to ask themselves if their cosmetics ‘pass the test’ of whether their beauty products are animal cruelty free. This campaign encompasses ten total products consisting of bath bombs, masks, lotions and more with a special edition white-sticker based packaging. This allows the campaign to stand out on the store’s shelves while retaining the brands minimalistic identity standards.

**Can I Touch Your Hair?**

**Danielle J. Thomasson**

Faculty Mentors: Marie Lee, Brett DeBoer,

“Can I Touch Your Hair?” is a photographic series consisting of six 18 x 24-inch portraits of various subjects with ethnic hair. People treat their hair in different ways and there are various types and textures of hair that differentiate us and play a big part in how not only we view ourselves, but how others view us as well. Being African American, I have textured curly hair. I love to find new and interesting ways to style and treat my hair because it is connected to my identity and personality. There have been many misconceptions and stereotypes created about hair, especially ethnic hair. For a long time, it was seen as superior to have straight hair. The straighter your hair, the more you fit in with society. It has been seen in history where people with “different” hair were looked down on and cast aside as inferior individuals. Yet as the years have progressed, Ethnic hair has started to become a positive characteristic within our society. When looking at my work I want the audience to see how ethnic hair can and should be seen on the same level of straight hair. An individual’s hair helps define who they are. Hair can come in all forms, shapes, and sizes. The photographs are shot on white backgrounds to highlight contrast. This distinguishes the individual’s hair and brings it to
Celebration of Life

Leila Cassandra Valencia

Faculty Mentors: Jennifer Little, Daniel Kasser.

Everything around me has influenced what I have become as a person and especially as an artist. Growing up in a traditional Hispanic home has taught me the value of hard work and how to respect all forms of life. Some of my influences include, Keith Haring, Willem de Kooning, and Wilfredo Lam, for their use of line work and variation of colors.

My mediums include painting, printmaking, and drawing. With the use of gestural line work and color I am able to capture certain essences that is influenced by personal experiences and current social issues. My work is a disfiguration of my own reality that is meant to evoke a sense of pleasure and unease. It is an abstract visual representation of vague retinal stimulation that is interpreted by the observer as continuous pareidolia.

Becoming a mother has impacted my work dramatically as it has created a series that strives to simplify a chaotic moment in life. My series deals with unexpected moments in life and the readjustment of school, work, and home life. It is meant to hypnotize, to keep the viewer constantly in wonder of what’s going on as they delve deeper into the layers of movement. The colors and strokes create a sensation of play that tell a story with the use of simplified figures where one is able to create their own story within each image that they see. Abstract thoughts navigate the brush to create an image of what cannot be heard but rather experienced.
10:00

**Flip the Script: Social Media and Communication Competence**

**Benny Huynh**

Faculty Mentor: Qingwen Dong

The rising use of social media in today’s youth raises interesting questions on how the preference and even reliance of a mediated communication channel can affect face-to-face interactions. Digital citizens may develop a different set of communication skills due to the use of social media. Previous research has found a difference in social media usage between genders. Social media seem to also work in conjunction with face-to-face interactions as tools to help build relationships. These platforms seem to supplement the communication that cannot be attained because of specific circumstances, like social distance. Face-to-face interactions are found to be preferred for intimate conversations, whereas social media platforms are preferred for undesired conversations (which were found to be able to ease anxiety and inhibition due to its asynchronous nature). However, there is little research as to what effect these social media platforms have on individuals’ interactions and communication in different social situations (i.e. with friends, with professors, etc.). This research paper focuses on the relationship between social media usage and perceived communication competence. This study intends to utilize a quantitative method to examine how social media usage affects how people interact with others in person and in face-to-face interactions. This research paper also aims to explore how the social media that defines this generation has changed the way people communicate with each other in daily life. This study anticipates either a positive or negative correlation between social media usage and perceived communication competence. This study is expected to see if the data can find a correlation between specific social media and their influence on communication competence.

10:20

**The Curse of Eve: 700 Years of Traditional Misogyny Represented in Roman de Silence**

**Diana C. Medina**

Faculty Mentor: Andreea Boboc

The concept that duplicity comes naturally to women has made an unfortunate resurgence in recent years. Heldris de Cornuaille’s *Roman de Silence* addresses this assertion as early as the 13th century: the romance uses the virtues and complex identity of its heroine to covertly challenge the traditional notion of women’s natural deceitfulness. Between the debates of allegorical characters Nature and Nurture and the foil characters of a willful, lustful queen and a demure countess, the romance employs the adventures an escapist character to argue that while women are often not credited for it, they are capable of achieving the same level of excellence as the best of men. My paper will seek to explore the narrative in light of the misogynistic tradition most prevalent at the time, in order to highlight the revolutionary and empowering nature of the title character, as well as discuss how this tradition has evolved within our own culture.

10:40

**A 4,000-Year-Old Chinese Myth Makes Its Way Back to Earth: a collection of poems**

**Carolyn Tse Lee**

Faculty Mentor: Camille Norton

The Chinese are a people who do not forget their roots. The myth of Chang’e, the goddess of the moon, is widely known by the Chinese as the myth that surrounds the Mid-Autumn festival, the 15th day of the eighth month on the lunar Chinese calendar, where families gather together to eat mooncakes and admire the moon. The story involves an emperor with 10 sons, a god of archery, a lonely woman, and a white jade rabbit. However, its meaning encompasses either betrayal or sacrifice, love or loathing, and wisdom or foolishness—depending on the interpretation, depending on the myth-teller. Chinese mythology is anything but absolute, anything but singular in understanding. My research evaluates the different
endings of the myth, which portray Chang’e as either the unlikely hero or as the selfish and problematic woman. I evaluate and respond to the myth through a group of my own original poems, each poem focusing on the perspective of a different character in the myth. Moreover, my research connects the 4,000-year-old myth to current events. In one poem, I juxtapose America’s Apollo 11’s moon landing in 1969 to China’s rover, Chang’e 4, and its recent landing on the far side of the moon 50 years later in January 2019. Interestingly, both the American astronauts and the Chinese astrophysicists reference the myth of Chang’e. My research explores the immortality of mythology through the lens of poetry, ultimately revealing the beauty of storytelling and its relevance across time and space.

11:00

“Write My Own Checks Like I Write What I Sing”: The Authorship and Independence of Female Singer-Songwriters in the Pop Music Industry

Jennifer Morrow

Faculty Mentor: Jeffrey Hole

This research project examines how, in the male-dominated structures of the popular music industry, narratives about women have been marginalized, ignored, and undervalued. While female pop artists have been understood and appreciated primarily for vocal ability and sexual appeal of the feminine body, men have traditionally occupied the positions of songwriter or producer, further solidifying their authorial role. These patriarchal structures, moreover, wittingly or unwittingly reinforce ideas about women as passive objects or instruments (Green 1994). The category of female singer-songwriter, my research suggests, is, by definition, a contradiction and subversion of traditional gender roles, and this position has been claimed by recent female musicians as a form of rebellion and resistance. In the scope of my research, I focus on how female pop artists have embraced songwriting as a medium for authentic self-expression, and how female authorship within pop music contests the male-dominated structures of the music industry. I examine the compositions and career trajectories of commercially successful women artists of contemporary popular music, starting within popular folk music of the 1960s such as the radically feminine storytelling of Joni Mitchell. I also explore current artists, such as Beyoncé and Ariana Grande, whose music and music videos have not only allowed them to reclaim their personal narratives as women in the entertainment industry, but function auto-ethnographically as social commentaries that represent the frustrations and collective experiences of women within the era of #MeToo.

11:20

Finger on Fast-forward: Transgender Literature and Theory from 1990 to Present Day

Danielle C. Garrett

Faculty Mentor: Jeffrey Hole

Despite the common belief that transgender and other non-binary identities are a recent phenomenon, evidence suggests that they have existed in societies throughout history all across the world. Transgender characters have also appeared in literature for many years, though their roles and how they are portrayed has evolved. Since its origin as an academic field 30 years ago, transgender theory has also experienced shifts in what ideas are being focused on. From the 1993 publications of both Leslie Feinberg’s novel Stone Butch Blues and Sandy Stone’s discussion of the transgender memoir in “A Posttranssexual Manifesto,” trans literature and theory have begun to look past the basic trans origin story and are, instead, focusing on gender as an oppressive construct. This body of scholarship has interrogated how factors such as race and class impact the lives of trans individuals. My research project reflects on the rapid theoretical evolution that transgender studies has experienced by examining works such as Kai Cheng Thom’s magical realist memoir Fierce Femmes and Notorious Liars and Andrea Lawlor’s novel Paul Takes the Form of a Mortal Girl. I argue that these works are illustrative of a theoretical shift in the discipline, what Susan Stryker emphasizes is a move towards examining how gender functions in relation to other institutions such as academia, medicine, education, and media.
12:30

Law and Literature: How U.S. Exclusionary Laws Shaped the Asian American Experience and Literature

Ericka Wong

Faculty Mentor: Xiaojing Zhou

My research critically analyzes the relationship between U.S. exclusionary laws and Asian American identities, social positions, and literature. I argue that U.S. immigration and other laws, which intended to exclude Asians from entering the U.S., and from the U.S. citizenship, produced a unique racial identity and social positions for Asians as the perpetual “foreigners.” This identity and social position shaped not only the Asian American experience, but also literature. I argue that China Men by Maxine Hong Kingston and When the Emperor was Divine by Julia Otsuka are two salient examples of strategic counter-narratives that expose racial exclusion, subjugation, exploitation of Asian immigrants, and call into question cultural assimilation as the right of passage to U.S. citizenship.

12:50

Die schöne Melusine: Mendelssohn's Forgotten Overture

Walter Steven Stedman

Faculty Mentor: Sarah Clemmens Waltz

Felix Mendelssohn-Bartholdy is well known for highly successful concert overtures such as The Hebrides and A Midsummer Night’s Dream, but his fourth concert overture, Märchen von der schöne Melusine op. 32 (The Fair Melusina), has been forgotten. This project investigates the possible reasons the piece was forgotten by examining the score for both quality of composition and of form, contemporary thought in letters pre- and post-premiere, reviews of early performances, secondary literature, and modern concert programming. Die schöne Melusine was the last of Mendelssohn’s fairy pieces, such as A Midsummer Night’s Dream, and his water music, such as The Hebrides, making it related to Mendelssohn’s best known works, yet rather than elevating the piece, it put the piece in a position to be compared. Features of the composition, such as the possible, but unlikely, borrowing of music from Conradin Kreutzer’s opera Melusina, which was the basis of the overture, the lack of a specific program, and the similarities of the water motives to the better known Hebrides, were also examined. The evidence shows that Die schöne Melusine fell to the sidelines of the orchestral performance canon not because of reasons of composition, but because of its lackluster premiere and because the piece was eclipsed by Mendelssohn’s more popular concert overtures. The combination of the overture’s lesser known position with a past trend in musicological research to disregard overtures led to the overture being relatively untouched by research. Die schöne Melusine was a piece that never gained recognition due to circumstances surrounding, but opened the path to ask why this piece, and by extension, other pieces are not performed. The project shows that a good piece of music can fail to take hold simply because it was overshadowed by another, far more popular piece.

1:10

Is Organized Religion Killing Democracy?
An Analysis of How The Presence of Religious Monopoly Within A Country Affects Individuals’ Opinions On Democracy

Erica Feasel

Faculty Mentor: William Herrin

Since September 11th, 2001, Islamophobia in the United States, other “Western” countries, and their allies has been on the rise. More recently, it seems to become even more salient because of the current U.S. administration. Yuchtman-Ya’ar and Alkalay’s “Political Attitudes in the Muslim World” highlights one common premise for disparagement; that Islam is incompatible with democracy. This work studies and expands upon the same premise. It analyzes whether Islam or any other religion that holds a “religious monopoly” within a country affects individuals’ attitudes toward democracy in that country. I analyze data from the World Values Survey as well as economic indicators to help isolate the effects of
religious monopolies on those attitudes. I divide countries into those with a religious majority and those without, and identify whether a majority is a religious monopoly. I also identify the dominant religion in each country with a majority. I expect to find that religious monopoly, no matter the religion, has a negative effect on individuals’ attitudes toward democracy, but I do not expect to find that majority Muslim countries have a significantly more negative effect on individuals’ attitudes compared to other religious monopolies.

1:30

¡Viva La Raza! : The Bracero Program in California’s Central Valley

Katelyn P. Getchel
Faculty Mentor: Laura Gutierrez

2018 Summer Undergraduate Research Fellowship Project

In 1942, at the beginning of World War Two, the American homefront was in crisis. With so many men off at war, no workers were available to pick crops for harvest. What would the American government do? Would crops go to waste? Would the women and children at home starve? Who would pick these crops? To fix this crisis the American government turned to its southern ally, Mexico. Since Mexico as a nation was relatively unaffected by the war, the American government pled its case to its neighbor in hopes of their support. The two governments worked out a deal in which male Mexican workers could obtain temporary work contracts to work in U.S. agriculture and in railroad construction. This program became known as the Bracero Program. While many places all across the United States were affected by the Bracero Program, Stockton was the first city in the U.S. to receive braceros and remained an important city for bracero labor until the end of the program in 1964. In the area, braceros were important for the economy and agriculture, yet no researcher has looked into braceros in Stockton and the Central Valley. Researchers have focused on regions closer to the U.S.-Mexico border, but the Central Valley has become forgotten history. This past summer I filled the research gap and have answered the following questions: What was the typical life of a bracero here in Stockton? How was the bracero experience shaped? What contributions did braceros make to the local area?

1:50

Chirality-Induced Systematic Gas-Phase Acidity Alternation of Cysteine Polyalanine Oligopeptides

Joshua Simon Ho

Faculty Mentor: Jianhua Ren
Graduate Student Mentor: Yuntao Zhang

This research endeavor investigates the effects of chirality change on the structures and acidities of cysteine polyalanine oligopeptides in the gas-phase. As the building blocks of proteins, amino acids are small chiral compounds (with the exception of glycine) in which L- and D-enantiomers exist. Forty years ago, scientists still believed that only L-amino acids had effects on biological processes in animals, humans, and nature. However, with further research, D-amino acids have shown to have significant impacts on biological functions. As a distinctive example, myriad studies have demonstrated increased levels of D-amino acids in the brains of patients diagnosed with Alzheimer’s disease. Although much research has been completed on D-amino acids, this field is widely unexplored. One of the major obstacles is the lack of understanding of how D-amino acids affect the conformations and chemical properties of peptides, which is examined in this project.

In this project, the gas-phase acidities of designed peptides were determined experimentally and theoretically. To experimentally determine the relative acidity of the peptides with the D-amino acid compared to its L-analog, a charged dimer between two peptides were formed and dissociated. The peptide that more likely takes the charge is the more acidic compound. To examine why one peptide is more acidic, computational studies were performed to obtain the structures and energies of the peptide species using molecular modeling.

Experimentally, in this Ac-CAA series, changing the chirality of the alanine closest to the N-terminal
cysteine resulted in the least acidic tetrapeptide. Congruent results were obtained from theoretical studies; the decreasing acidity trend is as follows: Ac-CAA^{D}A-NH_{2}, Ac-CA^{D}AA-NH_{2}, and Ac-CAAA-NH_{2}, with their gas-phase acidity values of 321.5, 323.6, and 324.7 kcal/mol, respectively. The elongated hydrogen bonding in peptides with the D-alanine closer to the N-terminus provides less stabilization of the charge and decreases the acidity.
**Poster 01B**

**Growth vs Reproduction in Female Túngara Frogs**

Grace Song

Faculty Mentor: Marcos Gridi-Papp

Túngara frogs have indeterminate growth and face a tradeoff between allocating resources to growth or reproduction. Females can invest in producing more viable eggs or growing. Based on patterns described for other amphibians, I hypothesized that large female túngara frogs would invest relatively more in producing viable eggs and tadpoles than small females. I also hypothesized that intermediate aged túngara frogs would produce more viable eggs than other age groups. To test these hypotheses, we bread a colony of captive frogs and recorded female size and number of tadpoles produced. Each trial lasted 2-3 days and 12 pairs (male + female) were placed to breed in 1 liter acrylic boxes covered with a mesh lid. In the box we gave the frogs reconstituted, deionized water and a ramp in case they wanted to come out of the water. Following data collection, we analyzed how the age and size of the female túngara frog influenced the number of tadpoles produced. A preliminary analysis of data collected over a year and a half revealed that larger female túngara frogs produce more viable eggs and therefore produce more tadpoles. Females of intermediate age produced the most eggs in general, regardless of body size. This suggests that large females of intermediate age are in best condition for reproduction.

**Poster 02B**

**Implications of Rising Temperatures on the Larval Development of the Túngara Frog**

Aleena Khan, Felicity Bao

Faculty Mentor: Marcos Gridi-Papp

As climate change continues to raise temperatures in subtropical regions of Central America, it is important to determine the developmental effects of temperature on the native species of those habitats, such as the túngara frog. The túngara frogs’ optimal temperature for growth has been coarsely estimated to be 28.8 °C. The purpose of this experiment was to refine the optimal water temperature estimate for the growth of tadpoles and quantify their performance at nearly optimal temperatures. We grew tadpoles from eclosion up to metamorphosis at 27, 28, 29, 30 and 31°C. We distributed six broods of tadpoles into five tanks with each tank receiving five tadpoles from each brood. The water in each tank was maintained at a constant temperature using a heater and a thermostat. All tadpoles were provided the same amount of food and vitamin supplements. Within each tank, individuals were grouped by brood in acrylic containers which were siphoned daily to remove feces and residual food. The water in the tanks was replaced as needed based on monitoring of pH, free ammonia, and water hardness. Biometrical data were collected daily throughout the development of the tadpoles using photographs. After metamorphosis, all tadpoles from each tank were counted for survival, preserved in formalin, and individually weighed. Additionally, all photographs of the tadpoles were analyzed using ImageJ to provide snout-to-tail (STL) and snout-to-vent (SVL) lengths of each tadpole. The results are being analyzed to identify the treatment in which tadpoles grew largest and fastest. The optimal temperature and the rate of decline in performance at higher or lower temperatures are being estimated, taking into account the development rate of tadpoles at all tested temperatures. These results can influence the raising of tadpoles of subtropical frogs and inform their thermal vulnerability to climate change.

**Poster 03B**

**Changes in plasma proteins and metabolites during fasting in elephant seals**

Reeti Banerjee, Anna Chang-Chien, Serena Ly

Faculty Mentor: Jane Khudyakov

Graduate Student Mentor: Jared Deyarmin

Northern elephant seals undergo prolonged fasting periods on land that are associated with activities such as molting and reproduction, which are energetically expensive and may increase oxidative damage to tissues. The goal of this project was to identify changes in the plasma proteome of adult
females during their molting fast and to determine whether markers associated with oxidative stress change during fasting. We first evaluated the effectiveness of two methods to eliminate the most abundant proteins in elephant seal plasma, such as immunoglobulins, transferrin, and albumin, in order to enrich for low-abundance proteins of interest for proteome sequencing. We found that ProteoMiner low-abundance peptide enrichment kit removed significantly more proteins than Top12 immunodepletion kit and resulted in more unique proteins identified by LC-MS/MS. We then compared the plasma proteomes of female seals early and late in their molting fast. We used AmplexRed colorimetric and fluorometric assays to measure abundance of byproducts of purine metabolism, such as xanthine, hypoxanthine, and uric acid, which are associated with oxidative damage and stress in mammals, in plasma of females seals sampled early and late in their molting fast. The assays were tested on the Qubit fluorometer as well as spectrophotometer. While the xanthine and hypoxanthine assays were not successful, we found that levels of uric acid increase over fasting, and we predict that they will also increase in response to stress in elephant seals. These are the first studies to describe the plasma proteome and measure uric acid in fasting elephant seals.

Poster 05B
Identification of a late acting gene in the hormogonium gene regulatory network of Nostoc punctiforme
Shadi Kurnfuli, Marvin HonJun Kweon
Faculty Mentor: Douglas Risser

*Nostoc punctiforme* is a filamentous cyanobacterium which forms nitrogen-fixing endosymbioses with several different plants and fungi. In order to establish such interactions, the cyanobacterium differentiates into hormogonia, motile filaments driven by a modified type IV pilus-like system which may also secrete polysaccharides that are essential for gliding. The goal of this project is to identify the genes controlling the differentiation of *N. punctiforme* using a transposon mutagenesis screen. An in-frame deletion of a gene identified using this screen was created to further understand the role it played throughout the differentiation process to motile filaments. The resulting mutant strain displayed hormogonium differentiation but lacked motility, which suggests this gene acts at a late stage of development.

Poster 05C
Characterization of HmpF, a novel component of the Hmp chemotaxis-like system that controls cyanobacterial motility
Thomas V. Harwood III
Faculty Mentor: Douglas Risser

2018 Summer Undergraduate Research Fellowship Project

Many species of filamentous cyanobacteria exhibit gliding motility, likely via a conserved type IV pilus (T4P) system arrayed in rings at the cell poles. This motility facilitates a variety of biological processes including phototaxis and the establishment of nitrogen-fixing symbioses with plants. In the model filamentous cyanobacterium *Nostoc punctiforme*, the activity of the T4P system is thought to be regulated by two chemotaxis-like systems, the Hmp system, and the Ptx system. The Hmp system is essential for motility, and the Ptx system is required for positive phototaxis, however, the precise nature in which these systems interact with the T4P motors to regulate motility is currently unknown. Recently, HmpF, a novel component of the Hmp system was identified and characterized. HmpF is an SMC-like protein that is essential for motility, and displays dynamic, coordinated, polar localization at the leading poles of cells in motile filaments, suggesting it could be interacting with the polar T4P motors to activate motility. To more precisely define the role of HmpF in motility, its localization is currently being investigated in various genetic backgrounds. Preliminary results indicate that HmpF is not interacting exclusively with any of the three T4P motor ATPases: PilB, PilT1, or PilT2, and that the coordinated polar localization of HmpF is established by the other components of the Hmp system. Furthermore, dynamic localization of HmpF in response to temporal changes in light requires the Hmp system, but not the Ptx system.
These results indicate that HmpF may not interact directly with components of the T4P system, and that there may be additional light sensing systems contributing to dynamic localization of HmpF in response to light, but that these systems may act cooperatively with, or upstream of the Hmp system.

Poster 06B

Acoustic Isolation of Calling Túngara frogs

Yun Jae Min

Faculty Mentor: Marcos Gridi-Papp
Graduate Student Mentor: Kelsi Navalta

Advertisement calling is a crucial factor in reproductive success for most male frogs. In our colony of túngara frogs, calling males are available daily for the study of the environmental factors that influence male signaling. Such study requires acoustic isolation of the males by an attenuation barrier of at least 60 dB, which can be challenging to achieve at their calling range (500-5000 Hz).

Previous tests have shown that boxes with four layers of soundproofing cellulose and plywood are insufficient in isolating the calls of male túngara frogs. Thus, we constructed nine-layered sound isolation boxes out of three alternating materials: five-layer plywood, mass loaded vinyl (MLV), and cellulose fiber, selected because of their sound-insulating properties. Each box is 58 cm long, 34 cm wide, and 38 cm tall, provides for sound-attenuated ventilation, cabling for electronics and an internal free space 30.1 x 12.5 x 20.5 cm, and is capable of a minimum sound attenuation of 60 dB in the 300-5000 Hz range. For testing, a single male túngara frog is placed inside the sound attenuation box. Because male túngara frogs call in alternation when they hear each other, we can play calls at a constant rate outside the box and compare the responses of the study subject having its isolation box closed or open. If the male túngara frog’s call alternation is absent with the box closed, we can assume that the isolating box is effective at blocking the external sound. Our preliminary data show that the male frog did not alternate its call with the recording. These isolation boxes will thus support a series of studies on male signaling mechanisms in our lab and further elucidate the strategies of male calling in frogs.

Poster 06C

Regulation of the Unfolded Protein Response by GADD34 and CReP

Louis Chen, Johnathan Ha, Jisoo Kim, John Lee, David Lotfizadeh, Ivy Lu, Jason Tran, Diana Wong

Faculty Mentor: Douglas Weiser

The endoplasmic reticulum (ER) regulates and processes one third of the proteins synthesized in eukaryotic cells. Failure to maintain proteostasis — homeostasis of proteins — results in accumulation of unfolded proteins in the ER, which is also termed as ER stress. In response to this stress, cells will activate the unfolded protein response (UPR), triggering downstream events such as the attenuation of protein synthesis, increase in chaperones and degradation of unfolded proteins. CReP (Constitutive Repressor of eIF2α Phosphorylation) and GADD34 (Growth Arrest and DNA-Damage Inducible) are the two major regulators of protein phosphatase 1 (PP1) that inhibits the UPR. For our research, we used zebrafish as a model of the role of GADD34 and CReP in UPR signaling. Other work in the Weiser lab has shown that mRNA levels of GADD34 and CReP are dynamically regulated by ER stress. We set out to determine if protein levels are also regulated by stress signaling. We set out to produce novel polyclonal antibodies to zebrafish GADD34 and CReP. In addition, we have been conducting co-immunoprecipitation experiments to determine if zebrafish GADD34 interact with PP1 and eIF2alpha, their primary cellular targets in mammals. These experiments will provide us with a better biochemical understanding of regulation of UPR in zebrafish.
**Poster 07B**

**Triggers of Egg-Laying: Does Mating Call Attractiveness Matter?**

Jenica Emerson

Faculty Mentor: Marcos Gridi-Papp

**2018 Summer Undergraduate Research Fellowship Project**

Previous studies in our lab have shown that túngara frog females will oviposit when stimulated with the conspecific male call. The male túngara frog call consists of two components: an obligatory whine that starts at 1000 Hz and sweeps down to 400 Hz and an optional note called a chuck. The whine is necessary for species recognition and can trigger oviposition. The addition of the chuck increases female attraction in phonotaxis experiments but has not been tested as a trigger for oviposition. Here we test if the addition of the chuck to the whine increases the rate of acoustically induced oviposition. Twelve females at a time were individually placed into acrylic boxes with reconstituted, deionized water and a plastic ramp. Each of these smaller boxes was placed in a ventilated, sound-attenuating box containing a loudspeaker. The treatment stimuli consisted of 1) the conspecific whine only or 2) the conspecific whine+chuck. Out of the females confirmed to be reproductively ready, 9 of 30 (30.0%) exposed to the whine stimulus oviposited while 7 of 32 (21.9%) exposed to the whine-chuck stimulus oviposited. A chi-square test shows the difference between the effects of the two call stimuli to be insignificant (p = 0.465). These results are in sharp contrast with experiments on mate choice, which have revealed strong and consistent female preference for whine+chuck over whine only. This indicates that the control of sexual behaviors and reproductive readiness may share the brain circuits that support species recognition but not the ones that support intraspecific preferences.

**Poster 07C**

**Male Influence on Oviposition in Túngara Frogs**

Nikki Parikh

Faculty Mentor: Marcos Gridi-Papp

In túngara frogs, males can be distinguished from each other by variation in traits such as age and size. This provides a basis for sexual selection by females through mate choice. The purpose of this experiment, however, was to determine if any male traits can affect the chances of oviposition and to what extent. Within our colony of túngara frogs, we control breeding by placing one male and one female into an acrylic box with a mesh lid. The boxes contain reconstituted, deionized water as well as a ramp, which is half inside and half outside of the water. In this study, 12 boxes, each containing a pair, were set up during each experiment. After 2-3 days, each box was inspected for eggs, and the animals were returned to the colony. We are currently analyzing the results to determine if age and size of the male frog influenced oviposition. Túngara frog females are known to prefer larger males over smaller males. Thus, small males may also have a smaller chance of inducing oviposition. Age of the male could affect mating success directly or indirectly, as frogs have indeterminate growth, and therefore, older males tend to be larger than younger ones. In addition to the induction of oviposition, we are also analyzing the number of viable offspring produced. These results can provide insight into the factors that affect oviposition and fertilization success.

**Poster 08B**

**Broadening host breadth in Adelpha butterflies from Costa Rica**

Connor P. Soderstrom, Rylie E. Towne

Faculty Mentor: Ryan Hill

Insects comprise about 70% of terrestrial organisms and have vital ecological roles. The sheer diversity of insects makes it difficult to understand details of their biology. For example, Lepidoptera have important interactions with their hostplants which help explain their diversification.
patterns. However, these insect-plant interactions require focused efforts to uncover given the ~160,000 lepidopteran species, and >390,000 vascular plant species. This can also be observed in Adelpha, a highly diverse genus of brush-footed butterflies (Nymphalidae) found throughout the western hemisphere which contains more than 200 species and subspecies. Studying the relationship between Adelpha and their larval hostplants can provide insight on how such diversity evolved. The large diversity in Adelpha is hypothesized to be a result of their relationships with larval hostplants, whether it is due to adaptation to plant families such as the coffee family (Rubiaceae), or the chemical protection (i.e. unpalatability) provided by such plants. Previous work on Adelpha host breadth made it possible to test this in a relatively coarse-grained way, focusing on Rubiaceae, but recent data identifying additional commonly used families can improve resolution. Our goal here is to summarize recent fieldwork results by our lab focused on Adelpha host breadth in Costa Rica. Although northwestern Costa Rica is arguably the best studied area for host-insect interactions in the Neotropics, focal efforts on Adelpha in other parts of Costa Rica have produced >850 new records across 18 families, 32 genera, and 40 species of plants. This effort has documented two new hostplant families, three new genera, and eight new hostplant species for Adelpha, with 16 new host-butterfly interactions in Costa Rica, as well as the discovery of previously undescribed immature stages for three species. Together, these data will provide a clearer picture of diversification in one of the most diverse lineages of Nymphalidae.

**Poster 08C**

**Characterizing the cellular composition of blubber tissue**

Eileen Abdollahi, Adriana Chan, Ayesha Soni, Alicia Stephan  
Faculty Mentor: Jane Khudyakov  
Graduate Student Mentor: Laura Pujade Busqueta  
Blubber is a specialized type of subcutaneous adipose tissue found in marine mammals. It contains an outer layer that is used for thermoregulation and an inner layer that is used for energy storage. Due to their different functions, we predicted that inner and outer blubber also have different structure and cellular composition, but this has not been examined in our study species, the northern elephant seal. We used histology and cell culture techniques to examine the characteristics of elephant seal blubber tissue. We embedded inner and outer blubber samples in paraffin, sectioned them, and stained the sections with hematoxylin and eosin. We identified slight differences in the histological features of the blubber layers. The outer blubber consisted of larger unilocular adipocytes that were uniform in size. The inner blubber contained more blood vessels and adipocytes that were smaller and more heterogeneous in size than outer blubber, as well as fibroblast cells. We also isolated fibroblasts from outer blubber samples and grew them in culture using standard methods to evaluate their potential for in vitro studies of elephant seal physiology. We characterized the replicative lifespan of elephant seal fibroblasts by passaging them over 12 times and examining their morphology and expression of senescence-associated beta-galactosidase. We did not find increased expression of the senescence marker at later passages despite slowed growth rate. We also developed karyotyping procedures to determine whether chromosomes change with increasing passages. Lastly, we attempted to immortalize seal fibroblasts by overexpressing an oncogene and green fluorescent reporter (GFP) plasmids and obtained stable GFP expression for 16 days. Our studies are the first to describe elephant seal blubber morphology at cellular detail and characterize replicative behavior of blubber-derived fibroblasts in culture.

**Poster 09B**

**Sage Advice: Don't Let Energy Development Impede Bird Reproduction**

Kevin Xu, Sweta Kumar, Long Dang, Michelle Ma  
Faculty Mentor: Stacie Hooper  
The Greater sage-grouse, Centrocercus urophasianus, relies heavily on acoustic signals to coordinate mating and woo females. In the early spring, males go to group display areas called leks in the hopes of attracting mates and produce
complex acoustic displays. Females use these sounds to lead them to leks and to find a suitable mate. A candidate for listing under the Endangered Species Act, Greater sage-grouse populations have been declining steeply in areas with energy development activities. The purpose of this project was to investigate how disturbance from natural gas extraction activities affects nesting success and activity at leks, using geographical datasets from the Pinedale Anticline Project Area of Wyoming in 1998 and 1999. Based on previous experiments, we hypothesized there would be a negative correlation between an increase in human activity and nesting success or lek attendance (Blickley et al., 2012). In order to test this hypothesis, we used ArcMap GIS software to measure the distance between 10 randomly chosen leks and nests and adjacent natural gas wells in 1998 and 1999 to see if an increase in well proximity (and presumably human activity and noise levels) affected lek attendance or nest success. The results of this study will help us better understand the impacts of energy development on the breeding habits of the Greater sage-grouse.

**Poster 09C**

**A Bioacoustic Analysis of Humpback Whale Social Calls**

Cheryl Chang, Serina Chen, Yasmin Desai, Adrian Lee, Riddhi Patel, Shayla Tran,

Faculty Mentor: Stacie Hooper

Humpback whales, *Megaptera novaeanglia*, primarily use acoustic signals rather than visual signals for communication because sound travels further than light in their marine environment. Studies of humpback whale vocalizations have focused on male song during the breeding season; however, both males and females produce an acoustically complex variety of calls and sounds. Despite years of study, we still know relatively little about the vocal repertoire of humpback whales (Dunlop et. al., 2007). Some humpback whales perform a cooperative foraging behavior called bubble net feeding, whereby a group of whales work together to herd fish to the surface using curtains of bubbles and loud vocalizations. Known as food calls, these vocalizations likely disorient the fish to facilitate their capture (Hanser, 2009). In addition to food calls, the whales produce social calls during this behavior; we hypothesized that social calls produced following a series of food calls may be used to synchronize feeding behavior. We therefore expected to find distinctive call types produced just prior to surfacing by the whales, when feeding begins. To test our hypothesis, we obtained underwater recordings of humpback whale vocalizations produced during bubble net feeding in the Gulf of Alaska (Hanser, 2009). We used the program Audacity to display the recordings and identify the call sequences, then had three volunteers visually categorize spectrograms of the social calls by type. We confirmed call types by collecting quantitative spectral and temporal measurements from sequences using Praat sound analysis software. Both methods identified what we have called Type 2 as the most probable call type to occur just before the whales surface to feed. The results of this work should help us better understand how humpback whales coordinate this extraordinary group feeding behavior.

**Poster 10B**

**Identification of genes required for typical hormogonium motility and cell morphology in the filamentous cyanobacterium Nostoc punctiforme.**

Jason Matthew Phen, Veronica Phen

Faculty Mentor: Douglas Risser

The goal of this project is to identify the genes essential for motility in the filamentous cyanobacterium *Nostoc punctiforme*. *N. punctiforme* has cells that can differentiate into hormogonia, motile filaments which can perform phototaxis, facilitate dispersal, and lead to the establishment of nitrogen-fixing symbioses with plants and fungi. Transposon mutagenesis identified several genes as essential for normal motility. With light microscopy, we observed that the in-frame deletion of one of these genes resulted in a more cocccoid cell morphology, compared to the orthodox bacillus-shaped cells. The time-lapse microscopy showed a slower motility than the wild type. This data supports a model where the gene of interest is required for normal hormogonium morphology, and that in turn, this morphology is essential to robust motility.
Poster 10C

**Regulation of GADD34 and CReP mRNA Expression in the Unfolded Protein Response**

Krithika Giresh

Faculty Mentors: Doug Weiser, Lisa Wrischnik

The failure to balance protein synthesis, folding, and degradation in the endoplasmic reticulum (ER) leads to the accumulation of unfolded proteins, leading to ER stress. Cells respond to ER stress by activating a stress response signaling pathway known as the Unfolded Protein Response (UPR). The UPR induces phosphorylation of eIF2α (Eukaryotic Initiation Factor 2) to attenuate global protein synthesis, allowing for a chance to clear misfolded proteins. This function is opposed by eIF2α phosphatases, which contain a catalytic subunit, Protein Phosphatase 1, and a scaffolding protein, either GADD34 or CReP. Inhibition of eIF2α phosphatases has shown to promote survival in cell types by prolonging the effects of the UPR. Despite the considerable clinical interest in eIF2α phosphatase inhibiting drugs, much is unknown about the mechanism of action of GADD34 and CReP. Zebrafish are an ideal model for this research because they are a good mimic of what happens in humans, and provide the ability to shut down or activate GADD34 and CReP in different tissues at different stages during ER stress and its recovery. Understanding the gene regulation of GADD34 and CReP can be done by observing the changes in gene expression in zebrafish embryos after the induction of ER stress. Primers for the genes of interest (BIP, CHOP, GADD34, and CReP) were designed to test for changes in levels of gene expression. The 24hpf (hours post fertilization) zebrafish embryos were treated with tunicamycin, thapsigargin, and salubrinal to induce ER stress and DMSO for a negative control for 4 and 24 hours. The RNA was purified from the treated embryos to perform quantitative PCR (qPCR) to look at changes in gene levels to understand when eIF2α phosphatases are active.

Poster 11C

**Zebrafish Rho kinase is required for proper midline development**

Skyler Chu

Faculty Mentor: Douglas Weiser

The non-canonical Wnt (wingless/integrated) planar cell polarity pathway (PCP), present in vertebrates and insects, is a highly conserved biochemical pathway involved in gastrulation, cell motility, cell polarity, and cell shape. Defects in upstream targets, such as Frizzled, have been shown to result in a variety of physical abnormalities in organogenesis, including cleft palate formation. The purpose of this project is to determine if Rock (Rho-associated protein kinase), one of the proteins present in the PCP pathway, is required to establish proper midline structure in zebrafish (Danio rerio). As a downstream target, Rock is implicated in being involved with orofacial cleft formation, however, no definitive confirmation has been given and further testing is required. In this study, I used morpholinos complementary to Rock mRNA to inhibit the production of Rock protein. A morpholino is a short oligomer with DNA or RNA bases attached that are able to bind to complementary mRNA transcripts at ribosomal initiation sites or splice sites and prevent translation or splicing respectively. The zebrafish embryos were injected with Rock morpholino during the 1-4 cell stage, and then fixed at the bud stage (about 10 hours post-fertilization). The resultant phenotypes were observed using in situ hybridization and recorded. Furthering our understanding of the PCP pathway and Rock’s role in the development of biological defects like orofacial clefts is key in finding methods of prevention.
Bloodfeeding Patterns of Culex tarsalis and Culiseta incidens in San Bernardino County

Anusha Murshed, Nuha Haque, Kristina Vu, Kimberly Narciso, Justine Beyer

Faculty Mentor: Tara Thiemann

Culex tarsalis and Culiseta incidens mosquito species are known vector species for West Nile virus (WNV) and St. Louis encephalitis virus (SLEV). Analysis of mosquito blood meal samples of both Cx. tarsalis and Cs. incidens can help identify their blood feeding patterns. Mosquitoes are biological bridge vectors in spreading these diseases to other species, including humans. In 2017, there were more than 2,002 cases of WNV reported in the United States, and since the first report of WNV in 1999, there have been cases in 48 states, making it the most common disease spread by mosquitoes in America. Throughout 2010-2012, 192 mosquito samples were collected in San Bernardino County, CA by three different traps: CO2 collections, gravid traps, and resting traps. These mosquitoes were stored at -80°C Celsius. The blood meal DNA from these samples were extracted and then amplified through a nested polymerase chain reaction (PCR), which targeted the barcoding region of the cytochrome c oxidase I (COI) gene. The PCR products were sent in for sequencing and the species fed upon were identified through the online database Barcode of Life (BOLD). Studying the feeding preferences of these mosquitoes gives insight into the pattern of transmission and the behavior influencing the feeding pattern which can help prevent the spread of WNV and SLEV to human populations. Once the mosquito samples are analyzed, trends regarding the location and habitat of the hosts can be identified, leading to a better understanding of the transmission of these diseases.

Wat-er the Effects? How River Proximity and Season Affect an Insect Community

Alyssa Bonfoey

Faculty Mentor: Zachary Stahlschmidt

Water is an essential resource for any animal community. Permanent water sources (e.g., rivers or lakes) allow animals to access water in the absence of sufficient precipitation, and precipitation is expected to become increasingly scarce in many global regions. Thus, my research aims to understand the importance of a permanent water source to the dynamics of an insect community, and whether the effects of proximity to a water source change across seasons that greatly vary in precipitation--from 0.1 cm to 8.7 cm of monthly precipitation. To address these aims, pitfall sampling was performed along a portion of the Calaveras River in Stockton, CA during fall (October) and winter (January), and future sampling is planned for spring (April) and summer (July). Traps were positioned along 10 transects 50 m apart, and traps on each transect were placed from 0 m up to 50 m from the river. Traps collected insects over 5 d periods, during which ground temperature was also determined at each set of traps via temperature data loggers. After collection, insects were identified to family, and the wet and dry mass of the insects found at each sampling site were determined. These data will be used to determine how season and proximity to a water source affect temperature, and the abundance, diversity, richness, and biomass of an insect community. After sampling in the spring and summer, my research will provide new insight into the complex role of water availability in the community dynamics of an important animal taxon.
**Poster 13A**

**Can CRISPR Improve the Protein Secretion of Pichia pastoris**

Joyce JiHae Choi, Caroline Chou

Faculty Mentor: Geoff Lin-Cereghino

*Pichia pastoris* is a methylotrophic yeast that is widely used for protein expression, such as vaccines, anti-cancer proteins, and rheumatoid arthritis treatment proteins. Previously, the lab isolated a mutant strain called bgs13. It was assumed that the strain was a knockout; however, it was not. In this mutant, the bgs13 gene sequence was changed, and a modified protein was still being made that had kinase activity. The mutant had a lower than normal kinase activity and was a super secretor, meaning it was able to secrete increased levels of beta-galactosidase and other proteins.

Our goal is to make a true knockout of bgs13 and observe its effect on the secretion levels of reporter proteins. We have attempted to abolish kinase activity by making a knockout with CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats), which targets the bgs13 gene in our studies. Having performed CRISPR, we are using colony PCR and sequence analysis to confirm that we have a strain in which the bgs13 sequence is edited to create an actual knockout. If we cannot isolate such a knockout strain, this would suggest that the bgs13 gene is necessary for survival. Thus, by searching for true knockouts of bgs13 with these methods, our results will help us figure out whether the bgs13 gene is essential for survival or can be knocked out to provide high levels of secretion.

**Poster 13B**

**Can potential mutant strains of the BGS13 gene lead to supersecretion of Pichia pastoris?**

Huy D. Nguyen, Michelle Hahn

Faculty Mentor: Geoffrey Lin-Cereghino

*Pichia pastoris* is a yeast used for expressing recombinant proteins and products such as antibiotics. *Pichia pastoris* is good at secreting certain proteins which is crucial because secreted proteins are easier to purify than intracellular peptides. Our lab has previously isolated a mutant strain of the BGS13 gene that is known to be a supersecretor. This strain is able to secrete elevated levels of B-galactosidase and other reporter proteins. The BGS13 gene encodes a kinase that is believed to be involved in cell wall integrity. Our goal is to see if BGS13 mutants with different localization or protein kinase C (PKC) activity lead to a supersecretion. We used site-directed mutagenesis to generate two new versions of the BGS13 protein and analyzed the effects of the mutations on their localization using fluorescence microscopy and on their PKC activity using an ELISA based assay. Our results can be used in future experiments to create strains with increased secretion of different proteins.

**Poster 13C**

**Optimization of Expression of Basic Fibroblast Growth Factor in Pichia pastoris for Oral Wound Healing**

Nadia Amer, Tou Vue, Colwin Yee

Faculty Mentor: Geoff Lin-Cereghino

One of the biggest downfalls of oral surgery is the long healing process, usually accompanied by a lot of pain. Our research aims to introduce a method of recovery that involves injecting a microbe into the oral cavity at the site of injury. We are working with *Pichia pastoris* in order to have it produce and secrete a recombinant human basic fibroblast growth factor (bFGF) that stimulates cellular growth. The purpose of our research is to see if yeast *Pichia Pastoris* can secrete recombinant proteins under mammalian tissue environment and to figure out which components in the medium: Fetal Bovine Serum (FBS) and/or Penicillin Streptomycin (P/S) promote greater protein expression in *Pichia*. The second part of our research focuses on the effects of mutations in the Mata gene, which is on the secretion of bFGF in *Pichia pastoris*.

Secretion of GFP in *Pichia pastoris* under yeast culture medium (BMDY) and human culture medium, Dulbecco’s Modified Eagle Media...
(DMEM), along with the components tested such as FBS and P/S, were compared through a Full Western. Site directed mutagenesis was used in order to create mutant strains of *Pichia pastoris*. The amount of bFGF secretion for each mutant strain was quantified through a Spot Western blot. The results indicate that *Pichia pastoris* can secrete proteins under medium mimicking mammalian tissue environment. Fetal Bovine Serum was found to be the component that increased protein secretion the greatest. The deletion of amino acids Δ 35-43 in the Matα secreted greater amounts of bFGF as compared to the wild type, super-secretor strain of *Pichia pastoris*. Further research still needs to be conducted to be able to put this research into practical use.

**Poster 14A**

**Phylogenetic analysis of Corydoradinae catfish for the evolution of venom glands**

Youyoung Min, Nancy Seo

Faculty Mentor: Eric O. Thomas

*Corydoras* is a genus of freshwater catfish widely distributed throughout South America. They, along with other species in the group Corydoradinae, can be divided into nine separate lineages. Catfish of the Corydoradinae are known to release toxic chemicals from venom glands when under captivity or stress. Our objective is to examine specimens from the different lineages to find the venom glands, and describe their location, appearance and variability between species. Representatives of eight species were examined. Fish were euthanized, then dissected to expose the area where venom glands are believed to exist. Tissues were examined visually and under dissecting microscope to identify the glands and discern their shape, color and size. In *Corydoras* sp. C020, large obvious venom glands were found under the body wall armor, posterior to the pectoral girdle. The glands were oval to round, relatively flat, and colored a dark reddish brown. These were similar to glands found previously in *Corydoras sterbai* and *Corydoras duplicareus*. These three species are all members of the same lineage. Glands were not found in species from three other lineages. This suggests that large venom glands evolved within the Corydoradinae and that the glands are not an ancestral trait shared by all nine lineages. Future work will include examining more species from the remaining lineages to determine at which point venom glands developed among the cory catfish.

**Poster 15A**

**Regional Variation in Childhood Malnutrition Associated with Staple Food Consumption: Evidence from Uganda**

Caroline Kendra Styc

Faculty Mentors: William Herrin, Michelle Amaral,

This work follows from Amaral et al. (2017), who use three waves of the Uganda Living Standards Measurement Survey (LSMS) to demonstrate that consuming rather large amounts of nutritionally deficient staple foods is associated with stunting and, to a lesser extent, wasting in young Ugandan children. Moreover, this lack of dietary diversity has a larger effect than food insecurity, defined as not having enough food, on malnutrition. Recognizing regional differences in staple food consumption patterns due to ethnic, cultural, and climatic differences, this work tests if the relationship between staple food consumption and childhood stunting varies regionally. Adding a fourth wave of LSMS data and using the Amaral et al. model, which estimates the odds of stunting with logistic regression, preliminary results suggest that regional differences exist, and that these differences may be driven by a few specific staple foods. Also, adding the additional year of data shows that food insecurity has grown to be more important in Uganda. Finally, mapping different staple food consumption patterns to different regions is imprecise; the lack of robustness in some of the preliminary estimates across different model specifications confirms this. Consequently, a broad array of different specifications is required to convey the regional differences of stunting in young Ugandan children.
Poster 16A

Structures and Energetics of B- and Y-Ions in Peptoid Fragmentation

Joshua Simon Ho

Faculty Mentor: Jianhua Ren
Graduate Student Mentor: Yuntao Zhang.

In this research enterprise, the conformations and energetics of fragments from multiple peptoids were investigated using high-level computational methods. Peptoids are a new class of man-made polymers that mimic the structure and function of peptides, which are the building blocks of proteins. Unlike peptides, peptoids are not susceptible to degradation by proteases, due to their vital, minor structural differences with peptides and the high specificity of protease proteins. Its rigidity and complexity has made peptoids one of the most promising peptide-mimicking strategies. However, there are no efficient, reliable peptoid sequencing techniques to promptly determine a peptoid’s structure presently. To solve this problem, better understanding of peptoid fragmentation needs to be obtained; computational studies are the most feasible way.

In these theoretical studies, fragments were built, optimized, and analyzed using two molecular modeling programs, Spartan ’14 and Gaussian ’09. Using different starting structures based on chemistry intuition, the conformational space was extensively examined through multiple algorithms including molecular mechanic and Monte Carlo simulations. Sequential geometry optimization and energy calculations at higher levels of theory allow for determination of the low-energy peptoid fragment conformations.

Based on the energies of the most stable conformations, Y-ions are favored for longer peptoids, while less favored for shorter peptoids, when fragmenting in the middle of the peptoids. The enthalpy differences between the Y- and B-ion channels (ΔH_Y - ΔH_B) are -4.6, -1.2, 3.1, 9.3, and 4.3 kcal/mol, respectively, for two-, four-, six-, eight-, and ten-residue peptoids. Longer Y-ions are favored due to multiple hydrogen bonding interactions, while in shorter Y-ions, less hydrogen bonds are available to accommodate the concentrated charge. Compared to the increasing charge compensation in longer Y-ions, the stabilization effects of the oxazolone ring remain constant among B-ions with varying lengths.

Poster 16B

Tracking the Pathways of Peptoid Fragmentation

Jasmine Shum

Faculty Mentor: Jianhua Ren
Graduate Student Mentor: Yadwinder Singh Mann.

In the present investigation, the fragmentation pattern of two isomeric peptoids having neutral residues was compared using mass spectrometry. Being able to understand how peptoids fragment will help to provide more insight in establishing de novo sequences of peptoid libraries. Peptoids resembles peptide in their general structure but are different than the latter because the side chains are attached to a nitrogen instead of an α-carbon. Applications of peptoids in therapeutics, catalysts, molecular machine and possible information storage house in future, etc make them a wonderful synthetic polymer.

For our study, two isomeric peptoid having alternating N-(2-methyloxyethyl)glycine (Nme) and N-(2-phenylethyl)glycine (Npe) with six residues were synthesized using Solid-Phase Peptide Synthesis (SPPS) method. This method allows for the synthesis of peptoids chains sequentially on a resin. The resin is activated for peptoid synthesis by deprotecting the Fmoc group with 20% Piperidine in dimethylformamide (DMF). Peptoid synthesis involves 2 steps: bromoacetylation and displacement. In bromoacetylation, a mixture of diisopropylcarbodiimide (DIC) and bromoacetic acid is used in DMF. In the displacement step, the bromine in the peptoid is displaced with the amine of choice in DMF solution. These bromoacetylation and displacement reactions were repeated until a desired sequence of peptoid was synthesized. After synthesis, the final step involves cleavage and purification. The fragmentation patterns of the peptoids were analyzed using Mass Spectrometry. The SPPS method was shown to be an efficient protocol for peptoid synthesis and resulted in products with high yield. The peptoids
were found to follow the same type of fragmentation pattern regardless of the side chain. After gaining insight on peptoid fragmentation, this knowledge will be used for further examination on how acidic and basic side chains will affect peptoid fragmentation patterns.

**Poster 16C**

**Peptide Synthesis and Liquid Chromatography Mass Spectrometry Analysis**

**Celine Marie Chandler, Tieler Simone Merel**

Faculty Mentor: Jianhua Ren
Graduate Student Mentor: Michael Browne

Thioredoxin is a class of redox proteins that plays an important role in many biological processes. The ultimate goal of this research is to synthesize peptides that will be useful in the study of thioredoxin. A method known as Solid Phase Peptide Synthesis was utilized to manually synthesize peptides of interest. This method consisted of adding amino acids to a resin bead through a series of coupling reactions. First, the carboxyl terminus of the first amino acid in the sequence was attached to the resin bead. The Fmoc protecting group on the N-terminus of that amino acid was then removed in a chemical reaction known as deprotection. Once the Fmoc protecting group was removed, the sequential amino acids were added in the correct order. This process was continued until the desired peptide chains were created. Afterwards, the peptide was cleaved from the resin and lyophilized.

Liquid Chromatography Mass Spectrometry analysis was then performed to verify the purity and identity of each peptide. Acetylated and non-acetylated peptide equivalents were synthesized for comparison purposes. The peptides that contained Proline complicated the fragmentation interpretation due to irregular fragmentation around the tertiary amide. However, careful data interpretation of b and y ion fragmentation confirmed that peptides Ac-CPC, CPC, Ac-CGPC, CGPC, Ac-GGA, and GGA were synthesized correctly and could be used for further research. Each peptide was synthesized with relatively high purity and high-performance liquid chromatography will be utilized in future studies to purify each of the peptides.

**Poster 17A**

**Correlating Knob-Socket Model Propensities with Alpha-Helicity and Stability**

**Kara Talbott, Aaron Demoville-Rahimi**

Faculty Mentor: Jerry Tsai

Graduate Student Mentors: Taylor Rabara, Melina Huey

The Knob-Socket (KS) model provides a basis for the description of a protein’s packing structure. The KS model describes secondary and tertiary packing based on a three amino acid residue “socket” which provides a space on one secondary structure element for the interaction with a single residue “knob”, which comes from another piece of secondary structure. Using the KS model, it has been shown that the socket propensities, as well as the amino acid sequence, are related to protein secondary structure and stability. For alpha-helical structure, the KS model can be used to accurately predict the change in alpha-helicity upon introduction of point mutations as well as indicate the direction of the change in stability using a hexagon of six sockets (Rabara) directly affected by that single point mutation. As a primary test to this relationship between Rabara frequency with secondary structure propensity and stability, a survey of the literature was made to collate point mutations in helical peptides along with their respective changes in secondary structure and/or thermodynamic stability. Previous data collected about the propensity and stability of the alpha-helical protein KStα1.1 and its mutant variants will provide another main data resource. The results plot across a wide range of helical sequences the correlation between the six socket Rabara hexagon construct and helical content as well as stability.
Poster 17B

Knob- Socket Predictions of Alpha-Helical Stability and Structure

Anneroos Nederstigt, Huy Quoc Pham, Nickraj Sandhu Singh, Cynthia Trinh

Faculty Mentor: Jerry Tsai

Graduate Student Mentors: Taylor Rabara, Melina Huey

The Knob- Socket (KS) Model is a novel method to describe protein packing. In this work, the KS model is applied to predict intra-helical and inter-helical packing from 2° through 4° structures involving a four-residue tetrahedral motif. The model involves a four-residue tetrahedral motif called the Knob-Socket. The motif consists of a single amino acid knob from one 2° structure that can be packed into a three amino acid socket on another 2° structure. From an analysis of structures in the Protein Data Bank (PDB), the propensity of a set of three amino acids forming a socket was found to exist in 3 states: (1) free, without a knob and favoring intra-helical interactions. (2) filled, packed with a knob, favoring inter-helical interactions and (3) non-unpacked and disfavoring alpha-helical structure. From these propensities, a parallel, α-helical protein homodimer designated KSα1.1, was designed to validate the Knob-Socket Model. In previous research, single and double point mutations were introduced into the wild-type protein sequence. These mutations’ effect on helix content and stability correlated with the change in propensity of the six socket hexagon or Rabara hexagon surrounding a mutation. In this current research, additional single point mutations were introduced into the stable KSα-T14V/M20L mutant DNA. As an amino acid packing code, the calculated socket propensities allow for the prediction of the change in secondary structure content and stability to the KSα1.1-T14V/M20L protein. The mutant variants were created through site-directed mutagenesis and were analyzed through circular dichroism to further characterize the alpha-helicity of these mutants. The raw data collected from CD were then deconvoluted using DICHROWeb to quantify the alpha-helical content of each mutant. The alpha helical character of these mutants was then compared to the original predictions made from the change in propensities of the Rabara hexagon. An increase in alpha-helicity would indicate a more stable structure, whereas, a decrease indicates a less stable structure. To further characterize the stability of these structures, thermal and chemical denaturation studies were carried out for each mutant protein.

Poster 17C

Cricket life in the Anthropocene: Effects of heat wave and artificial light at night on resource acquisition and allocation in Gryllus lineaticeps

David Luc, Garrett Masuda

Faculty Mentor: Zachary Stahlschmidt

Humans continue to profoundly influence their environments, and anthropogenic climate change is expected to include an increase in extreme weather events, such as heat waves. In addition, artificial light at night (ALAN; e.g., street lights) is an anthropogenic factor that leads to ecological light pollution, and it can influence human circadian rhythms and hormone regulation. However, the combined effects of ALAN and heat wave stressors on animals are unknown. In this factorially manipulated experiment, we observed how ALAN and heat wave affected resource acquisition (food intake) and resource allocation (investment into somatic and reproductive tissues) in the variable field cricket, Gryllus lineaticeps. At adulthood, short-winged female Gryllus lineaticeps (n=127) were isolated, weighed, and divided into four treatment group combinations: (1) control light (14 hour 98 lumens : 12 hour dark) and control temperature (daily range: 17 - 30.5°C), (2) ALAN (14 hour 98 lumens : 10 hour 62 lumens) and heat wave (daily range: 23 - 37°C), (3) control light and heat wave, or (4) ALAN and control temperature. Crickets were fed ad libitum food and water. After exposure to experimental conditions for six days, crickets were re-weighed and then frozen for further data collection. Food mass consumed, femur length, and the dry ovary mass (measure of investment into reproduction) were also determined for each female. Preliminary results indicate that heat wave increased food intake, body mass, and ovary mass, and that it also favored investment into reproductive tissue over somatic tissue. Females...
Poster 18A

Species-specific Variation in Hematological Characteristics in a Snake Community

Garrett Masuda, Andy Byeon

Faculty Mentor: Zachary Stahlschmidt

Animals exhibit variation in a diverse array of fitness-related traits due to different environmental and genetic factors. In this experiment, we focused on three widespread factors (species, season, and sex) and observed their effects on parasite load (number of red blood cells infected by *Hepatoporozen* parasites), stress level (ratio of two types of white blood cells: heterophils to lymphocytes [H:L ratio], which predicts levels of glucocorticoid stress hormones across vertebrates), and investment into cellular immunity (number of white blood cells) in a community of colubrid snakes. During the breeding and non-breeding seasons (March and September, respectively) in two years, six species of colubrids (*Coluber constrictor, Pantherophis guttatus, Thamnophis sirtalis, Nerodia fasciata, Pantherophis obsoletus, and Heterodon platirhinos*) from Spring Island, South Carolina were captured, bled, measured for body mass and body size (snout-vent length), and determined for sex. Blood smears (n=61) were analyzed for endoparasites (*Hepatoporozen*), and the number and types of leukocytes (white blood cells, such as heterophils and lymphocytes). We found that parasite burden was affected by species, but not by season or body condition. We did not detect an effect of any factor on H:L ratios or total white blood cell counts. In the future, we will combine our data with those related to humoral immune function, water balance, and disease prevalence in an animal community.

Poster 18B

Investigation of the Binding of Aminoglycosides to c-Myc G-quadruplex DNA Using the FID Assay

Eileen Rad, Faith Ching, Dinh Trinh

Faculty Mentor: Liang Xue

Graduate Student Mentor: Vanessa Rangel

More than 300,000 guanine-rich sequences are present in the human genome, many of which can form a unique DNA secondary structure known as G-quadruplex (G4). The formation of G-quadruplex structure has been confirmed in vivo, arousing much attention on their potential structure and function relationship. G-quadruplexes are believed to block the binding of DNA-processing enzymes and subsequently regulate their biological functions. Many small molecules, known as G4 ligands, can facilitate the formation of G-quadruplexes, which have been recognized as potential drugs for the treatment of various diseases. Our previous studies of a class of antibiotics (aminoglycosides) suggested that neomycin can efficiently bind to telomeric G-quadruplex DNA. In this study, we further investigated the binding of aminoglycosides to G-quadruplex structure formed in the promoter region of an oncogene (c-Myc) using the FID assay. Our results suggest that amongst the nine aminoglycosides tested, neomycin has the best binding affinity toward c-Myc G-quadruplex DNA. The apparent strong binding of neomycin with G-quadruplex DNA probably results from its molecular shape and multiple positive charges.
Poster 18C  

Binding of Flavonoid Derivatives to G-Quadruplex DNA Studied by Molecular Docking  

Aaron Tran  

Faculty Mentors: Liang Xue, Qiao-Hong Chen,  
Graduate Student Mentors: Mandeep Singh, Vanessa Rangel  

Four guanines self-assemble into a planar G-quartet structure via Hoogsteen H-bonding. Several G-quartets can stack on top of each other to form a unique DNA secondary structure – G-quadruplex. Over 300,000 G-quadruplex forming sequences are present in the human genome including the telomere region. The telomeres are single-stranded tails at the end of chromosomes that provide protection against nucleases and genomic degradation. The telomere region shortens with every cell division, eventually reaching a critical point resulting in cell death. The telomere length is maintained in 80-90% of cancer cells by a reverse transcriptase (telomerase) that adds telomeric DNA fragments to the chromosome ends. Such continuous telomere extension results in “immortal” cell growth and replication, a characteristic of cancer. Because of this, telomerase in recent years has become a promising anti-cancer target. It is well known that the formation of G-quadruplexes in telomeres inhibits the activity of telomerase. Small molecules that can facilitate G-quadruplex formation have been developed as potential anti-cancer drugs. In the present work, we studied the binding of novel flavonoid derivatives to various G-quadruplex DNA using computational tools. G-quadruplexes with different conformations including parallel, anti-parallel, and hybrid-type were used. Programs such as Spartan and ChemDraw3D were used for the creation of digital ligands, and AutoDockTools and Autodock Vina were used for finding probable and stable ligand-DNA conformations to determine the binding efficiency and stability. The preliminary calculations indicate that planar ligands, especially ring-based ligands, prefer to stack with the end G-quartets, while the sidechains fold into the large grooves between the DNA backbones. Planar ligands bind more effectively with parallel G-quadruplexes than anti-parallel and hybrid-type G-quadruplexes. Biophysical studies of the effective ligands identified from docking results with G-quadruplex DNA will be conducted in the future.

Poster 20B  

A Knob-Socket Model of Amino Acid Sequence Changes on Alpha Helical Stability and Structure  

Danielle MacArt  

Faculty Mentor: Jerry Tsai  
Graduate Student Mentors: Taylor Rabara, Melina Huey  

The Knob-Socket Model is a protein-packing model that explains how amino acid residues pack with each other. For alpha helices, the KS model describes how individual amino acids can contribute to a protein’s alpha-helicity and stability. The model is based on a construct consisting of a 3 amino acid residue socket on one alpha-helix that can be packed with a 1 amino acid residue knob from another alpha-helix. Sockets that are packed with a knob are considered to be “filled” and favor inter-helical interactions. Sockets that are not packed with a knob are considered “free”, meaning they favor intra-helical interactions. Lastly, certain combinations of amino acids are “non”, meaning an alpha-helical structure is not favored. The KS model can then be used in conjunction with a socket propensity library in de novo protein design. A novel alpha-helical protein KSa1.1 was built using this KS approach to be a parallel homodimer. Site-directed mutagenesis was performed in order to study the effects of single and double mutations on alpha-helicity and stability. A single mutation can affect the six sockets surrounding the amino acid residue, which forms a Rabara hexagon. The change in total socket propensity can be used to predict an increase or decrease in alpha-helicity and therefore stability in comparison to the wild-type protein. From previous studies, these predictions were shown to be consistent with experimental data from Circular Dichroism and denaturation studies. In addition, double mutations consisting of non-overlapping Rabara hexagons were computationally and experimentally determined to
be additive in terms of alpha-helicity. For double mutations exhibiting overlapping Rabara hexagons, there are two sockets that overlap between the two Rabara hexagons, while the rest of the sockets maintain the same propensities as seen in their single mutations. These changes in propensities of the two sockets can affect the total socket propensities of the two hexagons. This study seeks to explain how double mutations resulting in overlapping Rabara hexagons affect KSa1.1 alpha-helicity and stability. To determine if the computational data is consistent with the experimental data, as is seen with single mutations and double mutations displaying non-overlapping Rabara hexagons, Rabara hexagon propensities will be correlated with measurements of secondary structure and stability.
**Poster 01B**

**Cockeyed Optimist: Social Relevancy of Oscar Hammerstein II’s Lyrics**

Taylor Carnes, Ethan Albala  
Faculty Mentor: James Haffner

This study examines the social relevancy of the lyrics of American librettist and theatrical producer, Oscar Hammerstein II (1895-1960). With his powerful words and fierce advocacy, Hammerstein tackled issues of prejudice and politics never before seen on the Broadway stage. This study seeks to discover if Oscar Hammerstein II was successful in influencing and affecting change through his libretti not only in his own time, but also now in the present day. Furthermore, his text will be critically examined to find if there is objectively more meaning because of the iconic collaborations with composers Richard Rodgers and Jerome Kern.

The research explores three Hammerstein musicals, namely *South Pacific*, *Carousel* and *Flower Drum Song* and their connection to American society. Revival productions continue to capture the hearts of viewers just as the original productions did. The lyrics of Oscar Hammerstein II have had a strong connection to American culture since they were written. This presentation will seek to discover why these shows retain popularity and importance.

**Poster 02B**

**Thermo-Mechanical Analysis of Sequential Bone Drilling with Applications to Osteoarthritis Treatment**

Justin Mark Boetius  
Faculty Mentor: JuEun Lee

2018 Summer Undergraduate Research Fellowship Project

Current research has highlighted the thermal damages associated with surgical bone drilling. Such dangers include bone death, which can limit repair of tissues in the direct vicinity of the bored hole. This research project’s purpose was to investigate the benefits of various spindle speeds, feed rates, and drill-bit diameters to find favorable conditions that minimize temperature elevation in bone. In this experiment, bovine tibia was drilled, which has strikingly similar mechanical properties to human bone. Furthermore, these drilling tests were performed in cancellous bone, a lesser known bone tissue that is found in long bones, such as the tibia and femur. The drilling tests were performed on a computer numerically controlled (CNC) machine, and thrust force and surface temperature were simultaneously recorded as functions of time. The results of this experiment observe that smaller diameter drill bits result in lower temperature elevations on the surface of cancellous bone, and lower thrust forces overall. Moreover, lowering spindle speed also proves favorable. Lastly, faster feed rates did slightly lower force and surface temperature in this experiment. While the results provide evidence of lowering thermal damage to the bone region, additional testing on cancellous bone should be performed to improve upon current drilling techniques and to characterize the complex, undocumented behavior of this area. Few studies exist presently on cancellous bone, despite its direct vicinity to the bone surface in the knee and hip. With future studies, drilling procedures for the treatment of osteoarthritis, osteoporosis, and cartilage issues may prove more effective.

**Poster 03B**

**Aggregation behavior for emergent magnetic tops**

Daniel Cesar R. Madera, Sage Moreland  
Faculty Mentor: Joshua Steimel

Active matter systems are ubiquitous and include biological systems and processes like cell differentiation, wound healing, and chemotaxis. These biological systems exhibit non-equilibrium behavior as well. Active matter systems can vary in size and shape of the matter itself, mobility of the matter, and the environment. However, active matter systems are defined as being composed of active particles that continuously convert energy into motion and display emergent non-equilibrium dynamic behavior. As mentioned earlier, biological systems are active matter systems, which can be driven by biochemical or physical stimuli or even both. To understand these active matter systems,
experimental systems are necessary to investigate the physical phenomena. This experimental system consists of using active micrometer ferromagnetic colloids with passive particle monolayer in a microfluidic environment. Within a 3 directional helmholzt apparatus, the active colloids spin in a top-like motion by inducing a permanent magnetic field on the z-axis, and varying spins based on actuation periods on the xy-plane. This experiment varied the top-like motion actuation periods: 1, 5, 10, 30, 60, 120, 300s. The active particles were tracked during the video and were analyzed for aggregation behavior. Analyzing this behavior with varying spin times can lead to a better understanding of the physical phenomena of active matter systems. With top spin motion, the active matter aggregated due to stress within the monolayer then dissipated during a longer spin time. Decreasing actuation periods, this decreases the ability to stress the monolayer, thus not aggregating. This study provides the figures and graphs necessary to visualize and to interpret the data for understanding or possibly an innovative insight. Future studies would include applying tessellation and simulation models to characterize the structure.

**Poster 05B**

**Analyzing Water Quality of Produced Water in Kern County through Geochemical Modeling and GIS Mapping**

Emily M. Reynoso

Faculty Mentors: Mary Kay Camarillo, Daniel Jontof-Hutter

Produced water is a significant environmental problem in the realm of wastewater management; its high mineral content poses challenges for treatment. Chemical speciation modeling can assist in developing appropriate treatment strategies. The goal of this research project was to devise a method to analyze the water quality of produced water in Kern County, California, which contains a major oil and gas producing region, as well as a productive agricultural industry. PHREEQC was used to estimate precipitation potential of produced water originating from eight oil wells in Kern County, California, which were chosen for high alkalinity, iron, calcium, or sulfate content. A dataset containing data on the constituents of produced water samples was obtained from a state agency. Open source software QGIS was used to map the wells and analyze the ion concentration and depth data geographically. One of the major accomplishments of the project was creating a python script, which manages a dataset of produced water constituents and creates 18 input files to automate PHREEQC geochemical modeling. The demonstration of the automated input files is pending based on the availability of a computer cluster within the School of Engineering and Computer Science.

**Poster 05C**

**Nucleation Time Prediction of Selected Inorganic Salts during Reverse Osmosis Treatment of Produced Water in Kern County**

Stefanos Word

Faculty Mentor: Mary Kay Camarillo

Produced water treatment in drought-stricken regions can serve to augment freshwater supplies for potable and non-potable use. Extensive hydraulic fracturing operations in California contributed to the production of approximately 10.5 billion gallons of natural oil and gas, making it the third-largest oil producing state in America. Thus, the reuse of the large amount of produced and flowback water from these operations serves to benefit drought stricken-regions if viable and cost-effective combinations of membrane treatment can be determined.

The outcome of the study was to gain general insight into how and when regional variations of produced water constituents can potentially affect reverse osmosis (RO) recovery. Produced water data from the Kern Oil Field was obtained from a recently-updated Division of Oil, Gas and Geothermal Resources (DOGGR) database. Subsequently, three representative source waters were determined to be favorable, generally representative, and worst-case fouling scenarios and modeled in PHREEQC and DOW WAVE to determine nucleation times and membrane surface concentrations of selected inorganic salts. Wide, regional variances of produced water constituents
require specific evaluations to determine which scaling-prone salts will dominate fouling. Overall, the modeled results generally indicate that barite inhibits RO operational efficiency in source waters with lower fouling tendencies, while calcite inhibits RO operational efficiency in source waters with higher fouling tendencies.

**Poster 06B**

**Probing the Evolution of Galaxy Dark Matter Since Cosmic Noon**

*Jack W. Lonergan*

Faculty Mentors: Guillermo Barro, Elisa Toloba

The goal of this project is to study the kinematics, chemical composition, and dark matter content of distant galaxies observed at cosmic “noon”, when the Universe was only half of its current age. For this analysis we will make use of large sample of deep, +8hr galaxy spectra taken with the state-of-the-art Keck 10m telescopes as part of the HALO7D survey. The extremely high quality of these very deep spectra provide very detailed data of the stellar continua and emission lines for hundreds of galaxies which can be used to determine their stellar ages and their stellar and dark matter content. Ultimately, our goal is to compare the average properties of these galaxies at cosmic noon to those of well-known galaxies in our local environment. Such comparisons will help us understand the properties of galaxies at different points in the lifetime of the Universe, which allows us to reach conclusions regarding the evolution of the main properties of the Universe, from cosmic noon to the present.

Although the research is not yet complete, and the analysis is still a work in progress, preliminary results regarding properties of HALO7D survey targets can be made. Galaxies from the HALO7D survey have shown to be primarily star forming galaxies based on multiple plots. Signal to noise ratios of observation dates have been calculated which determines the validity of the given data sets. These preliminary findings can be expected to be displayed in the presentation, as well as possible preliminary results for the analysis of emission line spectra of star forming galaxies.

**Poster 06B**

**The World in 0’s and 1’s: Internet of Things Data Fusion and Sensor Interpretation**

*Daniel Castigador Balerite, Jason Arias To-Tran, Christian Villalobos, Celine Esteron*

Faculty Mentor: Fadi Muheidat

As technology inevitably continues to progress, and the interconnection between devices only growing in parallel scale, information acquisition and accumulation are notions that must be taken into consideration. Our research into data fusion investigates a more efficient, expansive, economical, and secure method of information compilation, thus making it so that such data will become assets for users and society. Data fusion, itself, is a means of integrating various data sources in order to deliver information that is more comprehensive, coherent, and complete, than if provided by any individual source. To put this concept into perspective, imagine the human body. A human body, with its five senses, possesses the capacity to collect bits and snippets of information about the world around it. Only when this mass of information is properly examined and evaluated by the brain can conclusions be made, and subsequent decisions determined. To this objective, though, therein lies a multitude of obstacles that will impede progress (e.g. data imperfections and inconsistencies, misled data association, data fusion portability, machine independence, security vulnerabilities, etc.). In order to amend such issues, while keeping our research in mind, our current efforts are turned towards the creation of an Arduino board fitted with a variety of sensors working in tandem with a Raspberry Pi appended with a wifi module that allows for their communication over the internet. Upon the completion of our modular device and the setup of our server environment, we hope to turn towards solidifying our design by integrating CORAL machine learning to assist us in resolving said issues. In doing so, we will be able to better utilize various data fusion models in our research such as: probabilistic, artificial intelligence, and evidence based mathematical theories such as Dempster-Shafer, which will be covered further during our board presentation.
From the Ground Up: Identification through a Floor based system

Robert Makoto Hughes, Mason Richard Lee

Faculty Mentor: Fadi Muheidat
Other Mentor: Dr. Lo’ai A. Tawalbeh, (Texas A&M University)

Current advances in sensor design technologies and computing power (computational and artificial intelligence) have made it possible to build smart assistive living systems that can improve the lives of everyday people. Because older adults want to live in the comfort of their own home, there is a need to monitor their health status, detect emergency situations, and notify health care providers. We have improved a floor based monitoring system, which we call the smart carpet, originally to detect falls, but we can take advantage of the continual 24/7 monitoring capability to get important information on gait, fall detection, and counting the number of people traversing the carpet. Recently, we studied the characteristics of the waveform of the scavenged signal from the sensors and used computational intelligence, feature extractions, and classifications to identify people. In this paper, we used Dynamic Time Warping (DTW) to help improve on walk identification, compared with the Mel Frequency Cepstral Coefficient (MFCC) feature extraction methods. Results showed that our system identifies walks using a dynamic time warping algorithm and KNN classifier with 86% precision, 76% recall, and 81% accuracy. We also present a cooperative cloudlet mobile computing model for eldercare and medical applications where the decisions are very time sensitive. The sensors data will be sent to the nearest cloudlet for analysis and extracting real-time decisions in minimal delay. Users can obtain these results and make decisions by accessing the cloud through their mobile devices and in a real time manner.

Gender Gap in Exercise Research in Individuals with Parkinson’s Disease

Chandana Kothur

Faculty Mentor: Preeti Oza

Parkinson’s disease (PD) affects approximately 10 million people worldwide. PD is a complex, progressive multisystem disease with a wide range of movement and cognitive impairments, activity limitations, and loss of independence. Research shows that exercise and physical activity help alleviate motor and non-motor symptoms. Men and women with PD experience different symptoms and have different challenges to healthcare access. It is unclear if exercise research has given due consideration to inclusion of women and compared/contrasted the effects of exercise protocols in men and women. A literature review was conducted to gather information about the representation of women and men in published exercise research. The review also aimed to gather the reported differences between men and women in responses to exercises. Peer-reviewed articles published in English language from PubMed, CINAHL, PEDro, MEDLINE and PsychINFO were collected using search terms ‘physiotherapy’, ‘physical therapy’ and ‘physical exercise’ for ‘Parkinson’s disease’. After deleting the duplicate articles, gender inclusion was assessed from the methods section and gender differences from the results section. 71 articles met our selection criteria. Of these 71 articles, only 4 articles reported gender information. Results will highlight the gender gap in research related to exercises in individuals with PD. This research project highlights the historically unmet research needs of women with PD, to elicit action in addressing these needs in future research and care. Consideration of differences between men and women with PD, to exercise effects and benefits will facilitate better-informed physical therapy and healthcare decisions.
**Poster 07C**

**Benefits of Behavior: Exercise Enhances Perception of Physical Function Independent of Improvement Among Diabetic Patients**

Shabnam A. Behin, Nathaniel J. Holmgren

Faculty Mentors: J. Mark VanNess, Courtney D. Jensen,

Graduate Student Mentors: Cynthia Villalobos, Alexis C. King

Other Mentor: Paul D. Vosti, Wellness Coordinator at St. Joseph’s Memorial Hospital

Patients with type II diabetes report lower quality of life (QOL) than those without chronic illness. Much of the literature focuses on the physical benefits of weight loss and blood glucose management rather than evaluation of psychological health, including patient perceptions.

**PURPOSE:** To determine factors that affect perception of physical function in diabetic patients.

**METHODS:** 38 men and women with diabetes completed a 10-week, 20-session exercise program that included both aerobic and resistance training components. At baseline and follow-up, body fat percent (BF%), body mass index (BMI), and performance was measured on six standard functional tests. Subjects completed a self-report QOL questionnaire in which perception of physical function was assessed. Linear regression tested the effect of functional performance (baseline capacity and 10-week change) on perception of function.

**RESULTS:** Patients were 67.9±9.1 years of age, mean BMI was 31.5±6.1, and self-reported physical functioning ranged from 5.0 (very poor) to 100.0 (optimal); mean score was 54.7±26.8. At baseline, perception of physical functioning was not related to sex (P=0.751), age (P=0.405), BMI (P=0.610), or BF% (P=0.864). It was related to improved performances in six-minute walk (P<0.001), functional reach (P=0.046), timed up-and-go (P=0.080), chair stand (P=0.006), and sit-and-reach (P=0.024). At follow-up, perceptions of functioning improved by 13.8±24.5 points (25.7%; P=0.002) but there was no association with improvement in any anthropometric or functional tests: BMI (P=0.457), BF% (P=0.526), six-minute walk (P=0.131), functional reach (P=0.293), timed up-and-go (P=0.226), arm curl (P=0.966), chair stand (P=0.592), and sit-and-reach (P=0.970).

**CONCLUSION:** 10 weeks of exercise improved perception of physical function by more than 25% in patients with diabetes. Improvement was unrelated to enhancement of any anthropometric or performance domain. Patients improved their perceptions via participation rather than progress. Thus, it may be important to incorporate the behavior of exercise into treatments, even if it fails to elicit physical improvement.

**Poster 08B**

**Utilizing A Novel Technique to Measure Biological Interactions**

Peter R. Hyatt

Faculty Mentor: Joshua Steimel

There are a large variety of molecular biological interactions that are vital to understand but difficult to quantify. A common example exists in the protein that causes blood clotting. Interactions such as these can occur in a wide range of strengths, speeds, and durations. The nature of these interactions void many measuring techniques of supplying adequate data. ELISA and SPR are some of the most common affinity tests which cannot be used to analyze these interactions. A novel method to better measure these biological interactions has been designed and utilized to measure the affinity of many previously obscure interactions.

The apparatus creates a rotating magnetic field by utilizing a Helmbolt Coils-like system; the difference being that the spacing between the coils are two radii. The current between the coils are controlled via MATLAB and a DAQ. A microscope is focused at the center of the three pairs of coils where a slide containing magnetic particles in a solution is observed.

A ferromagnetic particle can be coated with a ligand and caused to rotate and roll when a rotating magnetic field is present. By using the translation of the rolling particle in a hydrodynamic solution as a baseline, the relative strength of an interaction can be determined by comparing the baseline translation to the translation of a coated particle when a complementary ligand is present on the
substrate surface. The difference in the translational distances is due to the differing frictional force caused by the affinity between the ligand coated on the rotating particle and the substrate. By changing the coating ligand and the surface ligand, a variety of biological affinity values can be measured.

Current progress includes determining the baseline affinity values while future work involves determining the affinity values for specific protein interactions.

Poster 08C

Widening the Playing Field: A Biomimetic Modeling System

Erica Roy S. Ramos

Faculty Mentor: Joshua Steimel

Friction is fundamental at the cellular level because it is at the core of many locomotion modes utilized by cells to navigate the complex and often crowded cellular environments. Understanding to what extent friction plays in biological processes like chemotaxis or haptotaxis is crucial. Typically, the first step in doing so is by simplifying the complex biological system and developing a synthetic model system to mimic the biological system of interest. To do this, an apparatus is needed to drive magnetic particle motion and to break bonds between the particle and the substrate. To accomplish this, one can utilize a Helmholtz coil type apparatus to generate rotating magnetic fields. Previous iterations of this apparatus were able to generate magnetic fields up to several mT, however this was not large enough to break strong biological interactions. Thus, an entirely new apparatus was built with larger magnetic coils to produce a higher magnetic field strength to break these bonds. By increasing the magnetic field strength, we will be able to measure a wider range of effective friction and frictional environments. The frame of the apparatus was constructed out of cut T-slots and secured together with 1-inch silver corner brackets. There were 350 turns of copper gauge 19 wire wrapped on each coil with inner and outer diameters of 4 and 5 inches. The previous iteration of this apparatus had only 150 turns per coil, which produced a magnetic flux density of 10 mT. A gaussmeter will be used on the new apparatus to measure the strength of its magnetic field. This will then be compared to the previous apparatus and the theoretical magnetic field strength of the new apparatus, which should be between 30-50 mT. The homogeneity of the magnetic field will also be determined to prevent drift in future experiments.

Poster 09B

Emergent Aggregation Behavior of Magnetic Top like Particles in Passive Solution

Sage M. Moreland, Daniel C. Madera

Faculty Mentor: Joshua Steimel

Aggregation of particles in an active environment is a relatively untouched field with very few models and experiments. Active matter research studies ferromagnetic “active” particles in a monolayer of polystyrene “passive” particles. Active particles are excited with an external magnetic field to induce an alternating clockwise and counterclockwise moment vector around the z axis of the particle. These active particles rotate and create microfluidic systems that groups the passive monolayer particles into clusters. Passive particles aggregate based on the movement of the active particles and the analysis of that can help model microfluidic and biological systems. Samples were placed in a Helmholtz coil like apparatus containing looped wires that created a magnetic field that would move the active particles around within the passive medium. Experiments were conducted for about 10-20 minutes and included the movement of active particles spinning in clockwise and counterclockwise directions alternating for 1s, 10s, 30s, 60s, 120s, and 300s durations repeated for the experiments duration. Particles were not only spinning but were also rotating at an angle around the z axis which creates different movement from that of the already researched spinning particles. Analysis of the video involved taking snapshots and differentiating the particles from the surrounding fluid then evaluating the size of the open spaces to correlate between cluster size. Different durations of corresponded to different aggregation patterns and preliminary finds show that the aggregation of active particles could
only reach a approximate dimension before breaking apart and then reform the clusters. Future studies will continue to test duration times and eventually model the process through software.

**Poster 10B**

**Investigation on how students do their homework and knowledge retention**

*Justin Hidalgo Lee*

Faculty Mentor: Binod Nainabasti

Homework, midterms, and finals are commonly used in the everyday classroom to educate and test students. However, the efficacy of these methods to enforce knowledge retention are not clearly proven. The primary goal of this study was to investigate how students do their homework problems and how their ways of doing homework problems affect their performance in the class. This study was conducted on homework and exam problems assigned in introductory physics classes at two different academic institutions, University of the Pacific and Oregon Institute of Technology. We characterize students’ effort on doing homework in terms of consistencies of force diagrams with corresponding mathematical representations used in solving physics problems. We checked the connection between pictorial diagrams with equivalent mathematical equations and how these play a role in their knowledge retention. Preliminary findings indicate students who made mistakes on either the homework or midterm are able to gain more points on the final. These early findings suggest student knowledge retention occurs more effectively when students make mistakes early in the learning process.

**Poster 10C**

**Mass-radius relationship of simulated two-layer planets**

*Johnson Liu*

Faculty Mentor: Daniel Jontof-Hutter

In many cases, astronomers can measure the radius of a planet, but not its mass. Our models of Earth-like planets give us an estimate of the mass of small exoplanets. We model our planets as spheres that contain multiple layers of differing composition. We simulate the mass, radius, and core mass fraction (CMF) of these planets by integrating equations of planetary structure over many time-steps. For two-layer planets, we optimize the pressure at the center of the planet and the radius of the core by comparing the simulated planetary radius and CMF to the expected radius and CMF of the planet. If the radius and/or the CMF of a simulation are off from the expected values, we use linear interpolation to home in on better guesses for the pressure and core radius. Keeping one of the independent variable constant, the other independent variable is optimized by using one of the dependent variables as a measure of fit. Once one of the independent variables is optimized, that variable is kept constant and the other independent variable is then optimized using the other dependent variable. A family of planets, all with the same CMF, can be produced by varying the expected radius of the planets. We plot the radius of these planets against their simulated mass to produce equations that relate the radius of a planet to its mass and CMF. The estimated mass of an Earth-like planet is dependent on the state of the planet’s core (liquid or solid). This theoretical uncertainty should be considered in estimating exoplanet masses. In cases where the mass can be measured to high precision, our models may constrain the nature of the planet’s core.

**Poster 11B**

**Characterizing a large, far orbiting exoplanet with four smaller neighbors**

*Robert C. Ashby*

Faculty Mentor: Daniel Jontof-Hutter

KOI-2169 is an exoplanet system consisting of 4 small transiting planets discovered by the Kepler telescope whose orbital periods are less than 6 days. Their masses are a fraction of that of earth. Ground based follow up observations have discovered a larger planet orbiting every six years whose minimum mass is 1000 times an earth mass (3.5 times the size of Jupiter.) The goal was to put further constraints (an upper limit) on the large planet’s mass. We used computer code to model the planetary system. Once an accurate simulation
was constructed, we created different scenarios varying the large planet’s orbital inclination and mass. We assessed long term orbital stability of these scenarios and ruled out masses and inclinations that lead to unstable orbits within 10 million years. Through this method we were successfully able to determine an upper constraint of 31 Jupiter masses on the large planet. We don’t know if the systems discovered by the Kepler mission who have small close orbiting planets also have larger planets further out. This is one of the very first exoplanets systems where we know about planets close to the star as well as further out.

**Poster 12A**

**Picoplatin Derivatives for Anticancer Drug Development**

Ethan Y. Liu, Evan Le, Jane Ung, Joanne Kim, Dan Shao

Faculty Mentor: Qinliang Zhao
Graduate Student Mentor: Chao Feng

Platinum-based complexes have been extensively investigated as chemotherapy drugs for multiple cancer types. Since the discovery of the first platinum drug cisplatin, another six platinum drugs have been approved for clinical use in USA and other countries. Cancer itself, however, is forever evolving, constantly producing cross resistance to the current medication. The chemotherapy drugs used in the past are soon becoming ineffective against tomorrow’s cancer. To discover new anticancer agents that can overcome the resistance and toxicity issues of the existing platinum drugs, a new family of platinum complexes are designed and synthesized based on Picoplatin, a platinum drug in clinical trials for solid tumors. More than 10 picoplatin derivatives with distinctive amine groups as non-leaving groups have been synthesized. All complexes were purified from either solvent washing, crystallization or chromatography. The platinum intermediates and final products were characterized using ESI-AccuTOF MS, HPLC, $^1$H NMR, $^{13}$C NMR, $^{195}$Pt NMR, and X-ray crystallography. Solubility of the platinum complexes in water and organic solvents was obtained using ICP-OES.

**Poster 12B**

**Synthesis, Characterization and Reactivities of New HDAC Inhibitors**

Dan Shao, Jenny Zheng

Faculty Mentors: Qinliang Zhao, Xin Guo,
Graduate Student Mentors: Chao Feng, Yingbo Huang

The advancement of tumors and growing resistance to existing anticancer drugs required the constant need for new drugs and/or therapies. Histone deacetylase (HDAC) is found to be overexpressed in some cancer cells, which condenses the chromatin structure of tumor suppressor genes, cell-cycle inhibitor genes and apoptosis inducer genes. Our innovative approach to these problems is to develop bifunctional platinum complexes stabilized by newly designed HDAC inhibitors. Each inhibitor comprises of a main scaffold, a zinc-binding group, a protein recognition cap and also a coordination site to metal ions. The HDAC inhibitors were synthesized, purified, and have been characterized by MS and NMR analysis. Platinum ions were anchored at the coordination site of the inhibitors, resulting in the desired metal complexes. Cell viability studies of the inhibitors and selected bifunctional compounds demonstrated the critical and unique role of each component in the inhibitor and metal complexes.

**Poster 12C**

**Evaluation of cis-diamino-cyclohexane derivatives as potential chiral catalysts in enantioselective organic synthesis**

Kelsey Wong

Faculty Mentor: Vyacheslav V. Samoshin
Graduate Student Mentor: Carim Van Beek

2018 Summer Undergraduate Research Fellowship Project

Enantiomers are chiral molecules that are non-identical mirror images of each other—similar to the left and right hand. A pair of enantiomers exhibit indistinguishable physical properties, but contrasting biological properties. For example, the
drug(S,S)-(+) -ethambutol can treat Tuberculosis, while (R,R)-(−) -ethambutol can inflict blindness. Therefore, a selective enantiomer production is vital to the preparation of modern efficient drugs.

This research is an introductory step aimed at developing chiral catalysts that selectively synthesize one enantiomeric product instead of the conventional 50/50 mixture of two enantiomers. We chose a c-1,2-diaminocyclohexane (DACH) scaffold as the catalytic site for selective synthesis. Its two amino-groups were additionally equipped with supplementary attachments. By adding small quantities of the obtained DACH derivatives to appropriate chemical reactions, we established a fundamental starting point for further broader research towards chiral catalysts by demonstrating catalytic activity for the cis-DACH scaffold. The major accomplishments of this project are the design, optimization of synthesis, and preliminary testing of the model DACH-based catalyst.

Poster 13A

The Ultimate Monogamist: Exploring the Ubiquitination Activity of UHRF1

Danny Luu, Jenica Emerson

Faculty Mentor: Joseph Harrison

Polyubiquitin chains are important in the marking of proteins for degradation. These ubiquitin chains are formed by an enzymatic cascade reaction involving different E3 ligases such as IAP2 and UBOX. However, a special E3 ligase called UHRF1 attaches only a single ubiquitin molecule to histone protein H3 to signal for DNA methylation in epigenetic processes. The ubiquitination activity of UHRF1 is regulated by binding to DNA. Our studies focus on what makes UHRF1 different from other E3 ligases to understand its unique monoubiquitination activity. UHRF1 contains 5 domains, most notably the UBL domain (provides possible autoubiquitination sites), RING domain (site of E3 ligase activity), and SRA domain (binds hemi-methylated DNA). In vitro reactions were performed testing the autoubiquitination ability of UHRF1 with UBL domain mutations and UHRF1 variants containing RING domains from other E3 ligases. From the results of our experiments, we found that the UBL domain in UHRF1 did not significantly impact its monoubiquitination activity. Rather, it is the RING domain that is a key controller for monoubiquitination. Further experiments of mutant UHRF1 proteins with a RING domain from IAP2 showed large levels of polyubiquitination indicating less specificity. In addition, adding hemi-methylated DNA increases the ubiquitination activity of UHRF1, but only in the presence of its own RING domain. This sheds more light on how UHRF1 is extremely specific in its monoubiquitination activity which leads us to better understand the epigenetic maintenance of DNA methylation.

Poster 13B

Connecting Quantum Mechanics to Molecular Dynamics: Generating a Ligand Topology

Andrew Parkins

Faculty Mentors: Mike McCallum, Hyun Joo,

A topology file provides the physical parameters necessary for Molecular Dynamic (MD) simulations. A topology file needs to be generated from a set of coordinates from Quantum Mechanical (QM) calculations. We used Gaussian to optimize and generate the classical charges for the ligand LDN, which is the first time the topology for this molecule has been calculated. After calculations are finished, rotations around non-chiral atoms can be made to possibly find more stable conformations that could be different than the given structure. Once a minimum is found a force-field topology file can then be constructed. This will be released for use by other scientists as part of the large dictionary of topology files for the CHARMM force-field. This means that other users will be able to use different sections of LDN’s topology for other molecules that have a similar structure. By having a ligand’s topology, we are able to better understand the factor that it’s charge plays into binding. The ability to run a MD simulation also gives us the ability to understand how the ligand possibly binds to the site and how we could improve the manufactured ligand. Having a large library of ligand topologies is very helpful in the field of drug discovery.
**Poster 14A**

**Synthesis and Characterization of p-Coumaric Acid Derivatives and Determination of Radical Scavenging Potential**

Trey Andang

Faculty Mentor: Andreas Franz

Graduate Student Mentor: Cate Simmermaker,

Polyphenols have previously been studied and their biological properties evaluated, concluding that they are potent antimicrobial, antiviral, and antioxidant agents, the last being the most crucial to this research. The aim of this research is to synthesize and characterize p-coumaric acid-amino acid conjugate derivatives and determine radical scavenging by 2,2-diphenyl-1-picryl-hydrazyl-hydrate (DPPH) assay. Amino acids have been linked to synergistic effects and the combination of resonance assistance and amino acid assistance could lead to more efficacious properties. These compounds were synthesized through a 4-step scheme: acetylation, chlorination, amidation, and deprotection. Coumaric acid is a polyphenol of the hydroxycinnimates family commonly found in nut, beans, tomatoes, carrots, wine and vinegar.

Antioxidants, compounds that protect the body and cells from free radicals, quench those unstable molecules characterized by an unpaired valence shell electron, that damage cells and are generated by sun exposure, stress, and as part of the natural aging process by inhibiting oxidation which results in damaging biological chain reactions. Previous research shows both cinnamic acids and hydroxycinnamic acids contain antioxidant properties. Antioxidant potential can be determined through DPPH assay. DPPH is a stable free radical with a purple-red color, and will change via reduction to a clear-yellow color. This color change can be tracked by UV/Vis spectroscopy at 515 nm. The current DPPH rankings of some hydroxycinnamic acids from strongest to weakest are as follows: caffeic acid, sinapic acid, ferulic acid, p-coumaric acid. Because of the antioxidant properties found in polyphenols, synthetic derivatization of p-coumaric acid with possible resonance enhancing properties can prove significant for the study of structure activity relationships (SARs) in the field of antioxidants.

**References:**


**Poster 14B**

**What’s In It (for Students)? Magnetic Resonance Dewar Cross-Section for Classroom Demonstrations**

Ei Aueng

Faculty Mentor: Andreas Franz

Nuclear Magnetic Resonance Spectroscopy (NMR) is an instrumental technique to analyze the structures of chemical compounds by measuring their response to electromagnetic radiation while inside a superconducting magnet. Such analysis is performed by an NMR spectrometer. One of the most important components of such a spectrophotometer is the Dewar holding the magnet solenoid. A Varian, Inc. NMR model was used by the University of the Pacific’s chemistry department experiments until 2008. For the purpose of educating students how their NMR spectra are obtained, the magnetic resonance dewar model was cut open to showcase the construction of the vacuum system, the cryogen chambers, the probe, and the magnets. The dewar was cut by Physical Plant on campus and the cross-section will be showcased. In addition, NMR data were collected on the currently active NMR instrument in the Chemistry Department. Spectra and structure of two sugars, isomaltotetraose and gentiobiose, will be presented. The project was made possible by CAPD funding.
**Poster 14C**

**Architecture of Kepler’s Multi-Transiting Planet Systems**

**Kadri Nizam**

Faculty Mentor: Daniel Jontof-Hutter

NASA’s Kepler mission discovered ~700 planetary systems with multiple exoplanets orbiting the same stars. We study the typical architectures of exoplanet systems for single and multi-planet systems in hopes of shedding light on planet formation theory and the history of our solar system. This study specifically focuses on extracting information from the orbital period and period-ratios of transiting planets in the NASA Kepler catalog. In doing so, we have found that period-ratios of transiting multi-planet systems that are in mean motion resonances are not as common as they appear in current planet formation simulations. We have also managed to identify possible contributors to spikes at non-resonant period-ratios such as 2.2, which had no explanation in past literature. Statistical tests have also confirmed that observed single versus multi planet systems are drawn from different distributions. Our work improves upon prior studies that were conducted early in the Kepler mission. We have a much larger data set which enables us to perform statistical tests of typical system architectures for subsets of the data sorted by planet size, orbital period and the number of known planets.

**Poster 15A**

**An Evaluation of Group Behavioral Skills Training to Teach Members of Greek Letter Organizations to Free-Pour Standard Servings of Beer**

**Justin M. Shindo, Bailey M. Whitlock**

Faculty Mentor: Carolyn Kohn

Graduate Student Mentors: Meagan Strickland, Margaret Brock

Excessive drinking among college students is a significant problem that has serious negative consequences. Many members of Greek Letter Organizations (GLO) are more likely to report excessive drinking and increased negative consequences compared to other college students. Students who report experiencing fewer negative consequences as a result of drinking also report counting their drinks as an effective preventive strategy; however, in order to effectively use this strategy, students must be able to identify and pour accurate servings of alcohol. Previous studies have established that individually-taught behavioral skills training (BST) in a laboratory is an effective strategy to train students to accurately free-pour standard servings of beer; however, little is known about the effectiveness of BST when taught in a group format in a more naturalistic setting. We used a nonconcurrent multiple probe design across four weeks to assess the effects of group BST on the accuracy of participants’ pours taught in the GLO setting. We provided BST to participants who failed to pour within 10% of the standard serving of beer (12 oz.) during baseline assessment. Participants from GLO 1 ($n=2$) provided baseline pours and then immediately received training; then they provided follow-up pours at two, three, and four weeks. Participants from GLO 2 ($n=2$) provided baseline pours during week one and two, then immediately received training during week two. They provided follow-up pours at three and four weeks. Results show group BST was an effective strategy for teaching all participants to accurately pour standard servings of beer and that pouring skills were maintained at follow ups. However, the skill (i.e., accurate pouring) did not generalize to pouring into an untrained cup. Recommendations and limitations will be discussed.

**Poster 15B**

**Personal Control Beliefs and Memory in Aging: Mediation by Health and Lifestyle**

**Mercedes E. Ball**

Faculty Mentor: Carla Strickland-Hughes

Memory decline in aging is not universal but rather impacted by idiosyncratic factors, e.g., lifestyle. Control beliefs (belief one’s effort matters) might affect memory performance, and other behaviors critical for maintained memory. Higher levels of perceived mastery (global control belief) and physical health moderate age changes in memory.
(Gerstorf & Infurna, 2013; Robinson & Lachman, 2018), but role of mental health is unclear, as is the role of domain-specific control beliefs about memory. This research extends past work by testing the mediation of personal control beliefs on memory performance of middle-aged and older adults by (1) testing whether the relationship between control beliefs and memory was mediated by mental and physical health in parallel and (2) testing whether the relationship between control beliefs and memory were mediated in series by overall engagement in memory activities and specific mnemonic use. Participants were healthy, community-dwelling middle-aged and older adults (N=121; aged 51-93, M=73.3, SD= 8.32; 79% female; 92% white). Participants completed tests of episodic memory (delayed recall of a word list and learning new face-name pairs) and answered surveys about health (Ware et al., 1995), perceived mastery (Lachman & Weaver, 1998), memory control beliefs (Dixon et al., 1998) overall engagement in memory activities (Strickland-Hughes, 2017), and specific mnemonic use (West et al., 2012). The relationship between perceived mastery and memory was fully mediated by self-reported mental health. Further, a higher level of memory control beliefs was related to greater engagement in memory activities, which in turn was related to greater mnemonic use, and greater mnemonic use related to better memory. Thus, both global and domain-specific control beliefs may shape memory in aging. Further, our beliefs might relate to performance because of their relationship with a variety of personal and behavioral factors. We propose cognitive interventions should target changes beliefs, not just techniques.

Poster 15C

Socializing More Linked with Better Aging Attitudes

Kezhia Barba, Lluvia Garnica

Faculty Mentor: Carla Strickland-Hughes

Social engagement in late life is critical for healthy aging (Jopp & Hertzog, 2010), but motives and goals that direct activity choices change across adulthood. Socioemotional Selectivity Theory (Carstensen, 2006) posits older adults may emphasize present-related goals, such as strengthening emotional connections, because they perceive their futures to be limited. Similarly, generativity increases in aging (Erikson, 1950), so older adults are motivated to “give back” to younger generations and the community. Despite these positive changes, older adults report negative attitudes about old age in general and about their own aging (Strickland-Hughes et al., 2016). Research shows that intergenerational social engagement may improve aging attitudes in early life (Gaggioli et al. 2014), but the benefits to attitudes of older persons is less clear. Our aim was to test the relationships between social engagement and aging beliefs in middle-aged and older adults. Thirty-two participants (56-86 years old, M=74.75, SD=7.56; 88% white; 88% female) volunteered for our correlational study. We operationalized intergenerational social engagement by participation in 3-4 hours of discussion groups with undergraduates. Participants self-reported frequency and quality of contact with younger adults, and their frequency of engagement in public and private social activities (Jopp & Hertzog, 2010). Additionally, participants completed surveys assessing their general attitudes about old age, aging satisfaction, and awareness of age-related gains and losses in their lives. Overall, we expected greater social engagement to be related to more positive and less negative aging beliefs. Consistent with expectations, analyses suggested that more social interaction correlated with awareness of more age-related gains. Reports of more frequent and better quality interactions with younger adults correlated with feeling closer and more connected with younger adults (r = .405, p = .021). Our findings indicate that an actively social lifestyle may contribute to being more conscious of gains in aging.
Poster 16A

Are You Threatening Me? Responses to Age-Based Stereotype Threat

Sebastian Getman

Faculty Mentor: Carla Strickland-Hughes

Negative age stereotypes are detrimental (Hummert, 2011). Age-based stereotype threat (ABST) effects arise when older adults underperform on a stereotype-relevant task because they fear confirming the stereotype (Lamont et al., 2015). ABST might be worse for individuals with higher task-related anxiety (Abrams et al. 2008), lower confidence (Desrichard and Köpetz, 2005), or more negative aging attitudes (Hummert, 2011). This research aimed to replicate an ABST manipulation that disrupted performance on a dementia screening (Mazerolle et al., 2017) and to test mechanisms of ABST. We expected high ABST instructions to result in poorer memory, higher anxiety, lower confidence, and more negative aging beliefs. Participants (56-86 years old, M=74.69, SD=7.55, 90% female, 86% white, 49% completed Bachelor’s degree) were randomly assigned to high (n=14) or null (n=15) ABST and completed a memory task and surveys. Memory was worse for high (M=19%, SD=18%) compared to null (M=32%, SD=22%) threat, t(27)=1.81, p=0.041. The groups did not differ in anxiety, confidence, nor perception of stereotype threat. Interestingly, higher perceived threat was related to greater anxiety, r=-.370, p=.048, and to feeling older, r=-.328, p=.042. Confidence was higher for lower perceived threat (M=3.75, SD=0.74), than high perceived threat (M=3.19, SD=6.2), t(27)=2.21, p=.018. While our data replicated the ABST manipulation, participants exposed to high threat did not report greater perception of threat: Characteristics of the testing environment (e.g., being tested alone or in groups; experimenter age) or participant characteristics (e.g., prone to anxiety, more negative age attitudes) may cumulatively contribute to the perception of threat. The long-term goal of this research program is to design and test interventions to promote ABST resilience.

Poster 16B

Don’t Shy Away! Relations Among Activity Level, Gender, and Social Behaviors in Shy Toddlers

Kajal M Patel

Faculty Mentor: Jessica Grady

Graduate Student Mentor: Delaney Callan

Shy children are at higher risk for social adjustment problems, such as poor peer relationships and poor social skills, as well as internalizing behavior problems such as anxiety. These social outcomes appear to vary by child gender. One possible factor that may help reduce these negative outcomes in shy children is activity level. The present study considers the relation between activity level and various social outcomes including internalizing behaviors and social competence in shy boys and girls. It is hypothesized that a higher activity level will be associated with lower internalizing behavior and that this effect is more specific to shy boys than shy girls.

Fifty-five shy 21-24-month-old toddlers engaged in various episodes, two of which included a 5-minute introduction episode and a 3-minute free play episode from the Laboratory Temperament Assessment Battery (Lab-TAB). Latency to begin playing, the number of toys manipulated, and vigor level during the freeplay episode were scored. Social competence and internalizing behavior were measured through parent ratings on a survey and observed behavior during the introduction episode.

Preliminary data for 20 participants showed that activity level was correlated with internalizing behaviors, r=.56, p=.01. The correlation between activity level and internalizing behaviors was similar for shy boys (n=8, r=.62) and shy girls (n=12, r=.54). There was a weak correlation between activity level and social competence, r=-.19, p=.41. This association did not differ by gender. Activity level was negatively correlated with observed boldness for boys only (r=-.62, p=.10). Based on the preliminary data analysis, higher activity level does appear to be associated with fewer internalizing behaviors for shy boys and girls, and less observed boldness for shy boys. Results with the full sample will be presented.
Poster Session 2 - Abstracts

Poster 16C
Don’t talk to strangers, or should you? Shy children’s vocalizations with parents and strangers
Caitlin Reynolds
Faculty Mentor: Jessica Grady
2018 Summer Undergraduate Research Fellowship Project
Shy children experience fear and anxiety in social settings. This fear often leads to being quiet, despite desiring to interact (Coplan & Evans, 2009). Shy children’s lack of verbal behavior is important because it may disrupt the development of communication skills (Coplan & Weeks, 2009). The present study examined shy toddlers’ vocalizations in relation to aspects of the social context, including social familiarity and parents’ utterances. The goal was to identify a context that may support shy toddlers’ communication.

Participants were 54 shy toddlers (22 boys; \(M_{age} = 23.31\) months, range 21-24 months) and their parents (mostly mothers). They completed a series of episodes from the Lab-TAB (Buss & Goldsmith, 2000), in which toddlers were presented with unfamiliar social stimuli. All toddlers were pre-selected as temperamentally shy (>1 SD of the TBAQ social fear subscale; Goldsmith, 1996).

Child positive/neutral vocalizations and parent utterances were coded in Datavyu using event sampling. For each episode, coding occurred in two different contexts: familiar (20s before and after the stimulus entered) and unfamiliar (2-4 min period when the stimulus was in the room). Scores were proportionalized by duration of each context.

Results showed that shy children vocalized more with familiar people than with unfamiliar people. However, in the unfamiliar context, children did not differ in vocalizations by type of stimulus. Parent utterances were positively associated with child vocalizations in the stranger working episode only; however, these vocalizations were primarily parent-directed.

Since shy children vocalized more frequently when left alone with a parent than when an unfamiliar stimulus was present, further research needs to address what specific types of parent utterances can encourage shy children to adapt to unfamiliar environments.

Poster 17A
"Leave me" or "Help me" - Are Parent Behaviors Associated with Child Boldness in Shy Toddlers?
Andrew Leyva, Stephanie Ascencio
Faculty Mentor: Jessica Grady
Graduate Student Mentor: Delaney Callan,

Shyness refers to a state of wariness and anxiety in response to novel social situations. Shy children often cope with their wariness and anxiety by withdrawing from, rather than engaging in, social settings. However, social engagement is thought to be an important means of accumulating cultural knowledge, suggesting that children who do not engage in exploration may fail to gain meaningful skills. Previous research has primarily focused on behaviors that restrict shy or inhibited children from exploring novel situations, and comparatively less is known about behaviors that support exploration. Our study examined parent behaviors that might support shy children in adapting to novel social settings.

Fifty-five parents and 21-to 24-month-old toddlers were observed in four laboratory episodes that were designed to introduce children to social novelty (i.e. Stranger Approach, Stranger Working, Clown, and Puppet Show; Buss, 2011). Parental coaxing, modeling, positivity/affection, and warmth/reassurance were coded on a 5-point scale from 1 (not at all) to 5 (extreme) for each episode. Child boldness was coded on the same 5-point scale during each episode.

Results using preliminary data from 40 shy toddler-parent dyads showed that warmth was negatively correlated with child boldness across all four episodes (\(\beta_s = -.35\) to -.47, all \(ps < .04\)). Parental coaxing, modeling, and positivity/affection were not consistently associated with child boldness. These preliminary results suggest that parental warmth may hinder shy children’s exploration in novel social settings. However, given the correlational nature of the data, it is also possible that children’s lack of exploration may elicit greater
parental warmth in a bi-directional manner. Possible implications for the parenting of shy toddlers will be discussed.

Poster 17B

Do Women Represent Women? Feminist Theory in Political Representation

Caroline Kendra Styce

Faculty Mentors: Dari Sylvester Tran

More often than not, women are not represented by women: elected leaders in the United States are predominantly male. The feminist movement is trying to improve underrepresentation by encouraging more women to run for political office, therefore increasing descriptive representation of women. This increase is presumed to lead to more advocacy for women’s issues because it is assumed that women support women’s issues. However, do women really support women’s issues while holding political office? Health care policy, traditionally considered a women’s issue, creates opportunity to test the reality of this assumption. Utilizing the Affordable Care Act (ACA) legislation considered by most state legislatures, this research creates a logit model of the relationship between the percentage of women legislators and the odds that the legislation passes while controlling for: political party dominance in the state legislature, republican governors, Medicaid expansion history, and the states GDP per capita. Results suggest that increased levels of women representatives do significantly increase the odds that the Medicaid expansion passes in state legislatures; even with additional specifications to ensure robustness. These findings indicate that higher levels of descriptive representation of women are correlated with substantive representation. Therefore, elevating women into positions of legislative power increases the odds that women’s issues will be addressed through policy.

Poster 17C

Measuring Regime Type

Christopher L. Mitchell

Faculty Mentor: Dari Sylvester Tran

In this paper, I create a new measure of regime type and examine the implication that using such a measure would have on existing scholarship. Existing measures are highly correlated with one another, which points to their external validity, but they often lack conceptual validity. A new measure, focused on those aspects of a government most minimally necessary for democracy, is a step toward improving that. In this measure, a democracy is considered to have (1) competitive elections, (2) a broad electorate, (3) transparency, and (4) actual authority of elected officials. Authoritarianism is considered a residual category where those countries not considered “real” democracies are placed. However, by coding each of the four necessary factors for democracy as a different binary variable (1=true, 0=false), there is greater conceptual flexibility in coding regimes according to their unique qualities.

Poster 18A

Exploring Structural and Political Constraints on Authoritarian Learning: Blaise Compaoré’s Fall from Power in Burkina Faso

Abigail Miles

Faculty Mentor: Dari Sylvester Tran

In a time of increasing authoritarian proliferation and democratic backslide, it is increasingly important to study questions concerning how authoritarian regimes keep, or lose, power. This paper purports to help better understand the phenomenon of authoritarian learning, defined as the process in which authoritarian regimes adopt strategies and policies learned from the successes and failures of other regimes, or from a historical evaluation of their own regime, in order to prolong their rule. Through a case study of the 2014 revolutions in Burkina Faso and the subsequent resignation of former President Blaise Compaoré, this paper attempts to illustrate why Compaoré was
Unable to implement learned strategies from previous uprisings in Burkina Faso in order to keep power. This work utilizes the framework of Bank and Edel (2015) to find that learning by Compaoré, in fact, did take place, and then explores two potential variables, internal regime structure, and outside organizational forces, that help explain why policy implementation as a result of this learning was absent. This paper finds that the structural and political constraints of Burkina Faso in 2014 disallowed Compaoré from implementing strategies learned throughout his tenure that would have prolonged his rule.


**Poster 20A**

**Analysis of the Impact of the Popularization of Uber on Drunk Driving in Densely Populated Counties, US**

Lauren Herbert

Faculty Mentor: Michelle Amaral

The introduction of the rideshare service Uber in 2009 revolutionized the way consumers travel locally, inviting opportunities for study of its effects on society. While some of these effects may serve to bring positive changes to the number and nature of accidents that occur on the road, there lacks a comprehensive analysis of advancements that Uber potentially brings to these issues. This gives rise to a need for investigation into Uber’s influence on road conditions, and in particular, drunk driving. To analyze the potential impact of Uber on drunk driving, we utilize accident data from Fatality Analysis Reporting System (FARS) by county from 2007-2017. Using the introduction of Uber into any of the one hundred most densely populated counties in the US, we determine the number of accidents involving inebriated drivers per one thousand population during this time period. Using this as a dependent variable, we exploit variation across counties and over time in the introduction of Uber in densely populated counties to identify the relationship between the introduction of Uber in a county and the amount of drunk driving accidents. We run a series of additional model specifications to test the robustness of the model. This analysis is practically significant because it can be utilized in further studies of regional impacts of similar rideshare services as well as campaigning for methods to reduce drunk driving fatalities in the future. It is possible that these results may become more significant in magnitude in the future as the rideshare service becomes more prevalent in less densely populated areas across the country if its popularity continues to increase. This study is limited in that it does not account for Uber’s pricing or for counties that have restrictions on the ridesharing service’s use. Future work should incorporate these limitations.

**Poster 20B**

**Detrital zircon sample preparation of the Jurassic Tuttle Lake Formation, El Dorado County, California**

Emily M Chiappe

Faculty Mentor: Kurtis Burmeister

Preparation of a fine-grained sandstone collected from the Tuttle Lake Formation for detrital zircon analysis provided new insight into the mineralogy of Jurassic volcanic arc related strata in the southernmost Mt Tallac metamorphic roof pendant. The Tuttle Lake Formation is a weakly metamorphosed sequence of volcaniclastic sedimentary rocks deposited as debris flows in a shallow marine basin. Detrital zircon analysis of the Tuttle Lake Formation was undertaken in hopes of addressing compelling questions surrounding sources of sediment within the volcanic arc. Ages of zircon crystals determined through radiometric age analysis can be used to identify discrete populations that can be used to resolve the provenance of the sediment in a given area. We hypothesized that the zircons from the Tuttle Lake Formation either originated from within the Sierra Nevada volcanic arc or from the continental margin of North America. To test this hypothesis, we prepared our sample for detrital zircon analysis. Sample preparation involved separating zircon crystals from other minerals in the rock. This was accomplished through the combination of magnetic
and heavy liquid separation techniques. Two rounds of magnetic separation were conducted using a Frantz Magnetic Separator, first set at a 20 degree tilt and 0.35 amps, and then at an 8 degree tilt and 0.60 amps. The resulting diamagnetic minerals were submerged in a tungsten-based heavy liquid, allowing for the separation of dense grains from lighter grains. Our results were unexpected – we were unable to recover a statistically valid population of zircon crystals. The absence of zircon crystals within our sample suggests that the interval sampled within the Tuttle Lake Formation is not an ideal candidate for this method of geochronological analysis. We have already identified a potentially better location for sample collection and hope to conduct a follow-up analysis to address questions surrounding this unit’s history.

Poster 21A

History of Groundwater Flow in the Southern Great Basin Inferred From Paleodeposits

Katherine R. Andrews

Faculty Mentors: Laura K. Rademacher, Yadira Ibarra (San Francisco State University), Marty D. Frisbee (Purdue University)

Graduate Student Mentor: Zachary P. Meyers (Purdue University)

2018 Summer Undergraduate Research Fellowship Project

Paleohydrologic deposits (“spring mounds”) from the Great Basin were analyzed for petrographic indicators of past changes in groundwater flow throughout the groundwater system. This pilot study focuses on carbonate samples collected from spring mounds in Death Valley National Park (DVNP), CA and Ash Meadows National Wildlife Refuge (AMNWR), NV. The sampled springs that host these carbonate deposits are part of a larger project investigating the relationship between groundwater flow and ecological diversity in the modern environment. This study seeks to understand how and why portions of the flow system have dried over time, while others remain active. Results from our investigation provides insight into how the Basin and Range spring systems have evolved through changing climate regimes.

Hand samples were collected from two sites: one site in eastern DVNP and one site in north-east AMNWR. Sampling locations were located in the distal, non-flowing regions of large modern springs. In the lab, samples were photographed at high resolution and then cut and polished into standard thin sections for petrographic analysis. Petrographic analyses on all samples revealed that they are largely calcium carbonate. However, the analyzed samples vary in crystal size from micrite layers to bands of bladed spar crystals that may represent seasonal changes in temperature during deposition. Several samples appear to have undergone diagenetic changes while others exhibit only minimal post-depositional changes.

Future work will include carbon and oxygen isotope analysis that may suggest paleoenvironmental changes, that coupled with the petrographic analysis, will provide insight into particular paleo-climate conditions that may have correlated with a change in crystal structure or periods of growth or non-growth in the carbonates, thus providing insight into flow histories. In addition, future luminescence dating of the cores to provide a timeline for these observed changes.
String Quartet no. 2 "The Void"

Kevin Swenson

Faculty Mentors: Andrew Conklin, Robert Coburn

This piece was inspired by the 36th koan listed in Nyogen Senzaki's collection of 100 Zen Koans, The Iron Flute.¹ It reads:

36. Where to Meet After Death

Tao-wu paid a visit to his sick brother monk, Yun-yen. "Where can I see you again, if you die and leave only your corpse here?" asked the visitor. "I will meet you in the place where nothing is born and nothing dies," answered the sick monk. Tao-wu was not satisfied with the answer and said, "What you should say is that there is no place in which nothing is born and nothing dies, and that we need not see each other at all."

When I first read this koan I was immediately fascinated with the concept of "the place where nothing is born and nothing dies." I believe it boils down to a single word: the void. The concept of the void is entertained throughout the piece by the sustaining of single harmonies for long periods of time. At times, particularly during the middle of the piece, this sustenance is masked by a higher level of rhythmic activity and timbral transformation. Silence is also used as a means of illustrating a sense of the void. In light of this conceptualization, it is my sincerest hope that listeners might enter a reflective, even meditative state of mind by experiencing the piece.


Whirlwhim

Brian Bui

Faculty Mentor: Andrew Conklin

Whirlwhim was inspired by the way the wind forms vortices where leaves and petals seem to spin and dance around in a whimsical manner. The piece makes use of the intervals of a major second and perfect fourth throughout, especially through the use of quartal harmonies creating an open sonority that evokes the sound of air blowing through one's ears. Lines and gestures are also passed between instruments like leaves being passed from draft to draft. The piece begins with a breezy introduction, depicting petals gently falling from a tree. A storm can be seen from the distance and the gusts begin to pick up.

Sine Teste

Peter D. Altamura

Faculty Mentor: Robert Coburn

Sine Teste is written for flute (alto, piccolo), violin and viola. The title translates from Latin as ‘without witness’. This programmatic piece tells the story of a man who finds himself alone in a dark, strange place, surrounded by faces and tombstones.

The piece is split into three sections; 1. Ethereal Torment 2. Echoes in Eternity 3. Escape to Sanity

On the Contrary

Wyatt Cannon

Faculty Mentor: Robert Coburn

On the Contrary is a saxophone quartet written in three movements. The thrilling, energetic introduction focuses on chromatic melodic motion and crunchy, half-step harmonies. A florid, twisting melody highlights the second movement, contrasted with punchy full ensemble gestures and a playful melody near the end. The final section is built on an octatonic scale and features elegant melodic motion contrasted with angry chordal moments. It takes full advantage of the harmonic possibilities within the octatonic scale. Each part of the piece is punctuated with a tritone cadential moment near the end. Together, the movements give the listener an overall sense of inner struggle, turmoil, and discomfort until the very end, where balance is restored, and the listener feels contentment and peace.

Semblance

Maya Balachandran

Faculty Mentor: Robert Coburn

We operate on different wavelengths, and it's meant to be that way.
**Breath of Spring**

Micah Vogel  
Faculty Mentor: Robert Coburn  

This short piece was envisioned as a light, not overly serious work that would evoke some of the feelings and experiences of Springtime. For me, the A section with its quick and lively interlocking rhythms suggests the intense yet delicate excitement of a Spring day. The B section, then, represents the cool, languid evening-time peppered with shades of what the next day might bring.

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**Electric Dreamscape no. 1**

Kevin Swenson  
Faculty Mentors: Andrew Conklin, Robert Coburn  

This piece, commissioned by violinist Sabrina Boggs, is for violin solo and computer (Max/MSP). The computer records audio generated by a violin soloist and processes it, creating surreal textures. All of the sounds processed by the computer are recorded live by the soloist during the performance except for the percussive effects heard near the end of the piece. Those sounds were recorded in the Owen Hall Recording Studio by Sabrina on the violin and are a built in part of the patch. As a result the sound of Sabrina’s instrument is integral to the piece; those percussive effects will always be there no matter who performs the piece. The piece explores various extended techniques possible on the violin and actively avoids most traditional uses of the instrument.

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**The Body Where I was Born**

Kevin Swenson  
Faculty Mentors: Andrew Conklin, Robert Coburn  

This is an interactive piece for trumpet solo or duet and computer (Max/MSP) in 11-limit just intonation. The live performer(s) play improvisatory material governed by a performance algorithm. By means of a frequency follower the live performers can trigger samples stored in the computer which were recorded by Professor Leonard Ott in the Owen Hall Recording Studio. The combination of the sampled and live materials forms a drone-based texture that envelops the listener in a quadraphonic speaker array. The title and character of the piece were inspired by this stanza from Allen Ginsberg's 1954 poem "Song:"

> yes, yes,  
> that's what  
> I wanted,  
> I always wanted  
> to return  
> to the body  
> where I was born.

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**Talk to Me**

Wyatt Cannon  
Faculty Mentor: Robert Coburn  

Composed and performed using Max/MSP, this piece uses spoken material and transforms it through various looping processes and effects. By isolating specific phrases, the piece captures the inflections of the speaker’s voice and shows how that brings power to otherwise simple phrases. It was inspired by Steve Reich’s early tape pieces, such as *Come out* and *It’s Gonna Rain.*
A Low-Cost Portable Electroencephalographic System for the Identification and Prevention of Microsleep Episodes

Kyle A. Poe, Morgan T. Trembush, Matthew Panesis, Alisa F. Matuska, Christopher K. Chuang

Faculty Mentors: Jeff Burmeister, Fadi Muheidat

Studies have shown that lapses into microsleep episodes are common in truck drivers—a particularly dangerous event considering the oft-catastrophic consequences of falling asleep at the wheel. In this work, we have undertaken development of a low-profile electroencephalographic (EEG) device that would determine user consciousness levels and alert the user if a microsleep episode is imminent. Fitting within a baseball cap, 9 dry, comb-style electrodes are mounted within an elastic band within the 10-20 EEG placement convention. The transduced, microwatt-level electrical activity is then subjected to a low-pass filter and subsequently amplified by a Delta-Sigma differential amplifier wired in bipolar montage. The device is controlled by an Atmel ATmega microcontroller clocked at 16MHz which interfaces with a Bluetooth low-energy module for wireless transmission of data. The electronics are to be implemented on a printed circuit board, and the device will be rechargeable. To process the acquired data, the device transmits data via Bluetooth 4.1 to an Android app programmed in Java. This smartphone app is based upon an open source Bluetooth app which has been modified to receive, interpret, and send signals to the PCB. The data is separated into discrete time-packets and subjected to a continuous power-spectrum analysis algorithm, which will be trained using labelled EEG data from the Sleep-EDF database. Once the spectral signature of sleep is detected, the Android app will issue an asynchronous interrupt to the device, engaging an alarm system comprised of two vibratory motors and an audible alarm until the user disables the alarm. Currently competitive options that exercise these features are prohibitively expensive, have low battery life, and have only been available in European markets. As the project progresses, the goal is to ensure that brain activity can be accurately detected and interpreted to alert a user before they fall asleep.

An Improved Cooling System for Medical Tube Extrusion

Orion Candelario Capuyon, Jamie Anne Z. Narciso, Haris Jebrini, Analynne Madrid, Serena Chu

Faculty Mentors: Jeffrey Burmeister, Joshua Steimel

Specialized Engineering is a company that produces extruded tubing for various medical applications and devices. Extrusion of these medical tubes are subject to high scrutiny in terms of tolerances and sterility. In the hopes of streamlining their output, Specialized Engineering offered our team the opportunity to design a new cooling system for their extrusion process. They utilize a Harrel Extruder for their tube extrusion method, which is sufficient, but, they experience a bottleneck in the cooling process. The newly extruded tube must be cooled in a water trough before cutting can be carried out. The current water trough allows the tube to pass through water of a singular temperature which is dependent on the ambient temperature. Fluctuations in water temperature and water turbulence from water flow into the trough result in deformities along the tube. This not only contributes to a longer setup time, but also leads to the loss of hundreds of feet of tubing material. The water trough also requires very precise adjustment before adequately produced tubes can be attained. These adjustments are achieved through rudimentary “guess and check” hand adjustments. This method of tuning further delays production of tubes of sufficient tolerance. The goal of this project aimed to resolve the setbacks concerning the setup time and waste of material through a two zone, temperature controlled trough. This new cooling system also incorporates a motorized adjustment system using a PC interface, allowing precise control of the trough position as well as the water temperature at either end of the trough. Furthermore, the standard design was improved by integrating a UV light to sanitize the circulating water. The new trough design aims to reduce setup time from upwards of six hours to thirty minutes, reduce the amount of wasted material, and provide a sterilized environment for extrusions.
Modified Walker to Lift a Late-Stage Dementia Patient

Ryan McVicar, Chandana Kothur, Isabelle Huynh, Giacomo Pacioni

Faculty Mentors: Jeff Burmeister, Shelly Gulati

The project is a modified walker that eases the load placed on caretakers while assisting a late-stage dementia patient to stand from the seated position, sit from the standing position, and walk with guided support. The walker will feature handlebars for patient self-support, two locking gas springs, and a lever arm used by the caretaker to lift and sit the patient from under the armpits. B-Locking Gas Springs will be positioned beneath the lever arm, supported by a crossbeam, to provide a mechanical advantage during use. This walker is designed specifically for a patient with late-stage dementia. When a caretaker pushes down on one side, the patient would be lifted from the other side. To make the design cost-efficient, gas springs were used so that there would be no need for another power source other than the caretaker. The gas spring along with the caretaker’s force would be combined to yield a mechanical advantage for the walker. The weight needed to lift the patient will be decreased by 61.5% and the weight needed for the patient to be held at the top will be decreased by 76.9%. The calculations for the force of the gas spring on the patient and the force needed for the caretaker to push down on were determined by modeling a parametric study in MatLab. The walker is primarily designed to be used in a residential setting and the walker would help reallocate the weight to a safer position for a caretaker when they are lifting the patient.
A New Community Center for Stockton’s Growing Population

Gena Farley

Faculty Mentors: Mary Kay Camarillo, Camilla Saviz, Hector Estrada, Luke Lee, Scott Merry

Other Mentors: Dino Kloth, Paul Schneider, Roberth Norbutas (Siegfried Engineering), Adam Killinger (Geopier Foundation Company)

In this project we present a new and proposed community center that would include a basketball court, multipurpose rooms, café, outdoor soccer field, and a fitness trail. As part of this project we produced a site layout, drainage plan, utility plan, and structural and foundation design of the recreational center building. The site is located in “The Sanctuary”, an area that is proposed for development in the City of Stockton’s Master Plan, a publically available planning document that outlines future growth and urban development. Information contained within the planning documents was used to select the site and design the foundation and underground utilities. The foundation design was based on soils data collected by a local engineering firm. Based off the soil conditions, intermediate foundations were used to reduce settlement and support the building. Underground utilities were designed (water service, sewer service, and stormwater drains) based on the California Plumbing Code and City Standards. The site grading was designed to direct stormwater away from the building and parking lot and into bio-retention ponds. Stormwater reduction calculations were performed to size the bio-retention ponds, which functions to reduce the stormwater discharged from the site. The California Building Code was used in the design of the two-story steel structure, which was modeled using RISA software.

District 108 Wetland Habitat Pump Station Project

Neil H Irani, Muhammad Khan, Lillian Sam, Ethan Malonzo

Faculty Mentors: Mary Kay Camarillo, Scott Merry, Luke Lee, Camilla Saviz, Hector Estrada

California wetlands are disappearing at an alarming rate: over 91% of California’s wetlands have been converted to farmland and urban areas. One of these wetlands is located in Reclamation District 108 in Yolo County. Our project goal is to provide an alternative water source to this wetland, which provides habitat to many important species found in the Central Valley. We have designed our project to replace the existing water demands of our project wetland, which are currently met by a pump station sourced from the Colusa Basin Drain. If the Colusa Basin Drain is in any way compromised, our pump station is designed to provide for a flow scenario based on current usage.

The proposed pump station consists of a steel housing structure, new pumps and associated valves, and two new force mains. All steel structural design was done in accordance with the California Building Code, International Building Code, and ASCE-7 standards. The steel housing structure was modeled in Revit for 3-D visualization and in RISA for structural member analysis and optimization. Geotechnical work was necessary in design of our deep foundation piles, as well as in the design of our pipeline. Geotechnical work was performed to ASTM standards when applicable. We are also incorporating trenchless drilling technology as a means of running our new pipeline under both an existing levee and the Colusa basin drain. California Code of Regulations Title 23 was used in designing the path of our pipeline, and relevant materials were selected to ASTM standards.

The proposed pump station will help maintain an existing wetland while minimizing impacts during construction. Sustainability and environmental preservation were priorities in all design decisions.
Revitalizing Downtown Stockton One Building at a Time

Taneil Evans, Jeric Lagmay, Andres Muñoz, Marc Ney

Faculty Mentors: Mary Kay Camarillo, Hector Estrada, Camilla M. Saviz, Scott Merry

Other Mentor: Doug Wagner PE (JC Wagner & Associates, Inc.)

Buckenhams Stuttgart West is a 3,918 square foot auto mechanic shop in Downtown Stockton that has been providing restorative services to Stockton car enthusiasts for years. In 2018, a piece of machinery sparked a fire that spread throughout the building, charring the timber roof structure beyond repair and scorching the brick. As a result, the roof requires complete removal and replacement in the affected areas, while the brick walls remain intact and functional, although seismic bracing is needed. Due to the cost of demolition and the fiscal impacts on the owner’s business, the client has opted to retrofit and repair the building while keeping historical aesthetics intact.

The design includes key components from structural, geotechnical, and water resources disciplines. Our team provided a comprehensive solution to bring the unreinforced masonry structure back into code compliance in the following areas: new roof framing specifications to replace the damaged roof structure, the design of a subdiaphragm to stabilize the building under critical loading conditions, a foundation design and upgrades to the drainage onsite that will reduce environmental impacts. JAMT Engineers completed a construction cost estimate, construction drawings, and comprehensive calculation packages for structural, geotechnical, and water resources services provided. Our design process was based on the analysis and synthesis of empirical data obtained for the site combined with generally accepted engineering practices recognized by industry experts.

Our goal was to retain the historic aesthetics of the building and work within the confines of the existing footprint while addressing structural stability and environmental concerns. The improvements described here will restore the building to an operational state and allow the owner to successfully resume business.

Sheltering the Homeless, Serving the Community: The Stockton Women & Family Complex

Travis Pazin, Gimelle Jacala, Staysha Delgado, Jake Smith

Faculty Mentors: Mary Kay Camarillo, Luke Lee, Hector Estrada, Gary Litton, Camilla Saviz, Scott Merry

The Stockton Shelter for the Homeless has faithfully served San Joaquin County since 1986. Located at 411 South Harrison Street, the Stockton shelter has separate facilities for single men, families with children, veterans, and those with HIV/AIDS. In 2016, the shelter observed a sudden increase in the local homeless population. To meet increased demand, the shelter has been operating over capacity, allowing clients to sleep on the floor in common areas. In 2016, the Shelter served 3,678 people, including 309 children, 257 families, and 122 veterans. In this project we designed a new Women and Family Complex to replace the existing facility. The project scope includes an administration building containing a dormitory for single women, two multipurpose rooms and six staff offices. The project also includes three family dormitories, a courtyard with a play area, and a new parking lot. The buildings were sized for 170 people. The dormitory for single women can house 28 people, and each family dormitory has 12 rooms that can house a total of 48 people. Structural designs were performed using RISA-3D modeling to analyze forces acting on the buildings, and adequate steel member selections were confirmed by hand calculations using the American Institute of Steel Construction and ASCE 7-10 standards. Appropriate foundations were designed to support the structures using ASTM and American Concrete Institute standards. Bearing capacity and settlement calculations were performed in accordance with the 2009 Stormwater Quality Control Criteria Plan and the City of Stockton Standard Drawings. The rational method, Manning’s equation, and the hydraulic element were used to calculate the site runoff and pipe sizes.
Alexa What’s my schedule?

Ryan J. Su

Faculty Mentors: Osvaldo Jimenez, Shon Vick

As the increasing number of AI assistant devices finds their way into the homes and rooms of the populace, so should the number of apps increase for such devices. However, this is not the case for devices like the Google Home or the Amazon Echo. Although being around since 2015, the applications market for these devices grew at small rate until last year where the number of skills on the Echo more than doubled from 25,784 skills to 56,750 skills. This was due to the increased popularity of the devices and their overly-simple design that lacks flexibility and advanced functionality. In my research I seek to develop my own skill on the Amazon Echo that allows for more detailed scheduling and notifications that the default functions of the Echo lack.

BusMe: The Road to Better Public Transportation

Dominic Echeverria Lesaca, Shane Duan, Gurkirt Heerey, Ali Noorani, Jesse Talamantes

Faculty Mentors: Shon Vick, Osvaldo Jimenez

Buses do not have the best reputation when it comes to public transportation in most places. They are thought of as an unpleasant and off-schedule mode of transportation. This makes buses as a form of public transportation not as desirable in comparison to taxis or ubers. These taxis and ubers on the other hand create more pollution, use more space on the roads while carrying less people, and are overall not as eco-friendly as buses. As a result, if we could somehow make buses more convenient, faster, and more eco-friendly we could get rid of the issues that other modes of transportation cause. This web application will provide both bus drivers and bus passengers useful information from their internet-connected device. When the bus drivers will go on the web application they will be able to see the various bus stops where people are waiting, which will allow them to skip stops where nobody is waiting. The bus passengers on the other hand, will be able to input the number of people in their party to let the driver know they will need that many seats, so if the bus is too full the driver does not even have to stop at that particular location. Furthermore, the passengers will be able to see the exact location of the bus, so they can estimate when it will arrive at the particular stop they need to be at.

Derelict Station: A 2D Game

Jack Thias, Clarissa L. Franke, Jacob Barajas, Alex Lee, Jake Anhaltzer

Faculty Mentors: Shon Vick, Osvaldo Jimenez

As students at Pacific, we have found ourselves especially engaged when we have had game development projects in our classes. It therefore seemed fitting to us to develop a game for our senior project. ‘Derelict Station: A 2D Game’ is an exploration of game development with Unity, with the intent to create a more polished game than anything we’ve made in our earlier courses. Unity is a game development platform that uses the programming language C#. To use this platform, we still write our own code, but the platform provides tools to efficiently pack the code and combine it with the graphics. We see this project as a combination of both the technical programming in the backend of the project, as well as the art and design on the frontend. The game format we decided on for this game is a semi-linear (meaning there is a timeline of events in the game, but they do not all necessarily need to happen in a specific order) 2D platforming game, with an emphasis on area exploration.

Currently, we have programmed all the main functionalities of the game. We have character movement and actions, enemy movement and actions, scene transitions, and health all working. We have some art complete, mainly for the main character and enemies. We will next be constructing more levels and building the basic storyline of this game.

What we have learned so far is how important communication and teamwork are in game development, even on a smaller scale team. It can be extrapolated that with larger teams, communication becomes even more essential to avoid major issues. From a programming perspective, this project has allowed us to become much more comfortable working with Unity and the C# language.
Find your roommate today!
Maxine Lien, Cynthia Phan, Brendan Ahdoot, Pranav Thirunavukkarasu

Faculty Mentors: Shon Vick, Osvaldo Jimenez

As college students, we have a lot to stress about: school, finances, future plans, and so much more. The driving force behind this project is to minimize the amount of stress college students have to face as much as possible. The last thing students should have to deal with is a disruptive living situation.

To help solve this problem, we are in the process of developing an application called RoomMatch that will allow students to create accounts with their university email, view other users and their information, and choose whether to “like” or “dislike” them. Mutual likes between two students will allow them to meet, chat, and potentially become roommates.

This application is being developed for both iOS and Android devices. For frontend, we are using Facebook’s React Native which allows our project to be portable for both iOS and Android applications. We are connecting the frontend and backend using the Axios library (AJAX calls) and SocketIO (WebSockets). The backend is powered by Node JS for business logic and MongoDB for data storage. All of the backend is hosted on a Linux Red Hat AWS server.

Get rich quick: Investing carefully to build wealth over time
Jesse Hill, Anthony Helou, Dorothy Luu, Noah Garner

Faculty Mentors: Shonn Vick, Osvaldo Jimenez

Simple web searches for stocks to buy will be full of “hot stocks of the week” posts which don’t provide any insight and may be poor investment decisions for an individual. This makes building wealth through equity a confusing and daunting task for individuals without any financial education. To find investing strategies that have been successful for individuals, we reached out to a subject matter expert in the wealth management field to understand how best to provide personalized investment research to our users, and consulted with professors from the Eberhardt School of Business. We collect the following information from users: risk tolerance, financial knowledge, and company or industry interests. This information is implemented into our service solution that auto generates investment research that is tailored to a user’s personal investing needs and provides insight as to why they should invest into a specific security. The language is also appropriate for the knowledge level of the future.

GrowME
Antonio Tran, Carmie Mach, Danilo Baledio, Minh Pham,

Faculty Mentors: Shon Vick, Osvaldo Jimenez

In 2015, exports of agricultural products were worth an estimated 133 billion-U.S. dollars, while imports were worth around 113.5 billion-U.S. dollars. Within the United States alone, there are approximately 2.08 million farms. [5]. Today’s farmers and growers utilize advanced technology to minimize production costs. Technological advancements, such as robots, weather patterns and temperature, and aerial images, are making a significant impact within the agricultural industry. Our team was inspired by this emerging AGTech field. We recognized the usefulness of a predictive analytics application within the industry, which is how the idea of GrowME (Maturation Evaluator) came about. Another motivation for our proposed system, GrowME, is that the world population is still ever growing and putting more pressure on the need for increased food production which will lead to adverse side-effects on the environment [2]. Focusing our collective energy on creating innovating farming technology can optimize crop yields while simultaneously addressing the issues of environmental impact. GrowME, the proposed solution, is a user-friendly tool that collects data through sensors; utilizes its large knowledge base to conduct comparative analyses for the gathered information, and presents detailed and high leveled reports. Users, may it be your everyday home gardener or corporate farmers, can utilize the application to access useful data that would otherwise go unknown. In our project, we found the average reading level of dry soil and drenched soil. Depending on the soil type associated with the
plant, a recommended level of soil moisture is prescribed so the specific plant. Plants that prefer moist soil may experience optimal growth in levels of lower readings whereas desert type plants may experience optimal growth in higher readings.

**PacAuth: Because “just” a password isn’t enough**

Sam Sabetan, Joseph Soares, Race Nelson

Faculty Mentors: Osvaldo Jimenez, Shon Vick

This project outlines the security concerns associated with services utilizing “password-only” logins. With the abundance of password sharing across multiple platforms, the use of cyber attacks with regards to personal data has grown exponentially. For instance, the September 2017 Deloitte breach showed how even a massive corporate entity can fall victim to password sharing and limited access control. To combat these breaches, we have developed an enterprise level solution that creates a second-factor token which can easily be applied to any service that has a network connection for validation. Our solution integrates seamlessly with websites that feature user login as well as operating system authentication. A “one-time password” is generated by our token hardware or software, submitted to the website utilizing our service, and confirmed with our cloud verification API. The ability to choose either a software or hardware token allows an enterprise or individual to determine their own security risk and assume a posture that is equivalent to their concerns.

**S.P.A.M. Fighting SPAM**

John S. Kim, Alex J. Pelavin, Michael Myers, Nico Fasan

Faculty Mentors: Shon Vick, Osvaldo Jimenez

On Twitch.tv, streamers encounter issues where human moderators must continuously monitor live channels to prevent inappropriate discussion. Additionally the streamers are not able to take advantage of the rapid stream of information coming from their viewers. These problems stem from the large amount of data that is difficult for humans to process and are much more suited for a programmatic solution. Our system will allow streamers on Twitch.tv to apply automatic moderation to their streaming channel and will give insights into viewer trends and information. Currently, systems exist to solve similar problems but rely on human interaction to moderate channels or very limited bot interactions and provide only big picture statistical information. Our bot interacts with the Twitch.tv IRC channel, reading user input and server messages to determine previous actions taken against users as good or bad, learn from said actions, and be able to make accurate moderating actions. We are in the process of scrubbing chats and working through IRC logs to be able to train the bot to react properly to our specified criteria. In addition we have a preliminary classifier running that allows us to make judgements based on certain user and chat message statistics. In this paper we will detail the methods used to collect, label, and learn from the information gathered in addition to the methods of providing statistics. Need for human intervention to moderate and parse the constant streams of data that go through Twitch.tv motivated us to automate parts of the process. The kinds of statistics taken from streams, users, and channels allow us to take advantage of machine learning techniques to provide an enhanced experience for all.

**SecureVis**

David Samuel, Michael Davis, Steven Melavic

Faculty Mentors: Shon Vick, Osvaldo Jimenez

SecureVis is an open source smart computer vision driven security system that leverages an edge computing paradigm and deep learning computer vision algorithms to determine human activity across multiple spaces. Multi camera systems can be configured across various rooms / spaces, allowing for maximum coverage across a users property. Small camera clusters can be configured to communicate with a microcomputer (e.g. raspberry pi) which uses low computational cost OpenCV algorithms to determine if there is considerable movement within each cameras optical view. If such movement is detected data is passed over the network to a master system which utilizes a GPU accelerated Regional Convolutional
Neural Network (e.g. YOLO) to determine if the subsequent activity is human. This human activity then triggers the affected cameras to stream security footage from their respective edge systems to the master system. This data is saved locally on the master system. Due to the nature of the edge-based design this allows a user to configure multiple camera clusters across their property creating a smart connected security system that is easily expandable for a relatively low price, this cluster-based system will also allow users to toggle specific areas of their property depending on their circumstances. The end user will have graphical interface that will make it simple for them to review and manage their recorded security footage.

**The F6 Fix**

**Mark G. Fraser, Jillian M. David**

Faculty Mentors: Shon Vick, Osvaldo Jimenez

A software developer's time is valuable, and many Integrated Development Environments (IDEs) have been created to facilitate the developer's coding process. One key feature is the ability to quickly access source code relevant to the developer's current work. Most IDEs provide the ability to open a function's declaration through a shortcut key, but few open the declaration without leaving the current window. This change of context requires developers to reorient themselves in a new setting each time they switch windows, then identify and extract the relevant information they need. Certain IDEs, such as Microsoft Visual Studio, have incorporated the added functionality of viewing a function's declaration from another file without changing screens. The goal of this project is to deliver similar in-context viewing to Eclipse, an open-source IDE.

The biggest task of this project has been learning the Eclipse workflow itself. The project juxtaposes most all other school-related projects in that the plugin does not exist in isolation. The documentation for the Eclipse core architecture and the Java Development Tools source code proved to be the most helpful in accomplishing the daunting task of understanding where the extension point for the feature should reside. The plugin must match architectural conventions established by the Eclipse core developers and, especially for a user interface process, mesh with the current workflow a developer experiences. Understanding the existing framework proved to be most crucial in determining the extension's own sub-architecture. Currently, the plugin is installed both as a menu option and shortcut key with the ability to open properly indexed Java source code in a popup editor. The editor is dynamically placed below the cursor's location and allows the same operations provided by Eclipse.

**TigAR: An Augmented Reality Map Application**

**Keely Canniff, Jamie Lynn Culilap, Naomi Nunis, Katya Sheth,**

Faculty Mentors: Shon Vick, Osvaldo Jimenez

TigAR is an interactive augmented reality (AR) map of the University of the Pacific (UOP) which can be accessed by a GPS enabled smartphone mobile device. This application is used to help locate specific buildings on the Pacific campus and shows information about the building. The problem TigAR will solve is that of lost and confused people on the UOP campus, through using their camera with a graphical overlay of arrows on their mobile device.

All of the information used will be taken from the UOP official website, and GPS functionality will be handled by third-party APIs. What we currently have is the image recognition working with a target image, the 2D UOP campus map is displayed, and a simple application has been created to run TigAR on a mobile device.

Using this application a user can experience a new way to view campus maps, rather than viewing a traditional 2D image. More information about UOP buildings and the steps to get there can be available with TigAR. This application will lend itself towards the era of AR maps for future campuses.
Tiger Boards
Maximo T. Macchi, Sahibjit Gosal, Nathan Chica
Faculty Mentors: Shon Vick, Osvaldo Jimenez

Students at Pacific often need classrooms or other spaces on campus to conduct meetings, do homework, or hold study sessions. However, it is difficult to determine if rooms are available unless a student checks the room in person. While class schedules are available online through insidePacific, they are not broken down by room so it can be quite difficult to filter out room availability. As well, viewing class schedules requires multiple steps which can be tedious.

Our project is a web application which aims to remove the complexity behind finding available spaces on campus. The application will allow students to access it from any web browser and quickly find available spaces on campus for use. User accounts are not required, meaning that a student can navigate to the web app’s URL and find the information they need quickly. However, user accounts will be one feature which adds functionality to the web app. Data used for space availability will come from an IT internal tool known as EMS which has space availability information.

At the time of submitting this abstract, the application is currently in development. It will be hosted on a free hosting service and available for use by the SOECS Senior Project Day. On that day, you will be able to demo our product from our booth as well as learn more behind the architecture of our application.

Tricking NES games to run on laptops
Maxim Veligan
Faculty Mentors: Shon Vick, Osvaldo Jimenez

One of the fundamental problems in software engineering is that software only runs on the hardware it was designed to run on. If a language such as assembly is used, the resulting code can only run on the hardware that supports it. Higher level languages also only work for systems that have a compiler for them. The benefit of having platform specific code is that it allows programmers to apply system level optimizations, but has the downside of being platform specific. Once the platform is outdated or is no longer in development, the old code can no longer be run.

In an attempt to solve this problem, one can write code that emulates the behavior of older systems, thereby “tricking” the older software to run on current hardware. Such an emulator requires software components for each individual piece of hardware. The complexity lies in the fact that systems have multiple processing units that run in parallel, whereas code by its very nature (the Von Neumann Architecture) is sequential. Older systems also had additional hardware that would be plugged in through cartridges to expand the original system’s capabilities. These ASICs must be emulated accurately as well to run the programs.

To understand how the NES works at the lowest level, documents that were written detailing the original hardware were used. A lot of time was spent reading about the results of reverse engineering the hardware and designing a program that accurately modeled it. Audiences can expect a detailed description of how the internals of the NES worked, along with playing some NES games using the emulator.

Wow! A Rhythm Game with a Fighting Element?
Jeffrey Wu, Aarondip Singh, Anthony Tran, Shawn Elpuz
Faculty Mentors: Shon Vick, Osvaldo Jimenez

With gaming being a highly profitable industry and a hobby that we all partake in, our team was motivated to focus on gaming in our senior project. Creating a rhythm game that appeals to the masses is our main goal.

The Rhythm Fighter is a rhythm fighting game that uses a keyboard to match inputs to the beat of the song and notes. The fighting aspect of this game involves the usage of characters and health bars while the song progresses. If the player hits the notes in time, the enemies’ health depletes. But, if the player miss a note your health depletes.
The problem that our game will solve is the oversaturation of barebone rhythm games, which basically have a screen with falling/rising notes, hitting notes to the beat of the music, and a score to keep track. Creating a hybrid genre of rhythm and fighting games makes this game more unique. Providing a story, characters, fighting, and much more, while staying as a rhythm game to its core would make our application a step above the rest.

Following the waterfall method, the development/implementaiton process started from late March to late April. Our preliminary findings are that producing a fully functioning and smooth base gameplay would be the biggest challenge. But once we lay down that foundation, implementing more music would be easier and as a result, entertain the player more.
Audio Loop Pedal

Dan Lim, Zech Miller

Faculty Mentors: Rahim Khoie, Cherian Matthews

The purpose of this project is to create a guitar pedal that records audio signals, and then plays back that same signal. The Audio Loop Pedal is designed to take in up to 14 seconds of audio and store up to 200 different audio samples. These samples can be played independent of incoming audio at the discretion of the user. The pedal is controlled by two stomp switches. The overall design should be easy to use. One stomp switch controls record starts and stops. The other pauses or plays. Both at the same time will clear the signals in memory. The constraints are that the case be ordered from a single manufacturer but still within the ambitious goal of a $50 dollar pedal. A single loop is 1mb while the ram of the Raspberry Pi Zero is 512mb the adc will sample at 50 khz our pedal is able to sample at 150 Ghz. The design incorporates a sallen key filter for loop volume and high and low pass filters.

Augmented Reality Bike Helmet

Ashwin Thiagarajan, Simrandeep Singh, Harnak Singh, Sohil Singh

Faculty Mentor: Rahim Khoie

With 47.5 million cyclists in the United States, bicycles provide a portable, low cost form of transportation. The law requires riders to wear helmets for safety, meaning there exists a large bike helmet market. Many bike riders are concentrated in cities, and use navigation on their smartphones to reach destinations they haven’t been to before. Using a smartphone while operating a bicycle can be distracting and potentially dangerous. To help people get to where they need, a helmet that integrates navigation and other information in its display could be useful to users.

The purpose of this project is to create a bike helmet with a heads up visor that displays speed, navigation, object detection, and time to the user. The helmet will contain a speaker which outputs audio navigation instructions, along with a microphone that accepts user commands. An iOS application will provide navigation and user command functionality. Electrical components will be added to the helmet in a way that is unobtrusive, and does not compromise the user safety. Any retrofitting will occur along international safety regulations. Our group has a budget of 400 dollars to complete, but the total cost of building the project should be under 150 dollars. The overall design will be user-friendly and enhance the biking experience.

Autonomous Lightweight Green Algae Evaluation

Robert Ashby, Cameron Costa, Rachel Owens, Charles Reyes, Marlise van Tonder, Chris Uramoto

Faculty Mentors: Rahim Khoie, Elizabeth Basha

The growth of algae is a vital issue for watersheds, and monitoring these algal blooms can provide useful data on the health of the local environment. However, most equipment that is used to measure water conditions and algae concentration is bulky and expensive, which is prohibitive to field testing. Additionally, many bodies of water are in remote locations that are difficult to access by car or on foot. Our autonomous algae drone addresses these issues with a low-cost sensor package that can attach to an autonomous drone. The sensor array will measure five key parameters: pH, salinity, depth, temperature, and algae concentration. For the crucial measurement of algae concentration, we intend to use a combination of fluorescence and image processing. Preliminary testing has shown that at least partial submersion will be necessary for our device, and final testing will be completed next semester on the Calaveras River. This project will result in improved methods for autonomous field-testing of water and algae in critical watersheds.
BAC App and Breathalyzer Device

Catherine Hsiao, Jason Kerins

Faculty Mentor: Rahim Khoie

The project consists of a Blood Alcohol Content smartphone application using a hardware breathalyzer device. The breathalyzer device consists of a semiconductor based alcohol sensor, a bluetooth module, a toggle switch, a 9V battery pack, and a 3D printed case. The user will blow into the breathalyzer for a predetermined amount of time ample enough to gather data on the user’s BAC. This will pass through an Arduino Uno that will convert the breath of the user into analyzable data that can be passed through an API to our application over Bluetooth. The smartphone app reports the user’s BAC to them, along with helpful statistics such as the amount of time until they will be fully sober. Should they test above the legal limit, it will also display the amount of time until their BAC is below 0.08 and give them the option to call a predetermined emergency contact directly from the app. There is also a feature allowing the user to input the number and type of drinks they have had to get an estimate of their BAC based on their gender, weight, and time since the start of consumption in the event that the breathalyzer device is unavailable.

Strawberry Harvesting Robot

Crystal Beltram, Erin Dural, Christian Jenera

Faculty Mentors: Rahim Khoie, Elizabeth Basha

Despite extensive use of robots in automation factories, practical success of robots on harvesting tasks is still limited. The aim of these robots is to assist farmers in laborious harvesting work. To accomplish this, two main difficulties have to be faced: time, robots have to help farmers save time during the harvesting period; and quality, the harvested crops shall not be damaged or misplaced. This project involves only the mobile platform component of the system. A robotic arm which will pick berries and place them into a storage container connected to the robot was developed separately. The mobile platform utilized a combination of electrical and mechanical systems, including components such as a minicomputer, microcontroller, motor circuit, a camera, and proximity sensors. The result of this project’s development was a completed robot that autonomously navigates itself in a given environment, is aware of obstacles and turning points, and generates spatial coordinates for any strawberries it detects.

Topo Drone

Michael Hsueh, Angel Tehada, Eric Nooteboom

Faculty Mentors: Rahim Khoie, Elizabeth Basha

The Topo Drone system is an attachable module designed for aerial devices to create maps via aerial flight. This system uses various sensors to gather point data of the surrounding surfaces during the aerial flight which will then be used to render a 2D and 3D map. This module could be attached onto any other aerial device as the system uses its own power source and does not draw any power from the aerial device. The strategy behind this module was to use a combination of various sensors that would generate meaningful and real-time data of location, pressure, and distance which would be compiled into a MATLAB program where the map would be generated. This project presents the results of the research done for every component on the system, preliminary testing of each component, building of the system, and verification of the system as a whole to provide transparency on how the Topo Drone system came to life.
Engineering Management Senior Projects

Compaction Test - Sliding Hammer Device

Wesley H. Gee

Faculty Mentor: Abel Fernandez

A sliding hammer device will serve an important role in assisting field technician in creating holes meeting the specifications for CalTran Test Method 231 (CTM 231) as well as regulations set by other state programs when testing for relative compaction. CTM 231 is used to test for relative compaction on untreated and treated soil and aggregates determining the in-place wet density, moisture content and relative compaction.

Human Design for Decksweeper Sail of Class A Catamaran

Mackenzie Cook, Stella Rakhlina

Faculty Mentor: Abel Fernandez

The purpose of this proposed project is to study the "end plating" effects application to sail design. The goal of reducing aerodynamic drag forces and losses in drive force for the International A Class Catamaran. The specific design focus of the project is on overcoming the human interface challenges related to full length desksweeper sails and prevent the lift induced vortex from forming.

Repurpose API with a Mission

Vanessa D. Villanueva, Jessica Huang

Faculty Mentor: Abel Fernandez

The mission is to centralize cultural groups starting with Asian and Pacific Islanders to create a synergistic atmosphere for the Pacific Community. Renovating the first floor of Price Dorms to a cultural space that offers students a place for studying, relaxing, communicating, emotional/mental resources and individual/club space.

The first floor of Price is located directly adjacent from El Centro: the Latinx center, and the Black Student Success Center: located at the entrance of Price. Repurposing the first floor of Price Dorms not only mainstreams cultural representation but allows for future functions to be integrated in other spaces.

Veteran Resource Center Renovation and Relocation

Emanual Javuer Rodriguez, Jeddidiah Mack

Faculty Mentor: Abel Fernandez

A feasibility study for the relocation of the existing Veteran’s Resource Center at Pacific. The study defines the 5-year requirements, in coordination with Pacific Administration identifies potential existing space, creates engineering drawings for the redesign, secures contractor cost estimates and develops a transition plan for moving the existing Center to the new site. The project’s overarching objective is to ensure student veterans at the University of the Pacific have a dedicated space for securing the assistance and resources during their academic career.
Affordable, Automated Inventory Storage and Retrieval System

Ivy Halog, Tyler Kuhn, Nikaansha Prasad, Trevor Speckman

Faculty Mentor: Kyle Watson

With the rise of automation in manufacturing, more tasks are being solved using machines and robots. A problem in manufacturing that benefits from automation is the storage and retrieval of goods from shelves. To meet the demands of their customers, many manufacturers have to find solutions to maximize their inventory space while still being able to deliver fast, reliable, and accurate item fulfillment and delivery. Smaller companies may not be able to afford many of the AS/RS systems that are currently out on the market but they may still require a system that will help streamline their storage and inventory operations. To meet those demands, our design is manufactured to be cost efficient, time saving, and easily operable. The total cost of the AS/RS system produced is close to $1,000. The purpose of this design is to be affordable, scalable, and user friendly. The design is scalable to meet dimensioning needs of larger or smaller warehouses. The weight tested in this model was selected to be 10 lbs, which can increase if the scale of the AS/RS system is also scaled for different sized shelves. The AS/RS system also has an HMI touch screen to make it easier for the user to communicate directly with the system, and find the specific part they are looking for with ease and efficiency.

ASME Student Design Competition: The Pick-and-Place Race

Jeremy Clay, Natalie Giang, Doug Muller, Kevin Nijjar, Tyler Sutherland

Faculty Mentor: Kyle Watson

The 2019 ASME Student Design Competition, named the Pick and Place Race, entailed picking balls ranging from the size of ping pong balls to basketballs off PVC pipes and placing them into a scoring area. The venue for the competition was the Fairplex Complex in Pomona, California. This competition was a great way to network while representing the Mechanical Engineering Department at the University of the Pacific. The goal was to design and fabricate a robot to win the 2019 ASME Student Design Competition. To do this, the RamBot 5000 was designed to collect as many balls as fast as possible by maximizing its capacity and ramming the balls off of their stands. The strategy focused on restricting the opponent’s ability to score and place. During the competition, the strategy of ramming the balls off the PVC pipes was the most dominant. By the third and final day, those teams that survived, switched to this “ramming” style. Of the 22 teams entered, the RamBot 5000 ended up placing fourth. This was a huge accomplishment, since most teams had significantly more members and funding. This event was a huge success for Pacific as well, since no students had entered the student design competition for the last two years. All objectives were accomplished; the robot was successful in its design and highly competitive.

Automated, Adjustable Coffee Table/Work Desk

Abdulrahman Alshaker, Jack Dugoni, Ruben Raygoza, Christian Rodriguez

Faculty Mentor: Kyle Watson

The purpose of this project is to design and fabricate multi-task furniture that provides workers in the tech industry with spatial convenience, increased productivity and a healthier style of living. Working while standing has several health benefits and decreases fatigue leading to an increase in productivity. Workers in the tech industry often live in small houses/apartments in these tech cities since housing tends to be expensive. With limited space, trying to fit a coffee table and a productive workspace in small housing can be problematic. This project allows the user to have a sit/stand desk and a coffee table all in one. This was accomplished by incorporating three main motion mechanisms. A scissor lift and ball screw control the vertical motion of the system, a lead screw controls horizontal motion of the table top, and two linear actuators allow a computer monitor to deploy and retract through the top of the table. A button array allows the user to control all three motions along with saving 3 presets for
desired positions. Inductive Sensors and force sensitive resistors were also incorporated to protect both the product and the user. The main concern initially with the project was the stability of the scissor lift. This concern was cleared up as it was able to stably lift a group member weighing 170 lb. This easily meets our design objective of dynamically lifting 80 lb. and statically supporting 180 lb. The system can be controlled with google assistant and the powerful NEMA 34 motor allows the table to go from full retraction to full extension in easily less than 30 seconds. Overall, the project is a success as it meets all design objectives.

**Drones Equipped with Spray Paint**

**Actuating Mechanism for Artistic Pursuits**

Gerry George, Avi Graber, Zack Lent,

Jesus Leon Calderon, Ivan Reynoso

Faculty Mentor: Kyle Watson

Artists have always found creative ways to express themselves, whether it be sculpting a figure into marble or painting with oil on a canvas. One could argue that a major component of the artistic process is innovating new ways to extend and redefine the boundaries of expression. Currently, when it comes to painting a mural, artists are still required to use a ladder or scaffold to increase the reach of his/her arm. It is very time consuming to have to regularly move a scaffold, and all other equipment, in order to reach a desired location on a tall wall. Furthermore, it is also quite unsafe, as there is always the constant danger of falling from a high distance. Drones can be used to remedy this problem and augment the artist’s creative process. To fulfill this vision, a quadcopter drone was retrofitted to spray paint on a wall and/or designated canvas. A mechanism was created to house a miniature spray paint can and activate it upon user command from the remote control. Additionally, a sonar sensor was implemented to improve altitude stability. Since artistic precision requires fine proximity to the painting surface, propeller guards were designed to protect the propellers from contact force. A landing stabilization system was constructed to promote safe landings and adjust for the spray paint can attachment. The retrofitted drone satisfies all objectives, including but not limited to: spray painting on a designated wall or canvas 5 feet in the air for at least 10 minutes, carrying all necessary equipment for operation, is user-friendly and safe to use, and maintains a sub-1 kilogram payload. However, a few of these parameters, such as the flight height and time, are subject to change during the testing phase, which is still in progress.

**Electric Wheelchair Attachment**

Matthew Lee, Kevin Lei, Kevin Malhiot, Anthony Perez

Faculty Mentor: Kyle Watson

The worldwide rise in obesity has created an unexpectedly dangerous environment for healthcare workers. These dangers are present in the physical exertion of force upon the entire back when pushing a patient in a wheelchair. In addition to healthcare professionals, family, or friends, wheelchair users don’t have the ability to push themselves in the correct manner. This lack of proper form causes the user to develop health issues in their shoulder joints over time. To counteract the risk of physical injury, many electric wheelchairs along with a few attachments for manual wheelchairs exist in the market. However, these are either expensive, non-universal, or both. Our senior project goal has been to create an efficient, lightweight, and low-cost attachment that can be installed to a wide variety of manual wheelchairs to convert their source of propulsion to electric. This has been done by using two DC motors, each powering an individual wheel on the chair through a secondary manufactured wheel. These motors are powered using an internal battery that can be charged externally and are controlled by a joystick controller that can be placed in any convenient location for the user. The simple, yet effective style of this device ensures that the user can continuously install it from wheelchair to wheelchair.
Fabricating Varying Geometric Wind Turbine Airfoils to Analyze Flutter

Michael Nord, Jacob Ramme, Megan Waller

Faculty Mentors: Kyle Watson, Scott Larwood

Wind turbines are efficient and environmentally friendly, but they need to be constantly studied to improve safety and performance. Flutter is a particularly important concern for wind turbines, as it can cause fatigue and subsequent failure in turbine blades. Flutter is the vibration of the blade caused by external loads and high angular velocities. This report focuses on the design and testing of a system capable of simulating a small scale wind turbine at 5000 rpm. The blades were made of PLA and were rotated with a motor. The angle of sweep of the blade tips were varied and the rotations per minute (rpm) was measured. Sweep angles of 0 degrees, 5 degrees, 10 degrees, and 20 degrees were tested. The rpm at which flutter occurs is determined by the amplitude output measured by strain gauges mounted on the blades. This report aims to determine if there is a correlation between the angle of sweep and the rpm at which the blades flutter. From the data collected in a similar experiment, evidence suggests a slight trend of a decreasing rpm “speed limit” at which flutter occurs for higher degree sweeps (20 degrees), but overall there was not a strong correlation between sweep angle and the rpm at which flutter was evident.

Lifting and Leveling Cabinet Installation Device

Craig Chavez, Benjamin Conger, Brian Popish, William Rymers

Faculty Mentor: Kyle Watson

Current cabinet installation procedures typically require two operators. The first holds the cabinet at the right height and position while the second fastens the cabinet to the wall. The first operator is at risk of injury because they must hold a heavy item in a strict position for extended periods of time. In this project, a scissor lift device with self-leveling capabilities was designed and fabricated. The device meets the objectives of: a small footprint (12” x 30”), fine adjustment (1” lifting and ±0.5° leveling), adequate lifting capabilities (100 lbs), and low weight (~50 lbs). By meeting these objectives, the Lifting and Leveling Cabinet Installation Device facilitates a safer and more efficient cabinet installation procedure.

“Within Reach” Automated Shelf Lowering System

Emily Harris, Peter Hyatt, Jillian McKenzie, Erica Ramos

Faculty Mentor: Kyle Watson

Cabinets and shelving units are a feature that make organization and storage convenient in homes around the world. The height of cabinets is advantageous in that it increases storage space, but also inconveniently makes the shelves difficult and dangerous to access. Children, the elderly, and members of the disabled community have reported resorting to unsafe improvisations to reach inaccessible shelves. This limitation greatly reduces the shelving space that can be safely and actively utilized. With these factors considered, an automated shelving system has been designed and fabricated as a proof of concept to lower the top shelves to an accessible height. This product consists of a mount, shelf housing unit, and deployment system. Unlike other products that are currently available, this design can be installed in virtually any standard size cabinet. The system has rack and pinion mechanisms that are attached to compact square-face DC gearmotors to move the shelf housing out of the cabinet and downwards within a matter of seconds. The wireless controller has also made it easy and convenient for users to bring the housing in and out of the cabinet with the push of a button. The functionality of the automated shelf lowering system met the criteria to improve the safety of the consumers and the optimization of shelf storage space. This product could be altered to be more widely produced and distributed to improve accessibility to those that need it. Modifications could consist of construction method, improved user interface and customization, and aesthetic. Safety features could be enhanced to encompass a wider range of possibly dangerous situations by adding additional sensors and housings to enclose gears and other pinch points. In lieu of these features, the system successfully serves as a proof of concept to be improved upon in these ways in the future.
World’s First Magnetic Gun Storage Solution

Jeffrey Aube, Alexander Hui, Ryan Woodford, Yuan Zhao

Faculty Mentor: Kyle Watson

Currently there is no gun safe that allows the owner to see their gun while it is in the gun safe, dissuading approximately 54% of owners from using DOJ compliant safes at all. The objective of Vericia is to create a revolutionary gun safe compliant with the strictest CA DOJ certification while preserving firearm visibility, deterring theft and unsafe handling of firearms. Vericia uses an electromagnet to keep the firearm securely in place. It is constructed out of a solid block of aluminum for strength and security. The electromagnet may be disabled using a 9 digit keypad or an optical fingerprint scanner. A front door secured by two solenoid locks guards the trigger and reveals storage for two magazines. An 18,000 mAh battery ensures days of power from a full charge. A screen provides useful information, such as battery life, lock status, and date and time last opened. Everything is 3D modeled and precisely milled using a CNC.
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