FRONTIERS OF INNOVATION SCHOLARS PROGRAM

SECOND ANNUAL SYMPOSIUM

October 18, 2016

Sponsored by the
Office of the Chancellor
Office of Research Affairs
Student Affairs

UC San Diego
Welcome to the UC San Diego Frontiers of Innovation Scholars Program (FISP) Second Annual Symposium, a celebration of next generation, multidisciplinary research at UC San Diego.

This year's Symposium features more than 160 participants who have conducted faculty-mentored research in a wide variety of fields over the last year. The presenters include undergraduates, graduate students, and postdoctoral scholars from UC San Diego; also included are students from institutions across the state who performed mentored research at UC San Diego during the summer of 2016.

We hope you will enjoy the Symposium and the scholars' presentations. We gratefully recognize the critical contributions our faculty moderators, and, particularly, mentors make to the Symposium and the research program.

We express our equal appreciation for the leadership of Chancellor Pradeep Khosla, Vice Chancellor of Research Sandra Brown, Vice Chancellor of Student Affairs Juan Gonzalez, and Graduate Division Dean Kim Barrett in establishing FISP as a vital center of research at UC San Diego.

This Symposium was made possible by generous funding from the Office of the Chancellor and the Office of Research Affairs. Additional support for this symposium has come from the Vice Chancellor of Student Affairs, the Dean of the Graduate Division, the Student Retention & Success Unit, and the Academic Senate. The UC San Diego Frontiers of Innovation Scholars Program Symposium is planned and coordinated by Academic Enrichment Programs (AEP), a unit of the Student Affairs' Student Retention and Success team.

Thank you to all of the AEP staff and Symposium volunteers. Special thanks to Dr. Sophia Tsai and Dr. Kirsten Kung who helped to organize the panels and to create this program; to Dr. David Artis and Veronica Bejar for their guidance in shaping this event; to Charity Kunold for logistics planning; and to Carrie Keck and Mark Kinsey of the Price Center.
FISP SYMPOSIUM SCHEDULE
Tuesday, October 18, 2016

8:00 am REGISTRATION AND BREAKFAST
Price Center West Ballroom B

8:20 am OPENING REMARKS
Price Center West Ballroom B

Welcome:
Dr. David Artis, Dean of Undergraduate Research Initiatives
Dr. Pradeep Khosla, Chancellor
Dr. Miroslav Krstic, Associate Vice Chancellor for Research

Keynote Speaker:
Dr. Dorothy D. Sears, Associate Professor of Medicine

Additional Remarks:
Dr. Kirsten Kung, FISP Symposium Lead Coordinator

9:00 am – 12:00 pm ORAL PRESENTATIONS MORNING SESSION CONVENES
Price Center and Student Services Center (SSC)
Conference Rooms

12:00 pm LUNCH
Price Center West Ballroom B

12:30 pm – 1:30 pm POSTER SESSION A CONVENES
Price Center West Ballroom A

1:30 pm – 4:30 pm ORAL PRESENTATIONS AFTERNOON SESSION CONVENES
Price Center and Student Services Center (SSC)
Conference Rooms

4:30 pm RECEPTION
Price Center West Ballroom B

4:45 pm POSTER SESSION B CONVENES
Price Center West Ballroom A

5:45 pm CLOSING AND RAFFLE
Price Center West Ballroom B
Pradeep K. Khosla, an internationally renowned electrical and computer engineer, is the eighth Chancellor of the University of California, San Diego, and a Distinguished Professor. At UC San Diego, he initiated and led a comprehensive, all-inclusive strategic planning process to unify the campus and define UC San Diego's future. The initiative resulted in a Strategic Plan that outlines five overarching goals, four grand research themes, and 13 strategies to fulfill our sharpened mission and vision as a student-centered, research-focused, service-oriented public university.

Before his current appointment, Khosla served as Dean of the College of Engineering and Philip and Marsha Dowd University Professor at Carnegie Mellon University. There, he set the strategic direction for undergraduate and graduate education and research, and initiated undergraduate curriculum reform, successful diversity efforts, multidisciplinary research centers and graduate offerings, and international programs. Khosla spent the majority of his career at Carnegie Mellon, rising through the ranks from his first position as Assistant Professor in 1986 to his appointment as Dean in 2004. From 1994 to 1996, he also served as a Defense Advanced Research Projects Agency (DARPA) Program Manager in the Software and Intelligent Systems Technology Office, Defense Sciences Office and Tactical Technology Office, where he managed advanced research and development programs.


Dr. Dorothy Sears earned a Ph.D. in molecular biology and genetics from The Johns Hopkins University School of Medicine and is currently Associate Professor of Medicine at UC San Diego. Her research focuses on obesity and risk for obesity-related diseases including insulin resistance, type 2 diabetes.
cardiovascular disease, and cancer. She uses human, rodent, and cellular models and a variety of analytical approaches to identify which and how physiological pathways are altered in disease and by therapeutic interventions. Her scope of study spans molecular to population levels and includes transdisciplinary teams. Dr. Sears aims to identify and characterize genes, metabolites, biochemical pathways and behaviors that are regulators and/or biomarkers of cardiometabolic disease risk and which can be used as novel therapeutic targets or diagnostic tools. She is Principal Investigator (PI) of an on-going cross-sectional study of nightly fasting and cancer risk and a recently completed clinical laboratory pilot study of the metabolic and physiologic effects of prolonged sitting in postmenopausal women. She is also PI of the Basic Science Project component of a newly funded American Heart Association Go Red for Women Research Center, the focus of which is molecular, clinical, and psychosocial associations with time spent sitting. Dr. Sears is a faculty member for the new, annual 5-day Transdisciplinary Research in Energetics and Cancer Training Course (NCI R25CA203650). She is co-founder of the UCSD Women in Health Sciences, President of the American Diabetes Association San Diego Area Community Leadership Board, and has recently held several Executive Board positions with the Association for Women in Science San Diego Chapter (AWIS-SD; 2010-2015).

Opening Remarks: Dr. Miroslav Krstic

Miroslav Krstic holds the Alspach endowed chair and is the founding director of the Cymer Center for Control Systems and Dynamics at UC San Diego. He also serves as Associate Vice Chancellor for Research at UCSD. As a graduate student, Krstic won the UC Santa Barbara best dissertation award and student best paper awards at CDC and ACC. Krstic is a Fellow of IEEE, IFAC, ASME, SIAM, and IET (UK), and Associate Fellow of AIAA. He has received the PECASE, NSF Career, and ONR Young Investigator awards, the Axelby and Schuck paper prizes, the Chestnut textbook prize, the ASME Nyquist Lecture Prize, and the first UCSD Research Award given to an engineer. Krstic has also been awarded the Springer Visiting Professorship at UC Berkeley, the Distinguished Visiting Fellowship of the Royal Academy of Engineering, the Invitation Fellowship of the Japan Society for the Promotion of Science, and the Honorary Professorships from the Northeastern University (Shenyang) and the Chongqing University, China. He serves as Senior Editor in IEEE Transactions on Automatic Control and Automatica, as editor of two Springer book series, and has served as Vice President for Technical Activities of the IEEE Control Systems Society and chair of the IEEE CSS Fellow Committee. Krstic has coauthored eleven books on adaptive, nonlinear, and stochastic control, extremum seeking, control of PDE systems including turbulent flows, and control of delay systems.
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Panel #1: Graduate Student and Postdoc
Understanding and Protecting the Planet

Location: Bear Room
Time: Morning

Moderated by Dr. Tara Hutchinson
Department of Structural Engineering

Ahmed Abdulla ~ Global Policy & Strategy
Mentor(s): Professor David Victor, Global Policy & Strategy
Professor George Tynan, Mechanical & Aerospace Engineering
*A Radical Expansion Of Global Nuclear Power: The Institutional Challenge*

Jesse Chao ~ Biological Sciences, Cellular And Molecular Medicine
Mentor(s): Dr. Maho Niwa, Biological Sciences
Professor Susan Ferro-Novick, Cellular And Molecular Medicine
*The Endoplasmic Reticulum Surveillance Pathway Regulates Organelle Inheritance And Cell Cycle Progression*

Christine Wittich ~ Structural Engineering
Mentor(s): Professor Tara Hutchinson, Structural Engineering
Professor David Sandwell, Scripps Institute Of Oceanography
*Seismic Hazard Estimates Based On High-Fidelity Dynamic Analyses Of Precarious Rock Systems*

David Welkie ~ Center For Circadian Biology, Ucsd
Mentor(s): Professor Susan Golden, Biological Sciences
Professor Bernhard Palsson, Bioengineering
*Unique Attributes Of Cyanobacterial Metabolism Revealed By Improved Genome-Scale Metabolic Modeling*

Mizuho Ota ~ Biological Sciences
Mentor(s): Dr. James Golden, Biological Sciences
*A Genome-Wide Fitness Assay In Synechococcus Elongatus Identifies Genetic Determinants Of Resistance Against Protozoan Grazing*
Panel #2: Graduate Student and Postdoc
Understanding Cultures and Addressing Disparities in Society

Location: Comunidad Room
Time: Morning

Moderated by Dr. Jurgen Schulze
Qualcomm Institute (QI), Department of Computer Science

Yessica Garcia Hernandez ~ Ethnic Studies
Mentor(s): Dr. Jillian Hernandez, Ethnic Studies
Dr. Fatima El-Tayeb, Literature
Rebel Quinceañera Collective: Establishing A Feminist Girl Space

Marissa Salazar ~ Global Public Health
Mentor(s): Dr. Elizabeth Reed, Medicine
Dr. Craig McIntosh, Economics
The Role Of A Microfinance Intervention To Reduce Occupational Alcohol Use And Related HIV Risk Behaviors Among Female Sex Workers In Tijuana, Mexico

Cynthia Schairer ~ School Of Medicine
Mentor(s): Professor Michael Kalichman, Pathology
Peer Leadership For Promoting Scientific Integrity

Michael Nicholson ~ Political Science
Mentor(s): Dr. Tom Wong, Political Science
Dr. Pasquale Verdicchio, Literature
Dr. David FitzGerald, Sociology
Explaining Immigrants’ Political Participation: An Identity Politics Approach Using Evidence From Switzerland

Ben Smuin ~ History
Mentor(s): Dr. Michael Provence, History
Dr. Gershon Shafir, Sociology
Citizens Without States: Petitions And The Formation Of A Political Sphere In Syria

Reuben Silverman ~ History
Mentor(s): Professor Hasan Kayali, History
Richard Biernacki, Sociology
Becoming “Little America” In A Muslim Society: Markets And Culture In Early Cold War Turkey (1950–1960)
Panel #3: Graduate Student and Postdoc
Exploring the Basis of Human Knowledge, Learning, and Creativity
Location: Sixth College Room
Time: Morning

Moderated by Dr. Natacha Akshoomoff
Department of Psychiatry, Center for Human Development

Duygu Kuzum (presenting on behalf of Hongming Lyu) ~ Electrical And Computer Engineering
Mentor(s): Professor Duygu Kuzum, Electrical And Computer Engineering
Professor Anna Devor, Radiology
*Transparent Graphene Electrodes For Optical Imaging And Optogenetics*

Ma Xuanyi ~ Bioengineering, Nanoengineering
Mentor(s): Professor Shaochen Chen, Nanoengineering
*A 3D Printed Human Ipsc--Derived Hepatic Model That Help Improve In Vitro Liver Functional Maturation*

Ching-fu Chen ~ Electrical And Computer Engineering
Mentor(s): Professor Kenneth Kreutz-Delgado, Electrical And Computer Engineering
Dr. Ruey-Song Huang, Institute For Neural Computation
*Validation Of Periodic Fmri Signals In Response To Wearable Tactile Stimulation*

Holly Hasler ~ SDSU/UCSD Joint Doctoral Program In Clinical Psychology, Center For Human Development
Mentor(s): Dr. Natacha Akshoomoff, Psychiatry (School Of Medicine)
Dr. Joan Stiles, Cognitive Science
*Advanced Techniques For Imaging White Matter In Children Born Very Preterm*

Megan Bardolph ~ Cognitive Science
Mentor(s): Professor Seana Coulson, Cognitive Science
Dr. Tzyy-Ping Jung, Institute For Neural Computation (INC)
*Cognitive Modeling Of Evidence Evaluation And Belief Updating*
Panel #4: Graduate Student and Postdoc
Enriching Human Life and Society
Location: Revelle College Room
Time: Morning

Moderated by Dr. Ivan Garcia-Bassets
Department of Medicine

Priscilla Chan ~ Biology
Mentor(s): Dr. Jonathan Lin, Pathology
Mechanisms Of Endoplasmic Reticulum Stress Related To Retinal Degeneration

Sneha Bhattaram (presenting on behalf of Siva Prasad Varma Chiluvuri) ~ Bioengineering (Electrical Engineering)
Mentor(s): Dr. Harinath Garudadri, Qualcomm Institute
Professor Dilip Jeste, Sam And Rose Stein Institute For Research On Aging
Objective Metrics Based On Off-Body Remote Sensing For Fall Risk Assessment And Prevention

Edward Aminov ~ Mechanical Engineering Department
Mentor(s): Professor James Friend, Mechanical Engineering
Gopesh Tilwawala, Mechanical Engineering
Smartshunt-Gradually Expanding Cardiopulmonary Shunt

Lisa Black ~ Family Medicine And Preventive Health, Psychiatry
Mentor(s): Dr. William Sieber, Family Medicine And Preventive Health
Dr. Steven Hickman, Psychiatry
Implementation Of Neurofeedback Into The Primary Care Setting

Caroline Collins ~ Communication
Mentor(s): Dr. Angela Booker, Communication
New Media Communication For Community Wellness
Panel #5: Undergraduate
Understanding Cultures and Addressing Disparities in Society

Location: Red Shoe Room
Time: Morning

Moderated by Dr. Adam Burgasser
Department of Physics

Nicholas Locke ~ Global Health, Human Biology &
Ian Francis Yu ~ Urban Studies And Planning, Communication Studies
Mentor(s): Dr. Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts
Blum Summer Field Internship 2016: Field Validation, Toward A Huertito Educativo In San Ysidro

Ethan Ma ~ Urban Studies And Planning &
Alyssa Moyer ~ Global Health &
Stephanie Peng ~ International Studies
Mentor(s): Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts
Blum Summer Field Internship 2016: The Vital Role Played By Promotoras In The Community Of San Ysidro

Rebecca Chou ~ General Biology, Sociology
Mentor(s): Professor Mary Blair-Loy, Sociology
Does A Family-Friendly Welfare State Help Shatter The Corporate Glass Ceiling?
Comparing The U.S. And Norway

Erika D'Andrea ~ Sociocultural Anthropology
Mentor(s): Professor Nancy Postero, Anthropology
The Performance Of Female Queer Identity And The Claiming Of Social Space In Cochabamba, Bolivia

Rosemary Elliott Smith ~ Mathematics
Mentor(s): Dr. David Meyer, Mathematics
Music From A Map: The Relation Of Sound Characteristics To Geography
Panel #6: Undergraduate Enriching Human Life and Society
Location: Governance Chambers
Time: Morning

Moderated by Dr. Falko Kuester
Department of Structural Engineering, Qualcomm Institute (QI), Center of Interdisciplinary Science for Art, Architecture, and Archaeology (CISA3)

Emily Zheng ~ Media
Mentor(s): Professor Falko Kuester, Computer Science & Engineering
Media In The Field
Sedna Villavicencio ~ Anthropology, Ethnic Studies
Mentor(s): Dr. Ross Frank, Ethnic Studies
Omar Padilla, Ethnic Studies
Decolonizing The Museum Of Man: A History Of Museums, Anthropology And Racism Of American Indians

Estela Delgado Rodriguez ~ Public Health
Mentor(s): Dr. Elizabeth Reed, Medicine
Analysis For Improvement In Recruitment Of Female Sex Workers For A Social And Economic Empowerment Program In Tijuana, Mexico

Rhea-Comfort Addo ~ Biology - General
Mentor(s): Dr. Pamela Mellon, Department Of Reproductive Medicine
Shanna Newton, Department Of Reproductive Medicine
Mutations & Infertility: The Effects Of FOXL2 Mutations On FSH? Regulation

Rebecca Khamishon ~ Human Biology
Mentor(s): Dr. Seema Aceves, Division Of Rheumatology, Allergy & Immunology
Dr. Kim Barrett, Division Of Gastroenterology
The Pathogenesis Of Th2 Mediated Remodeling In Eosinophilic Esophagitis

Cameron Martino ~ Bioengineering
Mentor(s): Dr. Karsten Zengler, Pediatrics
Dr. Frederico Da Silva, Glycobiology
Influence Of A Red Meat-Derived Glycan In The Microbiome

Stephanie Thomas ~ Bioengineering
Mentor(s): Dr. Adam Engler, Bioengineering
Dr. Kristin Baldwin, Neuroscience
Improved Disease Modeling Reveals New Cardiac Phenotypes In 9p21 Gene Locus

(continued on next page)
Loren Lavadia ~ Summer Training Academy For Research Success (STARS), Cognitive And Behavioral Neuroscience
Mentor(s): Dr. Jared Young, Psychiatry
Dr. Zackary Cope, Psychiatry

Evaluating the Role of Muscarinic Acetylcholine Receptors in the Mechanism of Depression in Bipolar Disorder
Panel #7: Graduate Student and Postdoc
Understanding and Protecting the Planet
Location: Student Services Center (SSC) 260
Time: Afternoon

Moderated by Dr. Tamar Shemer
Division of Biological Sciences

Shelby Straight ~ Chemistry
Mentor(s): Professor Francesco Paesani, Chemistry
Exploring Electrostatic Effects On The Hydrogen Bond Network Of Liquid Water
Through Many-Body Molecular Dynamics

Shen Wang ~ Nanoengineering
Mentor(s): Professor Shirley Meng, Nanoengineering
Function Of Additives In Perovskite Solar Cells

Chen Zhang ~ Nanoengineering
Mentor(s): Professor William Gerwick, Scripps Institution Of Oceanography
Professor Garrison Cottrell, Computer Sciences And Engineering
Small Molecule Accurate Recognition Technology (SMART): A Digital Frontier To
Reshape Natural Products Research

Fanglin Sun ~ Economics Department
Mentor(s): Professor Richard Norris, Scripps Institution Of Oceanography
Professor Richard Carson, Economics Department
Valuing The Storm Surge Mitigation Effect Of Coastal Wetland

Clinton Edwards ~ Scripps Institution Of Oceanography, Marine Biology
Reasearch Division
Mentor(s): Dr. Stuart Sandin, Marine Biology Reasearch Division
Dr. Ryan Kastner, Computer Science And Engineering
Dr. Falko Kuester, Dcse/Calit2
Platform For Ocean Imaging: Building Capacity For Visualizing, Analyzing And
Communicating Underwater Ecological Data.
Panel #8: Graduate Student and Postdoc
Enriching Human Life and Society A
Location: Student Services Center (SSC) 350
Time: Afternoon

Moderated by Dr. Maho Niwa
Division of Biological Sciences

Francisco Contijoch ~ Cardiology, Bioengineering
Mentor(s): Professor Elliot McVeigh, Bioengineering
Dr. William Auger, Medicine
Advanced Assessment Of Chronic Thromboembolic Pulmonary Hypertension Patients

Kara Wentworth ~ Communication, The Bioregional Center For Sustainability Science Planning And Design
Mentor(s): Dr. Keith Pezzoli, Communication
Science Communication At UC San Diego: A "Rooted" Approach

Dokyoung Kim ~ Department Of Chemistry And Biochemistry
Mentor(s): Professor Michael Sailor, Department Of Chemistry And Biochemistry
Professor Mark Tuszynski, Department Of Neuroscience
Porous Silicon Nanoformulation For Alzheimer's Disease Treatment

Sharad Vikram ~ Computer Science And Engineering
Mentor(s): Professor Sanjoy Dasgupta, Computer Science And Engineering
Air Quality Monitoring With Cheap Hardware

Yi Hong Sim ~ Communication
Mentor(s): Professor Robert Horwitz, Communication
Professor Nancy Guy, Music
Professor Stefan Tanaka, Communication
Professor Boatema Boateng, Communication
Professor Amy Cimini, Music
How Starving The Artist Makes Work Work: The Othering Of Classically Trained Musicians And Its Ramifications For A Politics Of Work
Panel #9: Graduate Student and Postdoc
Exploring the Basis of Human Knowledge, Learning, and Creativity
Location: Student Leadership Chambers
Time: Afternoon

Moderated by Dr. Jamie Joseph
Department of Psychiatry

Tessa Verhoef ~ Communication, Electrical And Computer Engineering
  Mentor(s): Professor Carol Padden, Communication
  Professor Nuno Vasconcelos, Electrical And Computer Engineering
  Measuring And Analyzing Human Communicative Behavior In Gesture And Sign

Mollie Touve ~ Nanoengineering, Chemistry/Biochemistry
  Mentor(s): Professor Nathan Gianneschi, Chemistry/Biochemistry
  Professor Darren Lipomi, Nanoengineering
  Chemical Reactions In The Electron Microscope

Lin Zhang ~ Nanoengineering
  Mentor(s): Dr. Sheng Xu, Nanoengineering
  Two-Dimensional Multiplexed Soft Ultrasound Devices For Non-Destructive Testing

Junhee Park (presenting on behalf of Ashok Kodigala) ~ Electrical and Computer Engineering
  Mentor(s): Professor Boubacar Kante, Electrical and Computer Engineering
  Professor Anna Devor, Neurosciences
  Plasmonic Sensing

Joyce Van de Leemput ~ Psychiatry
  Mentor(s): Professor Ming Tsuang, Psychiatry
  Professor Fred Gage, Neurobiology (Biological Sciences)
  Genetic Variations In Schizophrenia, And Functional Implications For Synaptic Signaling
Panel #10: Graduate Student and Postdoc
Understanding Cultures and Addressing Disparities in Society
Location: Sixth College Room
Time: Afternoon

Moderated by Dr. David Moore
Department of Psychiatry

Rawan Arar ~ Sociology, Refugee Studies
Mentor(s): Dr. David FitzGerald, Sociology
Dr. Wael Al-Delaimy, Family Medicine And Public Health
Shouldering The Refugee Burden: Jordan And The Global Refugee Crisis

Cassandra Hartblay ~ Communication
Mentor(s): Dr. Elana Zilberg, Communication
Assistant Professor Deborah Stein, Theatre And Dance
Disability And Documentary Theater: An Ethnographic Play About Disability In Russia

Lauren Olsen ~ Sociology
Mentor(s): Professor John Evans, Sociology
Dr. Charles Goldberg, Medicine
Interdisciplinary Collaboration And Medical Curricular Change: Humanistic And Social Scientific Knowledge In Medical Education

Peter Braden ~ History, Sociology
Mentor(s): Professor Paul Pickowicz, History
Professor Karl Gerth, History
Prof. Richard Madsen (emeritus), Sociology
Did Animals Have A Chinese Revolution?
Panel #11: Graduate Student and Postdoc
Enriching Human Life and Society B
Location: Revelle College Room
Time: Afternoon

Moderated by Dr. Jesse Jokerst
Department of NanoEngineering

Stan Oklobdzija ~ Political Science
Mentor(s): Dr. Thad Kousser, Political Science
Building A Virtual Lab For Computational Social Science, With Applied Focus On Political Tweets During The 2016 Presidential Contest

Mahta Mousavi ~ Electrical And Computer Engineering
Mentor(s): Professor Virginia De Sa, Cognitive Science
Professor Bhaskar Rao, Electrical And Computer Engineering
Improving Motor Imagery Brain Computer Interface With User Response To Feedback

Alican Nalci ~ Electrical And Computer Engineering
Mentor(s): Professor Thomas Liu, Radiology
Professor Bhaskar Rao, Electrical And Computer Engineering
Enhanced Signal Processing Techniques For Fmri And Brain Connectivity Analysis

Matt Abraham ~ Pediatrics, Pharmacology
Mentor(s): Professor Elizabeth Winzeler, Pediatrics
Professor Dionicio Siegel, Molecular Pharmacology
High-Throughput Screen Of Complete Plasmodium Life Cycle Identifies Pyrazinamide Scaffold With Potent Liver-Stage Activity

Katarzyna Zientara-Rytter ~ Biology, Shiley Eye Institute
Mentor(s): Professor Suresh Subramani, Biology
Dr. Radha Ayyagari, Shiley Eye Institute
Assembly Of The Pexophagic Receptor Protein Complex
Panel #12: Undergraduate
ALL Themes
Location: Red Shoe Room
Time: Afternoon

Moderated by Dr. Morana Alac
Department of Communication

Karl Chen ~ Microbiology
Mentor(s): Professor Francesco Paesani, Chemistry And Biochemistry
A First Step Toward Understanding The Ice Nucleation

Carolyn Breeze ~ Mathematics-Computer Science &
Taylor Harman ~ Molecular Biology, Archaeology &
Rosemary Elliott Smith ~ Mathematics, Anthropology
Mentor(s): Dr. Tom Levy, Anthropology
At-Risk Cultural Heritage And Archaeological Data Management – The Archaeostor Solution

Hannah Rosenblatt ~ General Biology
Mentor(s): Dr. Amro Hamdoun, Marine Biology
Dr. Geoffrey Chang, Pharmacology
Compensation Of Drug Efflux Activity After Genetic Knockdown Of The Transporter P-Glycoprotein In Sea Urchin Embryos

Joshua Lozano ~ Psychology, Sociology
Mentor(s): Dr. Timothy Rickard, Psychology
MA Steven Pan, Psychology
Test-Enhanced Learning With Cued Recall And Recognition Tests

Jacob Cushnir ~ Structural Engineering, Visual Arts / Theatre &
Yuka Murakami ~ Cognitive Science, Visual Arts &
Melisa Tallis ~ Physics
Mentor(s): Professor Adam Burgasser, Astrophysics
Professor Tara Knight, Theatre
Cosmocosm: Sound Planetarium

ORAL PANELS
Panel #13: Undergraduate

Understanding Cultures and Addressing Disparities in Society

Location: Governance Chambers
Time: Afternoon

Moderated by Dr. Dina Hingorani
Department of Surgery

Tiffany Chan ~ Public Health, Ethnic Studies &
Colleen Mergen ~ Chemical Engineering &
Ainiwaer Yisimila ~ Communication
Mentor(s): Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Creating A “Zero Net Energy Community” In Encanto

Yesenia Cuevas ~ Human Development &
Kaeli Green ~ International Studies, Education Studies
Mentor(s): Dr. Fonna Forman, Political Science
Dr. Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Community Engagement: Principles And Practices

Mazyar Alamdari ~ Political Science, International Relations &
Jodi Fong ~ International Studies, Human Development Program
Mentor(s): Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Eco-Literacy In Action At The UCSD Earthlab Community Station

Christian Hillman ~ History
Mentor(s): Dr. Hasan Kayali, History

Turkish Guestworkers And Syrian Refugees: A Comparative Study

Oslín Licea Chávez ~ Spanish Literature, Math & Math Education &
Itzel Gonzalez ~ Structural Engineering &
Cesar Solis ~ Political Science, International Relations, Human Rights
Mentor(s): Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Mobility And Security In Sustainable Urban Transport At The UCSD Cross-Border Community Station: Tijuana

(continued on next page)
Magnolia Garcia ~ Public Health & Cinthia Sanchez ~ Public Health
Mentor(s): Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts
Blum Summer Field Internship 2016: Urban Gardens And Community Resilience At The UCSD Cross-Border Community Station: Tijuana

Estefania Huitron ~ Environmental Engineering/ MAE Department & Fumika Takazawa ~ Environmental Engineering
Mentor(s): Dr. Fonna Forman, UCSD Center On Global Justice
Dr. Teddy Cruz, UCSD Center On Global Justice
Blum Summer Field Internship 2016: Designing Green Infrastructure For Ecological Protection, Public Space, And Recreation At The UCSD Cross-Border Community Station: Tijuana
**Poster Session A**
12:30 pm - 1:30 pm
Ballroom A

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**Poster #: 1**
Leeann Alferness, Marine Biology
Mentor(s): Dr. Dimitri Deheyn, Molecular Biology, SIO
*Two steps forward, one step back: the challenges associated with purifying a new light producing protein from the brittlestar Ophiopsila californica.*

**Poster #: 2**
Nicholas Dudeck, Cognitive Science
Mentor(s): Dr. Fiza Singh, Psychiatry
Professor Jaime Pineda, Cognitive Science
*Gamma Synchrony Training in Schizophrenia*

**Poster #: 3**
Ingrid De Moraes, Theatre
Mentor(s): Professor Robert Castro, Theatre
*Collaborative Visual and Performing Arts Original Performance Response to the SDMOCA exhibit: “Papel Chicano Dos: Works on Paper from the Collection of Cheech Marin”*

**Poster #: 4**
Arya Anvar, Physiology and Neuroscience
Mentor(s): Dr. Varykina Thackray, Reproductive Medicine
*Puberty is Necessary to Fully Develop the PCOS Metabolic Phenotype*

**Poster #: 5**
Danielle Burner, Molecular Biology
Mentor(s): Professor Christina Jamieson, Surgery - Moores Cancer Center
Dr. Phillip Kyriakakis, Bioengineering
*A Red/Far-Red Optical Switch System for Localized Inhibition of Pain in Bone Metastatic Prostate Cancer*
**Poster #: 6**
Sumin Wang, Management Science
Mentor(s): Professor Richard Carson, Department of Economics
Professor David Fenning, Department of Nanoengineering
*Reducing Carbon Dioxide Emission from Cement Production*

**Poster #: 7**
Ziyi Zhao, Physics
Mentor(s): Dr. Heather Henter, Natural Reserve System, Office of Research Affairs
*Making research inclusive: instructional videos in multiple languages for The San Diego Biodiversity Project*

**Poster #: 8**
Maddy Luthard, Earth Science
Mentor(s): Dr. Keith Pezzoli, Communication
Zachary Osborn, Communication
*Sustainability Science and Use-Inspired Research*

**Poster #: 9**
Zachary Osborn *(presenting on behalf of Gabriella Bastos)*,
Communication
Mentor(s): Dr. Keith Pezzoli, Communication
*Sustainability Science and Use-Inspired Research*

**Poster #: 10**
Sherina Malkani, Bioengineering: Biotechnology
Mentor(s): Dr. Prashant Mali, Bioengineering
Udit Parekh, Electric Engineering
*A 3D-Printed Model of the Human Placenta*

**Poster #: 11**
Elaine Limqueco *(presenting on behalf of Jocelyn Lopez)*, Bioengineering
Courtney Wallace, Bioengineering
Mentor(s): Professor Shu Chien, Bioengineering
Dr. Mark Wang, Bioengineering
*Biophysical Induction of Smooth Muscle Lineage Differentiation Through microRNAs*

**Poster #: 12**
Christine Peters, Biochemistry and Cell Biology
Mentor(s): Dr. Joe Pogliano, Biology
*Determination of Mechanism of Action of Novel Compounds via Bacterial Cytological Profiling*

**Poster #: 13**
Dimitri Schreiber, Electrical Engineering
Mentor(s): Professor Falko Kuester, Computer Science, Structural Engineering

CaveCamX: Autonomous Stereo Spherical Panorama System

Poster #: 14
Yuka Okina, Mechanical Engineering
Mentor(s): Professor Michael Tolley, Mechanical Engineering
Graduate Student Adriane Minori, Mechanical Engineering

Rapid Manufacturing of Tensegrity Structures

Poster #: 15
Kaitlyn Lowder, Scripps Institution of Oceanography
Mentor(s): Dr. Jennifer Taylor, Scripps Institution of Oceanography
Dr. Joanna McKittrick, Mechanical and Aerospace Engineering

Fending off predators and ocean acidification: investigation of the complex exoskeleton of California spiny lobsters

Poster #: 16
Cory Stevenson, Bioengineering
Mentor(s): Professor Gert Cauwenberghs, Bioengineering
Dr. Tzyy-Ping Jung, Institute for Neural Computation
Professor Eduardo Macagno, Division of Biological Sciences, Cell and Developmental Biology

Integration of Electrophysiological Recording and Virtual Reality for Human Learning and Navigation

Poster #: 17
Daniela Zarate, Biological Sciences
Mentor(s): Dr. Joshua Kohn, Biological Sciences
Dr. Ronald Burton, Scripps Institution of Oceanography

Patterns of Genomic Admixture in Africanized Honeybees

Poster #: 18
Daniel Ortiz, Bioengineering
Mentor(s): Dr. Stephanie Fraley, Bioengineering
Dr. Hannah Carter, Medicine

3D collagen microenvironment triggers transcriptional programs related to vasculogenic mimicry.
**Poster #: 19**
Hannah Mack (presenting on behalf of Sinead Hawker), Bioengineering
Mentor(s): Dr. Stephanie Fraley, Bioengineering
Dr. Donald Guiney, School of Medicine
Dr. Shelley Lawrence, Department of Pediatrics, Division of Neonatal–Perinatal Medicine

Massively parallel digital high resolution melt for rapid and absolutely quantitative sequence profiling

**Poster #: 20**
Sarah Lerch, Marine biology, Scripps Institution of Oceanography
Mentor(s): Dr. Mark Hildebrand, Marine Biology Research Division
Dr. Joanna McKittrick, Mechanical and Aerospace Engineering and Materials Science and Engineering

Genetic engineering in diatoms gives insight into structural possibilities for tailored bio-materials

**Poster #: 21**
Yelena Gluzman, Communications
Mentor(s): Dr. Morana Alac, Communication
Dr. Jaime Pineda, Cognitive Science
Dr. Julie Burelle, Theater and Dance

An Interdisciplinary Analysis of Interaction Through Embodied Means

**Poster #: 22**
Chien-Ju Chen, Bioengineering
Mentor(s): Dr. Jesse V. Jokerst, Nanoengineering
Dr. Stephen Mayfield, Molecular Biology section, Division of Biological Sciences

Lipid–Polymer hybrid nanoparticles: photoacoustic imaging platform applied to cancer diagnosis

**Poster #: 23**
Josh Davis, Cognitive Science
Mentor(s): Professor Benjamin Bergen, Cognitive Science
Professor Stephanie Jed, Literature

Emotion recognition during language comprehension

**Poster #: 24**
Tianqi Ren, Materials Science and Engineering
Mentor(s): Dr. Olivia Graeve, Mechanical and Aerospace Engineering
Professor Robert Continetti, Chemistry

Solvothermal Process for the Preparation of Doped Ultra-High Temperature Ceramics with Unique Morphologies

**Poster #: 25**
Laura Shelley, Cognitive Science
  Mentor(s): Dr. Douglas Nitz, Cognitive Science
  Dr. Mark Tuszninski, Neurosciences

Creating spaces: A possible function of the hippocampal and parietal networks

Poster #: 26
Yang Li, Biological Sciences
  Mentor(s): Professor Nan Hao, Biological Sciences

Budding yeast as a potential tool in the developing of cell-based therapeutics

Poster #: 27
Shuhui Cai, paleomagnetism
  Mentor(s): Professor Lisa Tauxe, Geosciences Research Division

High-resolution archaeointensity study during the Middle-Late Neolithic in Central China

Poster #: 28
Emily Edmonds, Psychiatry
  Mentor(s): Dr. Mark Bondi, Psychiatry

Cerebral Blood Flow in Empirically-Derived Subtypes of Mild Cognitive Impairment

Poster #: 29
Melissa Troyer, Cognitive Science
  Mentor(s): Professor Marta Kutas, Cognitive Science
  Professor Zhuowen Tu, Cognitive Science

Harry Potter and the Chamber of What?: Real-time semantic access is a function of the individual’s knowledge

Poster #: 30
Ning Ma, Electrical and Computer Engineering
  Mentor(s): Professor Angela Yu, Cognitive Science
  Professor Martin Paulus, Psychiatry

Learning to Stop in Healthy Humans and Stimulant Users: a Bayesian Model-Based Analysis

Poster #: 31
Celia Symons, Biological Sciences
  Mentor(s): Dr. Jon Shurin, Biological Sciences
  Dr. Brice Semmens, Marine Biology Research Division

The influence of climate and drought on fish in California mountain lakes

Poster #: 32
Kristin Donnelly, Psychology
Mentor(s): Dr. Ed Vul, Psychology  
Dr. Jonathan Cohen, Philosophy  
*Toward a computational understanding of information processing during stereotyping.*

**Poster #: 33**  
Carson Miller Rigoli, Cognitive Science  
Mentor(s): Dr. Sarah Creel, Cognitive Science  
*Human Rhythm Processing in Complex Meters*

**Poster #: 34**  
Michael Ano, Visual Arts  
Mentor(s): Dr. Dan Donoghue, Chemistry and Bio Chemistry  
Professor Grant Kester, Visual Arts  
*CAT124- Exhibition Building*

**Poster #: 35**  
Ruichen Sun, Biology  
Mentor(s): Professor Ralph Greenspan, Biology  
Professor Ramesh Rao, Electrical and Computer Engineering  
Professor Christina Gremel, Psychology  
*Learning-based decision-making behavior in fruit flies*

**Poster #: 36**  
Shanthi Manian, Economics  
Mentor(s): Dr. Joshua Graff Zivin, Economics  
Steffanie Strathdee, Division of Global Public Health  
*Health Certification in the Market for Sex Work: A Field Experiment in Dakar, Senegal*

**Poster #: 37**  
Paolo Gabriel, Electrical and Computer Engineering  
Mentor(s): Dr. Vikash Gilja, Electrical and Computer Engineering  
*Exploring Neural Correlates to Natural Human Behavior for Brain Machine Interface Applications*
Poster #: 38
Mark Moosburner, Marine Biology
Mentor(s): Professor Andrew Allen, Biological Oceanography
Professor Prashant Mali, Bioengineering

CRISPR-Cas9 gene editing in the model diatom *Phaedactylum tricornutum* using bacterial conjugation
Poster Session B
4:45-5:45 pm
Ballroom A

Poster #: 1
Nimsi Guerrero, Psychology
Mentor(s): Dr. Timothy Brady, Psychology
*Individual Differences in Visual Working Memory and Long Term Memory Precision*

Poster #: 2
Andrew Johnson, Anthropology
Mentor(s): Dr. Tom Levy, Anthropology
Dr. Steve Savage, Anthropology
*The First Phase of the ASOR Cultural Heritage Initiative-TerraWatchers Collaborative*

Poster #: 3
Sebastian Afshari, Aerospace Engineering
Mentor(s): Dr. Curt Schurgers, Qualcomm Institute
*UAV Survey for Low Cost Habitat Analysis of Belizean Jungle*

Poster #: 4
Anvesh Macherla, Human Biology
Mentor(s): Dr. David Gonzalez, Pharmacology
Dr. John Lapek, Pharmacology
*Group A Streptococcus Hyper-Virulence: Identification of the Molecular Switch*

Poster #: 5
Vivek Jani, Bioengineering
Mentor(s): Professor Pedro Cabrales, Bioengineering
*Humanizing Science and Engineering to Reduce Health Care Delivery Inequalities*

Poster #: 6
Alfredo Lucas, Bioengineering
Mentor(s): Dr. Vikash Gilja, Electrical and Computer Engineering
John Hermiz, Electrical and Computer Engineering
*Estimating Motor Scores with Accelerometers in the Neuro ICU*
**Poster #: 7**
Huanqiu Zhang, Physiology & Neuroscience  
Mentor(s): Professor Shelley Halpain, Biological Sciences  
*Short and Long Term Cytoskeletal Changes in Response to Transient Neurocellular Stress*

**Poster #: 8**
Santiago Arconada Alvarez, NanoEngineering  
Mentor(s): Professor Jesse Jokerst, NanoEngineering  
*Development of a Nanoparticle-based Hybrid for the Monitoring of Therapeutic Drug Heparin via Ultrasound-based measurement.*

**Poster #: 9**
Samuel Balatbat, Media Visual Art (Photography emphasis)  
Mentor(s): Professor Falko Kuester, Computer Science and Engineering  
*Stereoscopic Photospheres of the Historical Site of Chaco in New Mexico*

**Poster #: 10**
Bertha Yue, Visual Arts  
Mentor(s): Professor Falko Kuester, Structural Engineering and Computer Science & Engineering  
*Using photogrammetry to create a 3D model of the Chaco pueblos in the American Southwest*

**Poster #: 11**
Kristine Ly, Human Biology  
Mentor(s): Dr. Karsten Zengler, Pediatrics  
*The Biological Effects of Alcohol Liver Disease*

**Poster #: 12**
Xinyuan Wang, Electrical and Computer Engineering  
Mentor(s): Dr. Mingxiong Huang, Radiology  
*Fear learning and extinction*

**Poster #: 13**
Andre Amador, Mechanical and Aerospace Engineering  
Mentor(s): Dr. Geno Pawlak, Mechanical and Aerospace Engineering  
Dr. Falk Feddersen, Scripps Institute of Oceanography  
Dr. Sarah Giddings, Scripps Institution of Oceanography  
*AUV Observations of Nearshore-Inner Shelf Flow Structure*
**Poster # 14**
Robert St. Louis, Psychology  
Mentor(s): Professor Piotr Winkielman, Psychology  
Professor Patricia Churchland, Philosophy  
*Effort Makes You Like Things Less But Financially Value Them More*

**Poster # 15**
Alice Harada, Marine Biology, Scripps Institution of Oceanography  
Mentor(s): Professor Ronald Burton, Marine Biology Research Division, Scripps Institution of Oceanography  
Dr. Anne Murphy, Pharmacology  
*Mitochondrial basis of thermal tolerance in the intertidal copepod Tigriopus californicus*

**Poster # 16**
Irina Potapova, Joint Doctoral Program in Language and Communicative Disorders  
Mentor(s): Dr. Leanne Chukoskie, Institute for Neural Computation  
Adjunct Professor Emeritus Jeanne Townsend, Neurosciences  
*Eye Movements During Word Learning In Children With And Without Autism Spectrum Disorder*

**Poster # 17**
Ji Dai, Electrical and Computer Engineering  
Mentor(s): Professor Truong Nguyen, Electrical and Computer Engineering  
Professor Jurgen Schulze, Computer Science and Engineering  
*Stereo Panorama Generation from Point Cloud Re-projection*

**Poster # 18**
Jonathan Knutzen, Philosophy  
Arseny Ryazanov, Psychology  
Mentor(s): Professor Dana Nelkin, Philosophy  
Professor Nicholas Christenfeld, Psychology  
Dr. Samuel Rickless, Philosophy  
*A Moral Imagination Limited by Bayesian Intuition*

**Poster # 19**
Shuwan Huang, Chemistry & Biochemistry  
Mengqian Liu, Materials science engineering  
Mentor(s): Professor Michael Tauber, Chemistry & Biochemistry  
Professor Shyni Varghese, Bioengineering  
*Use of Raman Spectroscopy to Study Tissue Fibrosis*

**Poster # 20**
Dylan Drotman, Mechanical and Aerospace Engineering/Robotics
Benjamin Shih, Mechanical and Aerospace Engineering/Robotics  
Mentor(s): Professor Michael Tolley, Mechanical and Aerospace Engineering  
Professor Andrea Chiba, Cognitive Science and Neuroscience  
Deborah Forster, Qualcomm Institute  
*Towards Soft Pneumatic Fingers with Tactile Sensing Skins for Human–Robot Interaction*

*Poster #: 21*  
Irina Koester, Scripps Institution of Oceanography  
Mentor(s): Professor Lihini Aluwihare, Scripps Institution of Oceanography  
Professor Pieter Dorrestein, Skaggs School of Pharmacy and Pharmaceutical Sciences  
Professor Rob Knight, Pediatrics and Computer Science  
*A metabolomic and transcriptomic profile of the Pseudo-nitzschia microbiome and its relation to the production of the algal toxin domoic acid*

*Poster #: 22*  
Kimberly McCabe, Bioengineering  
Mentor(s): Dr. Andrew McCulloch, Bioengineering  
Dr. J. Andrew McCammon, Chemistry  
*Multiscale Effects of Troponin C Mutations in Dilated Cardiomyopathy*

*Poster #: 23*  
Bryce Inman, Scripps Institution of Oceanography  
Mentor(s): Dr. Peter Franks, Scripps Institution of Oceanography  
Dr. David Saintillan, Mechanical and Aerospace Engineering  
*Tiny swimmers structure the ocean microenvironment by deforming ambient chemical gradients*

*Poster #: 24*  
Subhasis Dasgupta, San Diego Supercomputer Center  
Mentor(s): Dr. Amarnath Gupta, San Diego Supercomputer Center  
*Analyzing Community Dynamics In Social Media*

*Poster #: 25*  
Emily Petty, Division of Biology  
Mentor(s): Professor Lorraine Pillus, Division of Biology  
Professor Alexandra Newton, School of Medicine  
*New Interactions Between Dynamic Acetylation and Phosphorylation*
Poster #: 26
Keng-Lou Hung, Division of Biological Sciences
Mentor(s): Professor David Holway, Division of Biological Sciences
Professor Alon Orlitsky, Electrical and Computer Engineering
Elucidating Patterns Of Biodiversity Using Information Theory: Getting The Most Out Of Finite Ecological Data

Poster #: 27
Marcelo Aguilar-Rivera (in absentia), Bioengineering
Mentor(s): Professor Todd Coleman, Bioengineering
Professor Andrea Chibas, Cognitive Science
Plug and Play Telemedicine: Improving flexible skin electrodes towards developing a practical sensor, easily interfaceable with smart phones, for physiological data collection and tentative diagnosis.

Poster #: 28
Zachary Carrico (in absentia), Neuroscience
Mentor(s): Professor Roberto Malinow, Neuroscience
Professor Ian Abramson, Mathematics
Prof. David Kleinfeld, Physics
A fluorescence assay for detecting amyloid-β using the cytomegalovirus (CMV) enhancer/promoter

Poster #: 29
Mohsen Malmir, Computer Science and Engineering
Mentor(s): Professor Garrison Cottrell, Computer Science and Engineering
Professor Shlomo Dubnov, Music Department
Music Generation by Deep Recurrent Neural Networks

Poster #: 30
Nadejda Beliakova-Bethell (presenting on behalf of Cory White), Medicine
Mentor(s): Dr. Douglas Richman, Medicine
Off-target effects of SAHA may inhibit HIV reactivation

Poster #: 31
Joanne Liu, Bioinformatics and Systems Biology
Mentor(s): Professor Karsten Zengler, Pediatrics
Examining the Role of the Microbiome in Alcoholic Liver Disease through Systems Biology
**Poster #: 32**  
Clarisa Coronado, Psychology and Spanish Literature  
Mentor(s): Dr. Murray Stein, Psychiatry  
Dr. Nader Amir, Psychology  
*Mental Health in Latina/o Students*

**Poster #: 33**  
Allan Yeh, Computer Science  
Mentor(s): Dr. Ross Walker, Engineering  
*Interacting with Chemical Software*

**Poster #: 34**  
Animesh Gupta, Physics  
Mentor(s): Professor Justin Meyer, Biology  
Professor Terence Hwa, Physics  
*Viral-host interactome evolution to compensate for a host gene deletion*

**Poster #: 35**  
Agnieszka Grzechnik, Biomedical Sciences and Pharmacology  
Mentor(s): Professor Alexandra Newton, Pharmacology  
Professor Lorraine Pillus, Biology  
*Phosphatase Activity of the Fungal Adenylate Cyclase Cyr1, the Yeast Homologue of PHLPP*
Abdulla, Ahmed, UC San Diego

Department/Major: Global Policy & Strategy
Mentored by Professor David Victor, Global Policy & Strategy
Professor George Tynan, Mechanical & Aerospace Engineering

A radical expansion of global nuclear power: the institutional challenge
Protecting the planet from climate change requires a radical increase in carbon-free electricity production. One option is nuclear power—a mature and reliable technology—but concerns about its risks impede its adoption in many countries. To date, most academic research on this option has focused on the technological dimension, but the real obstacles to radical expansion of nuclear power are rooted in politics and regulatory institutions. Even the question of which reactor technology or fuel cycle arrangement to pursue is guided by such institutional pressures.

As a precursor to evaluating these institutions, we analyze the progress of the U.S. fission research agenda, in order to determine which nuclear technologies are going to be ready for deployment in the critical 2030-2050 emissions mitigation window. Here, we present a retrospective budget analysis of the institutional investment in fission technology research and development from 1998 to the present. We supplement this quantitative analysis with a semi-structured expert elicitation that poses questions regarding the state of the field—and its likely future—to thirty leaders across the nuclear enterprise. Our results reveal a grim picture, raising doubts about the role nuclear power might play in decarbonization.

Abraham, Matt, UC San Diego

Department/Major: Pediatrics, Pharmacology
Mentored by Professor Elizabeth Winzeler, Pediatrics
Professor Dionicio Siegel, Molecular Pharmacology

High-throughput screen of complete Plasmodium life cycle identifies pyrazinamide scaffold with potent liver-stage activity
Malaria continues to be a worldwide economic and health burden, with close to half the population at risk of contracting the disease. Each year, several hundred million cases of malaria are reported, leading to over a half million deaths, primarily in children. With emerging resistance to current standard of care treatments, the need for new therapeutics is clear. Our lab has developed three distinct high-throughput screening assays to test extensively curated small molecule libraries against all stages of the malaria life cycle. These techniques were used on the 70,000 compound Global Health Diversity Library, marking the largest life cycle spanning screen in malaria to date. The results identified a new class of pyrazinamide compounds that are highly potent against the liver stage of malaria, filling a role currently held by only two FDA approved drugs. Therapeutic tractability of this scaffold is reliant on target elucidation, to predict and mitigate side effects. In collaboration with medicinal chemists, we have designed and tested over 50 analogs of this scaffold, ultimately increasing potency and metabolic stability. Though the therapeutically relevant functional groups are now characterized, the true target of these compounds remains unknown.
**Addo, Rhea-Comfort**, Calif. State University, Long Beach

**Department/Major:** Biology - General  
**Mentored by Dr. Pamela Mellon**, Department of Reproductive Medicine  
**Shanna Newton**, Department of Reproductive Medicine

**Mutations & Infertility: The Effects of FOXL2 Mutations on FSH? Regulation**

Premature ovarian failure (POF) is the loss of ovarian function before the age of 40. Patients with POF are infertile, do not menstruate, have low estrogen levels, and high levels of follicle-stimulating hormone (FSH). Another disease, Blepharophimosis ptosis epicanthus inversus syndrome (BPES) Type I, leads to abnormal eyelid development and is associated with POF. Mutations in the FOXL2 gene have been found in patients with these diseases. FOXL2 is a necessary component in FSH? synthesis and mutations could contribute to the altered regulation of FSH in POF and BPES patients. The aim of this study was to determine how FOXL2 mutations affect the FSH? induction pathway, leading to POF and BPES. The effects of FOXL2 mutations on FSH? expression were tested by transfecting FOXL2 mutant expression vectors into a pituitary-specific L?T2 cell line. Human and mouse FSH? luciferase reporters were used to measure changes in FSH? expression in order to determine if the effects of FOXL2 mutations are conserved in both species. Results indicate that FSH? expression responds to mutations of FOXL2. Potentially, this study could bring us one step closer towards treating patients with these reproductive disorders.

**Afshari, Sebastian**, UC San Diego, Revelle College

**Department/Major:** Aerospace Engineering  
**Mentored by Dr. Curt Schurgers**, Qualcomm Institute

**UAV Survey for Low Cost Habitat Analysis of Belizean Jungle**

Unmanned Aerial Vehicles (UAV) present a powerful new approach to studying avian environments, as they can gather high-resolution data over large areas at low cost. We present such a system and its workflow, enabling the capture of visual and near-infrared (NIR) imagery covering many square kilometers in tropical lowland forest of Belize for a habitat analysis of the only known pair of harpy eagles in the country. Compared to satellite data (i.e. Landsat), our approach is more temporally relevant, cloud-free and has higher resolution (10cm versus 30m). Flight mission products include canopy height models (CHM), Normalized Difference Vegetation Index (NDVI), and even tree crown delineation. We used a small fixed-wing UAV to gather data over 700 hectares in and around the Bladen Nature Reserve, to survey the breeding territory for comparison with a nearby location where birds are not found. We conducted surveys during three days of flights, and created georeferenced maps in post-processing. The map data was comprehensive and accurate to 10cm resolution in visible and 18cm resolution in NIR spectra. We believe that UAV technology will be far-reaching for the future of bird study and conservation.
Aguilar-Rivera, Marcelo (in absentia), UC San Diego  

**Department/Major:** Bioengineering, [Not sure if he has one]  
**Mentored by Professor Todd Coleman, Bioengineering**  
**Professor Andrea Chibas, Cognitive Science**  

*Plug and Play Telemedicine: Improving flexible skin electrodes towards developing a practical sensor, easily interfaceable with smartphones, for physiological data collection and tentative diagnosis.*  
[Abstract redacted owing to proprietary information.]

Alamdari, Mazyar, UC San Diego, Muir College  

**Department/Major:** Political Science, International Relations  
**Mentored by Professor Fonna Forman, Political Science**  
**Professor Teddy Cruz, Urban Ecology**  

*Blum Summer Field Internship 2016: Eco-literacy in action at the UCSD EarthLab Community Station*  
We will present an 8 minute promotional video that we produced over the course of our nine week Blum Summer Filed Internship at the EarthLab, an outdoor experimental learning space located in the Encanto neighborhoods in San Diego. In the video, we showcase the five week D.E.E.P science literacy camp -- a summer program intended to engage K-5 graders in hands-on science learning -- in which we also participated.

Alfernness, Leeann, UC San Diego, Marshall College  

**Department/Major:** Marine Biology  
**Mentored by Dr. Dimitri Deheyn, Molecular Biology, SIO**  

*Two steps forward, one step back: the challenges associated with purifying a new light producing protein from the brittlestar Ophiopsila californica.*  
[Abstract redacted owing to proprietary information.]

Amador, Andre, UC San Diego  

**Department/Major:** Mechanical and Aerospace Engineering  
**Mentored by Dr. Geno Pawlak, Mechanical and Aerospace Engineering**  
**Dr. Falk Feddersen, Scripps Institution of Oceanography**  
**Dr. Sarah Giddings, Scripps Institution of Oceanography**  

*AUV Observations of Nearshore-Inner Shelf Flow Structure*  
The exchange of tracers (nutrients, pollutants, pathogens, larvae, phytoplankton, and sediment) in the inner continental shelf is particularly complex and has important implications for continental shelf ecosystems and for nearshore water quality. Vortical...
structures associated with seaward flowing currents (rip currents) have been shown to represent the dominant exchange mechanism between the surfzone and the inner-shelf. However, the spatial structure of these vortical features in cross-shelf transport has not been resolved and a paradigm for how these structures evolve in stratified inner-shelf waters is lacking. Autonomous Underwater Vehicles (AUVs) have tremendous potential for resolving spatio-temporal flow structure in the inner-shelf, but its capabilities are limited by the presence surface waves. Wave forcing complicates the measurement of flow velocities associated with large scale turbulent structures because they are typically much smaller than the oscillating wave velocities. Here we present AUV observations collected during a series of surfzone dye release experiments carried out during the fall of 2015 at Imperial Beach, California (CSIDE experiment). A fixed instrumentation array was employed to resolve the spatio-temporal wave field. Preliminary results highlight the post-processing methodology developed for isolating wave velocities in AUV-based hydrodynamic measurements.

**Aminov, Edward**, UC San Diego  
*Department/Major:* Mechanical Engineering Department  
*Mentored by Professor James Friend,* Mechanical Engineering  
*Gopesh Tilvawala,* Mechanical Engineering

**SmartShunt—Gradually Expanding Cardiopulmonary Shunt**  
[Abstract redacted owing to proprietary information.]

**Ano, Michael**, UC San Diego  
*Department/Major:* Visual Arts, 6th college  
*Mentored by Dr. Dan Donoghue,* Chemistry and Bio Chemistry  
*Professor Grant Kester,* Visual Arts

**CAT124—Exhibition Building**  
CAT124: EXHIBITION BUILDING is an ongoing experimental performance and exhibition series contemplating the intersections of pedagogy, para-institutional practice, labor, and institutional critique.

CAT124: EXHIBITION BUILDING takes the form of quarterly performance/seminar and exhibition. The performance has and will continue to invite undergraduates at UC San Diego to participate in a ten-week series of workshops and dialogues around institutional practice and exhibition development.
Anvar, Arya, UC San Diego, Marshall College

Department/Major: Physiology and Neuroscience
Mentored by Dr. Varykina Thackray, Reproductive Medicine

Puberty is Necessary to Fully Develop the PCOS Metabolic Phenotype

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in reproductive-aged women. In addition to infertility, many women with PCOS have metabolic dysregulation that increases their risk of developing type 2 diabetes and cardiovascular disease. Due to limitations in treatment, there is a significant need for new therapies for this disease. Previous studies demonstrated that treatment of pubertal female mice with the aromatase inhibitor, letrozole resulted in hallmarks of PCOS including elevated testosterone, anovulation, polycystic ovaries and metabolic abnormalities. In this study, we addressed whether puberty was necessary for development of PCOS by implanting adult female mice with a placebo or letrozole pellet for 5 weeks. We demonstrated that, like the published results with pubertal mice, letrozole treatment of adult mice resulted in many reproductive hallmarks of PCOS including increased testosterone, anovulation and polycystic ovaries. In contrast to pubertal female mice, letrozole treatment of adult mice did not result in increased weight, abdominal adiposity or increased fasting blood glucose. In summary, puberty appears to be necessary to fully develop a metabolic phenotype in a PCOS mouse model, indicating that puberty may be a critical time for development of PCOS.

Arar, Rawan, UC San Diego

Department/Major: Sociology, Refugee Studies
Mentored by Dr. David FitzGerald, Sociology
Dr. Wael Al-Delaimy, Family Medicine and Public Health

Shouldering the Refugee Burden: Jordan and the Global Refugee Crisis

The world is facing the largest refugee crisis since WWII with approximately 19.5 million refugees (UNHCR 2015). As countries in the Global North negotiate the number of refugees they are willing to accept, 86% of the world’s refugees live in developing countries and over 90% of the nearly five million displaced Syrian refugees are in the Middle East. The Global South has shouldered the refugee burden for the rest of the world, yet few sociologists have considered the implications of forced mass immigration to non-Western, non-liberal states. With a focus on Jordan, a country that has received generations of refugees for over 70 years, I investigate the refugee experience from the top-down, through state-centric frames, and from the bottom-up, with an emphasis on the refugee and host community. I ask: How do Jordanian social institutions govern the influx of Syrian refugees? And, how do refugees strategically navigate the limitations of Jordanian institutions to meet their present and future needs? I conduct in-depth interviews and field observations to answer these questions.
Arconada Alvarez, Santiago, UC San Diego, Warren College

Department/Major: NanoEngineering
Mentored by Professor Jesse Jokerst, NanoEngineering

**Development of a Nanoparticle-based Hybrid for the Monitoring of Therapeutic Drug Heparin via Ultrasound-based measurement.**

Heparin anticoagulation therapy is an indispensable feature of clinical care, yet has a narrow therapeutic window and is the second most common intensive care unit (ICU) medication error. Due to the time requirement of the current monitoring methods, patients take too long to get into the therapeutic window, which can cause complications during surgery. We found that Methylene Blue, an FDA-approved dye, undergoes a significant increase in photoacoustic signal when in presence of Heparin. The addition of Protamine, a heparin antagonist used to deheparinize patients after surgery, decreases the photoacoustic signal back to baseline. To bring this technology to the ICU, we synthesized Silica Nanoparticles to electrostatically capture methylene blue and form a hybrid that is easy to manipulate. The charge of the particle was a key element to control the binding of heparin to the methylene blue-nanoparticle hybrid. The hybrid was responsive to a range of heparin concentrations and also reversible by protamine addition. This nanoparticle-based material could be extremely useful in adapting this technology to the medical practice.

Balatbat, Samuel, UC San Diego, Muir College

Department/Major: Media Visual Art (Photography emphasis)
Mentored by Professor Falko Kuester, Computer Science and Engineering

**Stereoscopic Photospheres of the Historical Site of Chaco in New Mexico**

Stereoscopic photospheres are pairs of images captured by either a Cavecam or Cavecam X. These images have full 360° depth coverage, making it possible for archaeologists and viewers to be virtually present at sites. The visualization can happen through either head-mounted displays (HMDs, like the Oculus Rift or HTC Vive) or through our cave display systems (WAVE, StarCAVE, NexCAVE, etc.). These stereoscopic photospheres have been captured and processed to provide a visualization of the historical site of Chaco in New Mexico.

Bardolph, Megan, UC San Diego

Department/Major: Cognitive Science
Mentored by Professor Seana Coulson, Cognitive Science
Dr. Tzyy-Ping Jung, Institute for Neural Computation (INC)

**Cognitive modeling of evidence evaluation and belief updating**

Life experience tells us that people very rarely change their minds regarding emotional sociopolitical issues such as capital punishment. Consistent with this sentiment, our research suggests that while people without a strong prior opinion on such issues are quite open to new evidence, those with existing views are far less likely to adjust their opinions in response to new arguments. In our project, volunteers were asked to read arguments for and against various controversial issues, reading either to rate arguments
or to explain their thoughts while rating arguments. Argument evaluation and change in belief were tracked to assess how participants process and integrate evidence in light of their existing opinions. Our results show that prior belief affects argument ratings: those that are consistent with participants' belief are rated as stronger than those that are inconsistent. Contrary to other findings, participants did not polarize in their beliefs, but were instead sensitive to the information in arguments. Change in belief is modified when participants actively argue during the survey.

Beliakova-Bethell, Nadejda (presenting on behalf of Cory White), UC San Diego

Department/Major: Medicine
Mentored by Dr. Douglas Richman, Medicine

**Off-target effects of SAHA may inhibit HIV reactivation**

Suberoylanilide hydroxamic acid (SAHA) has been assessed in clinical trials as part of a “shock and kill” strategy to cure HIV-infected patients. It induced HIV RNA, but failed to reduce the latent HIV reservoir size. We therefore utilized a combined analysis of effects of 1 uM SAHA (24h treatment) on the host transcriptome (Illumina microarrays) and proteome (iTRAQ liquid chromatography mass spectrometry) to dissect its mechanisms of action that may explain its limited success in “shock and kill” strategies. Using limma package in Bioconductor R, we identified 185 proteins, 18 phosphorylated forms, 4 acetylated forms and 2,982 genes, whose expression was modulated by SAHA. A protein interaction network integrating these 4 data types identified the HIV transcriptional repressor HMGA1 to be upregulated by SAHA at the transcript and protein levels. Further functional category assessment of proteins and genes modulated by SAHA identified gene ontology terms related to NFkappaB signaling, protein folding and autophagy, which are all relevant to HIV reactivation. In summary, SAHA modulated numerous host cell transcripts and proteins, which would be expected to have very mixed effects on the induction of HIV-specific transcription and protein function.

Bhattaram, Sneha (presenting on behalf of Siva Prasad Varma Chiluvuri), UC San Diego

Department/Major: Electrical Engineering
Mentored by Dr. Harinath Garudadri, Qualcomm Institute
Professor Dilip Jeste, Sam and Rose Stein Institute for Research on Aging

**Objective Metrics Based on Off-body Remote Sensing for Fall Risk Assessment and Prevention**

Balance stability and gait variability are correlated with fall risk among adults over the age 65. The consequences of falls include decline in functional status, nursing home placement, increased use of medical devices and reduced quality of life. We will develop objective metrics for fall risk assessment, which are repeatable; easy to administer and will readily integrate with current workflows. While Gait labs and clinical grade Force Plates do provide “gold standard” objective metrics, they are used infrequently due to cost and time constraints. Our approach is based on off-body (visual) sensors and
Computer Vision algorithms to supplement current best practices with objective metrics for fall assessment. We have established the feasibility for balance assessment with healthy subjects. In this work, we propose to extend the algorithms for quantifying gait disturbances during activities of daily living and conduct clinical trials with seniors. Such a system is of extreme value to caregivers for early detection of fall risk and to intervene appropriately for fall prevention.

**Black, Lisa**, UC San Diego

**Department/Major:** Family Medicine and Preventive Health, Psychiatry  
**Mentored by Dr. William Sieber,** Family Medicine and Preventive Health  
**Dr. Steven Hickman,** Psychiatry

**Implementation of Neurofeedback into the Primary Care Setting**

Neurofeedback is a variant of biofeedback and involves training of brain activity by means of operant conditioning via visual and auditory feedback. Within the burgeoning field of cognitive neuroscience, recent research has supported neurofeedback as both a complementary and alternative therapy (CAM) and an evidenced-based practice (EBP) for a variety of conditions, including attention deficit disorder, epilepsy, substance disorders, and traumatic brain injury. Neurofeedback can be complementary to other treatment modalities such as counseling and medical care and can be delivered across a variety of settings. Despite these advantages, implementing and sustaining neurofeedback as a service into a primary care setting comes with its own set of challenges. Through the use of Peek’s Three World View Model of implementation the research addressed clinical, financial, and operational barriers and facilitators of implementation and sustainability, so as to increase access to neurofeedback services.

**Braden, Peter,** UC San Diego

**Department/Major:** History, Sociology  
**Mentored by Professor Paul Pickowicz,** History  
**Professor Karl Gerth,** History  
**Prof. Richard Madsen (emeritus),** Sociology

**Did Animals Have a Chinese Revolution?**

I wish to study how animals experienced the profound changes in human institutions (markets, laws, customs) that accompanied the Chinese revolution of 1949. Scientists recognize that animals can learn and have emotions, while some (such as orcas, chimpanzees, and wolves) can be considered to have cultures. How might their complex inner lives be affected by tumult and transformation in the realm of humans? Would it have been better to be a Chinese pig in 1940 or in 1960? Was there any difference? In recent decades, historians have gained insights by paying attention to categories previously ignored: gender, ethnicity, (dis)ability. Can we exclude even different species from rigorous historical inquiry? Since animals leave no written records, I will attempt to glean insights about their inner states by examining media coverage, laws, and other documents generated by institutions and people who handled animals. To supplement these findings, I will interview people who owned, raised, and slaughtered animals before and after the 1949 revolution. Our understanding of the past can only benefit from a closer study of the experiences of these intelligent beings whose lives are so intimately connected to our own.
**Breeze, Carolyn**, UC San Diego, Revelle College

**Department/Major:** mathematics-computer science  
**Mentored by Professor Tom Levy,** Anthropology

**At-Risk Cultural Heritage and Archaeological Data Management – the ArchaeoSTOR Solution**

Cultural heritage sites all around the world are being threatened; it is vital that these sites, their history, and their artifacts be preserved for future generations. To this end, we are developing a web-based database called ArchaeoSTOR. ArchaeoSTOR will fill a vital niche in the archaeological community by allowing researchers to safely store artifact metadata, location data, photographs, and even point cloud data. As part of ArchaeoSTOR's development, we travelled to Greece during the summer of 2016 with Dr. Tom Levy to participate in the excavation of a looted Mycenaean tomb at the site of Kastrouli, near Delphi. Surprisingly, undisturbed burial deposit was found during the excavation. As such, the Kastrouli excavations proved to be a perfect field test for the applications of ArchaeoSTOR that our team developed. Through the course of the excavation we were able to dramatically improve the functionality of the database and preserve vast amounts of precious data associated with the cultural heritage site. This helped us make ArchaeoSTOR ready to use on a larger scale across several UCs as part of a UC Office of the President Catalyst grant.

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**Burner, Danielle**, UC San Diego, Sixth College

**Department/Major:** Molecular Biology  
**Mentored by Professor Christina Jamieson,** Surgery - Moores Cancer Center  
**Dr. Phillip Kyriakakis,** Bioengineering

**A Red/Far-Red Optical Switch System for Localized Inhibition of Pain in Bone Metastatic Prostate Cancer**

Cancer metastasis contributes substantially to chronic bone pain. In response, opioids are often prescribed but do not offer much relief. Our research goal is to prevent pain locally using a version of a minimally invasive optogenetic system found in many plants and cyanobacteria adapted for mammalian cells. This system can be used in vivo by constructing it into lentiviral vectors. Our model design incorporates a genetic switch that can be turned on only when the photoreceptor PhyB and the ligand PIF3 interact in the presence of phycocyanobilin and red light. The switch contains a multicloning site, in which a particular gene can be inserted and conditionally expressed in a light dependent manner. The expression of this particular gene can be activated regionally and temporally in the presence of red (650nm) light and deactivated in the presence of far red (730nm) light. Here I describe the strategy for constructing the plasmid DNA and lentiviruses to control anti-NGF with light, which can lead to the inhibition of nerve growth in cancer patients, therefore preventing pain associated with abnormal neuronal growth in cancer.
Cai, Shuhui, UC San Diego

**Department/Major:** Paleomagnetism

**Mentored by Professor Lisa Tauxe,** Geosciences Research Division

**High-resolution archaeointensity study during the Middle–Late Neolithic in Central China**

The geomagnetic field is a window to the deep interior of the Earth and plays a key role on evolution of life on the Earth. The archaeological materials provide us an efficient way to understand the geomagnetic variations over periods of hundreds to thousands of years. This study focuses on a huge ancient kiln factory relic belonging to Miaodigou culture (~4000-3500 BCE) located at central China. We collected a large amount of artifacts from an excavated section. We carried out archaeointensity study on these samples and a great number of them gave excellent results (successful rate: 76%). The paleointensities recorded by our samples vary between 30-50 ?T. We also conducted relative paleointensity experiments on sediments collected from the same section. The variations of absolute and relative paleointensity versus depths show well consistency, which can be a strong evidence of the reliability of our data. Our new results allow us to establish a precise paleointensity variation between 4000 BCE and 3500 BCE in this area, which will fill many gaps of the present Chinese archaeomagnetic data set and improve the Eastern Asian model of the geomagnetic field greatly.

Carrico, Zachary *(in absentia)*, UC San Diego

**Department/Major:** Neuroscience

**Mentored by Professor Roberto Malinow,** Neuroscience

**Professor Ian Abramson,** Mathematics

**Prof. David Kleinfeld,** Physics

**A fluorescence assay for detecting amyloid-? using the cytomegalovirus (CMV) enhancer/promoter**

[Abstract redacted owing to proprietary information.]

Chan, Tiffany, UC San Diego, Sixth College

**Department/Major:** Public Health, Ethnic Studies

**Mentored by Professor Fonna Forman,** Political Science

**Professor Teddy Cruz,** Visual Arts

**Blum Summer Field Internship 2016: Creating a “Zero Net Energy Community” in Encanto**

Low income and underserved communities are often more affected by climate change yet denied resources for positive environmental change. We will present data we collected on energy use and efficiency in the neighborhood of Encanto in Southeast San Diego during our Blum Summer Field Internship. Our research is part of the UCSD EPIC project, funded by the California Energy Commission, to create a near zero net energy community in this marginalized region.
Chan, Priscilla, UC San Diego

**Department/Major:** Biology  
**Mentored by Dr. Jonathan Lin, Pathology**

**Mechanisms of Endoplasmic Reticulum Stress Related to Retinal Degeneration**

The accumulation of protein leads to endoplasmic reticulum stress and, consequently, the activation of the unfolded protein response (UPR). P23H rhodopsin is a common mutant protein that leads to the development of a retinal degenerative disease known as retinitis pigmentosa. This single amino acid change causes the protein to misfold, resulting in rod photoreceptor death within the retina. I am investigating how knocking out ATF6, one of the three branches of the UPR, will affect the rate of P23H rhodopsin mediated cell death.

In addition, PERK, another branch of the UPR, has been found to be tied to tau-mediated neurodegenerative diseases. Tau proteins have been found to lead to the development of neurodegenerative diseases and have been found to accumulate in the retina of PS19 mice, which carry the P301S tau mutation and are commonly used in Alzheimer's research. The second portion of my project focuses on determining the mechanism in which mutant tau protein accumulation leads to photoreceptor dysfunction in relation to the UPR. My preliminary results show that phosphorylated tau levels are higher while photoreceptor protein levels are lower in the retinas of PS19 mice.

Chao, Jesse, UC San Diego

**Department/Major:** Biological Sciences, Cellular and Molecular Medicine  
**Mentored by Dr. Maho Niwa, Biological Sciences**  
**Professor Susan Ferro-Novick, Cellular and Molecular Medicine**

**The Endoplasmic Reticulum Surveillance Pathway Regulates Organelle Inheritance and Cell Cycle Progression**

How organelle distribution is coordinated with the cell cycle is largely unknown. We are working to understand how cells check the quality of organelles before they are distributed from the mother to daughter cell, a process termed organelle inheritance. We have uncovered a surveillance mechanism for the inheritance of endoplasmic reticulum (ER), which synthesizes and secretes nearly all proteins in the cell. This ER surveillance pathway ensures that daughter cells inherit only a healthy and functional ER. If the ER is stressed, for example by the toxic accumulation of improperly synthesized proteins, ER inheritance is suspended, and cell cycle progression is blocked.

Using budding yeast, a great tool for studying ER inheritance, we found that the ER surveillance pathway can block the cell cycle by removing septins, a protein complex required for cell division, from their site of action. When ER stress is recovered, septins are restored and cell cycle progression can resume. This discovery suggests that the ER surveillance pathway coordinates its inheritance with the cell cycle, and is adaptable to stress. Together, these processes may ensure cell survival in adverse conditions.
**Chen, Karl**, UC San Diego, Muir College

**Department/Major:** Microbiology  
**Mentored by Professor Francesco Paesani,** Chemistry and Biochemistry

*A first step toward understanding the ice nucleation*

A critical step in multiscale modeling of ice nucleation is the accurate description of intermolecular interactions in a region of thermodynamic conditions and a cheaper computational model to allow simulations for a longer length and time scales. We use the recently developed many-body potential `MB-pol' for water to study ice Ih, and some proton ordered ice phases. Available experimental lattice energies of ice phases allowed critical assessment of the performance of MB-pol along with other known water flexible models - q-TIP4P/F, TTM3-F, and AMOEBA. We noticed that the MB-pol potential predicts both the lattice energies and stability order of ice phases in good agreement with experiments. More importantly, this agreement comes from the highly accurate energy estimates of the energy decompositions rather than the cancellation of errors. Energy decomposition analysis reveals that the short-range three-body energy of MB-pol plays a crucial role in predicting the correct stability order. We further compare the performance of MB-pol with density functional theory and random phase approximation.

**Chen, Ching-fu**, UC San Diego

**Department/Major:** Electrical and Computer Engineering  
**Mentored by Professor Kenneth Kreutz-Delgado,** Electrical and Computer Engineering  
**Dr. Ruey-Song Huang,** Institute for Neural Computation

*Validation of periodic fMRI signals in response to wearable tactile stimulation*

To map the cortical representations of the human body, we developed a wearable technology for automatic tactile stimulation in functional magnetic resonance imaging (fMRI) experiments. In a two-condition block design experiment, air puffs were delivered to the face and hands periodically. The signal-to-noise ratio and statistical significance of periodic fMRI signals were computed using linear statistical methods. A body-part representation on the cortical surface was identified as a surface-based region of interest (s-ROI) by thresholding a statistical measure. However, a single statistical measure is insufficient to illustrate the temporal characteristic of the signal. We developed secondary-level analyses including time-frequency transform and circular statistics to assess the temporal dynamics of the fMRI signal in each s-ROI. A measure of temporal variability of a periodic signal was defined and used to validate each s-ROI. Both within and outside the primary sensorimotor cortex, s-ROIs with high variability were rejected. S-ROIs with low to moderate variability are also found outside the broader sensorimotor network. This study suggested analyzing the temporal characteristics of fMRI signals is essential for validating periodic brain activation in somatosensory mapping experiments.
Chen, Chien-Ju, UC San Diego

Department/Major: Bioengineering
Mentored by Dr. Jesse V. Jokerst, Nanoengineering
Dr. Stephen Mayfield, Molecular Biology section, Division of Biological Sciences

Lipid-Polymer hybrid nanoparticles: photoacoustic imaging platform applied to cancer diagnosis

Early diagnosis of ovarian cancer is significant for patient because ovarian cancer is treatable in early stages and deadly in late stages. However, the traditional CA125-based screening is not successful and only has positive predictive values below 50%. This failure greatly results from the poor contrast of tumor tissues above near healthy tissues. In our project, we use photoacoustic ultrasound to obtain the high contrast signal above adjacent healthy tissues. To successfully deliver our contrast agents, DiR, to tumor tissues, we make use of lipid-polymer hybrid nanoparticle to deliver DiR. We encapsulate DiR molecules in PLGA hydrophobic core and PEG-DSPE as well as lecithin intercalate into the core to stabilize hybrid nanoparticles during blood stream circulation. Also, to further higher the contrast of ovarian cancer above nearby tissues, we use folate-conjugated nanoparticles to target the over-expressed folate receptor on ovarian cancer cell surface. We aim to increase the positive predictive values of ovarian cancer diagnosis as high as possible by integrating the photoacoustic tools and molecular imaging.

Chou, Rebecca, UC San Diego, Muir College

Department/Major: General Biology, Sociology
Mentored by Professor Mary Blair-Loy, Sociology

Does a family-friendly welfare state help shatter the corporate glass ceiling?
Comparing the U.S. and Norway
[Abstract redacted owing to proprietary information.]

Collins, Caroline, UC San Diego

Department/Major: Communication
Mentored by Dr. Angela Booker, Communication

New Media Communication for Community Wellness

This community research based media project executes a vital component of a collaborative UCSD Frontiers of Innovation Scholars Program (FISP) grant entitled: New Media Communication for Community Wellness. UCSD Communication Faculty and UCSD School of Medicine and Center for Integrative Medicine (CIM) Practitioners spearhead this overarching venture. The following media project represents a core goal of the collaboration: to ‘spread the message’ regarding UCSD’s CIM services (such as acupuncture, mindfulness stress reduction, and wellness classes) to help to bridge possible divides between CIM and particular segments of the Southeastern San Diego community, allowing the community to better understand CIM and their services and how these services may align with the community’s own distinct and diverse wellness goals.
**Contijoch, Francisco**, UC San Diego

**Department/Major:** Cardiology, Bioengineering  
**Mentored by Professor Elliot McVeigh, Bioengineering**  
**Dr. William Auger, Medicine**

*Advanced Assessment of Chronic Thromboembolic Pulmonary Hypertension patients*

With the development of the pulmonary thromboendarterectomy (PTE) procedure at the University of California, San Diego (UCSD), chronic thromboembolic pulmonary hypertension (CTEPH) has become the only type of pulmonary hypertension considered curable. However, some patients, termed non-responders, experience limited improvement after surgery and potential alternatives such as minimally invasive angioplasty and medical therapy have been recently developed. This proposal aims to identify non-responders pre-operatively via 1) quantification of vascular obstructions in the pulmonary vasculature and 2) evaluation of right ventricle contractility.

We have developed semi-automated image analysis techniques to isolate the pulmonary vasculature in conventional computed tomography (CT) angiographic images. This allows for visualization and quantification of stenosis and obstructions. Furthermore, we have adapted a recently-developed CT technique to measure regional right ventricular function.

We believe these measures will be able to identify non-responders pre-operatively. This would allow physicians to more accurately refer patients for surgery and explore the use of potential alternatives in non-responders patients.

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**Coronado, Clarisa**, UC San Diego, Muir College

**Department/Major:** Psychology, Spanish Literature  
**Mentored by Dr. Murray Stein, Psychiatry**  
**Dr. Nader Amir, Psychology**

*Mental Health in Latina/o Students*

In 2014, the estimated total of undocumented immigrants living in the United States was 11.3 million (Passel et al., 2015). Members of this sub-population often feel like they’re living in an “invisible prison” because of the ongoing fear of being deported, racial profiling and limited opportunities such as being employed or attending college (Sullivan, M., & Rehm, R., 2005). These stressful experiences can lead to the development of behavioral and emotional outcomes such as depression and anxiety ("Undocumented Americans", 2016). Given the challenges and high risk for developing mental health disorders that undocumented migrants face, systematic mental health research with undocumented migrants is necessary in order to improve the efficacy and efficiency of services. In this study, we are interested in examining cognitive and emotional differences of Latina/o students with Deferred Action for Childhood Arrivals (DACA) and Latina/o students who have permanent residency in terms of the stress that they experience, the coping mechanisms used, and whether this stress mediates mental health symptoms.
Cuevas, Yesenia, UC San Diego, Warren College

Department/Major: Human Development
Mentored by Professor Fonna Forman, Political Science
Ms. Camille Campion, Communications

Blum Summer Field Internship 2016: Community Engagement: Principles and practices
Having local knowledge of a community is essential for engaging in mutually beneficial and reciprocal university-community partnerships. The UCSD EPIC project, funded by the California Energy Commission, aims to engage local members in efforts to create a near zero net energy community in Encanto. We will present the community engagement strategies we developed during our Blum Summer Field Internship.

Cushnir, Jacob, UC San Diego, Sixth College

Department/Major: Structural Engineering, Visual Arts / Theatre
Mentored by Professor Adam Burgasser, Astrophysics
Professor Tara Knight, Theatre

Cosmoscosm: Sound Planetarium
Imagine entering a dark room, the walls and ceiling lined with speakers and plenty of space to stand or sit by yourself or in a small group. Instead of watching the stars reveal themselves on the ceiling of a planetarium, we hear localized sounds coming from every direction, spatialized in a full sphere around the body—this is our Sound Planetarium. For this project, we use data sonification techniques to translate existing astronomical data from the bright star catalogue into spatialized sounds. The Sound Planetarium is an audio laboratory, with the ability to modulate different samples to match the physical qualities of stars (ex. spectral type, spectral class, brightness, and color) to physical qualities of sound (ex. timbre, rhythm, volume, and frequency). In addition to experimenting with the sound qualities, we also adjust their locations according to the Earth’s rotation. Bridging the disciplines of live performance, audio installation, data sonification, and Astrophysics, our trans-sensory artwork is designed to live in between experimental art practice and scientific inquiry.

Dai, Ji, UC San Diego

Department/Major: Electrical and Computer Engineering
Mentored by Professor Truong Nguyen, Electrical and Computer Engineering
Professor Jurgen Schulze, Computer Science and Engineering

Stereo Panorama Generation from Point Cloud Re-projection
With the advent of various consumer-level virtual reality (VR) head mounted display devices, increasing focus has been put on discovering materials that can fully utilize such powerful devices. Among those materials, stereo panoramas entitle users an immersive experience of recorded scenes. While monocular panorama generation algorithm has been intensively studied and decent results have been achieved. Some problems like vertical disparity and parallax still degrade stereo panorama quality. We
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proposed an algorithm that can produce stereo panoramas with minimized vertical disparity and parallax error. The algorithm only needs input stereo image pairs and the camera positions at which the image pairs are captured. The algorithm also provides users the freedom of choosing desired viewing location and angle. They can also choose preferred baseline.

D'Andrea, Erika, UC San Diego, Marshall College

Department/Major: Sociocultural Anthropology
Mentored by Professor Nancy Postero, Anthropology

The Performance of Female Queer Identity and the Claiming of Social Space in Cochabamba, Bolivia

This investigation explores the performance of lesbian and bisexual identity and the movement to claim space for social recognition in Cochabamba, Bolivia. Queer women in Bolivia face alienation and exclusion, as they exist in a country where patriarchal and heteronormative structures dominate social hierarchies. By examining this context, I clarify that the subtle ways in which lesbian and bisexual women make their identities visible are in fact acts of resistance against dominant social norms. I argue that visual representation of lesbian and bisexual women through non-normative attire and the clandestine yet supportive spaces in which gatherings take place allow these women to define their identity and validate their existence. Further, I argue that lesbian and bisexual women, who are commonly excluded and marginalized from public discourse, designate space to make visible their identities in order to create an alternative sphere in which their concerns can be recognized and discussed. This collective recognition, however, is not all-inclusive; I uncover how female queer representation and social space in Cochabamba abide by a structure of norms that in turn exclude certain identities.

Dasgupta, Subhasis, UC San Diego

Department/Major: San Diego Supercomputer Center
Mentored by Dr. Amarnath Gupta, San Diego Supercomputer Center

Analyzing Community Dynamics In Social Media

Social media data can be viewed as “mixed model” data that reflect interesting community behavior. We take a graph-centric view of microblogs and develop a user-defined specification of a community on these social graphs. We demonstrate the temporal behavior of communities can be captured by a set of graph metrics. We describe a system which transforms a Twitter stream into a node and edge-colored graph, computes a user-defined community structure over a tumbling window, and maintains this structure to answer continuous queries. The system is currently being applied for social science research in studying political behavior and extracting events.
Davis, Josh, UC San Diego

Department/Major: Cognitive Science
Mentored by Professor Benjamin Bergen, Cognitive Science
Professor Stephanie Jed, Literature

*Emotion recognition during language comprehension*

[Abstract redacted owing to proprietary information.]

De Moraes, Ingrid, Palomar College

Department/Major: Theatre
Mentored by Professor Robert Castro, Theatre

*Collaborative Visual and Performing Arts Original Performance Response to the SDMOCa exhibit: “Papel Chicano Dos: Works on Paper from the Collection of Cheech Marin”*

This research revolves around what Chicano Theatre collaboration process response is, how it responds to its environment, with a special focus on contemporary urban culture, practicing radical inclusive theatre, and activation of a space into a performance stage. I argue that the activist aesthetics, founded by Teatro Campesino, have been transcending its functions, evolving into a new theatrical organism. This paper analyzes books, articles, and it includes a study with all artists who are part of the exhibition, as well as interviews with various scholars. I also look and consider ways to meaningfully connect and open a discussion about what contemporary Chicano Theatre is. I try to hypothetically define it as a theatre without borders, a worldly ensemble represented by all nations and all possibilities within the wide spectrum of culture. To conclude, I would like to open a fair dialogue on practicing radical inclusion in all performances and/with intercultural ensembles meanings.

Delgado Rodriguez, Estela, Southwestern College

Department/Major: Public Health
Mentored by Dr. Elizabeth Reed, Medicine

*Analysis for Improvement in Recruitment of Female Sex Workers for a Social and Economic Empowerment Program in Tijuana, Mexico*

[Abstract redacted owing to proprietary information.]
**ABSTRACTS**

**Poster Session A**

**Donnelly, Kristin**, UC San Diego

**Department/Major:** Psychology

**Mentored by Dr. Ed Vul**, Psychology

**Dr. Jonathan Cohen**, Philosophy

*Toward a computational understanding of information processing during stereotyping.*

Stereotypes both reflect and perpetuate numerous social, political, and economic disparities, yet little is known about the cognitive processes that underlie stereotyped reasoning. A quantifiable understanding of stereotype formation may better inform the social reasoning contributing to these disparities. The present project aims to quantitatively measure how human predictions of socially critical, but unobservable, traits (like income, education, criminality, etc.) are influenced by observable, correlated attributes (like gender, occupation, race, religion, etc.). As a first step, we recruited participants from Amazon Mechanical Turk (N = 515) to make judgments about the relative income levels of various hypothetical agents, all of which were randomly varied in terms of ethnicity, gender, occupation, and location. This approach allowed us to establish a set of human predictions that may be contrasted against those of a Bayesian ideal observer, which we will develop using objective measurements from national databases. Ultimately, we aim to ascertain exactly how human judgments of disadvantaged minorities deviate from reality. This will allow us to determine whether any distortions are due to reliance on incorrect conditional probabilities, poor calibration of specific probabilities, or overweighting of socially sensitive attributes.

**Poster Session B**

**Drotman, Dylan**, UC San Diego

**Department/Major:** Mechanical and Aerospace Engineering/Robotics

**Mentored by Professor Michael Tolley**, Mechanical and Aerospace Engineering

**Professor Andrea Chiba**, Cognitive Science and Neuroscience

**Deborah Forster**, Qualcomm Institute

*Towards Soft Pneumatic Fingers with Tactile Sensing Skins for Human-Robot Interaction*

We present soft robotic hands composed of silicone pneumatic actuator (SPA) modules that serve as fingers. First, we investigate how the design of the actuator impacts performance characteristics and motion. Then, we attach sensory skins on each actuator to measure bends, twists, and contact. Multiple fingers are combined to form a soft robotic hand. While there exist dexterous hands in Human-Robot Interaction (HRI) robots, our design advances HRI by enabling safer interaction with humans — particularly in handling objects. To this end, we will embed our hand design on RUBI (Robot Using Bayesian Inference), which studies the behavior of children in a classroom setting via interactive games. In the future, our studies can also be extended to learn how social touch influences a child's psychological development. Our results are a step towards soft robot fingers and hands capable of a complex range of motions and proprioceptive, morphological computation, which will help robots better understand the environments they are interacting with and increase physical safety in HRI.
**Dudeck, Nicholas**, UC San Diego, Eleanor Roosevelt College

**Department/Major:** Cognitive Science, Psychology  
**Mentored by Dr. Fiza Singh,** Psychiatry  
**Professor Jaime Pineda,** Cognitive Science

**Gamma Synchrony Training in Schizophrenia**

Schizophrenia (SCZ) is a chronic debilitating mental disorder that affects 2.4 million Americans and leads to considerable individual and societal costs. Cognitive deficits (CD) manifest early in the course of the illness, are associated with more severe illness, and are the best predictor of functional outcomes. Despite these facts, CD have been difficult to treat using available treatments. Recent studies suggest CD in patients with SCZ may arise from abnormal synchronization of distributed neural networks that are critical for higher cognitive functions. In this context, abnormal neural synchrony in the gamma frequency (GBR) is associated with the severity of CD. Improving GBR should improve cognitive symptoms in SCZ. The current study proposes using visually guided neurofeedback (NFB) to enhance gamma band responses compared to a sham control condition in SCZ patients. NFB is a low-cost, easily administered and well-tolerated treatment that “feeds back” brain function as a visual metaphor so that the subject can modify it. The methodology has been piloted successfully in healthy populations, where gamma NFB improved cognitive function. Therefore, we hypothesize that a NFB program targeting gamma responses will improve cognitive function in SCZ patients.

**Edmonds, Emily,** UC San Diego

**Department/Major:** Psychiatry  
**Mentored by Dr. Mark Bondi,** Psychiatry

**Cerebral Blood Flow in Empirically-Derived Subtypes of Mild Cognitive Impairment**

Reductions in regional cerebral blood flow (CBF) have been found in individuals who are at risk for dementia, including those with mild cognitive impairment (MCI). We examined CBF in subtypes of MCI identified using cluster-analytic techniques. Participants were 69 individuals diagnosed with MCI and 23 cognitively normal individuals from the Alzheimer’s Disease Neuroimaging Initiative. MCI was classified into specific cognitive subtypes: "amnestic MCI" (n=10), "dysnomic MCI" (n=7), "dysexecutive/mixed MCI" (n=10), and "false-positive" MCI diagnoses with intact cognition (n=42). CBF was measured via arterial spin labeling MRI. ANOVA revealed significant group differences in CBF within medial temporal and lateral temporal regions (p<.05). Amnestic MCI was associated with lower CBF values relative to normal controls (NCs), while dysexecutive/mixed MCI showed lower CBF compared to NCs and other MCI subtypes. Dysnomic MCI and "false-positive" subtypes had CBF values that largely did not differ from NCs. CBF in temporal lobe regions was reduced in MCI participants with primary memory impairment, and further reduced in those with impairments across several cognitive domains. Results suggest that vascular factors may play less of a role in the pathogenesis of MCI characterized by primary naming impairment.
**Edwards, Clinton**, UC San Diego

**Department/Major:** Scripps Institution of Oceanography, Marine Biology Research Division

**Mentored by Dr. Stuart Sandin,** Marine Biology Research Division  
**Dr. Ryan Kastner,** Computer Science and Engineering  
**Dr. Falko Kuester,** DCSE/Calit2

*Platform for Ocean Imaging: Building capacity for visualizing, analyzing and communicating underwater ecological data.*

Visually documenting seafloor habitats has the potential to answer challenging questions in several maritime disciplines including: ecology, geology, and archaeology. Unfortunately, most imaging efforts are limited to single images representing small spatial scales (~1m²). While recent technological advancements allow us to create and analyze large plots (100’s of square meters) of seafloor, computational and ecological post-processing steps are intensive and further developments are needed for practical implementations of this work. We have begun to develop and test platforms to address the intensive collection, storage and processing steps required to facilitate rapid extraction of key metrics from 3D digital maps of the seafloor. These maps will enable new insights in community ecology by increasing the scale of observation by over an order of magnitude larger than what is currently available. Refinement of these tools also provides an unprecedented opportunity for testing and refinement of the technological components of this work. Further, when visualized in the 3D environment, our imagery will provide exciting educational and outreach experiences. Together this work will allow us to create and make available a platform that has the potential to revolutionize the state of underwater imaging science.

**Elliott Smith, Rosemary**, UC San Diego, Revelle College

**Department/Major:** Mathematics  
**Mentored by Dr. David Meyer,** Mathematics

*Music from a Map: The relation of sound characteristics to geography*

Music is a universal language, one present in all human societies. But the traditional ‘dialects’ of music vary from culture to culture; this great diversity in historical music has often been attributed to societal and linguistic differences. While it is likely that these differences strongly influenced the development of sonic patterns, we propose that music has also been shaped by its physical environment. We hypothesize that there are strong links between the environmental and geographical attributes of the location of musical origin and major sonic characteristics. Specifically, we investigate features that describe the average fundamental frequency, contour, dynamic range, timbre, and rhythm of traditional musical pieces from around the globe to create a musical fingerprint. Using these metrics, we employ various statistical techniques to analyze the data and cluster it into phylosonic trees (phylogenetic analysis used on audio features) with an attached geographical stamp (longitude, latitude, average precipitation, average temperature, temperature range, etc).
Elliott Smith, Rosemary, UC San Diego, Revelle College

Department/Major: Mathematics, Anthropology
Mentored by Dr. Thomas Levy, Anthropology

At-Risk Cultural Heritage and Archaeological Data Management – the ArchaeoSTOR Solution

Cultural heritage sites all around the world are being threatened; it is vital that these sites, their history, and their artifacts be preserved for future generations. To this end, we are developing a web-based database called ArchaeoSTOR. ArchaeoSTOR will fill a vital niche in the archaeological community by allowing researchers to safely store artifact metadata, location data, photographs, and even point cloud data. As part of ArchaeoSTOR’s development, we travelled to Greece during the summer of 2016 with Dr. Tom Levy to participate in the excavation of a looted Mycenaean tomb at the site of Kastouli, near Delphi. Surprisingly, undisturbed burial deposit was found during the excavation. As such, the Kastouli excavations proved to be a perfect field test for the applications of ArchaeoSTOR that our team developed. Through the course of the excavation we were able to dramatically improve the functionality of the database and preserve vast amounts of precious data associated with the cultural heritage site. This helped us make ArchaeoSTOR ready to use on a larger scale across several UCs as part of a UC Office of the President Catalyst grant.

Fong, Jodi, UC San Diego, Eleanor Roosevelt College

Department/Major: International Studies, Human Development Program
Mentored by Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Eco-literacy in action at the UCSD EarthLab Community Station

We will present an 8 minute video that we produced over the course of our nine week Blum Summer Field Internship at the UCSD EarthLab Community Station, an outdoor experimental learning space located in the underserved Encanto neighborhoods in Southeast San Diego. In the video, we showcase the five week D.E.E.P science literacy camp, in which we participated. D.E.E.P. is a summer program that engages K-5 graders in hands-on science learning.

Gabriel, Paolo, UC San Diego

Department/Major: Electrical and Computer Engineering
Mentored by Dr. Vikash Gilja, Electrical and Computer Engineering

Exploring Neural Correlates to Natural Human Behavior for Brain Machine Interface Applications

The goal of the proposed research project is to study neural recordings for correlates to natural human behavior. This work will be used to inform decoders for brain-machine interface (BMI) applications. BMIs are human-computer interfaces that work by converting neural activity into interpretable states. BMIs have received much attention
in recent years, not only because they aid our understanding of the brain, but also because of their great potential to aid those with neurological disorders, like epilepsy. A specific focus of our research is to develop novel signal processing and machine learning tools to design a context-driven neural decoder. We have the unique opportunity to focus this work on human activity recorded over several days in the clinic, capturing a dynamic environment with many different kinds of behaviors throughout the day. Analyzing these massive data sets will inform new neural decoding algorithms, which can be applied to: developing control signals for individuals with motor impairment, localizing functional brain mapping, and better understanding the nature of specific neural disorders, like epilepsy.

Garcia, Magnolia, UC San Diego, Eleanor Roosevelt College

**Department/Major:** Public Health

**Mentored by Dr. Fonna Forman,** Department of Political Science

**Dr. Teddy Cruz,** The Visual Arts Department

**Blum Summer Field Internship 2016: Urban Gardens and Community Resilience at the UCSD Cross-Border Community Station: Tijuana**

Our project for the summer was to design a community garden in an informal settlement in the Laureles Canyon in Tijuana. For our project we first did assessments of the gardens in the field site as well as the open lots. We also conducted formal interviews as well as informal ones which helped shed light on the lack of access the community had to fresh fruits and vegetables. Once the interview process was done we convened a community-based garden committee comprised of active community members who had knowledge about gardening. The garden committee selected potential sites for the garden and will continue to play an active role in building and maintaining the garden.

Garcia Hernandez, Yessica, UC San Diego

**Department/Major:** Ethnic Studies

**Mentored by Dr. Jillian Hernandez,** Ethnic Studies

**Dr. Fatima El-Tayeb,** Literature

**Rebel Quinciañera Collective: Establishing a Feminist Girl Space**

This presentation focuses on the process of establishing the Rebel Quinciañera Collective, an all-girls outreach program in San Diego that focuses on girl empowerment using art, music, and film. We named the project Rebel Quinciañera Collective in order to represent the vision of teenage girls as agents of social transformation, producers of knowledge, and creative genius (Brown, 2013). We resignify the image of the feminized teenage girl of coming of age, a subject often assumed to hold no power or knowledge, with formidable abilities. In reframing, rather than rejecting, the image of the Quinciañera (Sweet 15), this project creates space for girls to both embrace and critique the meanings of culture, gender, race, and ethnicity they navigate in their lives.
Gluzman, Yelena, UC San Diego

Department/Major: Communications, Science Studies Program / Interdisciplinary Cognitive Science Program

Mentored by Dr. Morana Alac, Communication
Dr. Jaime Pineda, Cognitive Science
Dr. Julie Burelle, Theater and Dance

An Interdisciplinary Analysis of Interaction Through Embodied Means

This paper reports on an ongoing research project in which we attempt an interdisciplinary approach to studying embodied and encultured cognitive phenomena, combining methods from theater (performative enactments), with social science (multimodal semiotic analysis), with methods from cognitive neuroscience (behavioral coding) to develop a novel paradigm for the analysis of social interaction. Such an approach has the potential to both examine neural correlates of social behavior, while also considering the social to be not fixed, but rather emerging through embodied interaction.

Concretely, the project investigates two-person interactions in which either member spontaneously takes on the role of a fictional character in order to coordinate with the other. These interactions, situated within the context of an interactive performance installation, are instances of dynamic social interaction that are then analyzed in the lab. In the preliminary findings of the study, we report on embodied strategies used both by interacting pairs to coordinate with each other, and also by the researchers themselves as they attempted to code and analyze these interactions.

Gonzalez, Itzel, UC San Diego, Muir College

Department/Major: Structural Engineering

Mentored by Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Mobility and Security in Sustainable Urban Transport at the UCSD Cross-Border Community Station: Tijuana

This project explores the use of affordable and locally available materials for the benefit of under-resourced communities. Using a prototype originally designed as a housing structure, our team focused on building a bus stop in marginalized colonia in Tijuana. The bus stop will promote and facilitate the use of public transportation by providing a safe and comfortable space for people to wait for and board local buses.

Green, Kaeli, UC San Diego, Eleanor Roosevelt College

Department/Major: International Studies, Education Studies

Mentored by Dr. Fonna Forman, Political Science
Dr. Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Community Engagement: Principles and practices

Having local knowledge of a community is essential for engaging in mutually beneficial and reciprocal university-community partnerships. The UCSD EPIC project, funded by
Grzechnik, Agnieszka, UC San Diego

Department/Major: Biomedical Sciences, Pharmacology
Mentored by Professor Alexandra Newton, Pharmacology
Professor Lorraine Pillus, Biology

**Phosphatase Activity of the Fungal Adenylate Cyclase Cyr1, the Yeast Homologue of PHLPP**

PH domain Leucine Rich Repeat Protein Phosphatases (PHLPP) suppress survival signaling by at least two mechanisms: dephosphorylating AGC kinases, such as Akt, and regulating the epigenome by suppressing histone phosphorylation. Interestingly, the only adenylate cyclase encoded in the Saccharomyces cerevisiae genome, CYR1, has a previously uncharacterized amino-terminal segment homologous to PHLPP. Here we use biochemical, molecular, and genetic techniques to characterize the PHLPP-associated phosphatase activity in yeast. Specifically, we show that overexpression of Cyr1 results in reduced phosphorylation of substrates such as Ser10 on Histone H3. The segment of Cyr1 that is homologous to PHLPP comprises a Leucine Rich Repeat (LRR) segment and a Serine/Threonine PP2C phosphatase domain, but lacks the PH domain and C-terminal PDZ ligand of mammalian PHLPP. Thus, the ability of Cyr1 to suppress histone phosphorylation supports studies with mammalian PHLPP showing that the LRR segment is critical for its epigenetic function. Our study establishes that Cyr1 contains a previously undescribed phosphatase function, and suggests a functional link between cAMP-dependent signaling and PHLPP.

Guerrero, Nimsi, UC Riverside

Department/Major: Psychology
Mentored by Dr. Timothy Brady, Psychology

**Individual Differences in Visual Working Memory and Long Term Memory Precision**

In working memory, items are kept in mind actively for short amounts of time whereas in long term memory, items are stored and later retrieved after longer periods of time. Previous studies have found that on average, how precisely people can remember information is similar between working memory and long term memory. Could this mean that these two memory systems share the same visual representations? In other words, when we measure an individual’s working memory precision, can we predict their long term memory precision? To test this, we will ask participants to remember the color of objects and report their colors after a delay in order to estimate the precision of visual information in working memory as well as long term memory. If working memory and long term memory are similar, perhaps because they share the same visual representations, then precision for each should be highly correlated, with the same individuals having high precision in both or low precision in both.
Gupta, Animesh, UC San Diego

Department/Major: Physics
Mentored by Professor Justin Meyer, Biology
Professor Terence Hwa, Physics

Viral-host interactome evolution to compensate for a host gene deletion

Predicting disease emergence, like outbreaks of viruses like Zika, or Ebola, is one of the biggest challenges of modern times because they are caused by complex evolutionary processes that are difficult to study. To begin to tackle this problem, we performed experiments that reduced the complexity into simpler components. Rather than studying viral evolution to exploit a completely new host, we evolved one to exploit a slightly modified version of its original host. We studied the virus bacteriophage λ, challenging to its host bacterium Escherichia coli with the gene dnaJ removed. λ uses DnaJ to replicate its DNA, and is unable to infect E. coli without it. λ overcame this challenge through two mutations that allowed it to substitute another host gene, dnaK, for dnaJ. This work provides an example of how a virus can adapt to infect a host genotype it was initially unable to. My goal is to accumulate more examples of similar viral adaptations to begin to build a mathematical model of viral host-range expansion. Eventually, with enough cases studied, I may be able to predict even complex adaptations such as those required for species shifts.

Harada, Alice, UC San Diego

Department/Major: Marine Biology, Scripps Institution of Oceanography
Mentored by Professor Ronald Burton, Marine Biology Research Division, Scripps Institution of Oceanography
Dr. Anne Murphy, Pharmacology

Mitochondrial basis of thermal tolerance in the intertidal copepod Tigriopus californicus

Populations of conspecifics that are distributed across a wide latitudinal range allow for the study of adaptation to varying environments. Tigriopus californicus is a copepod found in tide pools along the west coast of North America. The relative genetic isolation of different populations, coupled with the range of thermal regimes to which they are exposed, make it an ideal study system for examining the evolution of thermal tolerance. Previous studies have shown that the southernmost populations of T. californicus have the highest survivorship following acute heat stress. In this study, we examine the physiological basis of heat tolerance. We hypothesize that adaptation among populations leads to differences in mitochondrial thermal performance and confers enhanced tolerance to southern populations. Using a range of mitochondrial performance assays, we found differences in mitochondrial performance between northern and southern populations as well as evidence suggesting mitochondria are more thermally sensitive than whole animals. These results may indicate that mitochondria have an important role in setting the range limits of T. californicus populations, leading to adaptation to the thermal environment.
Harman, Taylor, UC San Diego, Revelle College

**Department/Major:** Molecular biology, Archaeology

**Mentored by Dr. Tom Levy, Anthropology**

**At-Risk Cultural Heritage and Archaeological Data Management — the ArchaeoSTOR Solution**

Cultural heritage sites all around the world are being threatened; it is vital that these sites, their history, and their artifacts be preserved for future generations. To this end, we are developing a web-based database called ArchaeoSTOR. ArchaeoSTOR will fill a vital niche in the archaeological community by allowing researchers to safely store artifact metadata, location data, photographs, and even point cloud data. As part of ArchaeoSTOR's development, we travelled to Greece during the summer of 2016 with Dr. Tom Levy to participate in the excavation of a looted Mycenaean tomb at the site of Kastrouli, near Delphi. Surprisingly, undisturbed burial deposit was found during the excavation. As such, the Kastrouli excavations proved to be a perfect field test for the applications of ArchaeoSTOR that our team developed. Through the course of the excavation we were able to dramatically improve the functionality of the database and preserve vast amounts of precious data associated with the cultural heritage site. This helped us make ArchaeoSTOR ready to use on a larger scale across several UCs as part of a UC Office of the President Catalyst grant.

Hartblay, Cassandra, UC San Diego

**Department/Major:** Communication

**Mentored by Dr. Elana Zilberg, Communication Assistant Professor Deborah Stein, Theatre and Dance**

**Disability and Documentary Theater: an Ethnographic Play about Disability in Russia**

The play, "I WAS NEVER ALONE" shares the life experiences of six adults with disabilities living in contemporary Russia, and is based on over 12 months of ethnographic fieldwork. For US audiences, the play sheds light on assumptions about what daily life is like in contemporary Russia, and asks nondisabled audiences to contend with discrimination against people with disabilities in their own lives. For Russian audiences, it represents a key emergence of disability theater, in a culture and society where people with disabilities are still rarely depicted outside of the role of charity-seeking needy poor. And for all audiences, it resonates with universal themes of love, relationships, coming of age, and a sense of belonging. This work contributes to interdisciplinary scholarly conversations about disability studies and ethnographic design, and intervenes in theater practices that rarely cast actors with disabilities in main roles, and against disability type. The play was recently staged at UC San Diego’s La Jolla Playhouse (Oct 7 & 8) following a two week workshop featuring professional actors with a range of disabilities.
Hasler, Holly, UC San Diego

Department/Major: SDSU/UCSD Joint Doctoral Program in Clinical Psychology, Center for Human Development
Mentored by Dr. Natacha Akshoomoff, Psychiatry (School of Medicine)
Dr. Joan Stiles, Cognitive Science

**Advanced Techniques for Imaging White Matter in Children Born Very Preterm**

When infants are born very preterm (<33 weeks gestational age, VPT), white matter regions are especially vulnerable to damage. While advances in neonatal care have made severe brain pathology relatively uncommon, subtler changes may occur. Restriction Spectrum Imaging (RSI) is a technique that may allow for better quantification of white matter integrity in magnetic resonance imaging. Unlike traditional Diffusion Weighted Imaging (DWI), RSI does not rely on detection of specific directionality of water motion. RSI uniquely uses multiple diffusion weights within one DWI scan sequence, and allows for the separation of hindered diffusion (around tracts) and restricted diffusion (along tracts) for better estimation of white matter tract orientation. We have collected RSI scans from 32 VPT and 31 FT children. This study is still ongoing and preliminary results will be discussed. We hypothesized that RSI would be more sensitive to the subtle white matter damage characteristics of otherwise healthy children born very preterm than other methods previously used to study brain development in these children. We also predicted that these measures white matter integrity will be correlated with higher order neuropsychological functions in these children, particularly executive function skills.

Hillman, Christian, UC San Diego, Eleanor Roosevelt College

Department/Major: History
Mentored by Dr. Hasan Kayali, History

**Turkish Guestworkers and Syrian Refugees: A Comparative Study**

Since the 1960’s, over 1.8 million Turkish guest-workers have immigrated into Germany. While the recruitment of these migrant workers was intended as a temporary measure to ward off the anticipated labour shortage during the “economic miracle” of the post-war years, few Turks ended up returning home. As the duration of their residence in Germany increased, so did their calls for formal integration into German society. The struggle for citizenship and political rights has been a major source of tension between the Turks and their “host country”, and was only recently resolved. The current crisis in Syria, however, has displaced millions, and this year Germany anticipates allowing over 800,000 refugees into the country. Despite a xenophobic backlash and wide-spread concerns over the potential economic strain, German government officials have expressed confidence that they will be able to provide for the refugees. Indeed, some preliminary efforts are already being made to integrate them. I propose to research the connection between Germany’s historical experience with the Turkish gastarbeiter and its current policies regarding the acceptance and integration of Syrian refugees.
Huang, Shuwan, UC San Diego

**Department/Major:** Chemistry & Biochemistry  
**Mentored by Professor Michael Tauber, Chemistry & Biochemistry**  
**Professor Shyni Varghese, Bioengineering**

**Use of Raman Spectroscopy to Study Tissue Fibrosis**

Fibrosis is a disease characterized by the accumulation of extracellular matrix (ECM) proteins in tissue. Fibrotic tissue can accumulate in the human body and lead to organ failure. We are using Raman spectroscopy to probe fibrotic tissue, specifically the ECM proteins collagen and elastin. Our samples are the epidermal layer of skin harvested from healthy mice (wild type), as well as mice infected with fibrosis. We expect that differences in the Raman spectra will reflect structural changes in the ECM caused by fibrosis. Further insights will be gained by analyzing polarized Raman spectra, as well as the dependence on sample orientation.

Huitron, Estefania, UC San Diego, Warren College

**Department/Major:** Environmental Engineering/ MAE Department  
**Mentored by Dr. Fonna Forman, UCSD Center on Global Justice**  
**Dr. Teddy Cruz, UCSD Center on Global Justice**

**Blum Summer Field Internship 2016: Designing Green Infrastructure for Ecological Protection, Public Space, and Recreation at the UCSD Cross-Border Community Station: Tijuana**

This summer, we focused on the design of a recreational and ecological center for an informal settlement community in the Los Laureles canyon in Tijuana. We considered how a bus stop would enable the park to become a transit point, creating an active safe space and safe path for community members. Additionally, we explored sustainability aspects of the park. We considered the use of bioswales and native species to control erosion and create more stability in the region. Finally, we designed infrastructural interventions for the park such as shade structures, seating, an amphitheater, and a skate-park that doubles as water management facility. More than anything, our goal was to make Parque Fronterizo an enjoyable, sustainable, and social hub that is actively used and maintained.

Hung, Keng-Lou, UC San Diego

**Department/Major:** Division of Biological Sciences  
**Mentored by Professor David Holway, Division of Biological Sciences**  
**Professor Alon Orlitsky, Electrical and Computer Engineering**

**Elucidating patterns of biodiversity using information theory: Getting the most out of finite ecological data**

Biodiversity research often demands levels of sampling that are rarely achieved by ecological studies due to resource constraints. Thus, it is beneficial to extrapolate patterns of biodiversity from finite samples using algorithms known as diversity estimators. However, many ecological datasets have small sample sizes and highly skewed sampling distributions, making them unsuitable for existing diversity
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estimators. In this study, we survey state-of-the-art diversity estimators and compare them against newly designed Smoothed Good-Toulmin (SGT) estimators using a finely-resolved database of over 11,000 native bees collected in San Diego’s scrub ecosystems. We found that SGT estimators consistently outperformed existing estimators, yielding new insight into the patterns of bee diversity loss in San Diego and supporting the use of these new estimators for real-life ecological data. Research is ongoing to explore why different variations of SGT estimators function better for different sampling distributions, with the aim of constructing an improved diversity estimator that achieves maximum accuracy by basing calculations on the underlying sampling distribution of the data.

Inman, Bryce, UC San Diego

Department/Major: Scripps Institution of Oceanography
Mentored by Dr. Peter Franks, Scripps Institution of Oceanography
Dr. David Saintillan, Mechanical and Aerospace Engineering

Tiny swimmers structure the ocean microenvironment by deforming ambient chemical gradients

The ocean biosphere contributes half the primary production on this planet. Unlike in the terrestrial biosphere, the oceanic primary producers are small, dilute, turn over quickly, and are embedded in a moving fluid. The fluid environment, in particular, presents significant challenges to planktonic growth, feeding, sex, and infection: these rates are often constrained by microscale (<1 mm) chemical gradients and molecular diffusion. However, our understanding of the microscale dynamics of this enormous and important part of our planet is often based on a static view of the organisms and their chemical environment. In contrast, our work demonstrates that small swimming or sinking organisms will stretch and intensify chemical gradients around them up to 1000 times. Restructuring of the microenvironment by swimming plankton increases the diffusion of ecologically relevant chemicals, and enhances encounter rates of nearby organisms, resulting in significant local increases in the rates of biological interactions.

Jani, Vivek, UC San Diego, Muir College

Department/Major: Bioengineering
Mentored by Professor Pedro Cabrales, Bioengineering

Humanizing Science and Engineering to Reduce Health Care Delivery Inequalities

We have developed an experiential learning program that integrates modern non-invasive medical sensors with basic physiological principles, and modern medical practices in order to introduce the importance of understanding our own human physiology and its relationship to enriching human life and society. This experimental, multi-disciplinary, experiential learning program introduces physiology to undergraduate students in science, technology, engineering, and math (STEM). The program allows students to learn physiology by applying science and engineering within the context of their bodily functions. This personalized program to learn physiology utilizes an engineering approach via dynamic models and modern sensors. Additionally, the experiential learning program integrates the social problems that
influence modern healthcare, giving students a broader approach to basic physiological principles that affect health, life at extreme environments, and how modern medicine influences society. This program includes an outreach component targeted to high school students of the greater San Diego area, with the objective of increasing interest in physiology and STEM fields. Understanding physiological principles also allows students to learn the importance of both healthy living and healthcare, and their implications on both human life and society.

Johnson, Andrew, UC San Diego, Eleanor Roosevelt College

**Department/Major:** Anthropology

**Mentored by:** Dr. Tom Levy, Anthropology  
Dr. Steve Savage, Anthropology

**The First Phase of the ASOR Cultural Heritage Initiative-TerraWatchers Collaborative**

The Middle East is home to over 40,000 different archaeological sites dating from the Neolithic up until modern times. With such a major concentration of archaeological sites the Middle East provides archaeologists and historians with thousands of years of history through its material culture and written texts. Today the countries of the Middle East are at war, and Islam extremist groups, such as ISIS, along with other militants, civilians, and natural causes are putting these historic sites at risk of destruction. Together with the American School of Oriental Research (ASOR) and UC San Diego a research project to monitor at risk sites in the Holy Land by using satellite imagery has begun here at UC San Diego. 12,000 at risk sites have been provided to ASOR and uploaded into a web-based application called Terrawatchers. Terrawatchers runs satellite imagery through Google Earth and Digital Globe to monitor these at risk cultural heritage sites provided by ASOR. Students were used as a method of crowd sourcing to sift through the massive amount of data to make observations on these sites. In doing so thousands of observations were made.

Khamishon, Rebecca, UC San Diego, Eleanor Roosevelt College

**Department/Major:** Human Biology

**Mentored by:** Dr. Seema Aceves, Division of Rheumatology, Allergy & Immunology  
Dr. Kim Barrett, Division of Gastroenterology

**The Pathogenesis of Th2 Mediated Remodeling in Eosinophilic Esophagitis**

Eosinophilic esophagitis (EoE) is an allergic disease involving food antigen induced eosinophilic enrichment of the esophageal mucosa. EoE is increasing in prevalence and its chronic nature creates a significant healthcare burden. Many disease mechanisms remain unclear, however increases in Th2 and pro-fibrotic cytokines IL-13, IL-9, and TGF-β1 can alter esophageal epithelial and smooth muscle cell function. To further uncover the mechanisms of EoE and elucidate targeted therapies, we sought to understand the effects of IL-9 on epithelial barrier function using esophageal biopsy specimens, primary human esophageal epithelial cells, and a novel 3D esophageal epithelial model system (organoids). Our data suggests an upregulation of IL-9 and its receptor in EoE and supports its ability to alter epithelial barrier function and protein expression. Through these mechanisms we are able to further understand the burdensome disease, and provide the landscape for more focused treatment modalities.
Kim, Dokyoung, UC San Diego

**Department/Major:** Department of Chemistry and Biochemistry

**Mentored by Professor Michael Sailor,** Department of Chemistry and Biochemistry  
**Professor Mark Tuszynski,** Department of Neuroscience

*Porous Silicon Nanoformulation for Alzheimer's Disease Treatment*

[Abstract redacted owing to proprietary information.]

Knutzen, Jonathan, UC San Diego

**Department/Major:** Philosophy

**Mentored by Professor Dana Nelkin,** Philosophy  
**Professor Nicholas Christenfeld,** Psychology  
**Professor Samuel Rickless,** Philosophy

*A Moral Imagination Limited by Bayesian Intuition*

Moral reasoning is generally investigated through scenarios such as trolley problems, where outcomes are stipulated as certain to occur. We demonstrate that participants do not accept stated certainty, and that their moral judgments reflect the probability estimates they substitute for explicit stipulations. Bayesian reasoning limits judgment in moral dilemma tasks.

Koester, Irina, UC San Diego

**Department/Major:** Scripps Institution of Oceanography, Skaggs School of Pharmacy and Pharmaceutical Sciences

**Mentored by Professor Lihini Aluwihare,** Scripps Institution of Oceanography  
**Professor Pieter Dorrestein,** Skaggs School of Pharmacy and Pharmaceutical Sciences  
**Professor Rob Knight,** Pediatrics and Computer Science

*A metabolomic and transcriptomic profile of the Pseudo-nitzschia microbiome and its relation to the production of the algal toxin domoic acid*

In summer 2015, an extensive and unusually long bloom of Pseudo-nitzschia - a toxin-producing marine algae - was observed along the US west coast causing marine mammal mortality and fishery closures. While Pseudo-nitzschia is common in CA waters, the conditions that drive toxic blooms are still unknown. Recently, painstaking culturing approaches have shown that specific bacteria promote the growth of some Pseudo-nitzschia strains through chemical cross-talk. While elegant in their design, such studies do not easily scale-up to test how integral such partnerships are to the ecology of phytoplankton blooms in the environment. We are developing high throughput analytical methods in a laboratory setting before embarking on field studies to understand the ecological relevance of findings. Therefore, we isolated and grew three different species of Pseudo-nitzschia. We will sequence the metagenomes of each species and its associated microbiomes to identify bacterial communities and potential biosynthesis genes. To examine the metabolome of the Pseudo-nitzschia-microbiome association, metabolites were extracted and analyzed via high resolution mass spectrometry. This complex data will be analyzed using informatics tools to uncover dynamics of known communication molecules, and then identify new molecules showing similar patterns of variability.
Kuzum, Duygu (presenting on behalf of Hongming Lyu), UC San Diego

**Department/Major:** Electrical and Computer Engineering

**Mentored by Professor Duygu Kuzum,** Electrical and Computer Engineering

**Professor Anna Devor,** Radiology

**Transparent Graphene Electrodes for Optical Imaging and Optogenetics**

Emerging light and optics-based methods, such as optogenetics and multiphoton microscopy, have revolutionized neuroscience research in the past decade. Optogenetics involves the use of light to control neurons that have been genetically modified to express light-sensitive ion channels, and to measure the effects of these manipulations in real time. Multiphoton microscopy enable in vivo imaging at subcellular resolution deep in the tissue. Integration of multiphoton microscopy and optogenetics with electrophysiology is crucial to probe neural circuits with high spatiotemporal resolution. In this work, we demonstrate transparent neural electrodes made of graphene enabling artifact-free integration of electrophysiology with optical imaging or optogenetics.

Lavadia, Loren, Grossmont College

**Department/Major:** Summer Training Academy for Research Success (STARS), Cognitive and Behavioral Neuroscience

**Mentored by Dr. Jared Young,** Psychiatry

**Dr. Zackary Cope,** Psychiatry

**Evaluating the Role of Muscarinic Acetylcholine Receptors in the Mechanism of Depression in Bipolar Disorder**

Numerous factors can induce depressive or manic symptoms in bipolar disorder (BD), e.g., increasing acetylcholine levels can induce depression and heightening dopamine levels can induce mania. Understanding what triggers the switch between mood states remains unknown however. This study investigated mechanisms that may induce depression in BD. One trigger that induces depressive episodes is short active (SA) photoperiods (fall/winter) in BD patients. According to Dulcis et al. (2013), exposure to SA photoperiod initiates a cascading effect that may result in elevated acetylcholine levels and depressive-like behaviors in rodents. To examine a putative acetylcholine-depression relationship and its mechanism, we administered the acetylcholinesterase inhibitor physostigmine to elevate acetylcholine in mice. We then tested whether the muscarinic receptor antagonist scopolamine could block physostigmine-induced increased in immobility (depressive-like behavior) in the forced swim test in mice. Scopolamine significantly reduced immobility in the physostigmine- but not saline-pretreated mice. Hence, depressive-like behaviors may arise from acetylcholine-induced effects on muscarinic receptors. Therefore, this mechanism may play an important downstream role in BD switching to a depressed episode. Future studies will include testing remediation of SA-induced depressive-like behavior.
**Lerch, Sarah**, UC San Diego

**Department/Major:** Marine biology, Scripps Institution of Oceanography  
**Mentored by Dr. Mark Hildebrand**, Marine Biology Research Division  
**Dr. Joanna McKittrick**, Mechanical and Aerospace Engineering and Materials Science and Engineering

*Genetic engineering in diatoms gives insight into structural possibilities for tailored bio-materials*

Nanotechnology is important to society through its uses in fields such as clean energy and medicine, but these technologies are limited by the synthetic systems used to create nano-materials. We propose to take advantage of a biological system, diatoms, which synthesize nanoscale silica structures in the form of their cell walls. Diatom cell walls are already being investigated for their nanotechnological applications, but these applications are limited to native structures. Here we aim to remove these limitations by investigating the structural changes which can be generated through genetic engineering in order to create tailored bio-materials for nanotechnology. We targeted eight cell wall structure candidate genes in the diatom Thalassiosira pseudonana and silenced them using antisense RNA. Preliminary screening of transgenic lines identified two common phenotypes: a decrease in surface silica structures and bulges in the cell wall. SEM and TEM characterization focused on transgenic lines of two silenced genes which displayed these phenotypes. This work demonstrates our ability to generate two possibly applicable structural changes using genetic modifications. These findings contribute to our understanding of cell wall formation and ability to create tailored cell walls for future nanotechnological applications.

**Li, Yang**, UC San Diego

**Department/Major:** Biological Sciences  
**Mentored by Professor Nan Hao**, Biological Sciences

*Budding yeast as a potential tool in the developing of cell-based therapeutics*

Probiotics, as defined as live micro-organisms, have been widely used and proved to provide health benefits to the host. However, the mechanisms by which these probiotics act are poorly understood and therefore make the manipulation of probiotics are difficult. While most of the probiotics are bacteria, yeast has been shown as an effective eukaryotic probiotic. As eukaryotic cells, yeast shares very similar signaling pathways with human and mechanisms that regulate those signaling pathways are highly conserved. Those features make yeast a great candidate for the developing of a regulatable probiotic. In this project, we developed a microfluidic device that enables the co-culture of yeast and mammalian cells and going to test their interaction in the microfluidic device. Our preliminary data suggests the potential of budding yeast as a genetically engineered probiotic.
Licea Chávez, Oslin, UC San Diego, Warren College

Department/Major: Spanish Literature, Math & Math Education
Mentored by Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Mobility and Security in Sustainable Urban Transport at the UCSD Cross-Border Community Station: Tijuana

This project explores the use of affordable and locally available materials for the benefit of under-resourced communities. Using a prototype originally designed as a housing structure, our team focused on building a bus stop in marginalized colonia in Tijuana. The bus stop will promote and facilitate the use of public transportation by providing a safe and comfortable space for people to wait for and board local buses.

Limqueco, Elaine (presenting on behalf of Jocelyn Lopez), UC San Diego

Department/Major: Bioengineering
Mentored by Professor Shu Chien, Bioengineering
Dr. Mark Wang, Bioengineering

Biophysical Induction of Smooth Muscle Lineage Differentiation Through microRNAs

The pivotal role of vascular smooth muscle cells (VSMCs) in regulating vascular tone makes them valuable for tissue engineering. Biochemical stimulation of VSMC differentiation from mesenchymal stem cells (MSCs) through TGF-β has been reported, but the roles of biophysical factors resulting from local microenvironments, such as cell geometry and external mechanical forces, in regulating VSMC differentiation remain largely unknown. We aimed to elucidate how cell elongation modulates VSMC differentiation from MSCs, with a focus on post-transcriptional regulation. Soft lithography techniques were used to fabricate microgrooves for cell shape constraint. Our results showed that MSCs cultured with TGF-β on 10?m-wide microgrooves increased the expressions of SMC contractile markers and the cellular traction forces, in comparison with MSCs on flat surface without constraint. Profiling of myogenesis-related microRNAs suggested that miR-27 and miR-145 play important roles in the biomechanical modulation of SMC differentiation. The gain- and loss-of-function experiments showed that miR-145 mediated the increases of SMC differentiation and traction force exertion induced by elongated cell shape, whereas miR-27 had opposite effects. Our findings serve to advance the understanding of mechano-chemical mechanisms of MSC-to-VSMC transition and contribute to the stem cell-based regenerative medicine.
Liu, Mengqian, UC San Diego

**Department/Major:** Materials Science Engineering, Bioengineering  
**Mentored by Dr. Shyny Varghese, Bioengineering**  
**Dr. Michael Tauber, Chemistry and Biochemistry**

**Use of Raman Spectroscopy to Study Tissue Fibrosis**
Fibrosis is a disease characterized by the accumulation of extracellular matrix (ECM) proteins in tissue. Fibrotic tissue can accumulate in the human body and lead to organ failure. We are using Raman spectroscopy to probe fibrotic tissue, specifically the ECM proteins collagen and elastin. Our samples are the epidermal layer of skin harvested from healthy mice (wild type), as well as mice infected with fibrosis. We expect that differences in the Raman spectra will reflect structural changes in the ECM caused by fibrosis. Further insights will be gained by analyzing polarized Raman spectra, as well as the dependence on sample orientation.

Liu, Joanne, UC San Diego

**Department/Major:** Bioinformatics and Systems Biology  
**Mentored by Professor Karsten Zengler, Pediatrics**

**Examining the Role of the Microbiome in Alcoholic Liver Disease through Systems Biology**
Alcohol consumption and alcoholic liver disease (ALD) are major medical burdens in Western countries. ALD is dependent on gut-derived bacterial products. ALD is also associated with changes in the intestinal microbiome with both qualitative (dysbiosis) and quantitative (intestinal bacterial overgrowth) differences. Among the qualitative changes, it has been shown that alcohol suppresses probiotic bacteria, including Lactobacillus. However, we show that ethanol is not directly metabolized by the microbiome. Furthermore, we found that bacteria responsive to dysbiosis and overgrowth do not have genes for ethanol oxidation. To identify which metabolic pathways may be active instead, we assembled 185 bacterial genomes and mapped upregulated acetate assimilation to Bacteriodes. To explore the effects of acetate on the gut microbiome, we fed glyceryl triacetate to mice and observed changes in the microbiome composition.

Locke, Nicholas, UC San Diego, Eleanor Roosevelt College

**Department/Major:** Global Health, Human Biology  
**Mentored by Professor Fonna Forman, Social Studies**  
**Professor Teddy Cruz, Urban Studies**

**Blum Summer Field Internship 2016: Field validation, toward a huertito educativo in San Ysidro**
The BSFI internship focused on evaluating sites where food production is currently taking place in the community of San Ysidro as well as vacant lots where a future garden could potentially be developed. The recent establishment of an Urban Agriculture Incentive Zone in San Diego (outlined in A.B. 551) provides leverage for
community organizations to negotiate with property owners toward developing such a project. To help build a strong case for a community garden in San Ysidro, it is important to foment community capacity through platforms for the exchange of knowledge about growing food plants. Some community members are already knowledgeable about the process of cultivating food, and many express a sincere desire to learn the basics of gardening. As a product of this exchange, interested community members formed a garden committee that will organize efforts towards planning workshops and potentially establishing a community garden. In summer 2016, with this committee, the San Diego Master Gardeners’ Association, and in collaboration with Girl Scout Troop #5912, the 2016 BSFI San Ysidro cohort constructed a series of raised garden beds and an experimental vertical garden at the San Ysidro Community Center.

Lowder, Kaitlyn, UC San Diego

Department/Major: Scripps Institution of Oceanography
Mentored by Dr. Jennifer Taylor, Scripps Institution of Oceanography
Dr. Joanna McKittrick, Mechanical and Aerospace Engineering

Fending off predators and ocean acidification: investigation of the complex exoskeleton of California spiny lobsters

Ocean acidification (OA) caused by anthropogenic carbon emissions is likely to affect the exoskeleton (the hard outer shell) of crustaceans like crabs, shrimps, and lobsters. It is a vital body part for these animals; the exoskeletons of California spiny lobster, our study species, allow them to move, feed and defend themselves. However, it is not yet fully understood how different parts of this exoskeleton are specialized to provide various forms of defense, like stabbing at fish with their antennae and resisting the bites of octopus. Thus far, we have preliminary characterizations of the structure, composition, and mechanical properties of multiple protective regions of the exoskeleton using SEM, energy-dispersive x-ray spectroscopy, and nanoindentation. These regions do display distinct differences. For example, the exocuticle of the antennae base and carapace spine both averaged approximately 30 wt% calcium, while the outermost region of the rostral horns averaged just 2 wt% calcium. Now, we are implementing this knowledge, as well as field carbonate chemistry measurements, into a laboratory experiment to understand how this ecologically- and economically-important species might defend itself in future ocean conditions.

Lozano, Joshua, California State University, Dominguez Hills

Department/Major: Psychology, Sociology
Mentored by Dr. Timothy Rickard, Psychology
MA Steven Pan, Psychology

Test-Enhanced Learning with Cued Recall and Recognition Tests

The testing effect (TE) occurs when being tested on information enhances memory for that information relative to re-study. While many studies have demonstrated TEs, little research has directly compared the benefits of cued recall and recognition tests. Using a two-session, within-subject experimental design, we compared the effectiveness of both
test formats relative to re-study. Session 1 began with subjects studying a list of 54 weakly associated word pairs, followed by three counterbalanced conditions: (1) re-study 18 word pairs (view pairs again), (2) a recognition test for 18 word pairs (determine whether a given word pair was previously studied), and (3) a cued recall test for 18 word pairs (given one word of a pair, type the missing word). After 24 hrs, subjects’ memory for all word pairs was assessed via a cued recall test in Session 2, and the TE for cued recall versus recognition tests was compared using statistical analyses. We discovered that both cued recall and recognition generate a TE relative to re-study, however, the TE for cued recall was substantially larger. Therefore, cued recall is likely to be more effective when tests are used for learning.

Lucas, Alfredo, UC San Diego, Warren College

**Department/Major:** Bioengineering, Electrical and Computer Engineering

**Mentored by Dr. Vikash Gilja,** Electrical and Computer Engineering

**John Hermiz,** Electrical and Computer Engineering

*Estimating Motor Scores with Accelerometers in the Neuro ICU*

Gauging patient motor function is important to understand the current state of the patient and to determine the right time at which certain critical drugs can be administered. Clinicians rely on hourly neuro exams, and often times, anecdotal descriptions from nurses to assess motor function. However, hourly exams can be taxing for nurses and uncomfortable for patients who have to be disturbed regularly and, at times, subjected to noxious stimuli. In addition, nursing neuro exams can be subjective and inconsistent, depending on the training and experience level of the nurse. This might lead to undetected decreases in patient motor score, and therefore an untreated worsening patient condition. We propose a novel approach using triaxial accelerometers and a multivariate statistics based mathematical model to quantify and detect decreases in patient motor score without the need of patient-nurse interactions in an attempt to more accurately detect patient worsening conditions and optimize patient-nurse workflow.

Luthard, Maddy, UC San Diego, Revelle College

**Department/Major:** Earth Science, Ecology

**Mentored by Dr. Keith Pezzoli,** Communication

**Zachary Osborn,** Communication

*Sustainability Science and Use-Inspired Research*

We are working to bring small-scale agriculture into the 21st century while also bringing together the seemingly disparate research niches into a single interdisciplinary force aimed at bringing cheap and healthy food to all people. The projects ranged from involving renewable energies, to food-waste re-use and recovery, co-opting nature in the form of insects and fish, and utilizing new technology to control, automate, and collect data. The University must be rooted with its community and see these advances augmented with an emphasis to allow their propagation throughout communities regardless of socioeconomic standing.
Ly, Kristine, UC San Diego, Marshall College

Department/Major: Human Biology
Mentored by Dr. Karsten Zengler, Pediatrics

The Biological Effects of Alcohol Liver Disease
Excessive alcohol consumption may cause Alcoholic Liver Disease (ALD), a condition leading to fibrosis (protein accumulation), liver cirrhosis (scarring), and ultimately liver failure. ALD is characterized by dysbiosis in the intestines and the translocation of gut-derived bacteria into the liver. Previous studies show that administering ethanol to mice is correlated with a decline in the native population of probiotic bacteria, which function to maintain homeostasis of the intestinal wall. However, our metatranscriptomic data revealed that ethanol oxidation is not possible for many strains within the affected microbiome. Instead, acetate metabolism, a product of ethanol metabolism, is upregulated. We have shown that we can increase blood acetate levels artificially by feeding mice glyceryl triacetate (GTA). This study uses 16S, metagenomic and metatranscriptomic tools to examine the microbiome and progression of ALD in mice on a GTA and ethanol based diet. This characterization of the microbiome will be critical to developing novel methods of intervention and prevention for liver injury among chronic alcoholics.

Ma, Ethan, UC San Diego, Revelle College

Department/Major: Urban Studies and Planning
Mentored by Dr. Fonna Forman, Political Science
Dr. Teddy Cruz, Visual Arts

The Vital Role Played by Promotoras in the Community of San Ysidro
One of the goals of the Blum Summer Field Internship regards learning how to serve as mediators between communities and the university. In our project, which took place in the community of San Ysidro this summer, we found that the promotoras (community health advocates) were vital to our success in the role of mediator. Through this presentation, we will explore the crucial role of promotoras in giving our team insight into the real issues facing residents of San Ysidro.

Ma, Ning, UC San Diego

Department/Major: Electrical and Computer Engineering, Math/Statistics
Mentored by Professor Angela Yu, Cognitive Science
Professor Martin Paulus, Psychiatry

Learning to Stop in Healthy Humans and Stimulant Users: a Bayesian Model-Based Analysis
Inhibitory control, the ability to stop or modify an inappropriate action, is an important component of human cognitive functions. Our previous work showed that statistical learning is central to the planning and execution of inhibitory control: healthy humans learn from experienced outcomes to update their expectations of the need to stop in the classical stop-signal task, and the brain region dorsal ACC plays a key role in encoding
this expectation. We also found this brain region has an impaired response in stimulant users, and that this difference is predictive of whether a casual user eventually becomes a problem user or desists from future use. Our most recent work shows that healthy humans not only modulate their stopping behavior according to a learned probability of encountering a stop signal, but also to a learned expectation about the timing of the stop signal. Using a Bayesian model, we found that both kinds of statistical learning modulate subjects’ reaction time and stopping accuracy on subsequent trials. In this project, we propose to investigate the neural basis of this dual statistical learning process, and understand how this circuitry goes awry in substance users.

Macherla, Anvesh, UC San Diego, Muir College

**Department/Major:** Human Biology  
**Mentored by Dr. David Gonzalez,** Pharmacology  
**Dr. John Lapek,** Pharmacology

**Group A Streptococcus Hyper-Virulence: Identification of the Molecular Switch**

A top 10 human infectious agent, Group A Streptococcus (GAS) is responsible for over 700 million mild infections annually, of which 650,000 progress to severe invasive infections with an associated 25% mortality rate. Being one of the causative agents of necrotizing fasciitis, GAS receives specific point mutations on genes of the covRS two-component system in order to produce the invasive phenotype found in human infection isolates. Current methodology uses a 10-day murine implantation in order to achieve the hyper-virulent bacterial serotype (in vivo). Herein, we describe a new, more ethical, more efficient and more economical in-vitro method in order to execute the genetic switch and describe the previously unknown causative compound required for this change.

The in vitro method we have applied is through serum exposure. Our preliminary data includes similarities in protein gels between the in vivo GAS and wild type that has been exposed to the in vitro environment leading us to believe that there is a modifier in serum responsible for inducing mutations. Further studies through fractionation and LC-MS/MS analysis must be done to identify the essential compound.

Mack, Hannah (presenting on behalf of Sinead Hawker), UC San Diego

**Department/Major:** Bioengineering  
**Mentored by Dr. Stephanie Fraley,** Bioengineering  
**Dr. Donald Guiney,** School of Medicine  
**Dr. Shelley Lawrence,** Department of Pediatrics, Division of Neonatal-Perinatal Medicine

**Massively parallel digital high resolution melt for rapid and absolutely quantitative sequence profiling**

[Abstract redacted owing to proprietary information.]
**ABSTRACTS**

**Malkani, Sherina**, UC San Diego, Eleanor Roosevelt College

**Department/Major:** Bioengineering, Biotechnology  
**Mentored by Dr. Prashant Mali**, Bioengineering  
**Udit Parekh**, Electric Engineering

*A 3D-Printed Model of the Human Placenta*

The placenta is an organ which allows for essential oxygen, nutrient, and waste exchange between fetal and maternal blood supply. The exchange of necessary gas and nutrients is regulated by the placental barrier, which consists of trophoblast and endothelial cells. This barrier also regulates the transport of drugs, antibodies and other molecules into fetal circulation. Research on the placenta is greatly inhibited by the difficulty of obtaining viable human placentas to experiment on. The goal of this project is to develop an ex vivo model of the placenta including fetal vasculature with human placental barrier functionality. A model of the fetal vasculature will be fabricated using 3D bioprinting technology. Cytotrophoblast cells will be grown over this vascular network, and further testing will assess the accuracy and integrity of the model. The development of a morphologically and functionally accurate model will result in quicker and more reliable research regarding the transportation of drugs and molecules across the placental barrier. Additionally, this model can further be combined with stem cell technology and genetic engineering techniques to simulate and research genetic and physiological abnormalities in placenta formation that lead to pregnancy complications.

**Malmir, Mohsen**, UC San Diego

**Department/Major:** Computer Science and Engineering  
**Mentored by Professor Garrison Cottrell**, Computer Science and Engineering  
**Professor Shlomo Dubnov**, Music Department

*Music Generation by Deep Recurrent Neural Networks*

Music is a window into the perception and creation of beauty by the human mind. In this work, we aim to develop algorithms that learn to generate new music by learning from annotated music. We will train deep recursive neural networks (DRNNs) to generate sequences of tones along with their temporal information. We will analyze the structure of the trained network and the learned sequences to find relations with higher level structures in music. As part of this project, We will make the produced dataset of music and the relevant codes available to the research community for further development. This work serves as a preliminary step for future research by, for example, suggesting new behavioral experiments about music processing in the brain. It also helps us understand music and its regularities and develop new similarity metrics based on this new music representations.
Manian, Shanthi, UC San Diego

**Department/Major:** Economics

**Mentored by Dr. Joshua Graff Zivin,** Economics  
**Steffanie Strathdee,** Division of Global Public Health

**Health Certification in the Market for Sex Work: A Field Experiment in Dakar, Senegal**

In markets where suppliers possess important, unobservable information, theory predicts that credible certification can improve welfare. I study a sex work “legalization and regulation” program, which requires regular medical check-ups and provides government certification of female sex workers’ health, in Dakar, Senegal. Using a standard signaling model, I show that certified providers should earn higher prices, and when certification costs are low, almost all suppliers should choose to get certified. In a randomly selected treatment group, I offered a one-time incentive for certification that reduced the monetary costs of certification to zero. Contrary to the theoretical prediction, take-up of this incentive was very low: only 7 percent of the treatment group got certified, relative to 2 percent in control. Moreover, I find no evidence for a large price premium to certified sex workers. The lack of a certification premium is partly explained by evidence that some information about STI risk is actually observable: sex workers with visible STI symptoms earn 19 percent lower prices. As a result, the value of certification is limited for both clients and sex workers. To achieve STI control, legalization and regulation programs must be accompanied by complementary services that reach uncertified sex workers.

Martino, Cameron, UC San Diego, Revelle College

**Department/Major:** Bioengineering

**Mentored by Dr. Karsten Zengler,** Pediatrics  
**Dr. Frederico da Silva,** Glycobiology

**Influence of a Red Meat-Derived Glycan in the Microbiome**

Colon and colorectal cancer are responsible for tens of thousands of deaths every year in the U.S. and according to the National Cancer Institute in 2014 an estimated 13.8 billion dollars was spent on colon cancer related care. Inflammation induced by dietary intake of Neu5Gc and anti-Neu5Gc antibodies is a possible link between red meat consumption and growth of colon cancer. Neu5Gc is introduced into the human digestive tract primarily through the consumption of red meat. All mammals - except humans - have the gene Cytidine monophospho-N-acetyleneuraminic acid hydroxylase (CMAH) that produces an enzyme that allows N-acetyleneuraminic acid (Neu5Ac) to be converted into Neu5Gc, meaning the sugar is present in nonhuman red meat. It is the goal of this study to use 16S, metagenomic and metatranscriptomic tools in conjunction with in-vivo mouse models to further probe into the interactions of the colon microbiome and these sialic acids. A further understanding of the microbiome and the influence it has on colon cancer could potentially hold the key to the prevention of colonic inflammation induced by Neu5Gc antibodies.
McCabe, Kimberly, UC San Diego

Department/Major: Bioengineering
Mentored by Dr. Andrew McCulloch, Bioengineering
Dr. J. Andrew McCammon, Chemistry

**Multiscale Effects of Troponin C Mutations in Dilated Cardiomyopathy**

D75Y and E59D mutations in cardiac Troponin C (cTnC), a key regulatory protein of myofilament contraction, have been associated with dilated cardiomyopathy (DCM). Despite reports of altered myofilament function in these mutants, the underlying molecular alterations caused by these mutations remain elusive. Here we investigate in silico the intra-molecular mechanisms by which these mutations affect myofilament contraction. We tested the hypothesis that intra-molecular effects can explain the altered myofilament calcium sensitivity of force development for D75Y and E59D cTnC. We employed a multi-scale approach combining molecular dynamics (MD) and Brownian dynamics (BD) simulations to estimate cTnC calcium association and hydrophobic patch opening. We then integrated these parameters into a Markov model of myofilament activation to compute the steady-state force-pCa relationship. The analysis showed that myofilament calcium sensitivity with D75Y and E59D can be partially explained by changes in calcium binding affinity of cTnC and the rate of hydrophobic patch opening. In conclusion, this is the first multi-scale in silico study to elucidate how direct molecular effects of genetic mutations in cTnC translate to altered myofilament contractile function.

Mergen, Colleen, UC San Diego, Warren College

Department/Major: Chemical Engineering
Mentored by Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

**Blum Summer Field Internship 2016: Creating a “Zero Net Energy Community” in Encanto**

Low income and underserved communities are often more affected by climate change yet denied resources for positive environmental change. We will present data we collected on energy use and efficiency in the neighborhood of Encanto in Southeast San Diego during our Blum Summer Field Internship. Our research is part of the UCSD EPIC project, funded by the California Energy Commission, to create a near zero net energy community in this marginalized region.

Miller Rigoli, Carson, UC San Diego

Department/Major: Cognitive Science
Mentored by Dr. Sarah Creel, Cognitive Science

**Human Rhythm Processing in Complex Meters**

This project examines effects of short-term training and long-term enculturation on complex-meter processing in musical rhythm. Previous research shows that North American listeners have difficulty synchronizing to complex-meter music, producing timing errors which deviate toward simple-meter patterns. While uncommon in the
West, complex meter is prevalent in the music of the Balkans and South Asia. This raises the issue of whether the processing difficulties posed by complex meter arise from underlying and universal mechanisms of meter processing or are an effect of Westerners' lack of experience with complex meter. In this study, we measure Western listeners' performance on a tapping task with 7/8 meter rhythms both before and after short-term training. We find a general decrease in timing deviations that is consistent with a mechanism for rhythm processing which is dependent upon statistical information in the environment. These results rule out the possibility that complex-meter timing deviations are consistent and universally present. However, the timecourse of training improvements and a lack of observed rhythm-specific learning effects additionally allow an interpretation which depends on learning mechanisms that do not track statistical information.

Moosburner, Mark, UC San Diego

Department/Major: Marine Biology
Mentored by Professor Andrew Allen, Biological Oceanography
Professor Prashant Mali, Bioengineering

CRISPR-Cas9 gene editing in the model diatom Phaeodactylum tricornutum using bacterial conjugation

Phytoplankton, aquatic phototrophic organisms, is increasingly being recognized as potential biological platforms for the production of high-valued products including biofuels and bio-foods. With such enormous biotechnological potential, the development of molecular tools to study and engineer diatoms for industry is a must. Recently, the CRISPR-Cas9 genome engineering tool has been development for two model diatom species, Phaeodactylum tricornutum and Thalassiosira pseudonana. Here, CRISPR-Cas9 genome engineering was improved by harnessing the bacterial-conjugation transformation method. Using this delivery method, the Cas9 enzyme and short guide RNA (sgRNA) are maintained on a stably-replicating episome rather than genomically integrating which can lead to undesired physiological effects. Also, the mutation rate increased from 15% to 55% for targeting of the urease gene. Lastly, a plug-and-play system was developed to allow users to quickly and efficiently insert one or multiple sgRNAs into a Cas9 contained episome plasmid using golden-gate cloning.

Mousavi, Mahta, UC San Diego

Department/Major: Electrical and Computer Engineering
Mentored by Professor Virginia de Sa, Cognitive Science
Professor Bhaskar Rao, Electrical and Computer Engineering

Improving motor imagery brain computer interface with user response to feedback

Many people suffer from motor disabilities and some with brain stem strokes and late stage neurodegenerative diseases are completely locked in and unable to voluntarily control their muscles. This means that without an intervention, they are unable to communicate. However, in most locked-in patients, the brain and the autonomous nervous system are able to generate signals that can be read directly and brain computer interfaces (BCI) are a potential solution. Electroencephalography (EEG)-
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based brain computer interfaces (BCI) are high-speed, non-invasive, inexpensive and portable interventions that enable real-time control of a computer or robotic limb by analyzing electrical signals at the scalp. Motor imagery is a popular BCI paradigm where the subject generates control commands by imagining moving a part of her/his body. These brain signals however are combined with many sources of electrical noise and are also modified by changes in the user’s emotions and thoughts that are not directly related to the task. One source of this interference is the brain response to feedback provided by the BCI system itself. In this project, we studied this and proposed ways to alleviate the effect of subject response to visual feedback.

Moyer, Alyssa, UC San Diego, Sixth College

Department/Major: Global Health

Mentored by Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

The Vital Role Played by Promotoras in the Community of San Ysidro

One of the goals of the Blum Summer Field Internship regards learning how to serve as mediators between communities and the university. In our project, which took place in the community of San Ysidro this summer, we found that the promotoras (community health advocates) were vital to our success in the role of mediator. Through this presentation, we will explore the crucial role of promotoras in giving our team insight into the real issues facing residents of San Ysidro.

Murakami, Yuka, UC San Diego, Muir College

Department/Major: Cognitive Science, Visual Arts

Mentored by Professor Adam Burgasser, Astrophysics
Professor Tara Knight, Theatre

Cosmocosm: Sound Planetarium

Imagine entering a dark room, the walls and ceiling lined with speakers and plenty of space to stand or sit by yourself or in a small group. Instead of watching the stars reveal themselves on the ceiling of a planetarium, we hear localized sounds coming from every direction, spatialized in a full sphere around the body—this is our Sound Planetarium. For this project, we use data sonification techniques to translate existing astronomical data from the bright star catalogue into spatialized sounds. The Sound Planetarium is an audio laboratory, with the ability to modulate different samples to match the physical qualities of stars (ex. spectral type, spectral class, brightness, and color) to physical qualities of sound (ex. timbre, rhythm, volume, and frequency). In addition to experimenting with the sound qualities, we also adjust their locations according to the Earth’s rotation. Bridging the disciplines of live performance, audio installation, data sonification, and Astrophysics, our trans-sensory artwork is designed to live in between experimental art practice and scientific inquiry.
Nalci, Alican, UC San Diego

**Department/Major:** Electrical and Computer Engineering
**Mentored by Professor Thomas Liu,** Radiology
**Professor Bhaskar Rao,** Electrical and Computer Engineering

**Enhanced Signal Processing Techniques for fMRI and Brain Connectivity Analysis**

In resting-state functional MRI, the correlation between signals across brain regions is used to estimate the functional connectivity of the brain. This has revealed a number of resting state networks, including the default mode network (DMN) and the task positive network (TPN). Global signal regression (GSR) is a widely used preprocessing step that improves the specificity of the estimated resting-state networks. However, GSR is controversial because it can introduce artifactual anti-correlations. It has been argued that anti-correlations observed between the DMN and the TPN are primarily an artifact of GSR. Despite the concerns about GSR, there is no consensus regarding its use. Here, we introduce a new framework for understanding the effects of GSR. We show that GSR can be well-approximated as a temporal downweighting process in which the data from time points with relatively large GS amplitudes are greatly attenuated while data from time points with relatively small GS amplitudes are unaffected. We also show GSR can be well-approximated by a censoring function in which data from time points with large GS amplitudes are censored. This framework reveals that the anti-correlation between DMN and TPN are not artifactual.

Nicholson, Michael, UC San Diego

**Department/Major:** Political Science
**Mentored by Dr. Tom Wong,** Political Science
**Dr. Pasquale Verdicchio,** Literature
**Dr. David FitzGerald,** Sociology

**Explaining Immigrants’ Political Participation: An Identity Politics Approach Using Evidence from Switzerland**

[Abstract redacted owing to proprietary information.]

Okina, Yuka, UC San Diego, Marshall College

**Department/Major:** Mechanical Engineering
**Mentored by Professor Michael Tolley,** Mechanical Engineering
**Adriane Minori,** Mechanical Engineering

**Rapid Manufacturing of Tensegrity Structures**

Tensegrity structures have members in pure compression or tension making them extremely mass-efficient and lightweight; however, they are difficult to manufacture. Previous work theorizes that D-bars, tensegrities with four rigid and two tensile members, can decrease in mass while maintaining the same maximum load by using self-similar iterations where each rigid member is replaced with another D-bar. By controlling the length of the tensile components, the structures can be deployable.
Although tensegrities have many advantages, they are time-consuming to fabricate. Therefore, I seek to explore two automated processes to quickly mass produce D-bars and aim to confirm the theoretical prediction of their strength. 3D-printing is an advantageous process because it is easy to design for and can precisely reproduce structures by printing layer by layer. Another approach is laminate manufacturing, adhering different layers of materials together, which allows flat storage of D-bars and deployability using shape memory polymers. Potential benefits of these methods include applications to remote and dangerous locations. For example, tensegrity structures can be used to mass produce temporary shelters that can be transportable in lightweight, compact packages, deployable, and capable of self-assembly at their final locations.

Oklobdzija, Stan, UC San Diego

Department/Major: Political Science
Mentored by Dr. Thad Kousser, Political science

Building a Virtual Lab for Computational Social Science, with Applied Focus on Political Tweets During the 2016 Presidential Contest

With politicians running their campaigns through social media to a dramatically increasing extent in this election cycle, social scientists can access far more data on political communication than ever before. But they can only make sense of these data by using cutting edge tools developed in computer science to analyze massive text datasets. This project creates a virtual lab that would train graduate students in political science and sociology and three undergraduates from computer science and engineering, political science, and sociology to classify a small set of texts and then train computer algorithms to classify massive text datasets.

In its first application, the lab would focus on analyzing a unique database of every tweet cast by all candidates in the 2016 Presidential Election as well as those by their affiliated political action committees. Working under the mentorship of interdisciplinary faculty, students will be trained to ask how candidates change their messages in response the rhetoric of their rivals, identifying the factors that predict when they “go negative,” and asking whether purportedly independent SuperPACS closely coordinate with the candidates they support.

Olsen, Lauren, UC San Diego

Department/Major: Sociology
Mentored by Professor John Evans, Sociology
Dr. Charles Goldberg, Medicine

Interdisciplinary Collaboration and Medical Curricular Change: Humanistic and Social Scientific Knowledge in Medical Education

For decades social scientists have documented persistent health and healthcare disparities in the American healthcare system. Recently, medical education has taken concrete steps to address these longstanding concerns by including humanistic and social scientific knowledge into their curricula. All medical schools are required to implement cultural competence, expressly designed to teach physicians to be respectful of patients’ diverse understandings of health, illness, and treatment. In addition, a growing number of schools are engaged with medical humanities – a mix of literature,
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art, and history – to foster deeper reflexivity and critical thinking among budding physicians. Further, medical students must now master sociology, in order to develop a broader conceptualization of human behavior. This project examines how humanities and social sciences scholars, medical educators, and medical students – those that shape and receive medical education – understand the purpose of humanistic and social scientific knowledge for medicine and how their interpretations shape knowledge integration across epistemological divides. Through the collection of in-depth interviews, archival materials, and observations, this project describes this new interdisciplinary moment in improving patient care.

Ortiz, Daniel, UC San Diego

Department/Major: Bioengineering
Mentored by Dr. Stephanie Fraley, Bioengineering
Dr. Hannah Carter, Medicine

3D collagen microenvironment triggers transcriptional programs related to vasculogenic mimicry.

An initial step in cancer metastasis is the migration of tumor cells through the extracellular matrix (ECM) and into the lymphatic or vascular systems. Several cancer cell migration strategies exist in vivo, where local collagen density, stiffness, and fiber alignment are implicated in differentially regulating migration behaviors. It remains unclear to what extent intrinsic tumor cell heterogeneity and extrinsic ECM heterogeneity contribute to the emergence of aggressive migration phenotypes. To study this, we use high throughput time-lapse microscopy to monitor single cancer cell migration within 3D collagen matrices. We identify a pore size threshold, below which a majority of cells switch into a rapid, persistent migration behavior. Cells undergoing rapid migration up-regulate a conserved transcriptional program enriched for vascular development and migration regulation annotations. After seven days, rapidly migrating cells organize into interconnected networks coated with basement membrane molecules, a vascular mimicry phenotype (VM). Cells undergoing slow migration form spheroids. We demonstrate that b1-integrin signaling is required for VM. Our findings implicate a cell-intrinsic transcriptional and migratory response triggered by dense 3D collagen conditions that may be broadly relevant as a driver of metastatic progression in solid human cancers.

Osborn, Zachary (presenting on behalf of Gabriella Bastos),
UC San Diego

Department/Major: Communication, Urban Studies
Mentored by Dr. Keith Pezzoli, Communication

Sustainability Science and Use-Inspired Research

We are working to bring small-scale agriculture into the 21st century while also bringing together the seemingly disparate research niches into a single interdisciplinary force aimed at bringing cheap and healthy food to all people. The projects ranged from involving renewable energies, to food-waste re-use and recovery, co-opting nature in the form of insects and fish, and utilizing new technology to control, automate, and collect data. The University must be rooted with its community and see these advances augmented with an emphasis to allow their propagation throughout communities regardless of socioeconomic standing.
Ota, Mizuho, UC San Diego

Department/Major: Biological Sciences
Mentored by Dr. James Golden, Biological Sciences

A genome-wide fitness assay in Synechococcus elongatus identifies genetic determinants of resistance against protozoan grazing

Interactions between cyanobacteria and their free-living protozoan predators are poorly understood, yet they have substantial selective effects on cyanobacterial growth and, by association, the biosphere. A screen was conducted in a barcoded transposon mutant library in the model cyanobacterium Synechococcus elongatus PCC 7942 in order to find genes that influence the survival of grazing by amoebae. The screen yielded a quantitative assessment of the relative fitness of each mutant in the library under grazing stress; mutants with distinctly positive or negative fitness phenotypes may be defective in functions that determine the susceptibility of Synechococcus to grazing. Mutants defective in the synthesis of O-antigen, a component of the outer membrane lipopolysaccharide, had high fitness against grazing by two separate amoebae on solid media. Conversely, searching for mutants with low fitness against grazing in liquid media revealed a group of genes that are likely to function in the Type IV pili biogenesis pathway. These results prompt the further investigation of the role these cell envelope components play in interactions with the extracellular environment.

Park, Junhee (presenting on behalf of Ashok Kodigala), UC San Diego

Department/Major: Electrical and Computer Engineering
Mentored by Professor Boubacar Kante, Electrical and Computer Engineering
Professor Anna Devor, Neurosciences

Plasmonic Sensing

[Abstract redacted owing to proprietary information.]

Peng, Stephanie, UC San Diego

Department/Major: International Studies
Mentored by Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

The Vital Role Played by Promotoras in the Community of San Ysidro

One of the goals of the Blum Summer Field Internship regards learning how to serve as mediators between communities and the university. In our project, which took place in the community of San Ysidro this summer, we found that the promotoras (community health advocates) were vital to our success in the role of mediator. Through this presentation, we will explore the crucial role of promotoras in giving our team insight into the real issues facing residents of San Ysidro.
**Peters, Christine**, UC San Diego, Muir College

**Department/Major:** Biochemistry and Cell Biology  
**Mentored by Dr. Joe Pogliano,** Biology

**Determination of Mechanism of Action of Novel Compounds via Bacterial Cytological Profiling**

The rapid emergence of multi-drug resistant bacteria is creating an urgent need to develop new antibiotics. One bottleneck in the discovery of new antibiotics is the determination of their mechanism of action (MOA). We have developed a rapid and versatile platform for identifying the mechanism of action (MOA) of novel drugs called Bacterial Cytological Profiling (BCP). BCP utilizes fluorescence microscopy to observe changes in cytological parameters of bacteria produced by antibiotics targeting different metabolic pathways. We have screened a library of over 2,000 compounds and used BCP to determine the MOA of all of the hits. We identified six compounds that were active against E. coli, Bacillus subtilis and Staphylococcus aureus, of which the mechanisms were previously unknown. We have found that these compounds inhibit a variety of metabolic pathways such as translation, transcription, cell wall biosynthesis and lipid biosynthesis. Thus, our BCP-based screen has identified lead molecules, which hold potential to be further developed as antibiotics for the treatment of infections caused by drug resistant bacteria.

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**Petty, Emily,** UC San Diego

**Department/Major:** Division of Biology  
**Mentored by Professor Lorraine Pillus,** Division of Biology  
**Professor Alexandra Newton,** School of Medicine

**New Interactions Between Dynamic Acetylation and Phosphorylation**

The phosphoprotein phosphatase 2A (PP2A) complex family is abundant in human cells and has tumor suppressor function. Distinct regulatory (B) subunits direct PP2A specificity, and mutations of the human B56 family are associated with breast, lung, colon, and ovarian cancer, among others. There are at least 10 B56 isoforms in humans, which has complicated efforts to fully understand the mechanisms of PP2A-B56 function.

I have utilized a new interaction between the B56 homologue, Rts1, and the highly conserved histone acetyltransferase, Gcn5, in budding yeast to better understand the mechanisms of PP2A-B56 cellular function, focusing on effects in chromatin organization. We have found that overexpression of RTS1 suppresses cell cycle defects of gcn5Δ cells, including restored cell cycle-regulated gene expression. Further, specific histone H2B residues are required for the interaction between Gcn5 and Rts1. I hypothesize that PP2A-Rts1 has direct chromatin function in yeast and that a comparable function contributes to the tumor suppressor function of PP2A in humans. S. cerevisiae has only one B56 subunit, which will allow us to thoroughly dissect the mechanisms of PP2A-B56/Rts1 function in regulation of chromatin and cell cycle-regulated gene expression and may lead to a better understanding of how each contributes to cancer development.
Potapova, Irina, San Diego State University & UC San Diego

Department/Major: Joint Doctoral Program in Language and Communicative Disorders
Mentored by Dr. Leanne Chukoskie, Institute for Neural Computation
Adjunct Professor Emeritus Jeanne Townsend, Neurosciences

Eye movements during word learning in children with and without Autism Spectrum Disorder

The proposed research aims to create a task that allows for a sensitive investigation of word learning in children with typical and atypical development. To that end, we will present a child-friendly story on a computer monitor that includes exposure to novel objects with novel labels. Participants will include school-aged children with and without Autism Spectrum Disorder, recruited through community relationships established by the Research on Autism and Development Laboratory. In addition to assessing word learning outcomes with a traditional receptive comprehensive measure (i.e., matching one of four images to a target word; Rice, Oetting, Marquis, Bode & Pae, 1994), the participants' eye gaze will be tracked and analyzed. Specifically, we will examine saccade latency and fixation duration as children are exposed to the novel word-referent pairings in the story and as they complete the comprehension task. Results may serve to contribute to and differentiate profiles of linguistic performance in typically and atypically developing populations. Importantly, the task will be designed to be readily modified for research on word learning in other populations. Future research will investigate word learning in bilingual children with and without language impairment.

Ren, Tianqi, UC San Diego

Department/Major: Materials Science and Engineering
Mentored by Dr. Olivia Graeve, Mechanical and Aerospace Engineering
Professor Robert Continetti, Chemistry

Solvothermal Process for the Preparation of Doped Ultra-High Temperature Ceramics with Unique Morphologies

Transition metal carbides such as tantalum carbide (TaC), hafnium carbide (HfC), zirconium carbide (ZrC), and niobium carbide (NbC) are classified as ultra-high temperature ceramics (UHTCs) due to their extreme melting temperatures. In this project, we are exploring the possibility of controlling the particle morphology of transition metal carbides through dopant incorporation. Powder samples have been synthesized using a solvothermal method. We have observed promising cubic-faceted sharply-edged particles in TaC:15Y (15 at% yttrium), TaC:10Zr (10 at% zirconium) and ZrC:10Ta (10 at% tantalum) under scanning electron microscopy (SEM) with sizes typically ranging from 50 to 100 nm. We believe that the dopants are effective in modifying the thermodynamic surface energies of the powders and the growth kinetics during synthesis. Characterization has been performed for assessing the changes in local geometry at the atomic scale under high-resolution transmission electron microscopy (HRTEM).
Rosenblatt, Hannah, UC San Diego, Muir College

**Department/Major:** General Biology  
**Mentored by Dr. Amro Hamdoun, Marine Biology**  
**Dr. Geoffrey Chang, Pharmacology**

**Compensation of Drug Efflux Activity after Genetic Knockdown of the Transporter P-glycoprotein in Sea Urchin Embryos**

P-glycoprotein (P-gp) is a widespread membrane transporter that effluxes xenobiotics. Upregulation of P-gp is responsible for resistance of cancer cells against chemotherapeutics. However, in normal conditions P-gp also serves as a cellular defense against environmental toxins. Our research focuses on the protective functions of this protein in embryos.

My studies have revealed an unanticipated compensation mechanism for the genetic knockdown of P-gp. I found that sea urchin embryos with CRISPR/Cas9 mutated P-gp efflux 6.4 times more substrate (calcein-AM) than normal embryos when exposed to a P-gp inhibitor. This suggests the use of an alternative mechanism to efflux xenobiotics which could involve the upregulation of a related transporter or a previously unknown protein involved in protection against toxicants. I am currently investigating transcriptome and membrane protein changes to determine these compensatory genes/proteins.

Serving to increase both the viability of embryos and the robustness of cancers, P-gp compensation provides vital insight into how cells are able to protect themselves from a variable environment. Determining compensatory mechanisms could lead to more effective strategies for combating drug resistance in cancer and identification of a novel defense mechanism used by embryos.

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Ryazanov, Arseny, UC San Diego

**Department/Major:** psychology  
**Mentored by Dr. Nicholas Christenfeld, Psychology**  
**Dr. Dana Nelkin, Philosophy**  
**Dr. Samuel Rickless, Philosophy**

**A Moral Imagination Limited by Bayesian Intuition**

Moral reasoning is generally investigated through scenarios such as trolley problems, where outcomes are stipulated as certain to occur. We demonstrate that participants do not accept stated certainty, and that their moral judgments reflect the probability estimates they substitute for explicit stipulations. Bayesian reasoning limits judgment in moral dilemma tasks.
**Salazar, Marissa**, UC San Diego

**Department/Major:** Global Public Health  
**Mentored by Dr. Elizabeth Reed,** Medicine  
**Dr. Craig McIntosh,** Economics

**The Role of a Microfinance Intervention to Reduce Occupational Alcohol Use and Related HIV Risk Behaviors Among Female Sex Workers in Tijuana, Mexico**

Over one-third of female sex workers (FSW) in Tijuana who drink alcohol report having 10 or more drinks on a typical day, most often in the context of work. FSW employed in bars and clubs report experiencing pressure from venue managers and clients to consume alcohol. Drinking prior to sex with clients is associated with reduced condom use and increased violence, thereby increasing HIV/STI risk. Economic interventions, which aim to improve economic security and in turn increase negotiation power among FSW, may also improve negotiation power and other risk factors associated with occupational alcohol use. The proposed work aims to assess the impact of a microfinance economic intervention on work-related alcohol use among FSW in Tijuana. Participants enrolled in an existing economic intervention (ESTIMA; n=120) will complete a survey measuring alcohol use at baseline, 6, and 12-month follow up. Data will be analyzed using generalized linear mixed models. A subset of participants will complete in-depth interviews to explore factors that influence change in work-related alcohol use. Findings will be used to inform programmatic efforts to address the effects of work-related alcohol use on violence and HIV risk among FSW.

**Sanchez, Cinthia**, UC San Diego, Muir College

**Department/Major:** Public Health  
**Mentored by Professor Fonna Forman,** political science  
**Professor Teddy Cruz,** Visual Arts

**Blum Summer Field Internship 2016: Urban Gardens and Community Resilience at the UCSD Cross-Border Community Station: Tijuana**

Our project for the summer was to design a community garden in an informal settlement in the Laureles Canyon in Tijuana. For our project we first did assessments of the gardens in the field site as well as the open lots. We also conducted formal interviews as well as informal ones which helped shed light on the lack of access the community had to fresh fruits and vegetables. Once the interview process was done we convened a community-based garden committee comprised of active community members who had knowledge about gardening. The garden committee selected potential sites for the garden and will continue to play an active role in building and maintaining the garden.
Schairer, Cynthia, UC San Diego

Department/Major: School of Medicine
Mentored by Professor Michael Kalichman, Pathology

Peer Leadership for Promoting Scientific Integrity
Scientific integrity is a product of culture and daily practice rather than policies and law. We designed a workshop to promote research integrity by training grad students and postdocs to be peer leaders. Participants were asked to organize an activity or initiative in their home departments that would generate discussion around issues such as assigning authorship, collecting, managing, and interpreting data, or the proper care of lab animals.

This presentation will outline what was learned from qualitative evaluation of the workshop. Participant observation in the workshop and individual follow up interviews with participants inform recommendations for future efforts to boost scientific research integrity.

Schreiber, Dimitri, UC San Diego, Sixth College

Department/Major: Electrical Engineering
Mentored by Professor Falko Kuester, Computer Science, Structural Engineering

CaveCamX: Autonomous Stereo Spherical Panorama System
Over the last decade remote sensing has greatly improved in both its realism and coverage. Miniaturization and reduction in the cost of sensors, as well as advances resulting from the development of new technologies have played a critical role in these improvements. CAVECamX is a small binocular two-axis gimbal system used for creating high-resolution 3D photospheres, combined with GPS and IMU data, enabling better coregistration internally within a single photosphere, and externally between heterogeneous datasets, including fusion with point clouds generated from Photogrammetry and Lidar. This decreases human processing time by automatically recording location and orientation of the dataset, which would previously be recorded manually and therefore likely left out or lost. The attitude data will help fully automatic stitching of stereoscopic datasets without the commonly associated motion sickness by constraining the system. Its small size and low power consumption allow it to be easily taken with on field expeditions, without compromises in photo quality or excessive weight, like other systems. CAVECamX enables remote visualization of archaeological sites, allowing researchers to be virtually immersed in the captured scene without having to travel across the globe.

Shelley, Laura, UC San Diego

Department/Major: Cognitive Science
Mentored by Dr. Douglas Nitz, Cognitive Science
Dr. Mark Tuszynski, Neurosciences

Creating spaces: A possible function of the hippocampal and parietal networks
Our research focus addresses how brain systems produce abstract, high-level spatial concepts. We examined how the brain ‘fragments’ environments into distinct sub-spaces.
ABSTRACTS

based on cognitive processes such as rule learning, rather than concrete sensory stimuli. Preliminary work indicates that rats are capable of learning such logical fragmentation. Thus, we are positioned to examine the interface between awareness of environmental position and how organisms apply rules for action. We recorded single neuron ensembles of parietal cortex and hippocampus and determined what adaptations of their place-specific firing patterns yield a capability for logical fragmentation. We will move forward by examining whether retrosplenial cortex, which connects hippocampus and parietal cortex, is required for logical fragmentation. The latter experiments advance under advisement from Drs. James Conner and Mark Tuszyński who will provide expertise for a new chemogenetic approach to temporary inactivation of specific brain regions.

Shih, Benjamin, UC San Diego

Department/Major: Mechanical and Aerospace Engineering/Robotics
Mentored by Professor Michael Tolley, Mechanical and Aerospace Engineering
Professor Andrea Chiba, Cognitive Science and Neuroscience
Deborah Forster, Qualcomm Institute

Towards Soft Pneumatic Fingers with Tactile Sensing Skins for Human-Robot Interaction

We present soft robotic hands composed of silicone pneumatic actuator (SPA) modules that serve as fingers. First, we investigate how the design of the actuator impacts performance characteristics and motion. Then, we attach sensory skins on each actuator to measure bends, twists, and contact. Multiple fingers are combined to form a soft robotic hand. While there exist dextrous hands in Human-Robot Interaction (HRI) robots, our design advances HRI by enabling safer interaction with humans — particularly in handling objects. To this end, we will embed our hand design on RUBI (Robot Using Bayesian Inference), which studies the behavior of children in a classroom setting via interactive games. In the future, our studies can also be extended to learn how social touch influences a child's psychological development. Our results are a step towards soft robot fingers and hands capable of a complex range of motions and proprioceptive, morphological computation, which will help robots better understand the environments they are interacting with and increase physical safety in HRI.

Silverman, Reuben, UC San Diego

Department/Major: History
Mentored by Professor Hasan Kayali, History
Richard Biernacki, Sociology

Becoming “Little America” in a Muslim Society: Markets and Culture in Early Cold War Turkey (1950-1960)

Our research focuses on the case of modern Turkey in order to explore how the economic and political changes of the early Cold War (1945-1960) shaped the culture of developing countries. As it was incorporated into American-centered military-alliances and markets, Turkish society experienced particularly dramatic changes: Turkish leaders committed to anti-Soviet policies and secured American financial assistance, allowing them to promote industry. Rapid economic growth placed new strains on the traditional social order. Though Turkey's incorporation into American military
alliances has been studied, its simultaneous economic incorporation has received less attention. How Turkish leaders drew on and adapted an existing repertoire of symbols and discourse to blend “modern” modes of behavior with “Islamic values” remains largely unstudied. To better understand these processes, we will draw on economic data, political documents, and the products of a growing mass consumer culture in order to develop a multi-faceted picture of how a Muslim society in the early Cold War responded to the global forces affecting its economy, politics, and culture.

**Sim, Yi Hong**, UC San Diego

**Department/Major:** Communication  
**Mentored by Professor Robert Horwitz**, Communication  
**Professor Nancy Guy**, Music  
**Professor Stefan Tanaka**, Communication  
**Professor Boatema Boateng**, Communication  
**Professor Amy Cimini**, Music

*How Starving the Artist Makes Work Work: The Othering of Classically Trained Musicians and Its Ramifications for a Politics of Work*

As the central hegemonic ideology and structure of capitalist society, the meaning of work envelops all of us in American society. In this paper, I argue that popular cultural discourse and business and economic scholarship construct artists as Other. Specifically using the example of classically trained musicians, I demonstrate that, as working people, classically trained musicians are depicted as a relic of the past, behind the times, as well as timeless. This Othering reinforces and expands hegemonic work ideologies of American capitalism, and forecloses the possibility of better futures. The current championing of the values of artistic creativity through discourses of entrepreneurship is part of how capitalist processes exploit the Otherness of artists.

I will also present the hypothesis of my dissertation: that the Marxist class framework can be revised to support co-evalness rather than Otherness. My reconstruction of Marxist class analysis allows seemingly “non-capitalist” or not-quite-capitalist working people such as artists, who had previously been sidelined (Othered) from class analysis as inconsequential “dritte Personen,” to be recuperated into a revised class framework as critical classes.

**Smuin, Ben**, UC San Diego

**Department/Major:** History  
**Mentored by Dr. Michael Provence**, History  
**Dr. Gershon Shafir**, Sociology

*Citizens Without States: Petitions and the Formation of a Political Sphere in Syria*

A 1962 Syrian law revoked the citizenship of Kurds in northern Syria, leaving 20% of the country’s Kurdish population stateless. In 2011, the government of Bashar al-Asad reversed this and granted citizenship to 300,000 stateless Kurds in an attempt to gain support for his regime against widespread protests. In the contemporary world, states grant and revoke citizenship for various reasons, only some of which involve revolution
and political opposition. Often, citizenship rights are intrinsic to the process of state-building, a tactic employed by the Ottoman Empire and French mandatory authorities in Syria in the late-nineteenth and early-twentieth centuries. The Ottoman Law of Nationality of 1869 declared anyone living within the Ottoman Imperial realm an Ottoman subject. The Treaty of Lausanne after World War I granted Syrian nationality to anyone living within the new borders of French Mandate Syria. This project questions the changing definitions of citizenship in Syria from the late nineteenth-century to independence in 1946, and explores how citizenship was articulated, understood, and explained in petitions on individual and collective levels. Finally, the project addresses the complex nature of state and societal relations in the contemporary Middle East.

**Solis, Cesar**, UC San Diego, Warren College

**Department/Major:** Political Science, International Relations, Human Rights  
**Mentored by Professor Fonna Forman,** Political Science  
**Professor Teddy Cruz,** Art

*Blum Summer Field Internship 2016: Mobility and Security in Sustainable Urban Transport at the UCSD Cross-Border Community Station: Tijuana*  
[Abstract redacted owing to proprietary information.]

**St. Louis, Robert**, UC San Diego

**Department/Major:** Psychology  
**Mentored by Professor Piotr Winkielman,** Psychology  
**Professor Patricia Churchland,** Philosophy

*Effort makes you like things less but financially value them more*  
How does the effort relate to value? This question has been explored across the sciences and humanities. It has been argued that greater effort can be a cost, a benefit, or an indicator of value. We propose that the same effort experience can elicit very different judgments, depending on whether individuals consider objective vs. subjective value. Our experiments demonstrate that when people work harder, their perception of the subjective utility—or liking—of their ultimate goal declines, but their estimate of its objective value increases. This result reveals the flexibility of the inferences associated with effort, and has broad implications for many fields.
Stevenson, Cory, UC San Diego

Department/Major: Bioengineering, Institute for Neural Computation
Mentored by Professor Gert Cauwenberghs, Bioengineering
Dr. Tzyy-Ping Jung, Institute for Neural Computation
Professor Eduardo Macagno, Division of Biological Sciences, Cell and Developmental Biology

Integration of Electrophysiological Recording and Virtual Reality for Human Learning and Navigation

This study explores the neural and physiological mechanisms underlying human cognition and learning in spatial navigation and orientation, by integrating novel electrophysiological methods and our recent developments in virtual reality systems designed to test spatial learning and memory. This integration provides new avenues for neurocognitive experimental design, including potential use for clinical research on dementia, and novel methods of interfacing humans with virtual reality environments.

Straight, Shelby, UC San Diego

Department/Major: Chemistry
Mentored by Professor Francesco Paesani, Chemistry

Exploring Electrostatic Effects on the Hydrogen Bond Network of Liquid Water through Many-Body Molecular Dynamics

To probe the dynamic nature of the hydrogen bond network in water, infrared spectra of dilute HOD in H2O are computed from many-body molecular dynamics simulations with the MB-pol potential, which have been shown to accurately predict the properties of water from the gas to the condensed phase. The effects of various approximations to the many-body expansion of the dipole moment surface on the OD-stretch absorption line shapes are analyzed at different levels of theory. The interplay between effects associated with the variation of the HOD dipole moment and instantaneous nuclear configurations causes qualitative differences in the absorption profiles, which are traced back to how induction contributions are treated within the many-body formalism. Further analysis of the multidimensional infrared spectra demonstrates that the spectral diffusion of the OD stretching frequencies depends explicitly on the level of truncation in the many-body expansion of the dipole moment in the short-time regime that is associated with intact hydrogen-bond dynamics. In contrast, the long-time evolution of spectral diffusion, describing collective rearrangements of the hydrogen-bond network, is effectively independent of the details with which many-body contributions to the dipole moment are represented.
Valuing the Storm Surge Mitigation Effect of Coastal Wetland

Storm surge presents a severe threat to life and property along the coast. Coastal wetlands provide a natural levee for storms by attenuating waves and creating a buffer zone between the landfall location of the storm and populated regions. This paper investigates the contribution of coastal wetland vegetation to hurricane storm surge protection. I analyze 28 hurricane disasters to have hit the U.S. since 1996, and construct a county-level storm surge damage and coastal wetland distribution dataset using geo-spatial data on land cover across the United States. The main result of the paper is that for coastal communities suffering from storm surge damage, a 1% loss of coastal wetland is associated with a 0.6% increase in property damage, controlling for specific storm and county characteristics, as well as property value under flooding risk.

Learning-based decision-making behavior in fruit flies

Decision-making, behaviorally, is a process of choosing between at least two options. Using a novel behavior setup, I study freely-moving flies’ learning and decision-making process in the fruit fly, Drosophila melanogaster. Specifically, my question is: Can flies make decisions against their innate behaviors? To answer this question, I built a novel behavior apparatus in which single flies experienced heat stress when and only when they were moving. Flies have an innate heat avoidance behavior. Under normal circumstances, when they experience such uncomfortable heat, they tend to increase their locomotion activity. In this paradigm, however, they were trained to stop walking when encountering heat. After two spaced training sessions, flies showed significant inhibition of their locomotion activity compared to controls. Thus, flies can make decisions against their innate behaviors.

The influence of climate and drought on fish in California mountain lakes

California is experiencing one of the most severe droughts in its recorded history, and while the effects of drought are easily observable in water levels of reservoirs and streams, the impact on natural lakes is less apparent. Mountain lakes support important recreational and economic activities through fishing, which may be lost if drought
impairs the growth of fish. We can examine the influence of drought on fish because they provide a record of their growth in the width of bone rings, similar to tree rings. Previous work on the influence of drought on fish has provided conflicting results. Drought may either increase fish growth due to higher temperatures and longer growing seasons, or decrease fish growth due to reduced nutrient input from surface waters. By examining growth from historic records and the bones of long-lived fish populations we can estimate changes in growth rate between normal years and times of drought, which are predicted to become more frequent and severe. Our work will determine if drought results in an increase or decrease of fish growth, providing better predictions about how this important ecosystem service may change in the future.

Takazawa, Fumika, UC San Diego, Eleanor Roosevelt College

**Department/Major:** Environmental Engineering  
**Mentored by Professor Fonna Forman,** Political Science

**Blum Summer Field Internship 2016: Designing Green Infrastructure for Ecological Protection, Public Space, and Recreation at the UCSD Cross-Border Community Station: Tijuana**

This summer, we focused on the design of a recreational and ecological center for an informal settlement community in the Los Laureles canyon in Tijuana. We considered how a bus stop would enable the park to become a transit point, creating an active safe space and safe path for community members. Additionally, we explored sustainability aspects of the park. We considered the use of bioswales and native species to control erosion and create more stability in the region. Finally, we designed infrastructural interventions for the park such as shade structures, seating, an amphitheater, and a skate-park that doubles as water management facility. More than anything, our goal was to make Parque Fronterizo an enjoyable, sustainable, and social hub that is actively used and maintained.

Tallis, Melisa, UC San Diego, Sixth College

**Department/Major:** Physics  
**Mentored by Dr. Adam Burgasser,** Physics  
**Professor Tara Knight,** Theatre

**Sound Planetarium**

Imagine entering a dark room, the walls and ceiling lined with speakers and plenty of space to stand or sit by yourself or in a small group. Instead of watching the stars reveal themselves on the ceiling of a planetarium, we hear localized sounds coming from every direction, spatialized in a full sphere around the body—this is our Sound Planetarium. For this project, we use data sonification techniques to translate existing astronomical data from the bright star catalogue into spatialized sounds. The Sound Planetarium is an audio laboratory, with the ability to modulate different samples to match the physical qualities of stars (ex. spectral type, spectral class, brightness, and color) to physical qualities of sound (ex. timbre, rhythm, volume, and frequency). In addition to experimenting with the sound qualities, we also adjust their locations according to the Earth’s rotation. Bridging the disciplines of live performance, audio installation, data sonification, and Astrophysics, our trans-sensory artwork is designed to live in between experimental art practice and scientific inquiry.
**Thomas, Stephanie**, UC San Diego, Revelle College

**Department/Major:** Bioengineering  
**Mentored by Dr. Adam Engler,** Bioengineering  
**Dr. Kristin Baldwin,** Neuroscience

**Improved Disease Modeling Reveals New Cardiac Phenotypes in 9p21 Gene Locus**

Genome-wide association studies have identified single nucleotide polymorphisms (SNPs) in the 9p21 gene locus associated with increased risk of coronary artery disease and myocardial infarction. SNP associations have implicated vascular properties but have not identified mechanisms in cardiomyocytes (CMs).

Induced pluripotent stem cell-derived CMs from patients that are homozygous risk/risk (R/R) and non-risk/non-risk (N/N) for 9p21 SNPs were cultured on methacrylated hyaluronic acid hydrogels that mimic the fibrotic stiffening associated with disease post-heart attack, i.e. “heart attack-in-a-dish” stiffening from 11 kiloPascals (kPa) to 50 kPa “on-demand.” To eliminate patient variability, we created an isogenic line by deleting the locus from a R/R patient using TALEN gene editing, i.e. R/R KO. While all CMs independent of genotype beat synchronously on soft matrices, R/R CMs cultured on dynamically stiffened hydrogels exhibited asynchronous contractions and had significantly lower correlation coefficients versus N/N CMs in the same conditions. R/R CMs also exhibited reduced connexin 43 expression. R/R KO CMs had synchronous contractility and organized connexin 43 junctions. As a non-coding locus, 9p21 appears to repress connexin protein expression, leading to the phenotypes we observe only when the niche is stiffened.

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**Touve, Mollie**, UC San Diego

**Department/Major:** NanoEngineering, Chemistry/Biochemistry  
**Mentored by Professor Nathan Gianneschi,** Chemistry/Biochemistry  
**Professor Darren Lipomi,** NanoEngineering

**Chemical Reactions in the Electron Microscope**

[Abstract redacted owing to proprietary information.]

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**Troyer, Melissa**, UC San Diego

**Department/Major:** Cognitive Science  
**Mentored by Professor Marta Kutas,** Cognitive Science  
**Professor Zhuowen Tu,** Cognitive Science

**Harry Potter and the Chamber of What?: Real-time semantic access is a function of the individual's knowledge**

Arriving at a word’s meaning relies on rich sources of information, including sentence/discourse contexts. However, models of language comprehension often neglect a critical source of variability: the comprehender’s knowledge. We use event-related brain potentials to test the extent to which semantic access, inferred from N400 effects, is a function of comprehenders’ knowledge. Young adults read short stories from the world of Harry Potter which were either Predictable (true to the stories) or
Unpredictable (not true to the stories), e.g., ‘Harry has a patronus. It takes the form of a STAG (Predictable)/LIZARD (Unpredictable).’ Participants additionally read Control stories about general topics ending in a Predictable or Unpredictable word. For Control stories, we observed an N400 effect (Unpredictable > Predictable) across all participants, consistent with many previous studies. In contrast, for Harry Potter stories, the size of the N400 effect related to the participant’s knowledge: the most knowledgeable participants exhibited the largest effects, and the least knowledgeable participants exhibited the smallest (or no) effects. We conclude that real-time semantic access relies on the individual’s knowledge. The results underscore the importance of considering knowledge-based individual differences in models of online language comprehension.

**van de Leemput, Joyce**, UC San Diego  
**Department/Major:** Psychiatry  
**Mentored by Professor Ming Tsuang, Psychiatry**  
**Professor Fred Gage, Neurobiology (Biological Sciences)**

*Genetic variations in schizophrenia, and functional implications for synaptic signaling*

To date, many genetic variations have been associated with schizophrenia, but we understand very little about how they contribute to disease. A better understanding of the underlying developmental pathways will be key to develop more effective treatments and methods of prevention. Therefore, this project aims to study the functional implications of novel candidate genetic variations using human induced pluripotent stem cell (hiPSC)-derived models.

We identified a de novo fusion transcript based on whole genome sequencing data from a large Taiwanese schizophrenia cohort of trios (proband and both parents). For functional studies we used Epstein-Barr virus (EBV)-immortalized lymphoblast cell lines from the proband and both parental control lines to derive patient-specific hiPSCs, and subsequently neuronal progenitor cells. We are currently differentiating these cell lines into neurons to test for molecular and functional implications of the fusion transcript, by evaluating gene expression levels, neuronal maturity, network formation/synaptic connections (e.g., immunocytochemistry to identify neuronal subtypes, Sholl analysis to determine dendritic complexity, measures of synapse density).

**Verhoef, Tessa**, UC San Diego  
**Department/Major:** Communication, Electrical and Computer Engineering  
**Mentored by Professor Carol Padden, Communication**  
**Professor Nuno Vasconcelos, Electrical and Computer Engineering**

*Measuring and analyzing human communicative behavior in gesture and sign*

Language is one major characteristic that makes humans unique as a species. This project aims to study how communication systems emerge as multiple people gradually agree on shared behaviors, and novel languages move from mind to mind. Previous work has shown that language-like systems can emerge spontaneously in the laboratory when people are asked to communicate with simple signals such as whistles or
drawings. When these toy languages are transmitted from person to person, features of language structure appear. These laboratory methods are increasingly being used with more realistic signaling modalities such as gesture, resulting in richer and more complex data. This creates the need for more advanced computational methods for analysis. In this project we develop novel methods for analyzing video and depth data capturing human (communicative) behavior. We are designing and implementing techniques that will allow us to identify features in this data and quantify properties of gesture and sign language objectively.

Vikram, Sharad, UC San Diego

Department/Major: Computer Science and Engineering
Mentored by Professor Sanjoy Dasgupta, Computer Science and Engineering

Air quality monitoring with cheap hardware
We designed a cheap air quality sensor that monitors CO, NO and other pollutants with the goal of better understanding and eventually improving air pollution patterns over a large area (e.g. San Diego county). We are currently collecting a dataset of sensor measurements from some select locations in Los Angeles. Current sensors are expensive and immobile, but will produce more reliable and precise measurements than those from a sensor with commodity hardware. Future challenges include remote calibration of sensors to produce robust measurements and inference of air pollution in areas without sensors. We look to solve these problems using machine learning and statistical inference.

Villavicencio, Sedna, UCLA

Department/Major: Anthropology, Ethnic Studies
Mentored by Dr. Ross Frank, Ethnic Studies
Omar Padilla, Ethnic Studies

Decolonizing the Museum of Man: A History of Museums, Anthropology and Racism of American Indians
The development of the discipline of anthropology in the United States was founded on inherent racism and the colonialization of American Indians. As an emerging discipline in the 19th century, anthropologists began to collect, curate, and purchase stolen artifacts to fill up new museums. The link between the development of anthropology, the growth of museums and the development of the U.S nation state cannot be ignored. This paper will provide the background of museums, anthropology and American Indians in the colonial context. I argue that museums were created as colonizing institutions of knowledge to further subjugate colonized peoples. I further argue that as Indigenous peoples, we are the gatekeepers of our cultures and must have an active role in deciding how it is being represented. This paper aims to explain how the Museum of Man in San Diego is currently creating a plan to decolonize their museum’s Indigenous collections. Decolonizing museums is imperative for tribal nation building, healing, self-determination and cultural sovereignty.
**Wallace, Courtney**, UC San Diego, Warren College

**Department/Major:** Bioengineering  
**Mentored by Dr. Shu Chien**, Bioengineering

**Biophysical Induction of Smooth Muscle Lineage Differentiation Through microRNAs**

The pivotal role of vascular smooth muscle cells (VSMCs) in regulating vascular tone makes them valuable for tissue engineering. Biochemical stimulation of VSMC differentiation from mesenchymal stem cells (MSCs) through TGF-β has been reported, but the roles of biophysical factors resulting from local microenvironments, such as cell geometry and external mechanical forces, in regulating VSMC differentiation remain largely unknown. We aimed to elucidate how cell elongation modulates VSMC differentiation from MSCs, with a focus on post-transcriptional regulation. Soft lithography techniques were used to fabricate microgrooves for cell shape constraint. Our results showed that MSCs cultured with TGF-β on 10μm-wide microgrooves increased the expressions of SMC contractile markers and the cellular traction forces, in comparison with MSCs on flat surface without constraint. Profiling of myogenesis-related microRNAs suggested that miR-27 and miR-145 play important roles in the biomechanical modulation of SMC differentiation. The gain- and loss-of-function experiments showed that miR-145 mediated the increases of SMC contractile markers and the cellular traction forces exertion induced by elongated cell shape, whereas miR-27 had opposite effects. Our findings serve to advance the understanding of mechano-chemical mechanisms of MSC-to-VSMC transition and contribute to the stem cell-based regenerative medicine.

**Wang, Shen**, UC San Diego

**Department/Major:** Nanoengineering  
**Mentored by Professor Shirley Meng**, Nanoengineering

**Function of additives in perovskite solar cells**

Hybrid organic-inorganic materials for high efficiency, low cost photovoltaic devices have seen rapid progress since the introduction of lead based perovskites and solid-state hole transport layers. 4-tert-butylpyridine (tBP), commonly used in perovskite solar cells (PSCs), is assumed to function as a charge recombination inhibitor, similar to other solar cells. At the meantime, LiTFSI, a small organic lithium salt in PSCs, is assumed function as the p-dopant in perovskite solar cells as its function in other solar cells. However, our researches suggest that the small molecule additives tBP and LiTFSI play key roles in perovskite solar cell: tBP improves the stability of PSCs while LiTFSI enhances the device efficiency. Our research supplies the pathway on how to improve the efficiency and stability of perovskite solar cells by rational design the small molecular additives in PSCs.
Wang, Sumin, UC San Diego, Eleanor Roosevelt College

Department/Major: Management Science, Earth Sciences
Mentored by Professor Richard Carson, Department of Economics
Professor David Fenning, Department of Nanoengineering

Reducing Carbon Dioxide Emission from Cement Production
As one of the most energy intensive industries, the cement industry contributes around 5% of global anthropogenic CO2 emission. If CO2 emissions from the cement industry can be reduced, it can have a great impact on cutting down global man-made carbon emission and slowing down the global warming process. In my research, I focus on the responses of cement prices to increasing carbon tax, and I study how cement plants will react to higher carbon price with currently available technologies and R&Ds. I built four models to illustrate the effects of a carbon tax, improvements of energy efficiency, transition to renewable fuels and adoption of carbon capture technology on cement price. My conclusion is that the cement industry has the potential to significantly reduce CO2 emission by saving energy, switching to environmental friendly energy sources and installing carbon capture technologies. A carbon tax can provide motivations for cement industries to lower fuel cost and run efficiently. Because of the possibility of technology switching, the impact of a carbon tax on cement prices is likely to be considerably less than generally thought.

Wang, Xinyuan, UC San Diego

Department/Major: Electrical and Computer Engineering
Mentored by Dr. Mingxiong Huang, Radiology

Fear learning and extinction
MEG as a new imaging method is applied on conditioned fear and extinction learning performance on people with PTSD symptoms and healthy groups. With a MEG source imaging inverse technique called "Fast-VESTAL" we are able to localize the source activation on brain regions of interest. The brain areas which are highly related to human's fear learning and extinction show strong response, definitely validate their functionality in this research.

Welkie, David, UC San Diego

Department/Major: Center for Circadian Biology, UCSD
Mentored by Professor Susan Golden, Biological Sciences
Professor Bernhard Palsson, Bioengineering

Unique attributes of cyanobacterial metabolism revealed by improved genome-scale metabolic modeling
The model cyanobacterium, Synechococcus elongatus PCC 7942, is a genetically tractable obligate phototroph that is being developed as a possible host for the bioproduction of high-value chemicals. Genome-scale models of metabolism are important tools for metabolic engineering and production strain development. Models of phototrophic metabolism have been limited by the lack of experimental datasets for model validation and the challenges of incorporating photon uptake. We developed a
model of metabolism in S. elongatus using gene essentiality and physiological data specific to photoautotrophic metabolism. The model explicitly describes photon absorption and accounts for shading that results in the characteristic linear growth curve of photoautotrophs. Model predictions of gene essentiality were compared with data obtained from dense-transposon mutagenesis experiments, providing major improvements to the models accuracy. We present a validated and manually curated model of metabolism in S. elongatus that leads to 1) discovery of unique metabolic characteristics, 2) highlights poorly understood areas of metabolism, and 3) accurately quantifies light input and self shading. This coupling of experimental data and new photoautotrophic modeling methods resulted in a highly accurate model that can be used as a basis for metabolic design.

### Wentworth, Kara, UC San Diego

**Department/Major:** Communication, The Bioregional Center for Sustainability Science Planning and Design  
**Mentored by Dr. Keith Pezzoli, Communication**

**Science Communication at UC San Diego: a "rooted" approach**

How can we prepare a next generation of researchers to maximize the societal impact of their work through mutually beneficial partnerships and effective communication with communities? What sorts of skills will graduating PhDs need for work in or outside the academy? What does it mean for scientific research to take place in the world rather than "on" it?

As a FISP postdoc, I am working to set the groundwork to launch an interdisciplinary graduate program in Science Communication.

In this presentation, I will present a vision for science communication that is not just disseminating information out to communities, but that engages deeply with the people our research impacts to determine research questions and directions.

### Wittich, Christine, UC San Diego

**Department/Major:** Structural Engineering  
**Mentored by Professor Tara Hutchinson, Structural Engineering  
Professor David Sandwell, Scripps Institute of Oceanography**

**Seismic Hazard Estimates Based on High-Fidelity Dynamic Analyses of Precarious Rock Systems**

Reliable estimates of seismic hazard are essential for the development of resilient communities; however, estimates of rare, yet high intensity earthquakes are highly uncertain due to a lack of observations and recordings. Lacking this data, seismic hazard analyses for critical structures, such as nuclear waste repositories, are typically based on extrapolations from earthquakes with more moderate return periods, which can lead to physically unrealistic earthquake scenarios. However, the existence of certain precariously balanced rocks can be used to deduce an upper bound ground motion, which precludes toppling of the balanced rock, over its lifetime. Given that the age of these formations is typically in the tens of thousands of years, this upper bound over its lifetime can be used to constrain seismic hazard for very rare earthquakes. This research...
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aims to implement a robust numerical model for toppling predictions of certain precariously balanced rocks. The primary outcome will be improved estimates of seismic hazard for critical structures, which require an analysis of very infrequent earthquakes.

Xuanyi, Ma, UC San Diego

Department/Major: Bioengineering, Nanoengineering
Mentored by Professor Shaochen Chen, Nanoengineering

A 3D Printed Human iPSC-derived Hepatic Model That Help Improve In Vitro Liver Functional Maturation

[Abstract redacted owing to proprietary information.]

Yeh, Allan, UC San Diego, Marshall College

Department/Major: Computer Science
Mentored by Dr. Ross Walker, Engineering

Interacting with Chemical Software

For this past summer, I have been immersing myself in chemical software, and how my background in Computer Science can grow and adapt with a viewpoint from another field of study.
I’ve been working on developing a Molecular Database, in which new molecules can be uploaded for users to download and use in their own molecular simulations.
In the course of working on this project, I’ve learned how my previous studies in Chemistry have helped my understanding of my project.
The FISP scholarship has helped give me a better understanding of how my knowledge of Computer Science can be applied to the world at large.

Yisimila, Ainiwaer, UC San Diego, Marshall College

Department/Major: Communication
Mentored by Professor Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Creating a “Zero Net Energy Community” in Encanto

[Abstract redacted owing to proprietary information.]
Yu, Ian Francis, UC San Diego, Sixth College

Department/Major: Urban Studies and Planning, Communication Studies
Mentored by Dr. Fonna Forman, Political Science
Professor Teddy Cruz, Visual Arts

Blum Summer Field Internship 2016: Field validation, toward a huertito educativo in San Ysidro

The BSFI internship focused on evaluating sites where food production is currently taking place in the community of San Ysidro as well as vacant lots where a future garden could potentially be developed. The recent establishment of an Urban Agriculture Incentive Zone in San Diego (outlined in A.B. 551) provides leverage for community organizations to negotiate with property owners toward developing such a project.

To help build a strong case for a community garden in San Ysidro, it is important to foment community capacity through platforms for the exchange of knowledge about growing food plants. Some community members are already knowledgeable about the process of cultivating food, and many express a sincere desire to learn the basics of gardening. As a product of this exchange, interested community members formed a garden committee that will organize efforts towards planning workshops and potentially establishing a community garden. In summer 2016, with this committee, the San Diego Master Gardeners’ Association, and in collaboration with Girl Scout Troop #5912, the 2016 BSFI San Ysidro cohort constructed a series of raised garden beds and an experimental vertical garden at the San Ysidro Community Center.

Yue, Bertha, UC San Diego, Warren College

Department/Major: Visual Arts
Mentored by Professor Falko Kuester, Structural Engineering and Computer Science
& Engineering

Using photogrammetry to create a 3D model of the Chaco pueblos in the American Southwest
[Abstract redacted owing to proprietary information.]

Zarate, Daniela, UC San Diego

Department/Major: Biological Sciences
Mentored by Dr. Joshua Kohn, Biological Sciences
Dr. Ronald Burton, Scripps Institution of Oceanography

Patterns of Genomic Admixture in Africanized Honeybees

The African honeybee subspecies was brought from southern Africa to Brazil in the 1950s for experimental breeding purposes. These honeybees soon escaped and interbred with preexisting European honeybees (EHB) creating a hybrid known as the Africanized honeybee (AHB), or the “killer bee. AHB proved to be incredibly well adapted to the environment and they quickly expanded their range across the continent, replacing EHB along the way. The replacement of EHB by AHB suggests that AHB possess ecologically advantageous traits. In addition to high aggression, AHB exhibit
faster colony growth rates and increased resistance to the Varroa mite, a dominant honeybee parasite and a leading cause of colony collapse. The hybrid genome of the AHB poses many questions that may shed light on the success of AHB invasion and expansion. The AHB genome is made up of a majority of genes derived from the African subspecies with the rest of the genome derived from the European subspecies. Less well known is which regions of the genome come from each ancestral source and how consistent this pattern has been as AHB expanded north from Brazil, hybridizing with, and replacing, pure EHB populations.

Zhang, Chen, UC San Diego

Department/Major: Nanoengineering
Mentored by Professor William Gerwick, Scripps Institution of Oceanography
Professor Garrison Cottrell, Computer Sciences and Engineering

Small Molecule Accurate Recognition Technology (SMART): A Digital Frontier to Reshape Natural Products Research

In most natural products research (NPR), the characterization of novel compounds as well as the dereplication of known compounds entails the collection and analysis of NMR spectra. This involves the running of NMR spectroscopic experiments for the purpose of partial structure construction, assemblage and relative stereochemistry determination. As exciting advancements in the rapid genetic and proteomic approaches have made their way into NPR, conventional NMR practices have become one of several bottlenecks in the characterization and dereplication of new compounds. In regard to this challenge, we leveraged the advantages of Non Uniform Sampling Nuclear Magnetic Resonance (NUS NMR) and Artificial Intelligence to create Small Molecule Accurate Recognition Technology (SMART) as a tool to speed up marine natural products discovery. Fast NMR techniques like NUS NMR have the potential to further reduce detection limits while maintaining the same sampling time and quality. Next, we applied over 4100 experimental Heteronuclear Single Quantum Correlation (HSQC) spectra for the AI training. By testing different HSQC spectra using this algorithm, we can rapidly generating hypotheses about the relationship of new molecules to those used for the training based entirely on their NMR properties.

Zhang, Lin, UC San Diego

Department/Major: NanoEngineering
Mentored by Dr. Sheng Xu, NanoEngineering

Two-dimensional multiplexed soft ultrasound devices for non-destructive testing

Ultrasound devices for non-destructive testing provide an effective way in structure inspection. However, the complex geometries of components create challenges for structure evaluation. The commercial planar and rigid ultrasonic probes are not suitable for irregular surface, which lead to poor inspection performance. In this project, two-dimensional multiplexed soft ultrasound devices are developed, which can be seamlessly integrated on structure components with complex geometry and irregular surface for NDT application. The device is microfabricated by transfer printing thin layers of patterned metal electrodes, piezoelectric 1-3 composites, and polymer encapsulation...
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Zhang, Huanqiu, UC San Diego, Eleanor Roosevelt College

Department/Major: Physiology & Neuroscience, Mathematics - Applied Sciences
Mentored by Professor Shelley Halpain, Biological Sciences

Short and Long Term Cytoskeletal Changes in Response to Transient Neurocellular Stress

Chronic traumatic encephalopathy (CTE) is a neurodegenerative condition triggered by transient neurocellular stress and hyperactivation of glutamate receptors. At autopsy, CTE is also strongly associated with pathological changes in the neuronal cytoskeletal protein tau, whose missorting and aggregation into tangles is a hallmark of Alzheimer's disease. Our lab has described a dramatic actin filament reorganization following brief hyperactivation of glutamate receptors. F-actin, normally enriched in dendritic spines, accumulates in the dendritic shaft in long bundles. We used cultured rat hippocampal neurons to investigate the potential relationship between these and other cytoskeletal changes, and their potential to predispose neurons to neurodegeneration. Preliminary data show that two microtubule associated proteins having similar function responded differently to glutamate excitotoxicity: microtubule-associated protein 2 (MAP2) drastically decreased in 90% of the neurons within minutes; in contrast tau was missorted to the somatodendritic compartment, and adopted a pretangle conformation that is associated with Alzheimer's disease. While MAP2 was lost within minutes, appearance of aberrant tau required several hours. Future experiments will explore a potential functional connection among these changes and F-actin reorganization, and explore their consequences for neuronal function and stress resistance.

Zhao, Ziyi, UC San Diego, Muir College

Department/Major: Physics
Mentored by Dr. Heather Henter, Natural Reserve System, Office of Research Affairs

Making research inclusive: instructional videos in multiple languages for The San Diego Biodiversity Project

A team of three undergraduate students from both sciences and arts will join forces to create multilingual instructional videos for use in a course-based authentic research project entitled the San Diego Biodiversity Project. In this project, students in science courses contribute to an international effort to document the world's unknown
biodiversity. We know that biodiversity is critical for ecosystem functioning, yet most biodiversity remains undocumented and unknown. UCSD students have been using molecular methods to address this biodiversity knowledge gap locally and the project has now scaled up to include community colleges across southern California. Our partner schools all have large populations of students speaking English as a second language, however. Our collaborators have told us that language skill is the main challenge to implementing this research in their science courses, and they have requested a series of “how-to” videos in English, Spanish, and Arabic. The videos will show the research process from beginning to end, including examples of the type of troubleshooting that is required when generating novel data. By making original biodiversity research accessible to more people, UCSD students will make a real contribution to conservation.

Zheng, Emily, UC San Diego, Sixth College

**Department/Major:** Media

**Mentored by Professor Falko Kuester,** Computer Science and Engineering

**Media in the field**

Media coverage is often overlooked during field expeditions. Videos, images, and audio provide important context for the work being done by researchers collecting data in field work such as archeological excavations or documenting historical sites. As a part of CHEI, my team collects data for the purposes of 3D reconstructions. This is done through techniques such as LiDAR scanning, SFM, CaveCams, and UAV imaging. While the processed results from these methods are the end goal, the actual production process of data collection often gets ignored. My work concerns the recording of the labor behind data collection as it happens in the field to show the techniques and challenges of working in variable and changing situations. In this presentation, I will show media produced in field expeditions with CHEI to San Marino and Chaco Canyon.

Zientara-Rytter, Katarzyna, UC San Diego

**Department/Major:** Biology, Shiley Eye Institute

**Mentored by Professor Suresh Subramani,** Biology

**Dr. Radha Ayyagari,** Shiley Eye Institute

**Assembly of the pexophagic receptor protein complex**

Peroxisomes are cellular organelles present in all eukaryotic organisms. They are involved in lipid metabolism as well as detoxification of reactive oxygen species. Therefore, it is extremely important to understand the mechanisms underlying peroxisome clearance. When peroxisomes become old, abnormal or dysfunctional, they are degraded mainly by pexophagy, which is a type of selective autophagy wherein peroxisomes designated for degradation are recognized specifically by the pexophagy receptors and targeted for destruction in lysosomes or in vacuoles. However, despite the significant role of pexophagy in maintaining peroxisome homeostasis, the pexophagy process is still not fully understood and the molecular basis for regulation of pexophagy remains unclear. Therefore, our goal is to deepen understanding of pexophagy by describing molecular player involved in the assembly of the pexophagic receptor protein complex what allow establish proper therapy for patients with retinal disorders involving such proteins.
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The Frontiers of Innovation Scholars Program (FISP) was launched after the UC San Diego Strategic Planning process identified four research themes to focus on as we build the student-centered, research-focused, service-oriented public university of the future. These themes are:

- Understanding and Protecting the Planet
- Enriching Human Life and Society
- Exploring the Basis of Human Knowledge, Learning and Creativity
- Understanding Cultures and Addressing Disparities in Society

FISP supports these research priorities and continues the university’s investment in access and affordability for all students interested in an exceptional educational experience. This program will build the interdisciplinary expertise necessary to address society’s greatest challenges and forge new intellectual enterprises, which increasingly rely on the ability to work across diverse disciplines, either individually or as members of multidisciplinary teams.