4TH ANNUAL UNDERGRADUATE RESEARCH & CREATIVITY

Friday, April 21, 2017
Lamar University, Beaumont, Texas

Office of Undergraduate Research
Lamar University
Sponsored by the Office of Undergraduate Research

The event includes 120 presentations by 250 Lamar University students mentored by 88 faculty mentors representing 28 academic departments. All abstracts were reviewed and selected by the Office of Undergraduate Research.

All accepted abstracts are published and listed alphabetically by the primary author’s last name.
FOURTH ANNUAL
Undergraduate Research
Expo 2017
April 21, 2017

Dear Students, Colleagues, and Guests,

I would like to welcome you to the Fourth Annual Undergraduate Research Expo. We are pleased to include 120 presentations by 250 students working with 88 faculty mentors representing 28 academic departments. This is a significant increase from last year where 59 scholarly research projects were presented by 98 students mentored by 43 faculty.

Nearly four and half years ago the Office of Undergraduate Research (OUR) was created to promote and support student success through faculty-mentored undergraduate research, creative inquiry, and other scholarly experiences. We provide OUR grants, Summer Undergraduate Research Fellowships (SURF), travel grants and host faculty talks and workshops throughout the year.

Today is your day for a celebration of your scholarly accomplishments. I would like to thank all the students and their faculty mentors for taking the time to share your work with the university community. I want to thank the guest speaker Dr. Rissa Potter, and the keynote speaker Dr. James Bruce. Many thanks go to Dr. Kenneth Evans, LU president and Dr. James Marquart, LU Provost and VPAA. My special thanks to all deans and chairs. I could not have done this without the support of the OUR Advisory Committee. Finally, I would like to express my deepest appreciation for the time, energy and dedication that Antoinette Henry and Audrene Edwards give toward the success of the OUR.

Throughout this conference, I ask you to stay engaged, keep us proactive and help us shape the future of the Office of Undergraduate Research. My personal respect and thanks go out to all of you.

Sincerely,

Kumer Pial Das, PhD
Director, OUR

CONTACT US:
CHEMISTRY, ROOM 115A
P: 409-880-8430
E: antoinette.henry@lamar.edu
James D. Bruce graduated from Lamar University in 1958 with a B.S. degree in Electrical Engineering and a B.S. degree in Mathematics. In 1960, he received the S.M. degree in Electrical Engineering, and in 1964, the Sc.D. in Electrical Engineering from the Massachusetts Institute of Technology. That year he also joined the faculty of the Department of Electrical Engineering and Computer Science at MIT being promoted a decade later to Professor of Electrical Engineering. Over the 40 years of his service as a faculty member at MIT he had many roles, including Associate Dean of Engineering. He also served for 20 years as MIT’s Vice President for Information Systems and Chief Information Officer, the first person to hold this position. Professor Bruce received the MIT’s Gordon Y. Billard Award for Exceptional Service to the MIT community with a citation stating that he had “set a new standard for MIT commitment and service.”

As CIO, Professor Bruce was responsible for directing the evolution, integration, and effective use of computing and communications resources throughout MIT. In the early 1990s, Professor Bruce was a founder of NEARnet, the first academic and research IP-based network for the New England states. From 1999 to 2002, he chaired the Network Planning and Policy Advisory Committee for Internet2, and was a member of the Board of Trustees for the University Corporation for Advanced Internet Development.

Following his retirement from MIT in 2004, Professor Bruce joined MOR Associates to design and then offer a leadership development program delivered to staff at many of this nation’s top research-focused universities. To date this program has been offered some 80 times to about 2800 individuals. Professor Bruce was recognized for these activities by being named the first recipient of Internet 2’s William ‘Brit’ Kirwan Mentorship Award which recognizes individuals known throughout their community as “encouragers,” people who enhance career development in others, believing that proven leaders grow other leaders. Dr. Bruce directed a cash gift associated with the award to the Department of Electrical Engineering at LU, which, along with a matching gift from Dr. Bruce and his wife, funded the 2016 X-plore LUEE Camp for junior high school girls. A similar gift from MOR Associates will fund the 2017 camp.
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<td>11:30 AM – 12:00 PM</td>
<td>Registration – Education Building</td>
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<tr>
<td>12:00 PM – 12:30 PM</td>
<td>Welcome (Room 101 – Education Building)</td>
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<td></td>
<td>Dr. Kumer Das</td>
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<td></td>
<td>Director, Office of Undergraduate Research</td>
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<td>Dr. Kenneth Evans</td>
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<td>President, Lamar University</td>
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<td>Dr. Catalina Castillón</td>
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<td>Asst. Director, Office of Undergraduate Research</td>
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<td>Dr. Rissa Potter</td>
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<td>Executive Director, Council of Public University Presidents and Chancellors</td>
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<td>12:35 PM - 1:35 PM</td>
<td>Poster Exposition – Session I – Maes Building</td>
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<td>1:40 PM – 2:40 PM</td>
<td>Concurrent Oral Presentation – Session I – Maes Building</td>
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<td>Poster Exposition – Session II – Maes Building</td>
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<td>3:50 PM – 4:50 PM</td>
<td>Concurrent Oral Presentation – Session II – Maes Building</td>
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<td>5:30 PM – 7:30 PM</td>
<td>Dinner and Closing Ceremony – John Gray Library, 8th Floor</td>
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<td>• Dinner</td>
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<td>• Keynote Speaker</td>
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<td></td>
<td>Dr. James Bruce</td>
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<td>Professor of Electrical Engineering Emeritus, MIT and Vice President for Information System Emeritus</td>
</tr>
<tr>
<td></td>
<td>• Award Ceremony</td>
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</tbody>
</table>
Developing a User - Prosthetic Limb myoelectric interface
Aleksander Allen | Mentor: Dr. WeiHang Zhu
Electrical Engineering
*Presentation will begin at 1:40 PM*

Large-Scale Fabrication of Graphene-Based Membrane Modules for Water Desalination
Isaac Angeron, Michael Munther, and Jayna Patel | Mentors: Dr. Keivan Davami and Dr. Maryam Vasefi
Mechanical Engineering
*Presentation will begin at 1:55 PM*

Fabrication of Strong and Lightweight Metamaterials through a Combination of Advanced and Traditional Manufacturing Processes
Christian Dao, Michael Munther, Mehrdad Mohsenizadeh, |
Mentors: Dr. Keivan Davami, Dr. Ali Beheshti, and Mr. Kurt Dyrhaug
Mechanical Engineering
*Presentation will begin at 2:10 PM*

Nanoparticles as Lubricant Additives for Friction Reduction in Internal Combustion Engines
Andrew Hunt | Mentor: Dr. Ali Beheshti
Mechanical Engineering
*Presentation will begin at 2:25 PM*

BORDERS: How the Indie Game Formula Can Successfully Bypass Game Publishers
Gonzalo Alvarez | Mentor: Mr. Christopher Troutman
Studio Arts
*Presentation will begin at 1:40 PM*

Lamar in the 1950s: A Decade of Study
Carter Beck | Mentor: Dr. Mary Scheer
History
*Presentation will begin at 1:55 PM*

Suburbanization and Racial Segregation in Jefferson County, Texas
Nathan Vaughn | Mentor: Dr. Jeff Forret
History
*Presentation will begin at 2:10 PM*

Assessing Elementary Pre-Service Teachers’ Renewable Energy Education Awareness
Shelby Garbee | Mentor: Dr. Mamta Singh
Education
*Presentation will begin at 2:25 PM*
Theorycrafting: The Hidden Mathematical Analysis of Optimal Play in Massively Multiplayer Games.
Tera Benoit | Mentor: Dr. Jennifer Daniel
Mathematics and Computer Sciences
Presentation will begin at 1:40 PM

Work in Progress: Materials Mechanical and Thermo-Electrical Properties’ Role in Aerospace Applications and their Use for Active Flow Control
Carlos Caballero | Mentor: Dr. Cristian Bahrim
Mechanical Engineering and Physics
Presentation will begin at 1:52 PM

A New Method to Determine the Shape of a Glowing Object: Departure from a Regular Signal Driven by Malus’ law
Zakary Noel, Gabbrianna Escamilla, Daniel Cove, and Suzanne Wheeler | Mentor: Dr. Cristian Bahrim
Physics
Presentation will begin at 2:04 PM

Thor Sequences
Aaron Phillips | Mentor: Dr. PJ Couch
Physics and Mathematics
Presentation will begin at 2:16 PM

Effect of Surprise and Investor Expectations on Return
Tristan Crecelius | Mentor: Dr. Kumer Das
Mathematics
Presentation will begin at 2:28 PM

Sancho Panza’s Learned Irrationality
Laura Fiedler | Mentor: Dr. Catalina Castillón
Spanish
Presentation will begin at 1:40 PM

Thematic Connections of “The Impertinently Curious Man” in Quixote
Nancy Figueroa | Mentor: Dr. Catalina Castillón
Spanish
Presentation will begin at 1:50PM

The Intent of Religion in Don Quijote
Julia Gros | Mentor: Dr. Catalina Castillón
Spanish
Presentation will begin at 2:00 PM
The Legacy of Quijote on 21st Century Pop Culture
Humberto Jiménez | Mentor: Dr. Catalina Castillón
Advertising and Spanish
Presentation will begin at 2:10 PM

Becoming Quixote
Nathan Tokheim | Mentor: Dr. Catalina Castillón
English
Presentation will begin at 2:20 PM

### CHAIR: DR. MATTHEW HOCH
MAES 109 3:50 PM – 4:50 PM

#### SESSION 2A

Vapor-Liquid-Solid Growth of One-Dimensional Nanostructures
Federico Gasbarri and Michael Munther | Mentor: Dr. Keivan Davami
Mechanical Engineering
Presentation will begin at 3:50 PM

Autonomous Robotic Remediation of the Invasive Red Fire Ant (Solenopsis invicta)
Qiuyi Ma | Mentor: Dr. Harley Myler
Electrical Engineering
Presentation will begin at 4:05 PM

The Effect of Dice Probability on Player Experience in Tabletop Role-playing Games
Jason Miller | Mentor: Dr. Jennifer Daniel
Mathematics
Presentation will begin at 4:20 PM

John Gust, Michael Munther, and Sepehr Salari | Mentors: Dr. Keivan Davami and Dr. Ali Beheshti
Mechanical Engineering
Presentation will begin at 4:35 PM

### CHAIR: DR. DOROTHY SISK
MAES 108 3:50 PM – 4:50 PM

#### SESSION 2B

Students’ Opinions and Experiences of ASL Instruction at the Post-Secondary Level
Kelsey Monceaux | Mentor: Dr. Laura Maddux
American Sign Language
Presentation will begin at 3:50 PM

Encaustic Wax Painting Research
Amy Morris | Mentor: Dr. Donna Meeks
Studio Art
Presentation will begin at 4:02 PM
A Closer Look at the History of Dance Music  
Daniel Pemberton | Mentor: Dr. O’Brien Stanley  
Communications – Film Studies  
Presentation will begin at 4:14 PM

Hope Appeal as a Potential Motivator for Influencing Behavior in the Context of Alcohol Use Among College Students  
Alexandra Sokolova | Mentors: Dr. Jian Raymond Rui and Dr. Natalie Tindall  
Corporate Communication  
Presentation will begin at 4:26 PM

A Critical Analysis of Hawaii Five-O  
Rachel Curtis | Mr. O’Brien Stanley  
Communications  
Presentation will begin at 4:38 PM

CHAIR: DR. SARA HILLIN  
MAES 114  3:50 PM – 4:50 PM

SESSION 2C

The Old Testament: Demonstrating Its Application to Modern Society Through the Man After God’s Own Heart  
Rebekah Newell | Mentor: Dr. Sara Hillin  
English  
Presentation will begin at 3:50 PM

Violence in the Eye’s of Children  
Laura Stager and Vanessa Robinson | Mentor: Dr. Ginger Gummelt  
Social Work  
Presentation will begin at 4:02 PM

Chekhov and Nabokov: Russian Heritage within Literature  
Emily Tassin | Mentor: Dr. Sara Hillin  
English  
Presentation will begin at 4:14 PM

Roaring Red: Lamar in the 1920s  
Rebecca Butler | Mentor: Dr. Mary Scheer  
History  
Presentation will begin at 4:26 PM

A Presidents Path  
Presleigh Green | Mentor: Dr. Mary Sheer  
History  
Presentation will begin at 4:38

CHAIR: DR. MAMTA SINGH  
MAES 101  3:50 PM – 4:50 PM

SESSION 2D

Symbolism and History in “Leyenda de La Tatuana” by Miguel Angel Asturias  
Lakeisha Fontenot | Mentor: Dr. Catalina Castillón  
History  
Presentation will begin at 3:50 PM
The Appeal of “Sonatina”: What Makes It Popular
Briseida Gutierrez | Mentor: Dr. Catalina Castillón
Modern Language
Presentation will begin at 4:05 PM

Never-ending Endings: An Analysis of “El Sur,” by Jorge Luis Borges
Emily Jacobs | Mentor: Dr. Catalina Castillón
Spanish
Presentation will begin at 4:20 PM

Town and Gown: Beaumont and Lamar University
Isaac Valerio | Mentor: Dr. Mary Scheer
History
Presentation will begin at 4:35 PM

Edgar Allan Poe and the Detective Character
Savannah Foreman | Mentor: Dr. Katt Blackwell-Starnes
English
Presentation will begin at 3:50 PM

Improving Nonprofit Strategic Planning
Joshua Gibbs and Derrick Slaton | Mentor: Dr. Enrique Venta
Accounting
Presentation will begin at 4:05 PM

Behind the Bandstand: Jay G. Sims and the Internal Workings of the Sousa Band
Caitlin McAlister | Mentor: Dr. Bryan Proksch
History
Presentation will begin at 4:20 PM

Creating an Enriching Experience through Music and Memory
Bria McZeal and Tyneshia Kelley | Mentors: Dr. Ginger Gummelt and Dr. Elizabeth Long
Nursing
Presentation will begin at 4:35 PM
Poster Session Chairs:

- Dr. Stefan Andrei, Department of Computer Science
- Dr. Nicholas Brake, Department of Civil Engineering
- Dr. Jennifer Daniel, Department of Mathematics
- Dr. Bianca Easterly, Department of Political Science
- Dr. Gina Hale, School of Nursing
- Dr. Ashwni Kucknoor, Department of Biology
- Dr. Judith Mann, Department of Psychology
- Dr. Natalie Tindall, Department of Communication
- Dr. Robert Worley, Department of Social Work and Criminal Justice
- Dr. Jose M. Vega-Guzman, Department of Mathematics
Poster No.

1. **Supercapacitors from Recycled Industrial Mill Scale Waste**  
   Nasim Adebelwahap | Mentor: Dr. Ramesh Guduru  
   Mechanical Engineering

2. **Using Poisson Process to Approximate the Number of HIV Infections**  
   Destiny Allain | Mentor: Dr. Kumer Das  
   Mathematics

3. **Detection of Tritichomonas and Other Parasitic Infections in a Densely Housed Feline Rescue**  
   Ana Bland | Mentor: Dr. Ashwini Kucknoor  
   Co-Author: Carlo Vanz  
   Biology

4. **Effects of Aromatherapy on Stress Levels in BSN Students: A Pilot Study**  
   Naelyn Carruth | Mentors: Dr. Cynthia Pipkins, Dr. Nancye McAfee, and J.T. Seaman, MSN, RN  
   Co-Authors: Jessica Myers  
   Nursing

5. **The Therapeutic Potential of Cannabinoids in Alzheimer's Disease**  
   Merideth Chilton | Mentor: Dr. Maryam Vasefi  
   Co Authors: Ana Bland and Nic Nikoloutsos  
   Biology

6. **Investigation of Enhanced Water Harvesting of Superhydrophobic Nanostructured Surfaces**  
   Kirby Clayton | Mentor: Dr. Chun-Wei Yao  
   Co-Author: Robbie Clarke  
   Mechanical Engineering

7. **Early Detection and Intervention of Voice Problems in School Teachers**  
   Brooke Cleveland | Mentor: Dr. Nandhakumar Radhakrishnan  
   Co-Author: Kelsey Burt  
   Speech and Hearing Sciences

8. **Ancient Medicines in Modern Day Times**  
   Stephanie Constance | Mentor: Dr. Maryam Vasefi  
   Biology

9. **How Information Systems and Data is Used to Control Operations and Influence Management Decisions at the Panama Canal**  
   Tricia Contreras | Mentor: Dr. Mahdi Safa  
   Co-Author: Vidva Tanawade  
   Management Information Systems

10. **The Importance of a Second Hearing Screening for Infants**  
    Stephanie DeMeyer | Mentors: Dr. Diane Clark and Dr. Natalie Tindall  
    American Sign Language & Corporate Communications

11. **Preliminary Assessment of Salt Bayou Watershed Estuary Prior to Enhancement of Freshwater Inflows**  
    Keith Dugas | Mentor: Dr. Matthew Hoch  
    Co-Authors: Datron Brown, Katelin Catching, Claudia Marroquin, Taylor Marshall, and Linda Pham  
    Biology
Siren by Anne Berry: A Visual Response to the Writings of Flannery O'Connor
Jeremy Fam | Mentor: Dr. Jeff Forret
Co-Authors: Emmalee Calvert, Kaily Garcia, Lakyn Schaller, and Rebekah Wells
Art

The Effect of Wait Time on Hearing Aid Battery Life
Baylie Fox | Mentor: Dr. Erin Burns
Speech and Hearing Sciences

Appeals & Spiels: A Comparative Analysis on Alcohol Advertising in the U.S. and Ireland
Amina Gibic | Mentors: Dr. Vivek Natarajan and Dr. Kabir Sen
Marketing & Advertising

Modeling and Prototyping using Additive Manufacturing Technologies
Timothy Gonzales | Mentor: Dr. Stefan Andrei
Co-Author: Greg Yera
Computer Science

The Meadows Subdivision, Beaumont, Texas
Kassie Kolander | Mentor: Mr. Tony Whitehead, P.E.
Co-Author: Clint Dailey, Holden McCollum, Cameron Meyer, Berenice Villalpando and Eric Wooten
Civil Engineering

Development of Novel Cancer Migration Assay Platform for Drug Screening Applications
Yuangao Liu | Mentor: Dr. Ian Lian
Co-Author: Rachel Thompson
Chemical Engineering

The Importance and Different styles of Doctor Patient Connections
Lisette Loza | Mentor: Dr. Sara Hillin
Texas Academy of Leadership

A New Method to Determine the Shape of a Glowing Object: Departure from a Regular Signal Driven by Malus' law
Nicholas Lutz | Mentors: Dr. Mien Jao, Dr. Dan Su, Dr. Qin Qian, and Mr. Andrew Lee
Co-Authors: Zachary Ferguson, James Horne, Travis McCawley, Eric McGuire, and Matthew Shelton
Civil Engineering

Screening of soil bacteria for the prevalence of antibiotic-resistance in local soils of South East Texas
Arianna Mata | Mentor: Dr. Ashwini Kucknoor
Co-Authors: Danny Abdullah, Katelyn Catching, Taylor Reasons, Omar Hamza, Serene Kaqqai, Deja Rout, Minyone Marrs, and Taylor Marshall
Biology

The arrowhead redox-sipper: an all-in-one marsh sediment porewater and redox sampler
Travis McCawley | Mentor: Dr. Matthew Hoch
Co-Authors: C. Marroquine, L. Pham, D. Brown, B.T. Nguyen
Civil Engineering and Biology

The Language of Death: An Analysis of Doctors' Communication with Terminally Ill Patients
Analia Mendoza | Mentor: Dr. Sara Hillin
Liberal Arts & Texas Academy of Leadership
23 Discrimination in the Medical Profession: XX and Minorities
Jazmine Obregon | Mentor: Dr. Sara Hillin
Chemical Engineering

24 Telling it Like it isn't: Challenges of Communication in Medicine
Lauren Ocnaschek | Mentor: Dr. Sara Hillin
Liberal Arts & Texas Academy of Leadership

25 Doctors Are People Too: Analysis of Doctors' Work/Life Balances in the Medical Profession
Matthew Ratley | Dr. Sara Hillin
Biomedical Engineering

26 Children's Views of Violence in Their Lives
Vanessa Robinson | Mentor: Dr. Ginger Gummelt
Co-Author: Laura Stager
Social Work and Nursing

27 Improved K-Means Clustering Algorithm on Hadoop for Big Data Analysis
Frederick Ryans | Mentor: Dr. Sujing Wang
Computer Science

28 Efficient Cargo Forecasting Model for Port Operations
Kaley Sanford | Mentors: Dr. Berna Tokgoz, Dr. Brian Craig, Dr. Maryam Hamidi and Dr. Alberto Marquez
Co-Authors: Veronica Ochoa, Daliwealth Chou, and Erica Borel
Industrial Engineering

29 Is Lying OK in the Medical Profession?
Brendan Sholl | Mentor: Dr. Sara Hillin
General Business

30 Black Deaf Individuals and Interpreters as Allies: An Autobiographical Case Study
Tanasha Slack-Olumoya | Mentor: Dr. Diane Clark
Co-Authors: Sidney Omwuharonye, Karen Corbello, and Lindsay Antley
American Sign Language

31 Work in Progress: Machine Learning in Robotics
Colin Smith | Mentors: Dr. Sujing Wang and Dr. Peggy Doerschuk
Co-Authors: Timothy Gonzales, Timothy Holcombe, Greg Yera, Hannah Leleux, Logan Smith, and Alexander Strong
Computer Science

32 Catalyst Effect on Ammonia Borane-Polyvinylpyrrolidone Hydrogen Storage Composites
Weslynn Taylor | Mentor: Dr. Ozge Gunaydin-Sen
Co-Author: Ramanjaneyulu Seemaladinne
Chemistry

33 The Effect of Cooperative Learning in High School: Student Learning Achievement and Motivation and Challenges from Teachers
Julian VanDevender | Mentor: Dr. Julia Yoo
Interdisciplinary Studies

34 Metabotropic Glutamate Receptor Signaling in Alzheimer's disease
Shreya Vakil | Mentor: Dr. Maryam Vasefi
TALH
A survey of seasonal persistence of common bacterial and viral pathogens in Jefferson County Beaches
Carlo Vanz | Mentor: Dr. Ashwini Kucknoor
Co-Authors: David Narvaiz, Jason Janneaux, and Jami Brown
Biology

Biometric Analysis of Ego Depletion
An Vo | Mentor: Dr. Jeremy Shelton
Psychology

Developing Photo-catalysts for Converting Waste Carbon Dioxide into Saleable Products
Jennifer Watters | Mentor: Dr. Tracy Benson
Co-Author: Karishma Piler
Chemical Engineering

WORK IN PROGRESS: Finding the Composition of Selected Medical Plants through Spectroscopy of Absorption
Suzanne Wheeler | Mentor: Dr. Cristian Bahrim
Physics

Optimizing Inferential Basis for Determination of Kinase Inhibitor Selectivity
Christopher York | Mentor: Dr. Valentin Andreev
Mathematics & Computer Science

Poster No.
1 How Do Doctors Do it? The Perceptions and Expectations of Medical Professionals
Savannah Agee | Mentor: Dr. Sara Hillin
Management Information Systems

2 Associations between Periodontal Pathogens and Alzheimer's disease
Roshney Ali | Mentor: Dr. Maryam Vasefi
Biology & Pre-dental

3 Health Literacy and HIV Knowledge of Young Adults Studying at Lamar University
Oxserio Benites | Mentor: Dr. Gina Hale
Nursing

4 Dynamic Wireless Power Charging System for Electric Vehicles through Electromagnetic Adaptive Optimization
Jacob Bethea | Mentor: Dr. Reza Barzegaran
Electrical Engineering

5 Super hydrophobic Structural Steels
Quaid Campbell | Mentor: Dr. Ramesh Guduru
Mechanical Engineering

6 Energy Production by Anaerobic Digestion of Biomass
Progga Chironoti | Mentor: Dr. Niaja Farve
Co Authors: Afua Adusei, Kofi Afriyie, Louis Ayisi, Ranine Haidous, Paul Hughes, Lamia Rhymee, and Ajin Sunny
Chemical Engineering
Work in Progress: Medicinal Plants with Potential Antimicrobial Activity
Joy Collins | Mentor: Dr. Robert Corbett
Biology

Preparation of Copper-Manganese Catalysts for Methanol Steam Reforming
Alec Defeo | Mentor: Dr. Roland Barbosa
Co-Author: Gino Mart Canlas
Chemical Engineering

Imports and Exports of Central America
Syrissa Dominguez | Mentor: Dr. Mahdi Safa
Co-Author: Joshua Autry
Business

An Investigation of Successful Information Technology Practices for Nonprofit Organizations and Small Businesses
John Ellis | Mentor: Dr. Kami Makki
Computer Information Systems

Work in Progress: Programming is a Snap!: Increasing Knowledge and Interest in Computing
Diego Fernandez | Mentors: Dr. Sujing Wang and Dr. Peggy Doerschuk
Co-Authors: Timothy Gonzales, Hannah Leleux, Timothy Holcombe, Ethan Hall, Colin Smith, Alexander Strong, Greg Yera
Computer Science

More Talking, Less Examining: Communication and Continuity of Care in the Doctor-Patient Relationship
Hope Flores | Mentor: Dr. Sara Hillin
History

Has esotourism reached its peak in Costa Rica? The benefits and drawbacks of the ecotourism powerhouse
Jordyn Glenn | Mentor: Dr. Mahdi Safa
Co-Author: Katie Meeks
Accounting

Robot for Automated Benthic Survey of Pterois volitans Infestation
Tristen Harris | Mentor: Dr. Harley Myler
Electrical Engineering

An Analysis on Greek Ethical Ideals in Western Medicine
Wenzel Ilustre | Mentor: Dr. Sara Hillin
Pre-Med & Philosophy

Utilizing a Music and Memory Program in an Interprofessional Service Learning Environment
Tyneshia Kelley and Bria McZeal | Mentors: Dr. Elizabeth Long and Dr. Ginger Gummelt
Nursing and Social Work

The Effects of Work Hours on Project Safety
James Kight | Mentor: Dr. Mahdi Safa
Co-Authors: Erik Rodriguez, Nick Davis, Luis Suarez, Marco Arellano, Jeremy Zachery
Construction Management

Degraduation of Construction Materials at the New Orleans Hard Rock Hotel
Jean Kim | Mentor: Dr. Mahdi Safa
Co-Authors: Leony Alvarez, Jason Brent, John Stone, and Gary Pattern
Construction Management
Human Resource Department: Port of Beaumont
Michelle Jaramillo | Mentor: Dr. Mahdi Safa
Co-Authors: Mirka Rodriguez, Matt Timmer, Yael Velazquez, and Leonard Wysingle
Construction Management

Effects a Poorly Executed Design Phase has on Cost, Time, and Material
Coy Laughlin | Mentor: Dr. Mahdi Safa
Co-Authors: Tyler Walthall, Colin Bledsoe, Lucas Sammons, and Daniel Hess
Construction Management

Software Advancements, and Uses within the Construction Industry
Anthony Ledezma | Mentor: Dr. Mahdi Safa
Co-Authors: Abigail Saenz, Esther Salazar, Joshua Frank, Juan Hernandez, and Leoany Alvarez
Construction Management

Case Study of Facility Risk Analysis using Computational Tools
Julia Lin | Mentor: Dr. Dr. Helen Lou
Co-Authors: Huilong Gai and Helen Lou
Chemical Engineering

Women in Technology: The Impact of Self-Perception
Alexus Locke | Mentor: Sherry Freyermuth, MFA
Co-Authors: Raven Morse and Susannah Williams
Mechanical Engineering

Sustainability using Concrete Rubblization
Ryan Malone | Mentor: Dr. Mahdi Safa
Co-Authors: Gabe Nevela, Ben Hodges, Charlie Kappelman, and Jacob Major
Construction Management

An Advanced Construction Supply Model
Ryan Malone | Mentors: Dr. Mahdi Safa
Construction Management

Effect of Sea Surface Temperature on Microbiomes of Manicina areolata (rose coral) from Seagrass Habitats of Belize
Hostin May | Mentor: Dr. Matthew Hoch
Co-Authors: Dr. Mark McNab, University of Belize
Biology

Removal of Toxic Mercury Ions from Polluted Water Using Thioether Sacrificial Ligands
Caroline Nwandu | Mentor: Dr. Perumalreddy Chandrasekaran
Co-Author: Troy Selby-Karney
Biochemistry

Search for a nematic state in simulations of colossal m丹方toreisitive manganites
Emily Ochoa | Mentor: Dr. Cengiz Sen
Co-Author: Elbio Dagotto
Chemical Engineering

Improving Disaster Resilience of Power Distribution Network Using Photogrammetry Technology
Manisha Patel | Dr. Mahdi Safa
Chemical Engineering

Software Simulation of Monarch Butterfly Life Cycle of Education and Entertainment
Judah Roden | Mentor: Dr. Timothy Roden
**Port Safety Analysis**  
Marcus Rodgers | Mentor: Dr. Mahdi Safa  
Co-Author: Esther Salazar  
Mechanical Engineering

**Development of an Optimized Compressed Earth Block for the Southeast Texas Area**  
Molly Ross | Mentors: Dr. Mien Jao, Dan Su, T.Thuy Minh Nguyen, and Paul Bernazzani  
Co-Author: Mariam Abedelwahab, Kyle Edwards, Johnita Goodman, Julie Hammond, and Brandon Watkins  
Civil Engineering

**Material sustainability in Southeast Texas**  
Abigail Saenz | Mentor: Dr. Mahdi Safa  
Construction Management

**Modern Roundabout**  
Joanne Scarf | Mentor: Mr. Cory Taylor, PE  
Co-Authors: Ahmad Alzrahani, Madison Floyd, Diego Mingura, Freddy Ordonez, and Tyler Skinner  
Civil Engineering

**Cultures in Cadence: Nursing Student Panel Discussions addressing Unity and Diversity**  
Melissa Schirle | Mentors: Rose A. Harding, MSN, RN, Dr. Regina Hale, Mary Ford, MSN, RN  
Nursing

**Women in The Field: The Impact of Gender On Medicine**  
Aziz Shaaban | Mentor: Dr. Sara Hillin  
Biology

**Expressive Art and Stress Levels in Cancer Patients: A Mixed Methods Study**  
Lauren Smith | Mentor: Dr. Cynthia Pipkins  
Nursing

**Creating Predictive Models for Business Solutions Using Geoprocessing**  
John Stone | Mentor: Dr. Mahdi Safa  
Construction Management

**Exceptional Production of Quality Coffee from Doka Estate**  
Lance Vargas | Mentor: Dr. Mahdi Safa  
Co-Authors: Emily Carl and Madison Cole  
Human Resource Management

**Development of Plant-Microbial Fuel Cells using Southeast Texas coastal march plants**  
Jiaxuan Xu | Mentors: Dr. Ramesh Guduru and Matthew Hoch  
Co-Authors: Avinash Bajaj, Crystal Gardner, Scott Girdwood, Chelsea McDonald, and Deep Narula  
Mechanical Engineering & Biology

**Investigation of inflammatory response of cervical cancer cells to stimulation by Trichomonas vaginalis**  
Eric Yeager | Mentor: Dr. Ashwini Kucknoor  
Biology
Supercapacitors from Recycled Industrial Mill Scale Waste  
*Nasim Abedelwahab | Mentor: Dr. Ramesh Guduru*

The steel industries produce metal oxide based waste materials during the manufacturing processes, known as mill scale, which are of a grave concern from the environmental pollution point of view due to the lack of recycling options. The composition of mill scale is similar to the metal oxide based supercapacitor electrodes, and therefore, in this project, we have investigated mill scale for supercapacitor electrode applications. The mill scale based supercapacitors have been tested for electrochemical performance and then compared with the commercial supercapacitors. This testing is being performed using a multitude of variables, such as different electrolytes and different processes for manipulating the mill scale in order to increase capacitance. The acquired data from our tests has been analyzed using Matlab to accurately compute the capacitance over thousands of cycles of tests. Finally, after all data is acquired, a cost analysis will be performed on both mill scale supercapacitors and commercial supercapacitors in order to accurately compare the two. We plan on making several alterations, such as creating more versions of the mill scale electrode based on time of ball milling, in order to optimize the material for supercapacitor purposes. This project will have a positive impact on reducing mill scale waste and environmental pollution.

How Do Doctors Do it: The Perceptions and Expectations of Medical Professionals  
*Savannah Agee | Mentor: Dr. Sara Hillin*

While in the hospital it is easy for one to feel disconnected. Not physically however, due to intricate wires in your chest and arms making you one with the machines; whose steady buzzing break the silence, imitating a presence in the room. These uncomfortable feelings can lead to anger. Is this place of miracles and machines supposed to be somewhere you feel comfortable? These feelings of disconnect are often blamed and taken out on medical workers. Is it their job to make you feel comfortable or to save the life of the patient next door? This research paper will focus on the perception and expectations of medical workers. Focusing on doctors, this paper will also touch on the impact of nurses in the medical field. I want this research paper to open the eyes of those always expecting perfection from a hospital visit. My main goal is to show that doctors and nurses are people too, who have happened to dedicate their lives to the health of other human beings. I will discuss how media is skewing the perception of doctors to be perfect, using an article from the US National Library of Medicine. I will also reference an article from D.O. Amanda Kirzner that analyzes the popular TV show Grey’s Anatomy and compares it to real experiences. Using these two sources and others, I will provide a different perspective on what doctors and nurses should be capable of. Finally, I will discuss the mental strain of being involved in the medical field. By the end of this presentation, I expect those reading to begin walking into hospitals with more positive, accepting, and grateful attitudes.

Associations between Periodontal Pathogens and Alzheimer’s Disease  
*Roshney Ali | Mentor: Dr. Maryam Vasef*

Alzheimer’s disease is considered one of the leading causes of death. As the deadly disease worsens over time, it degenerates and eventually destroys brain cells causing memory loss. Furthermore, it has no cure or signs of prevention. Alzheimer’s disease is expected to affect more people over the next few years, so it is important to understand the causes and the prevention of the disease. In recent studies, Porphyromonas gingivalis, a pathogen of periodontitis, has been discovered in postmortem brain samples in patients with Alzheimer’s disease. The pathogen may possibly have an important role in starting and progressing the Alzheimer’s disease, because it uses its biofilm to adhere to a host and cause an inflammatory infection. In order to create the infection, the bacteria travels through the dental procedures or by passing through the nerves. The goal of this study is to conduct research by collecting scientific information through a literature review, analyzing data, and establishing a conceptual framework. By further investigating the relationship between Alzheimer’s disease and periodontal disease, the research will help to develop a crucial strategy to prevent or delay Alzheimer’s disease. Finally, the research may help to develop a new drug which will be useful to treat patients with Alzheimer’s disease.
Using Poisson Process to Approximate the Number of HIV Infections  
Destiny Allain | Mentor: Dr. Kumer Das

The Poisson process is a stochastic process used to count the number of events that take place over a certain period of time. The probability of an event taking place is a Poisson distributed random variable and the amount of time between events occurring is exponentially distributed. HIV infections are difficult to track because of the lag in time between contracting the disease and when the symptoms of the disease actually emerge.

Developing a User-Prosthetic Limb myoelectric interface  
Aleksander Allen | Mentor: Dr. WeiHang Zhu

The field of automated prosthetics has many design challenges that have to be overcome in order to develop prostheses that are both effective at improving the quality of life and cost-efficiency. Our research focused primarily on refining the human-prosthetic control interface. An open-source myoelectric sensor array, Myoband, capable of reading the electric potential inside of a user's muscles within the forearm, and the OpenBionsics AdaHand, were used as the research platforms. Our interface decodes the electric signals on the skin of the user's forearm, and is then able to communicate to the prosthetic limb the gesture it needs to perform. Our interface currently supports a few basic, easily differentiable gestures, the electronic signature of which is largely the same from person to person. While the focus of this research was mainly interface oriented, improvements to the design of the prosthetic hand, as well as an array of sensors focused on the use of controlling a prosthetic limb have been discussed and will be implemented into the future designs. Furthermore, per-user calibration will allow for more gestures, as well as precision control. The ultimate goal of this research is to develop a portable, lightweight system that can be used as a natural replacement for individuals that have undergone amputation.

BORDERS: How the Indie Game Formula Can Successfully Bypass Game Publishers  
Gonzalo Alvarez | Mentor: Mr. Christopher Troutman

Research for BORDERS, an indie video game, was gleaned from the paper "Pencils, Paint and Pixels?" completed for the McNair Scholars Program. Collected data focused on how indie video game art styles affect game players' interactive experience. This inspired the creation of BORDERS which combined requisite features of indie games, such as formal aspects, self-publishing, and generating meaning in game content, such as addressing social issues, features that make indie video games an art medium. BORDERS was created after Indiedcade 2017 through "collaboration between the researching artist and coding professionals. BORDERS invites players to simulate the role of a Mexican immigrant crossing the US-Mexican border illegally. "Pencils, Paints, and Pixels" showed a high number of respondents, 70.61%, preferred pixel art representations in indie games, possibly because the ambiguity of pixel art is more engaging than other styles, and as a result, pixel art was used in BORDERS. Lamar University's Department of Art provided a grant to facilitate an art installation and exhibition of the game BORDERS in the SOL Gallery. The grant and public exhibition served as peer review of the game as a work of art. The exhibition of BORDERS received local, national, and international media coverage, as well as online indie game reviews, testifying to the game’s success as an indie video game and the potential of independent publishing to reach wider audiences. Independent publishing can serve as a forum to initiate dialogue about the overlap between art mediums as well as encourage cultural exchange and inclusion.

Large-Scale Fabrication of Graphene-Based Membrane Modules for Water Desalination  
Isaac Angeron, Michael Munther, and Jayna Patel | Mentors: Dr. Keivan Davami and Dr. Maryam Vasefi

Today's population, combined with growing human pursuits is now attributing to our current challenge of Earth's overall water capacity. With water desalination as a major focus on improving this problem we face, finding a better way to create clean water is the key. The aim of this project is to create graphene-oxide membranes for water desalination applications. Commonly used reverse osmosis (RO) is a widespread water purification technology that uses a semipermeable membrane to remove ions and other particles from drinking water. However, RO-related technologies suffer from low desalination capacity and high capital costs. Therefore, development of novel membranes which can reduce the energy consumption together with high water permeability and high salt rejection capacity is highly demanding. Nanomaterials opened a window of opportunity for selection of new materials as
membranes for water purification and desalination. However, many of these materials have proven to be inefficient for this application. Consequently, membrane scientists are continuously seeking out novel membrane materials with high stability and high ion rejection for seawater desalination to surpass the present upper bounds for better membrane performance. Recently, graphene-based materials have emerged as potential candidates with excellent desalination characteristics. In this research, graphene oxide is synthesized via the Tour method. Subsequently, the nematic liquid crystalline phases of GO are produced by the synthesized GO and are then exposed to shear-alignment using a doctor blading to form large-area GO membranes. Finally, these membranes are employed to fabricate membrane modules by using spiral wound configuration. These modules are tested and their properties are reported. Fabrication of large-scale graphene oxide membranes might open doors towards a more efficient water desalination technology.

Lamar in the 1950s: A Decade of Study
Carter Beck | Mentor: Dr. Mary Scheer

Lamar University in the decade of the 1950s was a period of largely rich culture for the university. Lamar also possessed a large amount of spirit during this exceptional period. A great part of Lamar's culture during the 1950s was the football program. At least one page of every Lamar newspaper article at the time gave homage to Lamar's great football program, not to mention the achievements and intense rivalries. Other sports such as volleyball and especially basketball were also a large part of sports culture. Desegregation played a monumental part in 1950s Lamar culture, arguably being the most memorable. Media was an essential factor through the appeal of consumer goods. It is also important to note how the Cold War affected Lamar students during the 1950s. This research will be presented using mostly newspaper articles with the help of biographies. Therefore, this research paper will provide an in-depth analysis of a decade of study of Lamar University in the 1950s.

Health Literacy and HIV Knowledge of Young Adults Studying at Lamar University
Oxserio Benites | Mentor: Dr. Gina Hale

Health literacy is an individual's understanding of health information, and his/her ability to apply it to decision making. This exploratory research focused on health literacy of young adults with regard to the Human Immunodeficiency Virus (HIV). Study participants (N=105) completed the Brief HIV Knowledge Questionnaire (HIV-KQ-18) using Survey Monkey. The internal consistency of the HIV-KQ-18 was analyzed with a Cronbach's alpha of 0.79 obtained for this sample.

Assuming that health literacy and confidence are linked, a question was asked before and after the survey asking subjects to rate their confidence about HIV knowledge. Findings revealed that subjects mean confidence scores decreased after completing the survey (pre-survey $M = 2.58$, post-survey $M = 2.27$).

While the mean score on the HIV-KQ-18 for all subjects was 77%, 18 and 19 year old subjects scored 54%. T-tests ($t(102) = 3.946$) revealed health science majors mean score ($M = 15.13$) was significantly higher ($p = .000$) than non-health science majors ($M = 12.52$). Those who have been tested for HIV ($M = 15.20$) scored significantly higher ($t(103) = 3.404; p = .001$) than those not tested for HIV ($M = 13.050$). Non-Caucasian subjects ($M = 14.35$) scored higher than Caucasians ($M = 13.53$), however, the difference was not statistically significant ($t(103) = -1.175; p = .243$). Although the hypothesis, college young adults will have low HIV health literacy (< 75% on the HIV-KQ-18), was rejected, the results suggest that further education is needed relating to HIV testing, transmission, and prevention.

Theorycrafting: The Hidden Mathematical Analysis of Optimal Play in Massively Multiplayer Games.
Tera Benoit | Mentor: Dr. Jennifer Daniel

Theorycrafting is the colloquial term for community driven mathematical analysis of the various systems of player performance in massively multiplayer role playing online games (MMORPGs). Players use a process called data mining to recover hidden numbers and coefficients from game files. They then use this information in tandem with testing and simulation to develop formulas that are used to inform mathematically optimal player performance. This research develops an overarching analysis of the various ways in which these communities collect and parse their data in an effort to understand how the interaction of developer design vs. player behavior has and will
continue to influence the development of mathematical design philosophy in the ever-evolving gameplay systems of MMORPGs.

**Dynamic Wireless Power Charging System for Electric Vehicles through Electromagnetic Adaptive Optimization**

*Jakob A. Bethea | Mentor: Dr. Reza Barzegaran*

Delivering efficient power to Electric Vehicle through dynamic wireless charging is proposed due to the deficiency of EV energy storage mechanism. The design optimization of the transmitting and receiving coils will be implemented to reach the efficient power transfer for charging an on-going EV. In order to decrease the battery charging time and charge cycles, an innovative power electronics converter using wide band gap switches will be built. To retain the electromagnetic mutuality between coils, an adaptive actuator with an innovative control technique will be employed. Applying above techniques will lead to have the robust and reliable charging for EVs.

**Detection of *Trichomonas* and Other Parasitic Infections in a Densely Housed Feline Rescue**

*Ana Bland and Carlo Vanz | Mentor: Dr. Ashwini Kucknoor*

Trichomonosis is a disease caused if a cat, dog, or cow is infected with the Trichomonas parasite. *Trichomonas foetus* (*T. foetus*) is a protozoan parasite that likes oxygen deprived conditions inside of the feline colon. There is a specific test for this parasite because it is often confused for Giardia when examined under a microscope. The symptoms of this disease in cats is intermittent diarrhea, the diarrhea can contain blood and mucus. *T. foetus* infections are much more common in densely housed cats, much like in a shelter or a petshop. This study looked into three groups of cats at the same rescue center; a control group that has been treated for all intestinal parasites, a densely populated group that stay next to the house at all times and the third outdoor group stays in the woods most of the day and only comes to the house to eat. *Trichomonas* was detected using culture based method by collecting the samples from different cats and growing in TV InPouch media. Because it is hard to culture *Trichomonas* from swabs, we have also used fecal DNA samples for polymerase chain amplification of specific nucleic acids corresponding to *Trichomonas*, Giardia, Cryptosporidium and Campylobacter sp. Results obtained from the three cat populations are compared to determine the factors leading to frequent infections with parasites.

**Roaring Red: Lamar in the 1920s**

*Rebecca Butler | Mentor: Dr. Mary Scheer*

Lamar University was founded in 1923, allowing students in the southeast Texas region to gain opportunities to broaden their horizons and earn a higher form of education. In a world dazzled by the glittering Jazz Age, the Texas community prospered from the oil and agriculture industries during the 1920s. South Park Junior College held strong influence on the young generations of students within the southeast Texas community and played a large part in helping the community grow during the early twentieth century. This would not have been possible without the efforts of President Louis Pietzch and the first 100 students that walked the halls of South Park Junior College. Yearbooks, student newspapers, and photographs preserve the humble origins of Lamar University. Admission was offered to both male and female students alike for the entire duration of the university's history. The student body remained active in athletics, student organizations, and community events. President Pietzch and president Bingman each brought new life into the university during the years of their presidencies. The origins of Lamar and the lives of the original faculty members and other alumni influenced how Lamar University is known in today's modern view.

**Work in Progress: Materials Mechanical and Thermo-Electrical Properties’ Role in Aerospace Applications and their Use for Active Flow Control**

*Carlos Caballero | Mentor: Dr. Cristian Bahrim*

This presentation gives an overview of recent technological developments in aerospace applications. Composites, avionics, and biomimicry will be among the topics of conversation. We will highlight the relevance of materials’ thermo-electrical and mechanical properties in fuel consumption efficiency. In a broader sense, we will relate materials’ suitability to a variety of aeronautical applications. In particular, we will take a look at how the thermo-electrical and mechanical properties affect materials’ usage for Active Flow Control (AFC) Systems. Materials examined include Aluminum, Titanium, Carbon Fiber, Hardboard, and Cardboard. The end goal of this research is to identify avenues for improving the overall efficiency of aircrafts and even space vehicles.
Moreover, we will present an analysis and a discussion of the latest experimental data gathered with our in-house setup. In our conclusion, we will present future research trends in AFC, as well as other areas of growing interest in the aerospace industry.

**Super hydrophobic Structural Steels**
*Quaid Campbell | Mentor: Dr. Ramesh K. Guduru*

Structural (mild) steels are extensively used in many applications, including bridges, suspension springs, and automobile bodies etc. The steels have problem of corrosion upon exposure to moisture/humid conditions, thereby weakening the structures. In this project, the hydrophobic surfaces on the structural steels will be developed by creating micro and nanostructured rough surfaces through chemical etching process, minimizing the contact angle between water and steel surfaces due to air entrapped between the nanostructures and the water droplet. This allows water to slide off the surface with minimal resistance. These hydrophobic structural steels are expected to last longer in practical applications.

**Effects of Aromatherapy on Stress Levels in BSN Students: A Pilot Study**
*Naelyn Carruth and Jessica Myers | Mentors: Dr. Cynthia Pipkins, Dr. Nancye McAfee, and J.T. Seaman, MSN, RN*

Aromatherapy research suggests the inhalation of essential oils may enhance alertness and diminish anxiety (Morris et al., 1995; Lehrner et al., 2000; Ilmberger et al. 2001). Peppermint essential oil has positive effects of increased attention, performance, and mental acuity through stimulating the conscious mind (Barker et al., 2003). Stress is a common psychological factor that affect physiological factors in nursing students.

The specific aims of this cross-sectional pilot study were (1) determine the baseline stress level (Perceived Stress Scale [PSS]), and (2) evaluate the effectiveness of aromatherapy (peppermint) on physiological factors (heart rate and respiration rate) and psychological factors (Perceived Stress Levels [PSL]) of nursing students.

A convenience sample of baccalaureate nursing students (n=74) enrolled in a nursing course were utilized. Initially, participants completed demographics and PSS. The biophysical markers/PSL were documented at four different timed intervals around aromatherapy diffusion.

Descriptive statistics as means, medians, modes, and distributions showed that results were normally distributed. The PSS mean score (2.008) revealed the students were "sometimes" stressed. The mean PSL scores were 4.6667, 4.4912, and 4.8772 consecutively prior to aromatherapy and 3.2982 post aromatherapy. Means from heart rates, respiratory rates and stress, before peppermint oil was diffused were compared to respective means after oil was diffused using t-test. Analysis showed no statistical significance.

**The Therapeutic Potential of Cannabinoids in Alzheimer’s disease**
*Merideth Chilton, Ana Bland and Nic Nikoloutsos | Mentor: Dr. Maryam Vesefi*

Alzheimer’s disease (AD) is a progressive neurodegenerative disorder which is the leading cause of dementia worldwide. AD is currently incurable, and few treatment options exist with the effects of these drugs having limited success. Due to the known association of cannabinoids with memory, cannabinoids are being investigated for the potential treatment of AD. Cannabinoids have been known to have neuroprotective effects, with many correcting biochemical changes associated with AD. As a result, the use of the endocannabinoid system (ECS) as a target is becoming a promising route to a treatment method for AD. Some specific effects of cannabinoids related to AD include glucose metabolism enhancement, cannabinoid receptor activation, changes in genetic expression to produce fewer amyloid-β plaques, and inactivation of glial cells. A combination of these effects is likely to alleviate the symptoms of AD and restore normal brain function. This review highlights recent discoveries and experiments concerning cannabinoid use to treat AD, as well as provides a brief overview of AD itself. Further research into cannabinoids and their effects on AD could potentially provide a valuable treatment option for those with AD. For this pilot study, clinical significance measured a decrease in heart rates, respiratory rates and stress level after aromatherapy in nursing students. This study is not generalizable. Further study using larger samples is needed, and could yield different results.
Energy Production by Anaerobic Digestion of Biomass
Progga Chirontoni, Afua Adusei, Kofi Afriyie, Louis Ayisi, Ranine Haidous, Paul Hughes, Lamia Rhymee, Ajin Sunny | Mentors: Dr. Niaja Farve and Dr. Kevin Kung

Waste management is crucial in both urban and rural settings. Anaerobic digestion is a cheap and organic way to convert waste into energy by means of microorganisms in the absence of oxygen. This process of producing biogas and converting that to electric power leaves a lower carbon footprint in the atmosphere. In this research, farm litter was used for the anaerobic digestion process through which methane gas was produced. The methane gas was then combusted to produce energy which could potentially be used as electricity in that very poultry farm. A temperature-dependent kinetic model was prepared to predict the biogas output over time at different temperatures and a kinetic constant was found by least squares method that best fit the data and could predict methane and carbon dioxide production over a time-period. A basic process was designed to efficiently produce power from the output biogas of the anaerobic digester. The study analyzed the relationship between the mass flowrate of the farm waste, the energy produced, and the cost of the entire process. It was concluded that the biogas output is linearly related to the inlet flowrate of waste, the hydraulic residence time and the volume of waste in the reactor at any given time. Since the power produced is directly proportional to the biogas output, it is concluded that the power produced, that could be used as electricity in the farm, increases with an increased biogas output.

Investigation of Enhanced Water Harvesting Of Superhydrophobic Nanostructured Surfaces
Kirby Clayton and Robbie Clarke | Mentor: Dr. Chun-Wei Yao

Examples of global climate change have become increasingly more apparent in today's world, and is presently one of the biggest problems society is facing. As the average international temperature continues to rise, accessing fresh water for individual and agricultural use proves to be progressively more problematic. The goal of this project is to fabricate and characterize superhydrophobic nanostructured surfaces to study the underlying physical mechanisms responsible for enhanced water harvesting. If successful, nanostructured surfaces will be used in a portable atmospheric water generator which could extract water from humid ambient air and collect it much more efficiently than conventional surfaces.

Early Detection and Intervention of Voice Problems in School Teachers
Brooke Cleveland and Kelsey Burt | Mentor: Dr. Nandhu Radhakrishnan

Voice problems are common among professional voice users. Teachers, singers, politicians, and sales representatives are some of the professionals in this category. Vocal health is crucial for these people to perform their job. School teachers are the most commonly seen population in a voice clinic. Early detection and intervention can help teachers prevent voice disorders and save their job. This project to identified school teachers developing a voice problem and will implement a group therapy regimen. A hand-held voice recorder was used to collect voice samples of the participants during specific speech tasks used for voice evaluation. A spontaneous speech sample during teaching was also recorded. Noise levels of the classroom were also recorded to analyze noise related levels of vocal effort. This data was collected during the beginning (Monday) and end of the week (Friday). This was continued for four weeks. Participants identified with voice problems will undergo four weeks of voice therapy to alleviate symptoms that was exhibited during recording phase. The goal of this project is to identify teachers developing voice problems and implement a treatment program to educate them about voice production and alleviate vocal symptoms. This will decrease incidence of voice problems in these teachers, enhance their teaching performance, and decrease the number of days they miss work. Voice analysis was performed before and after therapy to study the efficacy of the intervention program. The results of this study identify an approach to detect voice problems in teachers and demonstrate the importance of voice therapy.

Work in Progress: Medicinal Plants with Potential Antimicrobial Activity
Joy Collins | Mentor: Dr. Robert Corbett

Within the past several decades there has been a growing interest in using plants to help improve ailments as an alternative to modern medicine. Bacteria grows more resistant to antibiotics every year causing researchers to think outside the box for new treatments. This research will investigate some well-known plants with antibacterial properties and compare them to plants that have yet to be thoroughly tested for antibacterial properties. Antibacterial activities of Allium sativum (garlic) and Rosmarinus officinalis (rosemary) will be compared to those
of lesser studied antibacterial plants Panax ginseng (ginseng), Silybum marianum (milk thistle), Juniperus communis (common juniper), Sophora flavescens (Ku Shen), and Persea Americana (avocado). The agar well diffusion method will be used with extracts made using different solvents against standard laboratory strains of the bacteria Staphylococcus epidermidis (Gram positive), Escherichia coli (Gram negative), Mycobacterium nonchromogenicum (acid-fast), Klebsiella pneumoniae (capsule forming) and Bacillus cereus (endospore forming) to determine their efficacies against bacteria with different cellular compositions or components that influence virulence. The results from medicinal plant extracts for each bacteria will be compared to current antibiotics to determine if they are likely candidates to use in conjunction with or in place of current antibiotic therapy. The overall goal of this research is to observe the effect of each plant extract on multiple bacteria, determine the most efficient and effective solvent extraction method, and to compare medicinal plant extracts to the effectiveness of antibiotics on the bacteria alone.

**Ancient Medicines in Modern Day Times**

*Stephanie Constance | Mentor: Dr. Maryam Vasefi*

Alzheimer’s disease cost the United States 221.3 billion annually. Texas is ranked fourth in the nation on the amount of cases of Alzheimer’s disease, and second in the number of Alzheimer deaths. The amount of Alzheimer cases is expected to double by the year 2050. Beta amyloid plaques and tangles are sticky pieces of proteins that bump together causing plaques and tangles to form in between neurons. In the case of Alzheimer’s, Beta amyloid plaques trigger an undesired immune response that causes inflammation which may lead to neuronal damage and is unbenevolent to the patient and their medical treatment. Certain medicinal plants used in antiquity are known to manipulate the immune response in a manner to protect neuronal cells and reduce inflammation that would cause additional damage to the patient. Some medicinal medicines are known to neutralize free radical and promote nerve cell viability which may be useful in the treatment of Alzheimer’s disease. By studying these medicinal medicines and their active ingredient extraction techniques, their use could be adopted for positive use in certain hard to treat or untreatable ailments. Many medicinal medicines have limited negative side effects, which would be of a great benefit to patients. The continued research in these medicinal medicines could lead to them being used for the treatment or prevention of Alzheimer’s disease by manipulating the immune system response in a manner to produce a reduction of inflammation and damage to neuronal cells could be of great benefit to patients suffering from this disease.

**How Information Systems and Data is Used to Control Operations and Influence Management Decisions at the Panama Canal**

*Tricia Contreras and Vidya Tanawade | Mentor: Dr. Mahdi Safa*

This work describes the history of the Panama Canal’s information systems, the information systems in place now at the Panama Canal, and offers a glimpse of marine logistics and port technologies for the future. The purpose of this research is to identify how the vast amounts of data created each day at the Panama Canal is collected, transmitted, processed, and used to monitor and conduct daily operations, and how it influences management decisions. The aspects explored include what types of data are collected, the history of technology used at the Panama Canal, the systems, instruments, and equipment used to collect data now, as well as how the data and information is processed, and how the data presented is used in performing tasks and making decisions. Internet research, personal observation, and Panama Canal employee interviews were the main methods used to investigate and collect data about the Panama Canal’s information systems. Academic, industry, and technical journals and articles were also used for gathering information during research. The information gathered and presented in this project provides a groundwork for improvements to logistics technology and management strategies in the port industry.

**Effect of Surprise and Investor Expectations on Return on Investment**

*Tristan Cecelius | Mentor: Dr. Kumer Das*

The stock market is the collection of exchange and markets where the issuing and trading of stocks, bonds, and other types of securities takes place. Companies sell stocks on the stock market to receive capital in order to grow their businesses. Each stock is, in essence, a piece of ownership of the company. The price of a stock and its EPS (earnings per share) shift daily and depend on a variety of factors. One of these factors is directly related to the expectations of the investors and growth versus value stocks. The Nasdaq 100 is a stock market index that is made up of 107 non-financial companies and can be split into different groups, such as growth stocks and value stocks. Investors can use the different aspects of growth and value stocks to make decisions about investing in certain
companies. The primary objective of this study is to analyze how effectively the market predicts a company’s earnings. In particular, the study discusses how the surprise of a company and the expectations of the investors can affect the financial return of the stock.

A Critical Analysis of Hawaii Five-0

Rachel Curtis | Mr. O’Brien Stanley

In a melting pot like the United States or in or globalized society, representation is an important factor some of us can take for granted. Just as children choose the dolls and action figures that look like they do, adults are drawn to characters in the media that are similar to them. While now more than ever the media industry is making great strides to bring to light more women, more characters of color, and more LGBT characters, these characters can be a shallow version of a real individual when written by people outside of these groups. Most Hollywood writers, producers and directors are white men, giving a limited spectrum in the background knowledge of the many lives outside their own and producing white male led stories with caricatures of people of color and shallow, inaccurate women.

This study was over a multitude of tests to measure the quality of representation in a media text to see if these concerns in representation can be overcome in a thrilling, dynamic action/crime procedural. This study is over the 2010 CBS television series Hawaii Five-0.

Preparation of Copper-Manganese Catalysts for Methanol Steam Reforming

Alec Defeo and Gino Martin Canlas | Mentor: Dr. Roland Barbosa

Copper-Manganese (CuMn) oxalates of varying metal ratios have been prepared using coprecipitation method. The thermal decomposition of these oxalates creates CuMn nanoparticles, but variation of the relative amounts of the metal precursors may affect the catalytic properties of the material. FTIR, XRD and DSC have been employed, revealing changes in the structure and coordination of the oxalate, which give rise to differences in reducibility and thermal behavior of the material. These fundamental phenomena will provide insights into rational improvement of the performance of CuMn catalysts in Methanol Steam Reforming.

The Importance of a Second Hearing Screening for Infants

Stephanie DeMeyer | Mentors: Dr. Diane Clark and Dr. Natalie Tindall

More than 50% of infants who are suspected to have a hearing loss are lost to follow-up. This project focused on identifying the barriers, constraints and questions that new mothers of infants up to 9 months old may have regarding hearing loss, Deafness and language development. An online survey was used to collect the data to determine what factors they believe would make them more likely to return to a second screening if their child was determined to have hearing loss at the initial screening.

Our sample had a significant selection bias, due to the participants being pulled from our own social circles as they earned higher incomes and had higher education levels. All their babies had hearing screenings, and all passed. Our original hypothesis was that mothers are not aware of the importance of a second hearing screening. However, results showed that there is an information gap between the healthcare team and the mothers on resources for the second hearing screening. Instead of targeting mothers, we believe that the PSAs should be aimed at healthcare providers and social workers. These should focus on the importance of setting up an appointment with a hearing clinic and making sure the mother has transportation and child care before they leave the hospital. A second series of focus groups will be required to assess the effectiveness of the PSAs.

Fabrication of Strong and Lightweight Metamaterials through a Combination of Advanced and Traditional Manufacturing Processes

Christian Dao, Michael Munther, Mehrdad Mohsenizadeh | Mentors: Dr. Keivan Davami, Dr. Ali Beheshti, and Mr. Kurt Dyrhaug

The objective of this research is to design and fabricate lightweight strong structures by taking advantage of the concept of metamaterials. The strength and lightweight characteristics of metamaterials are attributed to their complex architecture rather than their composition. Metamaterials are a premium in engineering with a wide range of applications in areas such as transportation, aerospace, and military. These complex geometric structures are usually created through advanced fabrication techniques that are expensive and complicated. In this research we will investigate a new route for their production by combining traditional and additive manufacturing processes.
First, we will design various structures that exemplify the strong and lightweight characteristics that accompany metamaterials using ABAQUS. This will be achieved by carefully engineering the architecture of the elements of the structure. It is through this careful design that superior strength at low densities can be achieved. The final design will be printed using a highly accurate stereolithography (SLA) 3D printer and will be used to create a mold. The finished 3D printed model will then be coated with a ceramic slurry and after the ceramic becomes hard, the 3D printed structure will be removed to achieve a ceramic shell with a cavity in the shape of the 3D printed structure. Molten aluminum will then be poured into the mold to form a cast of our 3D printed structure. The fabricated structures will endure various mechanical testing such as tensile and compression tests and their properties will be compared with the simulation results. Through this research we will present methods to generate complex metamaterials from various metals with the help of a 3D printed sacrificial structure. We will also investigate the capabilities and limitations of advanced 3D printing for the fabrication of complex structures.

**Imports and Exports: A Daily Grind in Costa Rica and Panama**

*Syrissa Dominguez and Joshua Autry | Mentor: Dr. Mahdi Safa*

Within the six countries that make up Central America, there is significant economic diversity. Some countries are very poor while others are doing very well. Panama and Costa Rica are considerably more developed in terms of GDP per capita. In the past, much of this was dependent on two products: coffee and bananas, and a strong trade link with the United States. However, in recent decades, there has been much success in diversifying exports, and expanding to new trade partners.

The focal point of this research paper will be to explore what makes these two countries tick. One might be surprised to discover that the current largest export for Costa Rica is actually integrated circuits followed by office machine parts. The top export for Panama is led by passenger and cargo ships. We will also examine why exports for Costa Rica are increasing while Panamanian exports are declining.

Lastly, we will learn the importance of the Panama Canal and its significant contribution to world trade. Since 2007, the Panama Canal has been under construction to expand the size of the canal in order to allow larger shipping vessels to pass through. We will explore how this newly expanded Panama Canal that allows greater shipping volumes to pass through it, will also effect jobs and supply chains as well as increased international business partnerships through importing and exporting.

**Preliminary Assessment of Salt Bayou Watershed Estuary Prior to Enhancement of Freshwater Inflows**

*Keith Dugas, Datron A. Brown, Katelin Catching, Claudia Marroquin, Taylor Marshall, and Linda K. Pham | Mentor: Dr. Matthew P. Hoch*

The Salt Bayou Watershed is beneficial to Southeast Texas Gulf Coast region for its storm protection, commercial crab fishery, opportunities for outdoor recreation (fishing, hunting, and nature watching), and productivity of coastal marshes and its estuary. Since the 1950s, marshes adjacent to the estuary have experiences increased inundation frequency, due to subsidence and sea-level rise, accompanied by increased salinity. Subsequent decline of marsh vegetation and increased open water habitat has led to establishment of a management plan for Salt Bayou Watershed that includes using dredge material to elevate marshes and reduction in salinity by constricting tidal exchange while increasing freshwater inflows. These modifications will change the current physicochemical conditions and biological communities that effect productivity in the estuary. Presented here is an initial baseline survey begun in summer 2016 of the Salt Bayou Watershed Estuary, consisting of Salt Bayou and the Shell-Keith Lake system which enters the Neches Sabine Shipping Channel. Physicochemical properties of salinity, temperature, turbidity, dissolved organic carbon, dissolved oxygen, pH, salinity, temperature, light attenuation were measured at six sites along the longitudinal estuarine transect. Continuous monitoring of salinity, temperature, depth and precipitation is being performed between Johnson and Keith Lakes. Water and surface sediments (0-2 mm) were collected for DNA extraction and 16SrDNA analysis of planktonic and microphytobenthic microbiomes. These results will contribute to an on-going baseline study of the estuary prior to implementing increased freshwater inflows, planned to begin in two years.
AN INVESTIGATION OF SUCCESSFUL INFORMATION TECHNOLOGY PRACTICES FOR NONPROFIT ORGANIZATIONS AND SMALL BUSINESSES (BASED ON FINDINGS FROM DCI-MEMBER DRUM & BUGLE CORPS PROGRAMS) [INCOMPLETE]

John T. Ellis | Mentor: Dr. Kami Makki

Drum Corps International, a nonprofit organization in Indianapolis, Indiana annually hosts educational clinics and performance events for students in the United States and beyond. Its main function is an annual summer tour featuring over 42 drum & bugle corps from across the country (also nonprofit programs). This research will observe how the participating organizations successfully assess the challenges of mobility, data security, and digital communication posed by the DCI summer tour through their IT infrastructures. These findings will provide information on how other nonprofits and small businesses can use information-communication-technology solutions that are effective, efficient, and cost-effective.

_Siren_ by Anne Berry: A Visual Response to the Writings of Flannery O'Connor

Jeremy Fam, Emmalee Calvert, Kaily Garcia, Lakyn Schaller, and Rebekah Wells | Mentor: Dr. Stephanie Chadwick

This project explores the themes of innocence, freedom, and gender in the black and white photograph _Siren_ by Anne Berry. Depicting a young woman wearing a wedding dress and encased in glass, _Siren_ is a work inspired by the fiction of American writer Mary Flannery O'Connor, which deals with the nuances of southern identity. Our analysis delves into the biographies of O’Connor and Berry and investigates the ways in which elements of the photograph, such as the medium of gelatin silver print, composition, and use of light and dark, convey the artist's interest in these themes and provoke thought about social norms based on gendered identity.

Work in Progress: Programming is a Snap!: Increasing knowledge and Interest in Computing

Diego Fernandez, Timothy Gonzales, Hannah Leleux, Timothy Holcombe, Ethan Hall, Colin Smith, Alexander Strong, and Greg Yer | Mentors: Dr. Sujing Wang and Dr. Peggy Doerschuk

This project investigates whether high school students' interest and knowledge in computing can be increased by engaging them in an hour-long hands-on game programming lab that is led by undergraduates. The undergraduates create the instructional materials, conduct the hands-on activity and participate in evaluating the effectiveness of the approach. Instructional materials include a partial game that students complete, a set of slides that explain concepts, and instruments that measure students' interest and knowledge in programming before and after the activity. As of this writing, all materials have been created and tested. They will be used and evaluated in a series of on-campus visits by high schools planned for this academic year.

Sancho Panza’s Learned Irrationality

Laura Fiedler | Mentor: Dr. Catalina Castillón

_Don Quixote_ by Miguel de Cervantes Saavedra tells the story of a madman who believes himself a knight errant and pursues adventures with his simple-minded squire, Sancho Panza. Published in two volumes in 1605 and 1615, the work is considered the first modern novel, in part because of its realistic portrayal of humanity. Quixote and Panza are often seen as each other’s antithesis: Quixote as delusional, and Panza as his rational counterpart. However, an analysis of Panza’s speech and actions suggest that his seemingly “rational” behaviors are actually demonstrations of the psychological phenomenon of rationalization, an irrational behavior. This essay will evidence how Panza’s greed motivates him to justify the discrepancy between Don Quixote’s illogical claims and reality because they are a means to his personal gain. The fact that the theory of rationalization was developed well after Cervantes’s time reveals his talent for accurately depicting human behavior, reinforcing his story’s merit and universal recognition.
Thematic Connections of “The Impertinently Curious Man” in Quixote

Nancy Figueroa | Mentor: Dr. Catalina Castillón

“The Impertinently Curious Man” is one of many short stories within Don Quixote. Many scholars have criticized its inclusion as unnecessary. However, while unrelated to the plot, “The Impertinently Curious Man” has strong thematic parallels to Cervantes’ most famous novel. This literary analysis will put forth these connections showcasing the novel’s motifs. The inclusion of “The Impertinently Curious Man” is not superfluous—it expands on Quixote’s message.

More Talking, Less Examining: Communication and Continuity of Care in the Doctor-Patient Relationship

Hope Flores | Mentor: Dr. Sara Hillin

What leads to our satisfaction as patients? What makes us feel as though we are being seen as human by doctors, and not just illnesses that need to be cured? Doctor-patient relationships are a key to quality healthcare. As with any relationship, communication establishes a bond between patient and physician, and continuity strengthens that bond. It is through communication that a doctor learns of the patient’s symptoms, health, and medical history. It is – most importantly – from communication that doctors and patients become familiar with each other, learn to be honest with each other, and trust each other. Moreover, continuous care from a primary physician allows patients the potential to receive personalized care through the bond established by communication. This research paper dissects the doctor-patient relationship by analyzing two important aspects: communication and continuity of care. The research shows how these aspects affect the quality of the doctor-patient relationship, the physician’s ability to treat patients, and patient satisfaction. Where is communication lacking in the doctor-patient interaction? How can doctors connect with their patients, and ensure that their patients are highly satisfied with the care that they are receiving? Why should people consider primary physicians? This paper seeks to reveal the importance of communication, and how communication can be improved between doctor and patient. In addition, the research sheds some light on what exactly determines patient satisfaction during a doctor visit, and how continuity of care increases the likelihood of satisfaction.

Symbolism and History in “Leyenda de La Tatuana” by Miguel Angel Asturias

Lakeisha Fontenot | Mentor: Dr. Catalina Castillón

Miguel Angel Asturias (1899-1974) was a Guatemalan writer and scholar of the twentieth century. His passion for Guatemalan politics and Mayan culture is evident in his writings. In 1930, he completed his first book titled Leyendas de Guatemala. This is a collection of short stories. One of the short stories in this book, “Leyenda de La Tatuana” portrays symbolic messages of Guatemalan history and Mayan culture. Through literary analysis, this presentation will demonstrate how Miguel Angel Asturias effectively used symbolism to create a powerful short story.

Edgar Allan Poe and the Detective Character

Savannah Foreman | Mentor: Dr. Katt Blackwell-Starnes

Edgar Allan Poe is often deemed the “father of the detective story” by critics and fans alike. He uses the recurring detective character that operates on logic and reason in much of his short fiction, including “The Purloined Letter” and “The Murders in the Rue Morgue.” Additionally, Poe supports his detective story motif with use of character symbolism and the investigative style of the master sleuths in his fiction. Poe also uses ratiocination, or the process of exact thinking or reasoning, to formulate his rational analysis theme prevalent in his detective short stories. In this paper I explore the beginning of Poe’s transition from gothic horror narratives to detective fiction that is characterized by a short story entitled “The Man of the Crowd.” The unnamed narrator in this story was Poe’s first attempt at a detective-like character, and through his downfalls as an amateur sleuth, the narrator becomes characterized as a “flaneur.” Second, I explain the creation of Poe’s most famous detective character August C. Dupin and the three qualities that define him. Although Dupin is a master sleuth, his intrinsic qualities such as his alienation from society and his paradoxical personality. However Dupin has many redeeming qualities, such as his superior skills of logical reasoning. Through the creation of these characters, Poe created the genre of the modern detective story.
A question has arisen in the audiology community on whether or not wait time after zinc air battery activation affects battery longevity. This could have a significant impact on end user cost and the environment due to lessened waste. Two sets of three Unitron Moxi Pro hearing aids, programmed to fit a conventional high frequency hearing loss, were used to assess battery life of size 312 and 13 batteries, utilizing wait times of 0, 2, 5, and 10 minutes. Hearing aid run time data was collected via computer datalogging and the number of hours needed for full battery drain were recorded and compared across wait-time trials. Results indicate that there is no significant difference in longevity of battery life in relation to wait time after activation. These results suggest a need for change in audiologists’ counseling and recommendations.

Assessing Elementary Pre-Service Teachers’ Renewable Energy Education Awareness

Shelby Garbee | Mentor: Dr. Mamta Singh

The purpose of this study was to investigate knowledge and attitudes of elementary pre-service teachers towards renewable energy resources. Participants for this study were students enrolled in science methods for teacher’s course. Content knowledge pre-posttests and energy attitude survey were used to measure research objectives. The results suggest that elementary pre-service teachers were educated on renewable energy resources and the student participants were able to develop energy related lesson plans that can be taught in elementary classroom.

Vapor-Liquid-Solid Growth of One-Dimensional Nanostructures

Federico Gasbarri and Michael Munther | Mentor: Dr. Keivan Davami

One-dimensional nanostructures such as nanowires and carbon nanotubes have unique properties that cannot be found in bulk materials, due to their high surface to volume ratios. Their applications in biosensors, photodetectors, etc. have raised a growing interest among the scientific community. Implementing and improving the methods to grow these nanostructures with more control of their properties and morphologies are necessary in order to bridge laboratory curiosity to industrial productivity.

This research aims to design and fabricate a system for the synthesis of one-dimensional nanostructures through the vapor-liquid-solid technique and synthesize a variety of nanowires. The vapor-liquid-solid (VLS) technique is a “bottom-up” mechanism for the growth of nanowires. This method has attracted great attention due to its ability to rapidly generate one-dimensional nanostructures compared to “top down” fabrication techniques. In this system, a quartz tube is placed inside two furnaces, one upstream and the other downstream, each with different temperatures. The powder of the source material is inserted into the tube in the high temperature zone (upstream). In the lower temperature zone (downstream), a substrate coated with a thin layer of metal (catalyst) is placed. When the heat is supplied by the furnaces, the powder sublimes while the catalyst liquefies. Inside the tube a vacuum is created and an inert gas is introduced to carry the particles over the surface of the catalyst. After being moved from the high temperature to the low temperature zone, the particles of the source material solidify and are trapped by the catalyst. Once the catalyst is supersaturated, the source material precipitates in the form of one-dimensional crystals that continue to grow as long as the vapor components are supplied. The outcome of this project is to build a system to synthesize various one-dimensional nanostructures in a controlled manner using a simple and versatile VLS mechanism.

Improving Nonprofit Strategic Planning

Joshua Gibbs and Derrick Slaton | Mentor: Dr. Enrique Venta

Not-for-Profit organizations often fail to make progress towards their mission seemingly due to a lack of guidance from a strong strategic plan. These organizations focus on an endless cycle of raising money for operations, rather than accomplishing the goals on which they were founded. Research in the area of non-profit strategic planning has the ability to increase the efficiency of these organizations, increasing capacity in their particular area of focus. This proposed study focuses on creating a model and analyzing key elements of a strategic plan. This will be done through the consultation of leading texts in the field of not-for-profit strategic planning and distribution of a survey to local not-for-profit executives. The results of this survey will help distinguish inconsistencies in the not-for-profit strategic plans.
The purpose of our research is to analyze and compare consumer advertisements of alcohol products in both the United States and Ireland. Alcohol commercials, ranging from the year 2002 to the current year, will be collected and then analyzed (75-100 ads from the U.S., 75-100 ads from Ireland). Data collection will focus on the appeal used in the ad (image, product, sex, or humor), type of alcoholic beverage promoted, and the audience targeted (young men ages 18-49, young women ages 18-49, sports fans, and niche market: craft beer, health conscious, etc.). Country based statistics on drunk driving, crime statistics linked to alcohol consumption (i.e. drunk brawls) and alcoholic sales by beverage type and the market share of each beverage will also be collected. This will then warrant background research into the policies and interventions in place in both respective countries, leading the research to have a focus on advertising as a response to competitive pressures, as previously mentioned. We hypothesize that the data will show more alcohol advertisements with an appeal to underage drinkers in the United States, due to the higher drinking age minimum. In addition, spirits will have the largest market share in Ireland, while a subtler beverage, such as beer, will assume the largest market share in the United States. Lastly, we hypothesize that the United States will have an emphasis on restrictions in place on the consumer, while Ireland will have more of a restraining hold on the industry itself, thereby explaining the higher alcohol consumption, yet lower alcohol-related mortality rates.

“Has ecotourism reached its peak in Costa Rica? The benefits and drawbacks of the ecotourism powerhouse.”

Jordyn Glenn and Katie Meeks | Mentor: Dr. Mahdi Safa

Tourism has become a key and an influential industry sector in North America and Costa Rica. The tourism industry as whole is growing rapidly in both countries. This research project is important because if the tourism industries in the two countries know more about who is visiting and what they do while they are there, they are better able to market to the right travelers in order to increase the income and overall profit of tourism. This research involves a comparison of the tourism industry in the United States and Costa Rica. The research has been done through statistical data analysis and interviewing the tourism leaders and organizations. The aspects explored include a thorough examination of the tourism GDP, ecotourism and its benefits and drawbacks, popular trends, as well as marketing measures taken by each country. The findings can help you better understand the different parts of tourism industry in both the United States and Costa Rica.

Modeling and Prototyping using Additive Manufacturing Technologies

Timothy Gonzales and Greg Yera | Mentor: Dr. Stefan Andrei

The 3D printing technology, also known as additive manufacturing, is used for creating three-dimensional objects from a digital STL (Standard Tessellation Language) file. A 3D printer is a type of industrial robot. With support from Provost Doblin and the Dean of College of Arts and Sciences, the Department of Computer Science acquired a MakerBot Desktop 3D Printer which uses Poly-Lactic Acid (PLA) material to be extruded into layers. Successive layers of PLA material are laid down under computer control. Among existing graphics software, we decided to use Blender software because it is open source and provides excellent modeling capabilities. However, with the rise in interest from faculty we have begun to look at the benefits that other software could provide. K3DSurf, Adobe Maya, and 123D are some of the frontrunners, all providing useful features. The purpose of these models is to provide computer science instructors with tangible teaching aids. Many concepts in computer science are quite abstract and difficult to illustrate using typical methods. Using the 3D printer however, abstract ideas can be printed to become real-world objects. So far, we designed various 3D models for teaching classes such Bioinformatics, Computer Graphics, Game Development, Foundations of Computer Science, Discrete Structures and more. We have produced working models of finite automata machine as well as an aid for learning bucket sort. In the future, we plan to develop more visual aids and also to begin to print 3D representations of mathematical functions as well as software development aids.
Lamar University was founded in 1923 in Beaumont Texas, and has been running ever since. This research will focus on the presidents that have come through the school since the beginning. What were the goals and images that these Presidents had for Lamar? What did they accomplish while they were here, and how did the school change because of their actions as president? The goal for this paper is to have a better insight on how our school became what is today through the past and present of our school's leaders. Lamar's Presidents from 1941 to the present, have had a major impact on the growth and development of the campus and the student body. There will be both primary and secondary sources through the Lamar University Library and articles. While collecting biographies and autobiographies of our former presidents, it should give enough information to Lamar History. By conducting oral interviews with Dr. Evans and Dr. Simmons if possible, could give an even better insight to the minds of our presidents here at Lamar Beaumont. Therefore, this paper will be over a significant number of the Lamar University Presidents and the history of how Lamar came to be today.

The Intent of Religion in Don Quijote

Miguel de Cervantes’s novel El ingenioso hidalgo don Quijote de la Mancha, a satirical story that follows a mad man who believes he is a knight errant, is laden with mentions of god, the church, and the catholic religion in general. In my research I explore Cervantes's intent with the vast inclusion of catholic themes in his work. I wish to prove one of two likely reasons for these religions themes in Don Quijote. The first, which must be investigated in order to counter it, is an attempt by Cervantes to prove his devout Catholic faith and to rebut any claims made against his faith. The other, which my research is intended to support, is his use of religious themes as a satirical manner of criticizing the Catholic Church, the ultimate power in Spain during the Spanish Golden Age.


The gemological and industrial applications of diamond and the cost of natural diamonds have created immense demand for synthetic bulk and thin film diamond. Diamond thin films have potential uses in numerous applications such as cutting tools, electronic cooling, etc. due to their exceptional electronic, optical, mechanical, and thermal properties. Graphene-to-diamond phase transformations have undergone extensive theoretical study, but experimental reports are limited. Thus, further research into novel synthesis methods and characterization of synthesized diamond films is required. This research focuses on chemical transformation of graphene to diamond thin films and determination of their atomic structures as well as wear and mechanical properties. Wear test were conducted, and it was found that the conversion of the thin films had a significant effect on the friction and wear properties as well as adhesive forces of the films.

The Appeal of “Sonatina”: What Makes It Popular

Rubén Darío is considered the father of Spanish modernism. He was born in the small town of Metapa, Nicaragua, in 1867, and died in Leon, Nicaragua, in 1916. Given the nickname of “poet boy” at the age of thirteen, his poems continue to be popular to this day. One of his most popular poems among the Spanish youth is “Sonatina” from his book Prosas profanas (1896). So what is it about this poem that makes it appealing? This analysis will answer the preceding question through the evaluation of the poem’s structure and content.

Robot for Automated Benthic Survey of Pterois volitans Infestation

There is a problem with invasive red lionfish (Pterois volitans) in U.S. coastal waters which is escalating into a more serious issue. As such, novel solutions to combat the infestation are warranted. Current methods involving divers harvesting lionfish have been successful, but the approach has limitations. This research project aimed to
develop and implement a method of locating, identifying and tracking lionfish using existing technology of remotely operate vehicle (ROV) underwater robotics to assist divers. Divers are limited by time, depth and require equipment which an ROV would not be limited by. This project provides the means to a solution more effective than solely human efforts. Implementing the advantages of current technologies like robotics, image processing, computer vision and operator control, the invasive lionfish may be effectively remediated in a new and unique manner. Controlled underwater environments were used to test the effectiveness of this method. Throughout the project much was learned about: microelectronics, and their implementation underwater, control systems, specialized structuring for underwater tasks, the challenges of underwater robotics, and machine vision. All of this culminated in a distinctive learning opportunity about the applications of robotics and software in a new environment. Eventual applications will involve little to no human interaction and the implementation of autonomous methods. This can be scaled up for widespread use in aiding the developing invasive species issue.

Nanoparticles as Lubricant Additives for Friction Reduction in Internal Combustion Engines

Andrew Hunt | Mentor: Dr. Ali Beheshti

Friction is the main cause of power and efficiency loss in the form of unnecessary heat, wear, and system failure in almost every mechanical system, especially the internal combustion engine. All of this leads to costly repair and operational inconvenience. These issues call for modern methodologies to reduce friction as much as possible especially in view of current concerns about fossil fuel and materials consumption as well as their environmental effects. The proposed research seeks to investigate the effect of dispersing nanoparticles into oil on friction reduction in the most important piece of the powertrain; the internal combustion engine.

We began with a very simple and controllable approach. We used 3 different nano-particle types in 2 different concentrations and compared the results to a control sample. All results were recorded using a Nanovea Tribometer to measure the friction coefficient and wear of the samples. The greatest result achieved so far is a 36% tribution in the friction coefficient when using a 4% by weight concentration of MoS2 nano-particles. These 8 separate tests are being used as a proof of concept and will be the starting basis for continues research utilizing actual engine components.

An Analysis of the Greek Ethical Ideals in Western Medicine

Wenzel Ilustre | Mentor: Dr. Sarah Hillin

This research paper focuses on the ethical ideals in western medicine and the influences that ethical naturalism, consequentialism, deontology and ethical subjectivism have had on what medical professions deem ethically proper. In the medical practice, there are many times when a medical professional must ask themselves if what they are doing is morally proper. For example, should a doctor lie to a patient if it is in the patient’s best interest to not know? It is in the actions and the reasoning of these medical professions where we can truly see the ethical values that are embedded into the medical profession. I want to use this research paper to highlight the four most prominent ethical ideals that have shaped the ideology within western medicine and to shed light on how these ethical ideas have influenced the actions of medical professionals. I have researched documents over not only ethical and medical ideas but also ethical examinations on historical medical practices. I have organized these documents according to their corresponding ethical ideals and the history behind their practice. Overall, this paper will analyze past medical events and interpret the ethical ideals behind these events while also examining the ideals behind medical professionals’ actions and thoughts.

Never-ending Endings: An Analysis of “El Sur,” by Jorge Luis Borges

Emily Jacobs | Mentor: Dr. Catalina Castillón

Jorge Luis Borges [1899-1986], an author from Buenos Aires, Argentina, revolutionized the Spanish American literary world with his short stories, poems and essays. His works stretched reality, asked philosophical questions, were paradoxical and self-reflective. One story, “El Sur” (The South), from Ficciones (1944), has been widely anthologized. This analysis focuses on the literary tools Borges used in this story to create a reality twisting, world dividing, open-ended masterpiece. You will be challenged to decide the ending for yourself; two possible options will be presented, but in the end, the ending’s options are never-ending.
The purpose of this project is to identify any potential problems the Human Resources Department and other divisions within the Port of Beaumont may face. The goal is to show possible actions that may solve the problems in the port. The first phase of the project entails collective research amongst group members using various sources to discover issues present at the Port of Beaumont. Phase two will consist of seeking out and contacting workers, members or people associated with the issue to collect present-day data. Phase three the team will assemble all research made to arrange a possible resolution to the issue.

The Port of Beaumont is a deep water international public seaport located in Jefferson County, Texas on the Neches River 40 miles inland from the Gulf of Mexico. The port is accessible from the Gulf of Mexico and the Gulf Intracoastal Waterway. The Port of Beaumont covers an area of about 150 square miles including the City of Beaumont, Texas. The Port offers 600,000 square feet of covered storage, bulk cargo terminals and 80 acres of open storage. Three major rail carriers, five major roadways, the Gulf Intracoastal Waterway and global steamship lines feed into the Port of Beaumont. The port offers a 3.5 million bushel grain elevator capable of loading 80,000 bushels per hour. The U.S. military recognizes the Port of Beaumont as the busiest military port in the world.

Some of the areas in which this research project will focus on include: port security, possible growth in fuel emissions around the area, logistics in and out of the port, and jobs on demand. This research draws mainly upon primary sources including published articles, The Port of Beaumont main website, and interviews.

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**The Legacy of Quijote on 21st Century Pop Culture**

*Humberto Jiménez | Mentor: Dr. Catalina Castillón*

*Don Quijote de la Mancha* by Miguel Cervantes is a 17th century fiction novel that has had a profound effect in pop culture. Even today, the influences of *Quijote* can be seen in many different mediums. This essay will show the impact of *The Ingenious Gentleman* by drawing parallels between the book and 21st century pop culture mediums such as comics and films. This comparative analysis is another testimony of the lasting legacy of this classic novel of Spanish literature.

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**Utilizing a Music and Memory Program in an Inter-professional Service Learning Environment**

*Tyneshia Kelley and Bria McZeal | Mentors: Dr. Elizabeth Long and Dr. Ginger Gummelt*

Today it is estimated that nearly six million Americans live with some form of dementia. Students in the health care field are in need of experiences which help to promote inter-professionalism in the care of patients with dementia. Over the past decade a significant amount of attention has focused on the use of music in the care of a persons with dementia demonstrating that it decreases distress, enhances engagement, promotes memory recall, and improves verbal interaction. The purpose of this study was to examine nursing and social work students’ experiences working with a Music and Memory program in older adults with dementia. The students met weekly with residents in a long term care facility and developed personalized music playlists. This program allowed students to generate an enriching learning experience with a vulnerable population. It also provided students an opportunity to help individuals suffering from dementia recollect memories and engage in social interaction. Students reported increased communication and problem solving skills while caring for residents who are unable to effectively communicate their needs. Results of this research support the use of service learning and active engagement in an inter-professional environment.

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**The Effects of Work Hours on Project Safety**

*James Kight, Blake Kight, Erik Rodriguez, Nick Davis, Luis Suarez, Marco Arellano, Jeremy Zachery | Mentor: Dr. Mahdi Safa*

Working excessive hours can take a toll on your body physically, mentally, and emotionally. While working in a potentially dangerous environment any delay in reaction time could be fatal. When workers are forced to work long hours or many days in a row without fatigue days their senses are dulled. This can make a construction job site an accident waiting to happen. Though a short interview process we plan on taking a sample of working people to get an accurate study of how many hours are safe to work in consecutive days and other health effects regarding sleep deprivation. The people being interviewed will be asked questions based on the following concepts: working long hours in consecutive days, working without breaks, what health effects do they fill when...
over worked, also feeling of safety knowing people around you are exhausted, and among other safety concerns. We will include a literature analysis about possible health effects of sleep deprivation, and the effects of long hours on reaction times and reflexes.

**Degradation of Construction Materials at the New Orleans Hard Rock Hotel: A Case Study**

*Jean Kim, Leony Alvarez, Jason Brent, Gary Patten, and John Stone | Mentor: Dr. Mahdi Safa*

The case study of the New Orleans Hard Rock Hotel revolves around two main materials, ceiling tiles and stainless steel welds. Environmental conditions in New Orleans include high humidity, and because the city is adjacent to the Gulf of Mexico there are particles of dissolved salt in the humidity. This combination of high humidity and adjacency to salt water led to the degradation of the ceiling tiles in the kitchen area and some brittle welds breaking in the bar area. This issue of sagging ceiling tiles presents a fire hazard in the commercial kitchen area and the brittle welds present a structural concern. When considering replacement materials for the ceiling tiles and alternative materials or procedures for the welds it is important to present a solution that is cost effective, replaces the degraded materials with long lasting materials, and can be implemented in an expedient manner to minimize shutdown time and loss of revenue for the Hard Rock Hotel. In addition to developing a solution to the problem of material degradation, a model will be developed to identify areas where the environmental conditions that have caused this problem occur, so that the solution can potential be marked to additional clients.

**The Meadows Subdivision, Beaumont, Texas**

*Spring 2017*

*Kassie Kolander, Clint Dailey, Holden McCollum, Cameron Meyer, Berenice Villalpando and Eric Wooten | Mentor: Mr. Tony Whitehead, P.E.*

During the month of July 2016, two land developers upon request of Lamar University Senior Design Team proposed an expansion of a current residential subdivision consisting of a 200 acre tract. Our Senior Design Project’s objective will expand the design of a current subdivision as well as determine solutions for adequate drainage so as to accommodate future development. Upon completion, the subdivision has been divided into two sections, East and West side, of the tract. In the center as the connecting feature for both The East Meadows and The West Meadows, a detention pond has been proposed. Included in this project, two drainage solutions have been considered for adequate drainage for the future development along with all necessary calculations and analysis for drainage, storm sewer, and sanitary sewer were determined to meet TCEQ and City of Beaumont regulations. The design team chose to implement a storm water drainage ditch connecting to the proposed detention pond located in the center of the future development and exiting into Beaumont’s Drainage District No.6. In summary, the Master Plat of the subdivision has been redesigned into a more simplistic approach so the geometry of the roads will provide a more linear design to utilize the full area for lot development which in turn increases profit for future expansion.

**Effects a Poorly Executed Design Phase has on Cost, Time, and Material**

*Coy Laughlin, Daniel Hess, Lucas Sammons, Colin Bledsoe, and Tyler Walthall | Mentor: Dr. Mahdi Safa*

The well-being and quality of a construction project can often have a lot to do with how well the design phase is executed. Design flaws may include sketches and drawings that lack accuracy or necessary information that is needed to build the object. The effects of an overall poorly executed design phase can have terrible consequences when it comes time to start building the project. Building off an inaccurate design is almost certain to lead to large amounts of rework, increased cost, and inability to complete the project on schedule. In extreme cases, some company’s relationship with the client are permanently damaged and may even result in the company losing the project in its entirety. Our overall goal as a group is to provide ways to makes the design phase efficient and consist of high quality. We will try to provide a variety of tactics and examples of successful design phases that have worked in the past. Some potential results may be allowing ample amount of time for completion of the design phase, hiring a reputable specialty contractor to do the designing, and providing and utilizing accurate and up-to-date tools and technology for whoever may be responsible for designing.
The construction industry has been greatly impacted by the use of technology in all the different construction phases and processes. Ever since the first time construction software was introduced to the industry, there has been many improvements made to software as well as new computer programs published. According to Rivard (2000), information technology in the construction industry has helped with raising productivity in businesses. It has assisted on the increase of quality, financial controls and with the pace construction projects move at. IT and software are replacing processes done by hand or man, and executing them in a faster and more accurate way. The use of IT in construction has fallen behind compared to other industries (Stewart 2004). The possible reason for this is because most of a construction process consists of executing a project hands-on compared to different industries like an accounting firm where most of the work is done in a permanent office and on a computer. Although software is used differently depending on the field, if the use of technology in the construction industry was to keep up with other fields, the productivity would increase at a higher rate. Industry leaders and professionals should aim to explore more technologies for this sector (Betts 1999). Due to this exploring done by different institutions, new software is invented that benefits the industry. New computer programs will eventually be made that will facilitate a team member’s job over something that is believed that can only be accomplished by man.

Case Study of Facility Risk Analysis using Computational Tools
Julia Lin and Huilong Gai | Mentor: Dr. Helen Lou

In the chemical process industry, the importance of inherent safety has become an increasingly prominent concern, aiming to avoid hazards through facility design rather than add-on measures. This research intends to analyze the risk of a chemical process through a case study. Our case study analyzes the mixing and storage of various waste liquid and gas streams in a chemical plant. Using a separate tank for each individual waste stream is impractical; therefore careful analysis is required to ensure that no hazardous effects will result from the mixing of the waste streams. The potential hazards associated with the chemicals were evaluated and modeled using CAMEO Chemical, a suite of software programs developed to plan for and respond to chemical emergencies. The inherent hazards and the compatibility of chemicals were examined using two programs: ALOHA, a model for predicting the dispersion of hazardous gases, and MARPLOT, electronic mapping programs were deployed to quantify the potential exposures and the eventual risks. Limitations of the current computational tools were identified through this study.

Development of Novel Cancer Migration Assay Platform for Drug Screening Applications
Yuangao Liu and Rachel Thompson | Mentor: Dr. Ian T. Lian

The combined phases of basic science research, animal testing and clinical trials for drug development often cost more than a billion dollar and over ten years to complete. One major reason for the inefficiencies and costs is the limitation of in vitro cell-based assays. In the current project, we conduct a time-lapsed study to quantify the toxicity and efficacy of novel pharmacological agents with the goal of developing an innovative cell-based drug screening protocol. Specifically, we are employing a novel cell patterning technique to allow precise measurement of cancer cell migration rate. The results are analyzed for differences in the effectiveness of one and a combination of nanoparticles agents, extent of anti-tumor properties, and cancer cell selectivity against healthy cells. Our preliminary finding shows Cerium Oxide particles with diameters less than five nanometers is capable of arresting cancer cell growth and can preferentially induce apoptosis to malignant melanoma, demonstrating a potential therapeutic value of this metal nanoparticle.

Women in Technology: The Impact of Self-Perception
Alexus Locke, Raven Morse and Susannah Williams | Mentor: Sherry Freyermuth, MFA

It is an established fact that women in the United States often do not receive the same opportunities in the workforce as men. The percentage of women working in major technology companies is around 30 percent, with significantly fewer women in positions that may allow them to influence a company’s’ product development or strategic direction. This project is focused specifically on key reasons why there is such an extreme underrepresentation of women in technology-based careers. To better understand why the presence of women in technology fields is so few and far between, we gathered the findings of several studies, focusing our efforts
specifically on the computer science and web design fields, to determine how self-perception plays a role in this issue. We conclude that self-perception developed at an early age directly affects a woman's path to careers in the technology fields. We suggest broadening young girls' interests and aspirations by providing them with realistic information on career opportunities and role models in technology fields to shape their self-perception and ensure they do not opt out of technology-based careers because of misinformation or negative stereotypes.

**The Importance and Different Styles of Doctor Patient Connections**  
*Lisa Loza | Mentor: Dr. Sara Hillin*

The importance between the patient and doctor connection will be explained to my audience. The connection between doctor and patient is extremely important because it helps build trust and support between the two. It also allows the patient to feel confident with asking any questions they desire, and they are able to confide with their doctor with any problems they may seem to have. The trust is necessary so that the patient will feel comfortable with the doctor and acknowledge their confidence, which will lead them to more than likely take their doctors' medical advice with any issue presented. There are also times when the patient is unsure about a procedure and if they have a healthy and trust filled relationship then the patient will seek their doctor’s opinion and recommendations. Furthermore, my research will include many possible forms of interactions between the patient and the physician. A few ways of connection and communication between patient and doctor are: The strongly directive approach, the protectively paternalist approach, the supportively directive approach, negotiation, the supportively self-directive approach, and the self-directed or consumerist approach. These interaction types vary, depending on the physician for any type of decisions made to just being self-directive and not including the doctor in any medical issues and advisements.

**Erosion Mitigation at FM787 and the Trinity River**  
*Nicholas Lutz, Zachary Ferguson, James Horne, Travis McCawley, Erin McGuire, and Matthew Shelton | Mentor: Dr. Mien Jao, Dr. Dan Su, Dr. Qin Qian and Mr. Andrew Lee*

River migration is a process in which a river moves laterally with time. This can cause issues with the design of highways or structures near these bodies of water. The area of concern for this project, owned and operated by the Texas Department of Transportation (TxDOT) is located on the Trinity River near Romayor, TX. In the past, TxDOT has spent millions of dollars on this location to implement erosion countermeasures; however, the solutions have only been temporary. The current situation being encountered is the river has impeded the right of way of FM 787 at the Trinity River and is encroaching on the actual highway. In recent floods, TxDOT has even had to go in and replace materials that have experienced washout from the river. The goal of this project is to establish efficient and cost beneficial erosion countermeasures that will help minimize further erosion. This project has utilized the HEC-20 Manual provided by the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA) to analyze stream instability. For the design solution, various design manuals have been utilized provided by the USDOT, as well as the SPW-911 Software for sheet pile design. Over the course of the year, multiple field visits have been necessary to collect data for design. During the field visits, an assortment of data was collected such as bank profile and highway surveys, as well as soil samples that could be tested in the Lamar University Hydraulics lab. From the results, the design process began to focus more towards utilizing riprap and sheet piles to mitigate the area of concern. Furthermore, road relocation has been considered as an alternative and a final recommendation will be made based off of a variety of factors.

**Autonomous Robotic Remediation of the Invasive Red Fire Ant (Solenopsis invicta)**  
*Qiuyi Ma | Mentor: Dr. Harley Myler*

The invasive red fire ant damages agricultural assets, including livestock, as well as crops. In addition to attacking people and animals, they can also cause damage to plants, buildings, air conditioning units, and telephone wires. My research will harness a robot that can kill fire ants by photonic heating that is environmentally friendly. This robot is capable of executing independent operation in remote areas. It's solar powered with GPS and telecommunications, and it will kill fire ants with a machine vision directed blue laser (470 nm). Besides, the walking robot is able to navigate rough terrain and to provide a stable platform for the laser targeting system. The setup of the robot has been accomplished, and the next step is to integrate camera and laser onto the body of the robot and the wireless connection between camera and computer. Future task includes: Task 1 Design and construct servo-controlled laser pointing system (under RnV control) using LUEE nest maker space equipment (3D scanner/3D printer). Materials (ABS plastic) supplied by LUEE. Task 2 Adapt tracking algorithms developed in the for lionfish in the Invasive Species and Environmental Monitoring Robotics Lab to track fire ants. Integrate
control of laser pointer to target ants. Task 3 Evaluate and tune acquisition, targeting and tracking algorithms, prepare final report.

**Sustainability using Concrete Rubblization**  
*Ryan Malone, Gabe Nevala, Charlie Kappleman, Jacob Major, and Ben Hodges | Mentor: Dr. Mahdi Safa*

Rubblization is defined as a construction and engineering technique that involves reducing existing deteriorated Portland Cement Concrete (PCC) into rubble at its current location. Our project is based around sustainability and how we can improve the Rubblization process. When Rubblization is utilized it breaks down the existing concrete (highway) and then is compacted to become a sub-base for HMA (Hot Mix Asphalt). The question is: How can we improve the Rubblization process to make the newly formed sub-base last longer? There are many different ways that you could potentially solve this question but you have to take into account the terrain, seismic plate shifting, weather, size of loads traveling on the highway, and the number of cars per day/month/year. NAPA estimates that Rubblization costs approximately one-third as much as PCC removal and replacement 1. With this being said, we are already aware of the cost efficiency of using Rubblization and that Rubblization cuts down on time as well. What we will be researching is what we can add to the rubblization process to help secure the PCC rubblized base. Are there additives? If not, we could possibly test and design additives to chemically bond the base for a stronger more sustainable lifespan.

**An Advanced Construction Supply Model**  
*Ryan Malone | Mentor: Dr. Mahdi Safa*

The complex and challenging process of construction supply chain management can involve tens of thousands of engineered components, systems, and subsystems, all of which must be designed in a multi-party and collaborative environment, the complexity of which is vastly increased in the case of megaprojects. A comprehensive Advanced Construction Supply Model (ACSM) was developed as a computational and process oriented environment to help project manager’s deal efficiently and effectively with supply chain issues: fragmentation, resource shortages, design delays, and planning and scheduling deficiencies, all of which result in decreased productivity, cost and time overruns, conflicts, and time-consuming legal disputes. The proposed model has been developed as a computational and process environment to help project managers evaluate value packages efficiently and effectively. Through the application of the value packaging concept and new technologies and methods, the advanced construction supply model will improve the performance and management of the enterprise-wide supply chain. In this exhibition, two demos will be presented: 1. Demo of the software that was developed for implementing the construction contract management will be presented, along with the functionalities of the model using the data that was collected on a construction megaproject in the United States. The model is developed in the MATLAB environment and has a well-developed Graphical User Interface. 2. In addition, a demo of the An Integrated Construction Materials Management (ICMM) system will be provided.

**Screening of soil bacteria for the prevalence of antibiotic-resistance in local soils of Southeast Texas.**  
*Arianna Mata, Danny Abdullah, Katelyn Catching, Taylor Reasons, Omar Hamza, Serene Kaggal, Deja Rout, Minyone Marrs, and Taylor Marshall | Mentor: Dr. Ashwini Kucknoor*

Soil is a rich source of microorganisms and less than 1% of those microbes are readily culturable by current methods. It is believed that soil is most likely the ecosystem where antibiotic synthesis originally evolved and soils from diverse locations around the world such as forest, prairie, agriculture and urban have been explored to develop new clinical and medicinal applications. Antibiotic resistance is common in soil bacteria and studies show evidence that multiple diverse mechanisms for resistance are associated with microbes from different soil samples. The high density of antibiotic-producing bacteria makes soil a likely source of diverse antibiotic resistance determinants. The abundance of pathogens that can survive in soil has resulted in a potent mixture that can give rise to the emergence of antibiotic resistance in the clinical setting. In the search for antibiotic resistant heterotrophic bacterial colonies present in soil, three different samples were collected from the surrounding South East Texas area (a community garden, Big Thicket National Preserve, and a local family farm). Total heterotrophic plate counts were determined. Five bacterial colonies were selected from each of the samples’ original growth plates and further analyzed through Kirby Bauer testing, leaving a panel of 12 isolates for PCR testing. Results from Kirby-Bauer tests showed varied degree of resistance to different antibiotics tested. The isolates were further
used to determine the frequency of presence of plasmids, as antibiotic resistance often is coded on the plasmids. Some of the colonies that were resistance to antibiotics did contain a plasmid.

Effect of Sea Surface Temperature on Microbiomes of Manicina areolata (rose coral) from Seagrass Habitats of Belize

Hostin May and Dr. Mark McNab | Mentor: Dr. Matthew P. Hoch

Global warming is detrimental to seagrass meadows and coral reefs that protect and provide resources to tropical coastal communities. Small increases in sea surface temperature (SST) can initiate disease processes in corals that may lead to bleaching and mortality. The microbiome of some reef corals can change in response to SST rise, favoring growth of coral pathogens. But does this happen in corals of seagrass meadows which experience greater SST ranges than on the reef? To address this, a common coral of seagrass habitats, Manicina areolata (rose coral) was sampled from sites on the Belize Mesoamerican Barrier Reef with contrasting of SST ranges. Also, M. areolata was subjected to an experimental temperature rise in laboratory experiments conducted at the Smithsonian Carrie Bow Caye Field Station, Belize, January 2017. Coral hologenomic and plankton metagenomic DNA were extracted from corals of ambient sites and experimental treatments. Extracted DNA is in the processes of being analyzed by targeted metagenomic sequencing of the 16SrDNA V4 region. These sequence results will be used to identify the bacteria in coral microbiomes and surrounding plankton microbial communities, to determine if thermal selection of coral pathogens occurs in this coral species.

Behind the Bandstand: Jay G. Sims and the Internal Workings of the Sousa Band

Caitlin McAlister | Mentor: Dr. Bryan Proksch

Between 1919 and 1932, Jay G. Sims was personnel manager for the Sousa Band. Despite the important role he subsequently played in the band’s day-to-day workings, including hiring members, making arrangements for the band’s equipment, and dealing with the issues regarding current members that came up during the band’s extensive touring, there are few references to Sims in the existing scholarship on John Philip Sousa and the Sousa Band. This research explores Sims’s role within the Sousa Band, by examining an archival collection of Sims’s business papers and letters held in the John Philip Sousa Collection at the University of Texas at Austin’s Harry Ransom Center. In doing so, this research will show that Sims played a vital and understated role in the Sousa Band’s operations.

The arrowhead redox-sipper: an all-in-one marsh sediment porewater and redox sampler

Travis McCawley, Claudia Marroquine, Linda Pham, Datron Brown, and Tran B. T. Nguyen | Mentor: Dr. Matthew P. Hoch

Sediment redox and porewater analytes of sulfide, salinity, pH and sulfate can lend insight to conditions for marsh vegetation productivity, the state of coastal marsh health, and efficacy of marsh restoration. Typically, rapid surveillance of marsh sediment physicochemical condition has been accomplished using simple vacuum sippers of porewaters and independent measurement of redox by inserting platinum electrodes. However, expensive platinum electrodes can become damaged when penetrated into sediments and sippers can become clogged in fine grain clay sediments. The arrowhead redox-sipper (ARS) was designed to combine vacuum sipping of porewaters with simultaneous redox measurements. A stainless steel mesh minimizes sipper clogging, and the internal platinum electrode is protected from damage and loss of calibration. A field trial of the ARS at a coastal marsh in Salt Bayou Watershed, Southeast Texas, was performed in July 2016. The redox and porewater analyte (e.g., sulfide, salinity and pH) values for the ARS were not significantly different (n = 5; P < 0.05) from the typical approach of independent sipping and redox probing. The 3D printing files for the ARS will be shared.

Creating an Enriching Experience through Music and Memory

Bria McZeal | Mentor: Dr. Ginger Gummelt

The number of persons living with dementia is expected to increase by 300% in the next 30 years. Having a loved one suffer from any form of dementia can be extremely difficult for the family and caregivers. The Music and Memory Program is a national initiative which seeks to provide personalized music playlists for dementia clients. This program has been shown to decrease distress, enhance engagement, promote memory recall, and reduce agitation in individuals suffering from dementia. The purpose of this study was to examine student experiences using the interdisciplinary music intervention and evaluate the client transformations using a personalized
Nursing and Social Work students implemented music interventions in long-term care facilities. Qualitative data was collected in a form of weekly journaling by students for a phenomenological analysis of both student and residents’ response to their personalized music. Initial analysis collected by the students demonstrates improved communication with aging populations and increased interest in serving this population. Patient observations included positive physical and emotional responses to music, increased communication, improved activities of daily living, and reduced agitation. Themes extracted from the data can guide both educational and direct practice approaches used with older adult residents in long-term care. These results have the potential for widespread applicability in allied health care education across the state while also improving quality of care for older adults.

The Language of Death: An Analysis of Doctors’ Communication with Terminally Ill Patients
Analia Mendoza | Mentor: Dr. Sara Hillin

For terminally ill patients and their loved ones, the moment a doctor relates their doomed prognosis will live with them, lurking in a shadowy corner of their minds, for the rest of their lives. In this one crucial moment, a doctor makes difficult ethical decisions. Will he or she be truthful? Will he or she be blunt? Will he or she show empathy and compassion for a patient? In a matter of minutes, a person can either find him or herself thrust into depression, possibly losing the will to live, or made to know his or her condition in a way that imparts hope into the time left. For my research paper, I will discuss the complicated process behind communicating the prognosis of a terminal illness to a patient, and how the language used can shape a person’s view about their remaining time on earth. I will use both qualitative and quantitative sources that reveal doctors’ perspectives on this issue in conjunction with accounts detailing patient anecdotes and perspectives. Using these sources, I hope to impart the personal knowledge they provide onto the medical community and general public alike. Caregiving does not the end at the physical level; it means being able to care for patients in every aspect they may need care for including mental spirit, and that requires empathy and compassion.

The Effect of Dice Probability on Player Experience in Tabletop Role-playing Games
Jason Miller | Mentor: Dr. Jennifer Daniel

Many tabletop role-playing games, such as Dungeons & Dragons, rely on dice to introduce an element of chance to the game. Different game systems change the dice they use and their methods for measuring success. These differences change the frequency distribution of the dice rolls, which in turn changes the actions and reactions of the players.

This research examines several game systems and their methods for determining player success and failure to see how the changes made to each game system affect the frequency distribution of dice rolls and the experience of the players. It compares the intended tone and experience of each game system to the actual likelihood of a given player’s success or failure in order to determine how the underlying mathematics may impact subjective player experience.

Students’ Opinions and Experiences of ASL Instruction at the Post-Secondary Level
Kelsey Monceaux | Mentor: Dr. Laura Maddux

Currently there are more than 100,000 college students taking American Sign Language (ASL). For this reason, there is a great need for a more standardized instructional approach to teaching this language. To date, there has been little research conducted that takes into account ASL students’ opinions and experiences in their language learning. I am interested in conducting a survey to gather this information, so that we may begin the process of understanding what these students need to successfully learn the language, and to improve ASL instruction. By enhancing the learning opportunities for these ASL students, we will be opening the door for future interpreters and teachers. Interpreters enable the Deaf community to have equal access to communication, and thus to lead flourishing lives. Teachers spread ASL to hearing and Deaf children, which can impact the future of the Deaf community. Producing more of these skilled professionals would lead to a direct benefit for the Deaf community. It is my hope that with this research we will contribute too many future successes for Deaf and hearing alike. This presentation will focus on prior research, types of questions asked in the survey, and a discussion of what I hope to discover from the survey. My presentation will impact those attending the expo so that those who are ASL
students will feel compelled to take this survey and contribute to our research, as well as to spread awareness of the importance of ASL instruction and learning to the broader Lamar community.

Encaustic Wax Painting Research
Amy Morris | Mentor: Dr. Donna Meeks

Encaustic is an ancient Greek painting technique using hot wax and pigments. It is most famously known for use in Egyptian funerary portraits, arguably the most well-preserved paintings in antiquity. The qualities of wax also bring sculptural depth, texture, and volume to a painting as no other medium can. I encountered encaustics upon viewing an Egyptian funeral portrait display at the Menil Collection in Houston last fall. Since then, I have looked into the current uses of encaustics in painting. My research is geared to cultivate a technical understanding of different encaustic techniques for integration into my current artwork.

The Old Testament: Demonstrating Its Application to Modern Society Through the Man After God's Own Heart
Rebekah Newell | Mentor: Dr. Sara Hillin

Throughout historical writings, one can often observe a certain correlation between the writing style and influential events of that specific time. The Old Testament Bible is no exception to this rule, for it captures the ancient world appropriately for the people of that age to easily relate to and understand. However, because of the time gap between ancient Israel and today, one often brushes off the Old Testament’s value, simply regarding the difficult language style as not worth muddling through. Despite that consensus, I have found the Old Testament essential to understanding human nature and the inevitable consequences of it without complete reliance on God. Such a character in the Bible who exemplifies this idea is King David of Israel, commonly known as a "man after God's own heart.” King David leaves a legacy of not only great political power and conquest, but also of pure, heartfelt humanity, for not even a great king can escape the struggles life has to offer. Nevertheless, because David surrenders his life, kingdom, and all glory to God in every situation, he becomes perhaps the greatest and most memorable king in Israel’s history. King David's journey leaves readers sobbing with him through his trials, cheering with him through his victories, and most importantly, praising God with him through everything.

A New Method to Determine the Shape of a Glowing Object: Departure from a Regular Signal Driven by Malus' law
Zakary Noel, Gabbrianna Escamilla, Daniel Cove, and Suzanne Wheeler | Mentor: Dr. Cristian Bahrim

Our experiment aims to provide a methodology for determining the shape of a glowing object using polarimetric measurements. We propose a simple, but reliable, tabletop setup, which includes a polarizer/analyzer pair for light analysis located between a black-body emitter and a light sensor. Polygon shaped apertures are mounted in front of a glowing cavity in order to choose a probe signal which characterizes the shape of a glowing object. We have determined that a comparison between the experimental ratios of normalized probe signals to control (circular) signals based on area coverage of the polygon can lead to the identification of the aperture’s shape. Introduction of new equipment such as an electric shape-cutter and better polarizers provide the best data we have been able to gather from the experiment so far. The overall perceived intensity of the detected light depends on the sensitivity of the photodetector, therefore, we plan to improve our system by using filters in order to eliminate wavelengths of light that lie on the outskirts of the detection range for our light sensor.

Removal of Toxic Mercury Ions from Polluted Water Using thioether Sacrificial Ligands
Caroline Nwandu and Troy Shelby-Karney | Mentor: Dr. Perumalreddy Chandrasekaran

Mercury is a highly toxic ion and is deposited into aquatic water sources through industrial processes. These ions are then passed into the body system in the form of methylmercury (CH₃Hg⁺) when fishes from the contaminated water are consumed. Methylmercury is detrimental to human health because it causes damage to the central nervous system and in severe cases, can cause permanent damages to some parts of the brain. Our goal is to develop an alternative method to the removal of toxic mercury ions from industrial water waste by using a thioether sacrificial ligand. Thioethers are very stable under oxidative conditions and are convenient to synthesis in larger scales. In addition, the sulfur in the thioether sacrificial ligand has high affinity for mercury and therefore,
will selectively remove the toxic mercury ions from the contaminated water. In our first experiment, we will synthesize 1,2,4,5-tetra(isopropylthio)benzene by reacting 1,2,4,5-tetrachlorobenzene with potassium isopropyl xanthate. The 1,2,4,5-tetra(isopropylthio)benzene ligand will bind to the mercury ion, extracting it from the water waste. The intended result is to convert the isolated toxic mercury compounds into a less toxic inorganic mercury sulfide.

**Discrimination in the Medical Profession: XX and Minorities**

*Jazmine Obregon | Mentor: Dr. Sara Hillin*

The following research paper will discuss and center on the discrimination that females tend to face in modern medical fields. I wanted to utilize this research paper to expose the severity of racism and sexism, also emphasize how individuals continue to be ignorant even in times of need. I will give real life examples and experiences that support my argument continuous bigotry. I also have the intention of demonstrating how even in today's ever-evolving society, we see individuals being intolerant towards women, especially those of minority status. Although many would like to believe we have made great strides in distancing ourselves from times of blatant racism and sexism, it is still evident in our society by an ingrained mindset inherited by previous generations. This is perpetuated through normalization of rape culture, justification of wage gaps, as well as an overall attitude that delegitimates women's efforts and accomplishments in the business field. My research paper will elaborate on each specific topic to indicate the significance they have on women’s success. Examples incorporated will include that of Tamika Cross and Caroline Tan, who both have had to endure unpleasant experiences pertaining their skill or ability in their profession on account of their gender or race. Overall, this presentation will exhibit issues of discrimination that women continue to face regularly in the medical profession.

**Search for a nematic state in simulations of colossal magnetoeresistive manganites**

*Emily Ochoa and Elbio Dagatto | Mentor: Dr. Cengiz Sen*

We report nematic state tendencies around the first order CE transition in the twoorbital double exchange model with Jahn-Teller phonons at electronic density n = 0.5. Beginning with a random state at high temperatures, we apply a cool-down method using a Monte Carlo algorithm. We then monitor the spin structure factor S(q) of the CE phase as a function of temperature. Near the critical temperature, S(q) grows with decreasing temperature for both right- and left-ordered CE ladders, followed by a spontaneous symmetry breaking into one or the other as the critical temperature is reached. Below the critical temperature a pure CE state with a staggered charge order is obtained. Our results are similar to those observed in pnictides in earlier studies.

**Telling it Like it Isn't: Challenges of Communication in Medicine**

*Lauren Ocnaschek | Mentor: Dr. Sara Hillin*

Medical professionals have come to realize that their job requires more than simply diagnosing patients and prescribing treatments. One of the most difficult challenges they face is communicating with patients and their families. Both physicians and nurses find it difficult to know when some form of deception would benefit their patients more so than telling the truth, and there are not many sources that explain the best way to solve this issue outside of deciding generally on a case-by-case basis. However, a few articles have proved to me that there are more specific answers out there. I have compiled a variety of articles that describe several ways to train healthcare professionals in the art of communication. In this presentation, I will first clarify the ethics of deception in medicine including a discussion of the various forms of deception and the proper use for each. I will then detail each proposed form of training I have discovered in my research. I will weigh the benefits and challenges of each of these in order to get a better idea of which work best. This presentation will analyze the challenges faced by medical professionals in communication and propose a variety of solutions that may help them to more effectively care for their patients.

**Improving Disaster Resilience of Power Distribution Network Using Photogrammetry Technology**

*Manisha Patel | Mentor: Dr. Mahdi Safa*

The resilience approach continuously investigates the competence of a system to anticipate and absorb threats. The vast and vital infrastructures are highly vulnerable to various natural disasters while the threats of adversarial natural disasters are rapidly growing. For instance, the frequency of extreme, wind-related events (e.g. hurricanes, tornados, and storms) have increased over the last twenty years. Electric power distribution system, as a critical infrastructure, is extremely liable to wind related disasters. This study introduces a methodology to facilitate the preparation and mitigation action in order to improve resilience in electric power distribution.
system. Developing and implementing such a methodology in the power distribution infrastructure sector can result in tremendous productivity improvements and, operation cost and schedule savings. The main contribution of this research to body of knowledge is developing a methodology to increase the resilience of electric power distribution networks. The proposed model has a potential to radically increase accuracy and rapidity of the assessment of resilience of this critical infrastructure by utilizing the state-of-the-art technology: photogrammetry. The proposed methodology also has a potential to mitigate existing vulnerabilities of the power distribution infrastructure by precise monitoring the health of the power distribution facilities.

A Closer Look at the History of Dance Music
Daniel Pemberton | Mentor: Dr. O’Brien Stanley

Throughout the history of popular music in the west we have seen a cycle of appropriation by white, mostly European, artist of the labor of predominantly black musicians. This is evident in the history of rock n’ roll, blues, as well as numerous other genres. Most recently we have seen this cycle repeated again with modern dance music which has, for the past 15 or so years, risen to become the most popular music genre in the world. But this popularity has been granted disproportionately to white European newcomers to the genre, while the music’s radical history has been divorced from it in the process. This depoliticizing of the genre has led many to forget the importance that electronic dance music had to the minority communities that created it. My paper examines how this process of appropriation of a genre from its origins takes place by examining the history of electronic dance music as well as the societal climate it was reacting to that made it radical and not palatable to mainstream culture. Utilizing the writings of the Frankfurt school of cultural critics to navigate the cultural and economic corridors through which appropriation is encouraged by way of disarming the original, ‘authentic’ culture of the threat it poses to the hegemonic mass culture it is adopted into; as well as the implications and negative impact this process has the culture of minority communities.

Thor Sequences
Aaron Phillips | Mentor: Dr. PJ Couch

Let a graph $G = G(V,E)$ where $V$ is the vertex set, and $E$ is the edge set. Given a set of vertex weights, a Thor sequence $T$ is a sequence of graphs on $n$ vertices and $m$ edges such that the vertex weights of $G_1$, the first term in the sequence, induce the edge-weights of $G_2$, the second term, and so on. This research focuses on determining the properties and applications of these sequences.

Doctors Are People Too: Analysis of Doctors’ Work/Life Balances in the Medical Profession
Matthew Ratley | Mentor: Dr. Sara Hillin

This research paper focuses on the importance of doctors maintaining a healthy work/life balance as well as the consequences that could ensue should a doctor fail to maintain this crucial balance. Most people view doctors from a somewhat jaded point of view without ever considering their own personal lives. Doctors are not robots and should not be treated as such. Although it might be difficult for a normal person to understand all the pressure and responsibility that rests upon a doctor’s shoulders, it is important that people at least attempt to understand what doctors endure. I wanted to use this research paper to raise awareness about the importance of work/life balance of doctors, because if doctors do not take care of their own health, they could potentially endanger a patient’s health as a result. I researched articles both from medical students’ and practicing doctors’ perspectives as well as a few studies that gathered data to answer questions related to my topic. This paper will be divided into multiple sections that will each explore a different sub-question related to a healthy work/life balance. Each sub-question will have at least one source that presents credible data to answer the question at hand. Overall, this paper will analyze the importance of modern doctors maintaining a healthy work/life balance and the possible consequences of not doing so, while including scholarly articles and primary sources to further emphasize the importance of this topic.

Software Simulation of Monarch Butterfly Life Cycle for Education and Entertainment
Judah A. Roden | Mentor: Dr. Timothy E. Roden

A PC-based 3D graphics software program will be created that highlights the life cycle of the monarch butterfly reported to be in danger of extinction. The monarch is a migratory insect that spends warmer months in the United States. Much of this species migrates to Mexico for the winter, with smaller amounts migrating towards the
coast of southern California. The next few years may prove critical for the species, as the monarch population has been subject to continuous drops over the past several years. If conservation efforts are organized and funded, the monarch may yet survive. An important goal in the development of this software is to heighten awareness concerning the monarch and to help promote conservation efforts. Development of the software will not start from scratch, as currently there is a basic software prototype that allows interactive control of a butterfly. This software will form the starting point for the project. I envision the software to be both educational and fun in addition to exhibiting a high degree of artistry along the lines of computer games such as Flower. As part of the project, I have also created original music for the software. My goal is to expand upon the current prototype in order to depict the life of the monarch, as well as to create an interactive experience for the player.

Children’s Views of Violence in Their Lives

*Vanessa Robinson and Laura Stager | Mentor: Dr. Ginger Gummelt*

Exposure to violence is a threat to the health and well-being of society – especially for children. Current research indicates that nearly 50 million children will be exposed to at least one type of violence in the coming year (Finkelhor, Turner, Ormrod, Hamby, & Kracke, 2009; Kaufman, Ortega, Schewe, & Kracke, 2011; Listenbee et al., 2012). By understanding children’s views of the violence experienced within their everyday life, social work professionals can design comprehensive prevention and intervention programs that more effectively address the needs of children living in today's violent world.

*Do the Write Thing,* the hallmark program of the National Campaign to Stop Violence, is designed to educate middle school students about violence in their lives and inspire them to explore solutions by writing about their experiences. As researchers examine the themes of the writings, we can begin to determine what youth see as the solutions to violence. These solutions are emerging from those directly impacted and provide a viewpoint that hasn’t previously been thoroughly studied in depth. The goal of the *Do the Write Thing* program is enable youth to move beyond the violence in their lives, with an effort to circumvent the continuation of the cycle of violence. The data gathered through the Do the Wright Thing project will contribute to establishing age appropriate interventions.

Safety Analysis in Port Systems

*Marcus Rodgers and Esther Salazar | Mentor: Dr. Mahdi Safa*

Safety in ports around the world is a growing concern due to several factors, including the port being accountable for everyone’s well-being on the premises. Almost all incidents in ports are caused by human error, and are preventable. To make everyone safer, most ports provide safety rules and training before anyone can set foot onto the premises. The process of measuring the safety of a port is a tricky subject. The worker’s compensation institute does not report any accident that has less than a 3-day recovery (Fabiano, Curro, Reverberi and Pastirino 2003). Additionally, any data collected is only applicable for that port, due to the extreme differences that arise in each port. We propose a different method for collecting safety data. A survey was developed to collect information from workers in the port system about their personality and abilities as well as their own feelings of personal and group safety. This data will be collected and analyzed to find the aspects of safety that needs improvement in each port, and then address those issues. With the added safety measures in mind after the survey, not only would the employees be safer, but the port itself would profit from not having to pay for medical expenses, and from the increased reputation of safety surrounding it.

Development of an Optimized Compressed Earth Block for the Southeast Texas Area

*Molly Ross, Mariam Abedelwahab, Kyle Edwards, Johnita Goodman, Julie Hammond, Brandon Watkins | Mentors: Dr. Mien Jao, Dr. Dan Su, Dr. T. Thuy Nguyen and Dr. Paul Bernazzani*

Earth blocks, or soil bricks, have been utilized as a building material throughout the world for centuries and acts as a locally sourced, sustainable alternative to conventional building materials. Earth Blocks can be formed using a variety of methods, but for our project Compressed Earth Blocks (CEBs) will be manufactured and tested. The bricks composition and type must be customized based on the properties of the soil available, local weather and climatic conditions, and must meet building code standards. Two hundred and forty gallons of soil between 12-36 inches below ground surface was collected in Fannett, TX and preliminary test were performed in order to classify the soil to be used to make the compressed earth blocks. The soil to be used was classified per AASHTO and USCS classification systems as silty and clayey gravel and sand and silty, clayey sand, respectively. Moving forward, four different additives, including cow dung, rice husk ash, lime and class F fly ash will be utilized to develop nine
different mix designs with the soil. The CEBs will be manufactured using the manual block press, Auram Press 3000. Each CEB design will be tested for modulus of rupture, compressive strength and absorption at 7, 14 and 28 days. Once testing is completed, a "best block" will be selected based on strength properties, materials required and cost.

**Improved K-Means Clustering Algorithm on Hadoop for Big Data Analysis**  
*Frederick R. Ryans | Mentor: Dr. Sujing Wang*

High dimensionality of Big Data introduces unique computational challenges, including scalability and storage bottleneck, due to the huge volume of data, the complexity of data types and structures, and the speed of new data creation and growth. It is difficult or even impossible for large-scale data to be sorted and processed on a single computer. Processing Big Data requires high performance computing infrastructure. Therefore, efficient data mining techniques are needed to address these challenges, and to provide effective solutions to analyze massive data by integrating modern computer infrastructures (e.g., Cloud, GPU, Clusters, and GRID) and powerful programming platforms. A popular programming platform that has seen more use in the past decade is MapReduce. MapReduce, is a desirable parallel programming platform due to its simplicity, scalability, and fault tolerance. Thus, this project focuses on improving the classical K-Means Clustering algorithm with MapReduce, and analyzing the results for its use in practical Big Data analysis projects.

**Material sustainability in Southeast Texas**  
*Abigail Saenz, Pedro Escamilla, Anthony Ledezman, Logan Mitchell, Luke Potter, Jonathan Saenz and Stephen Thomas | Mentor: Dr. Mahdi Safa*

This research will be over the environmental effects on construction material. It demonstrates how money, time, and efficiency is lost due to lack of protection from environmental hazards. The end proposal is to create a website where buyers can bid on products before they are shipped, making the consumption of materials a lot easier; the buyer will also be introduced to a larger market filled with more variety. The materials will be kept in a temperature safe warehouse, where they will not be able to be harmed by outside variables. These materials will be shipped straight to the consumer decreasing the amount of time available for the environment to harm them. Wood, metal, and concrete are three of the most commonly used materials in construction, these categories include subcategories such as iron, steel, and copper. One similarity between these two materials is that they’re able to get damaged; whether it’s due to poor handling or due to the conditions the material is surrounded by. Throughout the research, the authors focused on the impact the environment has on materials; this is something neither the consumer nor the seller can control but, they can prevent or slow down the process. From fungi to chemical reactions, if treated right these materials can last a long time. After gathering information on how they could be damaged the authors collected and concluded a proper way to handle these materials.

**Efficient Cargo Forecasting Model for Port Operations**  
*Kaley Sanford, Veronica Ochoa, Dalileon Chou, and Erica Borel | Mentors: Dr. Berna Tokgoz, Dr. Maryam Hamidi, Dr. Brian Craig and Dr. Alberto Marquez*

This project was designed to help the Port of Beaumont (POB) find a more effective way to store and optimize the cargo upon its arrival at the port. Although the port has enough space to accommodate all of their shipment needs, tools are needed to help forecast and keep track of their cargo throughout the port. The cargo is stored where it fits without strategically accessing the problem, which causes an increase in transshipment cost, time, and bottlenecks. A mathematical model has been developed to optimize the use of the storage lots by minimizing the cost per distance associated with storing cargo. By assigning and recording the cargo at a specific location upon arrival, the math model eliminates time in the current process. The math model has been programmed into IBM CPLEX®, which gives the output data. The output data has been integrated into ArcGIS® software. The POB will be able to see the visual layout aspect of the mathematical model with the GIS implementation. Operators will be able to see what area locations are or are not available at a given time and optimize the best-fit location based on the constraints. A simulation model has been generated in Rockwell Arena® to capture the average number of cargo in and out of the port and how long the cargo has been in the port. The completion of this project will help the POB increase their clientele and economic growth, reduce time in the current process, and cut costs within the port.
Modern Roundabout Spring 2017
Joanne Scarf, Ahmad Alzrahani, Madison Floyd, Diego Mingura, Freddy Ordonez, and Tyler Skinner
Mentor: Mr. Cory Taylor, PE

As we move into the 21st century, many national and local transportation agencies are working diligently in order to reduce safety hazards and to promote safe roadways for the general public. With the increasing number of car collisions and fatalities that could be caused by speeding and inattention while driving, modern roundabouts are one of the best solutions to solve the issue.

The main purpose of this project will be the design of a modern roundabout. The intersection of SH 87 and FM 3247 has been chosen for the implementation of the roundabout due to the high number of accidents recorded at this location. Inserting a modern roundabout would greatly reduce the number of accidents and provide a safer environment for the public.

The project will have the following aspects: pavement design, geometric design, drainage design, signage, lighting and aesthetics. The pavement design will be utilizing flexible design for the west side road entering into the roundabout and for new entering sections that will need to be constructed. Also, the process of white topping will be laid on existing pavement for the roundabout. The geometric design will consist of designing specific parameters that can optimize the efficiency and safety of the roundabout. The parameters will include inscribed circle diameter, horizontal alignment, lane width, splitter-island design and truck apron. The drainage design will consist of catch basins to be installed on the outside perimeter of the roundabout as well as a permeable solution to be installed in the central island to reduce storm water runoff that will allow for proper drainage during heavy rains. Signs will also be placed around the roundabout as well as leading up to the roundabout to reduce entering speed and direct traffic within the roundabout. Light poles with LED luminaires will be on all entering roads and Central Island of the roundabout to provide efficient lighting for the drivers entering the roundabout.

Aesthetics will consist of efficient and low maintenance landscaping to provide a visual barrier to prevent drivers from crossing through the roundabout.

Cultures in Cadence: Nursing Student Panel Discussions addressing Unity and Diversity
Melissa L. Schirle | Mentors: Rose A. Harding, MSN, RN, Regina Hale, PhD, RN, CNE and Mary Ford, MSN, RN

The concept of a Student Panel Discussion was conceived based on a motivation to promote positive orientation between cultures. This initiative was created to facilitate open dialogue among diverse students about perceptions and experiences related to diversity in society. The project also emphasized self-awareness of one’s values, behaviors, and interactions.

Eleven volunteer nursing students participated in four 1-hr panel sessions with agreed upon ground rules stressing open-mindedness and respect. Panel topics were provided in advance and each participant was allotted a specified timeframe in which to address the topic questions. Panel members, faculty moderators, and audience classmates were afforded opportunities to ask follow-up questions at the conclusion of each session.

PANEL TOPICS AND BRIEF OVERVIEW:

**Philosophy, Personal Background and Beliefs:**
Focused on personal characteristics, beliefs, values, and worldview.

**Unity versus Division.**
Contemplated and discussed societal views of unity and diversity. Examples included those that promoted or hindered unity and diversity.

**Individual Behaviors and Interactions.**
Focused on personal views and behaviors that may influence interactions. Explored the impact of "self-division" and methods of balancing personal values and building relationships with others.

**Looking to the Future:**
Reflected on what was learned and how to actualize the experience both personally and professionally to promote positive change.
This work investigates the combination of reinforcement learning and radial basis function neural network (RBFNN) learning to improve the performance of a robot’s task execution. Due to the benefits of a controlled environment and controlled variables, the robot has been ported to a simulator called VREP. In the current phase the robot is learning to follow a wall. This machine learning technique uses episodic learning, which only processes the learning algorithms once the state has changed. The state is evaluated using ultrasonic sensors, and the sensor itself. The robot evaluates the distances returned from all sensors and calculates its orientation and distance from the wall combining them into a state. It processes this state through the machine learning algorithms and combines the two “thought processes” to decide its next action. The next phase of the development phase will be to combine the current separate classes into a Robot and Simulator classes.

Women in The Field: The Impact of Gender On Medicine
Aziz Shaaban | Mentor: Dr. Sara Hillin

This research paper will focus on the effects of the gender of a physician on their life, their career development, and their role in improving the quality of medicine. Buddeberg-Fischer claims that most western countries have seen an increase of up to sixty percent in the number of women graduating from medical schools. With the revelation of gender proportions in medicine comes great concern over the influence of these changes on the profession. So, as a result of said concerns, many studies and peer edited papers have been conducted and written to report and satisfy these worries. Based on my research, understanding gender in medicine is important for prevention, screening, diagnosis, and treatment for the patient. In this presentation, I want to address issues that could negatively impact many aspects of female physicians’ lives and careers, such as parenthood, unequal pay for equivalent number of hours worked, and minimum representation in the higher levels of power within academic medicine. I also want to introduce my audience to some of the positive influence female physicians bring to medicine, which includes the overwhelming sympathy and compassion towards the ill and suffering and the better understanding of the female anatomy which will ultimately improve health and medical services for women across the globe.

Is Lying OK in the Medical Profession?
Brendan Sholl | Mentor: Dr. Sara Hillin

When it comes to medical care, patients and medical professionals alike may find it easier to not tell the whole truth to each other. While this may seem effective in the short run, it may lead to some horrible outcomes. Not being honest may lead to misdiagnoses, it halts the medical process, and it jeopardizes the fragile doctor-patient relationship that is so integral to the healing process. A doctor may see it fit to not tell their patient about the illness they have so as not kill their spirit, but almost every source I have read has disputed this belief that this placebo effect has any effect on patients. I will be mainly focusing on the complex moral dilemma that medical professional’s face every day when it comes to telling the truth to their patients. This is not just an issue for doctors, but also for patients, as the patients should care if they are getting an accurate diagnosis.

Black Deaf Individuals and Interpreters as Allies: An Autobiographical Case Study
Tanasha Slack-olumoya, Sidney Omwuharonye, Karen Corbello, and Lindsay Antley | Mentor: Dr. Diane Clark

Black Deaf individuals are a doubly oppressed group, excluded from African American culture because of being deaf and excluded from Deaf culture because they are black. The research regarding Black Deaf individuals is extremely limited. Given this lack of knowledge, two Black Deaf ASL students and two white interpreting students are analyzing how Black Deaf individuals make meaning in their lives and how interpreters function to become allies for their clients, peers, and friends who are Black Deaf. The project is using an autoethnographic methodology to create a counter narrative that places Black Deaf individuals at the center of the story. The layered story reviewed tears and angry dialogues that were resolved through consensus building. The process began at a shallow level and developed into a rich and respectful group of Black Deaf individuals and their allies.

Work in Progress: Machine Learning in Robotics
Colin Smith, Tim Gonzales, Timothy Holcombe, Greg Yera, Hannah Leleux, Logan Smith, and Alexander Strong | Mentors: Dr. Sijing Wang and Dr. Peggy Doerschuk

This work investigates the combination of reinforcement learning and radial basis function neural network (RBFNN) learning to improve the performance of a robot’s task execution. Due to the benefits of a controlled environment and controlled variables, the robot has been ported to a simulator called VREP. In the current phase the robot is learning to follow a wall. This machine learning technique uses episodic learning, which only processes the learning algorithms once the state has changed. The state is evaluated using ultrasonic sensors, positioned on the front, left and right sides of the robot. These sensors detect the distance from a solid object, the wall, and the sensor itself. The robot evaluates the distances returned from all sensors and calculates its orientation and distance from the wall combining them into a state. It processes this state through the machine learning algorithms and combines the two “thought processes” to decide its next action. The next phase of the development phase will be to combine the current separate classes into a Robot and Simulator classes.
Expressive Art and Stress Levels in Cancer Patients: A Mixed Methods Study

Lauren Smith / Mentor: Dr. Cynthia Pipkins

Expressive art (EA) is utilized to calm and balance the mind, body, and spirit improving quality of life and patient vitality (Hattori et al., 2011) through enhanced relaxation (Heuberger et al., 2001). Stress is a common psychological factor (perceived stress level) that affects physiological factors (heart rate/respiratory rate) in cancer patients. This mixed method pilot study was conducted to determine the baseline stress (Perceived Stress Scale) level of the cancer patient and evaluate (pretest/posttest) the effects of expressive art on the physiological (heart rate and respiratory rate) and psychological (Perceived Stress Level) factors of cancer patients. Additionally, the participants described the EA session impact on current stress levels and described the completed art work.

Participants are real time cancer patients whom are waiting or receiving cancer treatment in the facility. The principal co-investigators conducted different weekly EA sessions 2 times per week for 4 weeks. Each session was presented to the participants in the waiting room foyer or chemotherapy treatment site. Initially, participants were consented and completed the demographics and Perceived Stress Scale (PSS). Biophysical Markers/Perceived Stress Level (PSL) were collected before and after each EA session. After the Expressive Art session was completed the participant was asked to answer the open-ended questions. Currently, we are in week 2 of data collection. The data collected by the PSS, PSL, and biophysical markers will be analyzed through descriptive statistics and pretest/posttest changes. The open-ended questions will be analyzed through color analysis and descriptive themes. Results and conclusions are pending.

Hope Appeal as a Potential Motivator for Influencing Behavior in the Context of Alcohol Use among College Students

Alexandra Sokolova / Mentors: Dr. Jian Raymond Rui and Dr. Natalie Tindall

The transition from high school to college represents risk for binge drinking among college students. Health educators and communicators have pointed out that Public Service Advertisements (PSAs) that use fear appeal do not cause effective attitude change in young adults. Fear appeal overemphasizes the risks that target audiences might face but fails to highlight the benefits and effectiveness of the recommended acts. Built on positive framing literature, this research aims to compare the effectiveness of messages that evoke hope versus fear appeals in shifting attitudes towards alcohol use in the college setting.

Violence in the Eye’s of Children

Laura Stager and Vanessa Robinson / Mentor: Dr. Ginger Gummelt

Violence touches the lives of children in America daily. According to the World Health Organization (WHO), exposure to violence is a significant health risk for children which warrants scholarly attention and effective interventions. Historically, solutions to the problem of children’s exposure to violence have come from those who are not directly affected by it. In a school setting those would be the teachers, administrators, and the parents. While some of these people may have struggled with violence as children, they are now removed from the day to day struggles the children face. Examining what children perceive as the solutions can, over time, change how violence is addressed and potentially shape prevention measures. This study used data from the national Do the Write Thing Challenge to explore children’s solutions to violence. The national Do The Write Thing Challenge encourages students to write about their experiences with violence and explores solutions they believe would be effective. Qualitative data was gathered from this program in the form of written essays, and from this, researchers were able to identify common themes in the lives of area children, as well as how children think about solutions to violence. Emerging themes evident in this study centered on empowerment and action which directly engages the children. In tracking this data, future researchers will be able to see if employing solutions developed by the children is effective in reducing the exposure or impact of violence.

CREATING PREDICTIVE MODELS FOR BUSINESS SOLUTIONS USING GEOPROCESSING

John T. Stone / Mentor: Dr. Mahdi Safa

Contractors and consultants are often called in to diagnose and fix problems that arise. The solution to some problems will be novel to the situation: however, sometimes the problem will have arisen from predictable scenarios, such as a readily measured environmental conditions. Predictive models can be generated to ascertain where the problem is likely to occur, allowing a business that has invested time and resources into solving the problem an opportunity to find additional audiences for the solution. For this model, the problem of high relative...
humidity, combined with high levels of dissolved salts caused a fire hazard. The cause of the problem is predictable, a combination of relative humidity and the presence of dissolved salts: therefore, a model can be made to predict where the problem is likely to occur. Utilizing the power of ArcMap geoprocessing, a model can be developed to show where problem area can be expected by overlaying data on environmental variables. This allows the contractor to contact businesses in the hazard area, reaching new customers while also allowing for preventative, rather than reactive maintenance. These models are extremely versatile and can be used by managers to make better decisions and develop effective business strategies.

**Chekhov and Nabokov: Russian Heritage within Literature**  
*Emily Tassin | Mentor: Dr. Sara Hillin*

The history of Russia is considerably one of the most controversial and interesting journeys of politics and culture among any country. For my presentation, I will be explaining how Russian literature echoes the real-life stirring events of past and modern Russia through popular authors Anton Chekhov and Vladimir Nabokov. After analyzing two short stories from each, my research shows that the two authors write in similar styles, however, Nabokov tends to write abstractly than Chekhov, who was an esteemed writer of realism during his time. Many critics may find Nabokov to be unlike Chekhov in the fact that he does not respond to the events of his motherland, but my research into Nabokov’s life and readings of other biographical analyses proves otherwise. Chekhov and Nabokov spoke of the beauty of Russia and of proudful Russian heritage, and both either inferred or explicitly discussed the harrowing events that took place in their lifetimes. Chekhov’s family struggled in poverty whilst the political chaos of the tyrannical government systems of the mid to late 1800s carried on after the Serf emancipation. Nabokov led a privileged life of wealth in Russia in the early 1900s but was forced to flee from the Red Army and was a refuge for many years of his life. This research is consisting of a biographical analysis of these two authors to connect their lives to their works, portraying the intense journey Russian literature tells of the country itself.

**Catalyst Effect on Ammonia Borane - Polyvinylpyrrolidone Hydrogen Storage Composites**  
*Weslynn Taylor and Ramanjaneyulu Seemaladinne | Mentor: Dr. Ozge Gunaydin-Sen*

Ammonia borane (NH₃BH₃) is a promising hydrogen storage material to be used in hydrogen fuel cells, but its application is restricted by the slow hydrogen release and unwanted byproducts. The bulk composites were prepared by mixing NH₃BH₃ with polyvinylpyrrolidone in different proportions and drying under vacuum. The catalyst, MgCl₂ was also added to evaluate the changes. High temperature thermal studies via differential scanning calorimeter were performed to investigate dehydrogenation kinetics of the composites with and without the catalyst. We conducted decomposition at several heating rates and calculated activation energies. The activation energies of the composites with MgCl₂ were lower than the neat NH₃BH₃ as well as the polymer composites. The decrease in the temperature for the release of hydrogen demonstrated the enhanced kinetics for the composites with MgCl₂. All of these results supported the improvement of the properties of Ammonia borane - Polyvinylpyrrolidone composites by the addition of a catalyst. Future studies involve property investigation of different polymer composites of NH₃BH₃ with catalysts.

**Becoming Quixote**  
*Nathan Tokheim | Mentor: Dr. Catalina Castillón*

One of the most ubiquitous motifs of philosophy is the search for meaning, and through that, the pursuit of happiness. Countless philosophers and intellectuals have pondered and debated this topic, and many different schools of thought have been born in its wake. One example of these schools of thought is existentialism, and one example of existentialism in literature can be found in Quixote’s psychosis and his becoming an existential hero. To this end, Quixote’s lack of met needs according to Maslow’s hierarchy will be presented. Then, it will be posited that Quixote’s apparent psychotic episode is a coping mechanism in the mode of an existential becoming. To finish off, existentialism will be shown as a means of self-actualization, and Quixote will be shown as having met these needs as an existential hero.
Metabotropic Glutamate Receptor Signaling in Alzheimer’s disease
Shreya Vakil | Mentor: Dr. Maryam Vasefi

Alzheimer’s disease (AD) is the sixth leading cause of death in the United States and more than 5 million Americans are living with this disease. By 2050, this number could rise as high as 16 million and treatment of patients could cost the nation $1.1 trillion dollars. Not only is AD an issue of the present but it also affects our future. There is no current drug that cures AD, and the current drugs mask the symptoms of AD. AD is the most prevalent neurodegenerative disease mediated by soluble beta-amyloid oligomers. Beta-amyloid (Aβ) comes from a larger protein found in the fatty membrane surrounding nerve cells and are a key component of the senile plaques that characterize AD. Metabotropic glutamate receptor 5 (mGluR5) interacts with Aβ oligomers and disrupts normal neural signaling and function. Therefore, chronic treatment with mGluR5-selective negative allosteric modulator, improves cognitive performance and reduces Aβ pathology in Alzheimer mouse models. Evidence was provided to show that mGluR5 is an ideally suited target to improve the clinical progression of AD. In this study, I investigate mGluR5 signaling that contributes to the establishment of AD like symptoms. This study is important to understand the process of how the glutamate receptor function is impaired in AD. This discovery, through experimentation and investigation, suggests a strategy for a potential drug target for treatment of AD.

Town and Gown: Beaumont and Lamar University
Isaac Valerio | Mentor: Dr. Mary Scheer

Lamar University and the city of Beaumont, Texas have shared a “town and gown” relationship for close to a century now. Through time, both have benefited greatly from the symbiotic relationship they partake in, and are both responsible for each other’s growth, development, and impact on the community. Beaumont would not be the same if it was not for Lamar’s presence in the community. Lamar University has also benefited tremendously from its residence in Beaumont and to a greater level the Golden Triangle. Through the use of newspaper articles, yearbooks, quarterly publications, as well as secondary sources such as oral interviews, books and magazines this paper aims to portray the most accurate development of both Lamar and Beaumont through time. This research explores the development of both Lamar and Beaumont individually, as well as their cohesive development and the effect they have had in the community. Both Lamar and Beaumont share a distinct history and present a promising future which are both worth exploring.

The Effect of Cooperative Learning in High School: Student Learning Achievement and Motivation and Challenges from Teachers
Julian VanDevender | Mentor: Dr. Julia Yoo

This study will examine the effect of cooperative learning among teachers and students in core departments in a southeast Texas regional high school. Surveys and observations will be used to collect the data from both teachers and students. The aim of the research is to investigate the relationship between teacher competencies for cooperative learning and student learning achievement and motivation. Data will be collected through surveys, and observation. Also, student learning outcomes will be collected. In order to see the effect of cooperative learning, multiple regression analyses will be used. For the observation data, qualitative data coding will be used.

A survey of seasonal persistence of common bacterial and viral pathogens in Jefferson County Beaches.
Carlo Vanz, David Narvaiz, Jason Janneaux, and Jami Brown | Mentor: Dr. Ashwini Kucknoor

Exposure to marine recreational waters carrying a variety of human pathogens has been linked to multiple adverse health outcomes. Due to this reason, the recreational marine waters are subjected to regular monitoring of indicator bacterial species (fecal coliforms) by the environmental protection agency. However, there are several other bacteria, protozoa and viruses that are responsible for more chronic diseases. *Vibrio vulnificus* is responsible for seafood related infections. Open wound infections resulting from *Vibrio vulnificus* is a common occurrence during summer months and several cases have been reported from around the South East Texas region. Wound infection results in varied degrees of tissue damage which can require amputation. This study utilized the water samples concurrently collected for the routine beachwatch analyses run by Lamar University Beachwatch program to detect indicator organisms. Water samples were collected weekly during different seasons (spring, summer and fall) from McFadden and Sea Rim beaches in South East Texas. Nucleic acids (both RNA and DNA) were isolated from these samples. Species specific primers were used to detect the presence of *Vibrio vulnificus* (bacteria), *Giardia* (protozoa), human adenovirus, human enterovirus and human
norovirus using PCR and RT-PCR methods. The data from all the different samples will be analyzed to see any seasonal variation with the presence or absence of a given type of pathogen.

**Exceptional Production of Quality Coffee from Doka Estate**

*Lance Vargas, Emily Carl and Madison Cole / Mentor: Dr. Mahdi Safa*

The purpose of this research is to identify the internal structure of the Doka Estate Coffee Plantation. Doka is a plantation in Alajuela, Costa Rica that is owned by the Vargas family and has been in operation since 1940. This globally conscious company grows, roasts, and sells coffee. The aspects explored in this research are Doka Estate’s human resource policies, information systems procedures, and marketing strategies. Extensive research was conducted first hand at the plantation in Costa Rica by speaking with Doka Coffee’s owner and manager, Mariano Vargas, and his employees. Business students Emily Carl, Madison Cole, and Rafael Vargas have collected key information during the Lamar University 2017 study abroad trip to Costa Rica. The research concluded that Doka Estate Coffee has an excellent business model. Doka tracks their production effectively through their information systems procedures, treats their employees well, and successfully reaches global consumers with their marketing strategies.

**Suburbanization and Racial Segregation in Jefferson County, Texas**

*Nathan Vaughn / Mentor: Dr. Jeff Forret*

Regardless of income, black and white families in the United States continue to live in separate worlds. The reality of residential segregation, in which minorities live in poorer communities and whites in more affluent neighborhoods, means that blacks and whites find differential opportunities with respect to housing, public transportation, job opportunities, and public education. What led to this division? Was it blatant racism or simple lack of economic opportunity? Was segregation approached the same in the North and in the South? And how did private enterprise affect efforts to desegregate? What role did suburbanization play? These questions are all extremely broad in scope and defy easy answers, but by examining and researching smaller locals we can begin to piece together an understanding of modern residential patterns. This research examines housing and neighborhood deeds in Jefferson County, Texas, between the dates of 1917 and 1948, accessed from the Jefferson County Clerk’s Office’s public records. Many of the deeds contain explicit racial restrictions for who can and cannot lease or own property in many areas of Jefferson County. Often barring black people for ninety-nine years or more, these racial covenants played a crucial role in the suburbanization of Jefferson County.

**Biometric Analysis of Ego Depletion**

*An Vo / Mentor: Dr. Jeremy A. Shelton*

The resource model of ego depletion states self-control is a limited resource that is depleted after a period of exertion. Recent research, however, questions what the actual “resource” is that powers self-control and is supposedly depleted with repeated use. The limited resource model indicates blood glucose is the limited resource, whereas, the process model indicates dopamine (produced via intrinsic motivation) is the resource and is not limited. The proposed research project will explore this controversy by testing whether ego-depletion produces measurable biometric changes (i.e., reduced blood glucose levels and evoked pupillary responses) utilizing pupillometry eye tracking hardware and blood glucose meter. Data collection will be in the initial stage of experimentation.

**Developing Photo-catalysts for Converting Waste Carbon Dioxide into Saleable Products**

*Jennifer Watters and Karishma Piler / Mentor: Dr. Tracy Benson*

This study involves the conversion of waste carbon dioxide, namely from electric power generators and petroleum refineries, to saleable products, such as gasoline and diesel fuels. A light activated catalyst, formed from titania and carbon nanotubes, has been developed to readily convert mixtures of CO₂ and steam to syngas (CO and H₂), which are feedstock compounds for Fischer – Tropsch reactions. These photo-catalysts have been synthesized and will be tested in the laboratory and are expected to achieve molar CO₂ conversions of 20 %, which is up from 2 % of today’s best photo-catalysts for CO₂ transformation to syngas.
Spectroscopy represents the optical analysis of light, emitted or absorbed by substances. The analysis of absorption spectra, which is the focus of my research, is more challenging than the emission spectra because it implies dealing with a background light profile in which absorbed photons show their presence as small dips. Also, the absorption spectrum has lesser characteristic transitions than emission spectra because they all relate to an excitation from the ground state. We intend to analyze the absorption spectra of various medicines and plants in teas and solutions made from various plants. The purpose is finding similar light patterns of chemicals in plants and in some of the over-the-counter medicines selected based on the recommendation of the pharmaceutical industry for alternative cures. The cases of errors in spectral analysis with spectrometers will be addressed, such as: the efficiency of the diffraction grating, the sensitivity of the photodetector, and the reflectivity of optical components.

Development of Plant-Microbial Fuel Cells using Southeast Texas coastal marsh plants

Jiaxuan Xu, Avinash Bajaj, Crystal Gardner, Scott Girdwood, Chelsea McDonald, and D. Narula | Mentors: Dr. Matthew Hoch and Dr. Ramesh K. Guduru

Renewable energy is expected to grow by 2.6% per year from 2012 to 2040; although we will remain majorly dependent on fossil fuel through 2040. Plant-microbial fuel cells (PMFCs) are promising alternatives for the production of electricity without any disturbance to ecosystems. In PMFCs, plant photosynthesis supplies the microbial community in the fuel cell with organic compounds as root exudates, and ultimately exoelectrogenic bacteria donate electrons to an anode to initiate current. We are developing PMFCs that use microbial communities and plants from local coastal marshes. Our preliminary PMFC utilized *Spartina patens*, a marsh sediment enrichment culture, and stainless steel electrodes. The present study has three objectives: 1) determine a cost-efficient electrode material with high current yield; 2) select for marsh sediment enrichment cultures with greatest current production; and 3) determine the most effective coastal marsh plant species for use in PMFC. Small-scale microbial fuel cells (MFCs) are being used to test potential electrode materials (steel versus carbon) and anaerobic enrichment cultures inoculated with different sources of coastal marsh sediment. The MFC design used in these experiments includes a conical shape vertically installed cells with the separate anode and cathode compartments via cation-selective membrane. The array of MFCs are connected to a continuous monitoring current measurement device. Data from these small MFC experiments will guide modification to improve our previous PMFC.

Investigation of inflammatory response of cervical cancer cells to stimulation by *Trichomonas vaginalis*

Eric Yeager | Mentor: Dr. Ashwini Kucknoor

*Trichomonas vaginalis* (Tv) is a protozoan parasite that causes Trichomoniasis, a sexually transmitted disease in humans. This organism can penetrate the mucosal lining of the genital epithelium. But, many people, both men and women, show no symptoms of having this STD. Studies have shown that long-term hoarding of the pathogen has been linked to prostate cancer. Tv has been found in patient tissue of benign prostatic hyperplasia (BPH), and is suggested to cause chronic prostatitis. Several reports suggest that specific cytokines that are known to be pro-inflammatory chemicals have been secreted by human prostate epithelial cells after interacting with Tv. This project aims at studying the cytokine responses of human cervical epithelial cells after interacting with Tv. The way this research was conducted was by first interacting the Tv cells directly with the HeLa cells for a specific amount of time. Then, the RNA was extracted which acts as an explicit layout of what genes are being expressed at that time. The RNA was then converted to DNA through reverse transcription so that the samples could be amplified through many rounds of polymerase chain reaction. Once the sample was amplified, the DNA was separated using agarose gel electrophoresis to visually identify which genes were expressed in the HeLa cells at the time of interaction. The primers used for amplification targeted genes that coded for well-known pro-inflammatory signaling proteins. Understanding the inflammatory responses sheds light on the molecular mechanism of pathogenesis of this parasite, and will provide potential targets for chemotherapy.
As the heterogeneous nature of cancer began to emerge, scientists started advocating molecular therapies based on a multi-pronged attack on tumors; of central clinical importance then is whether the derived clinical impact is likely to have side effects. Zhang and Fernandez have shown that the binding of a kinase against a set of inhibitors is highly correlated to the structural information of the kinase. It was then discovered that knowing the interaction between a small subset of kinases suffices to determine the specificity of a given inhibitor. Using current information on kinase inhibitors, we intend to optimize the basis of kinases for determining inhibitor selectivity.
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