





## WELCOME



Welcome to the San Diego State University College of Engineering's Spring 2024 Senior Design Day at Viejas Arena. We are proud to have our seniors showcase the projects they have conceived, designed, and built during the 2023-24 Academic Year. The senior design teams represent our Senior Design classes in Aerospace Engineering, Civil, Construction & Environmental Engineering, Electrical & Computer Engineering, and Mechanical Engineering.

Congratulations to our student teams on their innovative design projects, which display the culmination of the technical knowledge they have developed during their studies in the College of Engineering. These projects prepare students with the expertise necessary to tackle critical world problems and skills that will springboard them into successful engineering careers. Through this experience, our students learn to apply and develop critical thinking skills, recognize human and societal needs, and design novel engineering solutions.

We are grateful to our many sponsors for their generous support of these student projects, such as J.R. Filanc Construction Company, Parsons, Solar Turbines, Dokken Engineering, General Atomics, Hoch Consulting, Fluidra, Caltrans, County of San Diego, Masimo, Booz Allen Hamilton, San Diego Zoo Wildlife Alliance, Dexcom, and Kimley-Horn.

Many of our sponsors are integrally involved with the student design teams, lending their mentorship and resources to support the teams' success. We sincerely appreciate all of our sponsors for uplifting our students.

Enjoy SDSU's Spring 2024 College of Engineering Senior Design Day. Thank you for being a part of this significant event.

**Eugene Olevsky, Ph.D.**

*Dean and Distinguished Professor  
College of Engineering*



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Bruce Urquhart



# THANK YOU TO OUR SPONSORS



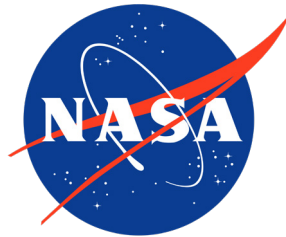
Hoch Consulting



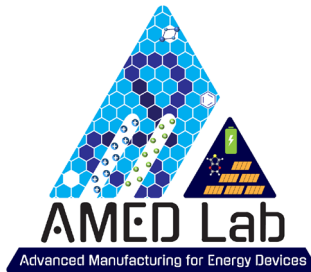
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## 2024 DESIGN DAY FACULTY

### Aerospace Engineering



**Pablo Machuca, Ph.D., Visiting Professor**

*pmachuca@sdsu.edu*

Pablo's research interests lie in the field of (deep-) space exploration, involving areas like astrodynamics, trajectory design, (autonomous) guidance, navigation and control (GNC), spacecraft attitude dynamics, (small-spacecraft) mission design and analysis, and systems design. Research topics include Earth-orbiting missions and space debris modeling, cislunar space exploration (Earth-Moon region), small-body exploration (asteroids and comets), and planetary exploration. Current research efforts focus on cislunar optical navigation, uncertainty propagation in cislunar space, robust, autonomous cislunar guidance, asteroid gravitational modeling, autonomous attitude determination and control for comet fly-by missions, and small-spacecraft systems design and mission analysis.



**Geoffrey S. Butler, Lecturer**

*gbutler@sdsu.edu*

Mr. Butler is a working professional aerospace engineer involved in the design and analysis of aircraft for both military and civil applications. He has over 39 years of experience in the aerospace industry and has contributed to the development of vehicles ranging from cruise missiles, to unmanned aircraft, to hypersonic vehicles, as well as launch vehicles. He is an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA) and is a member of the AIAA Missile Systems Technical Committee. He has been a lecturer teaching aerospace engineering courses at SDSU including Dynamics, Astrodynamics, Stability and Control, and Aerospace Engineering Applications (AE 460) for over 25 years, and applies a thorough yet practical, applied engineering approach. He was awarded the AIAA Outstanding Teacher award in 2015.



**Joseph Katz, Ph.D., Professor**

*jkatz@sdsu.edu*

Professor Katz has a wide variety of research interests in the following areas: internal combustion engines: cooling, carburation; powerplant optimization; passenger car safety; two phase flow cooling; heat transfer and heat exchangers; wind tunnel measurements, including laser doppler anemometry in two phase flows; non-conventional naval propulsion e.g.: undulating propellers, swimming fins; non-steady aero and hydrodynamics; potential flow and general fluid dynamics; general aviation piston engine cooling and drag reduction; post-stall-spin aerodynamics; automotive aerodynamics and dynamics; lifting body airplane; transonic wings; and stall resistant configurations.

## Civil, Construction & Environmental Engineering



**Mark Filanc, PE, Lecturer**

*mfilanc@filanc.com*

Mr. Filanc is the CEO of J.R. Filanc Construction Company Inc. and has over 40 years of experience in water/wastewater design and construction, as well as extensive expertise in all areas of project management. He is a registered professional engineer in the State of California and has been designated as a Design-Build Professional in Design-Build Institute of America's (DBIA) charter group for lifetime experience. He is past chairman and current member of DBIA's Water Committee, past President of the San Diego Chapter of AGC, and an instructor at the national level for AGC's Supervisory Training Program. Mark also serves on the SDSU College of Engineering Dean's Advisory Board and the Department of CCEE Industry Advisory Board. Mark holds a Bachelor of Science degree in Environmental Engineering/Water from California Polytechnic State University, San Luis Obispo, and a Master of Science degree in Civil Engineering, specializing in Construction Management, from Stanford University.



**James R. Haughey, PE, MBA, LEED AP, ENV SP, Lecturer**

*jrhaughey@mbakerintl.com*

Mr. Haughey is Vice President with Michael Baker International in San Diego, California. Jim has over 30 years of experience in Design-Build with an emphasis in public social infrastructure, military engineering, healthcare, aviation, and school development. Jim has a BS in Civil Engineering (BSCE) from San Diego State University and has an MBA from the University of Phoenix. Jim is a Past President of APWA and serves on several industry boards including Society of American Military Engineers (SAME), ACE Mentorship San Diego, Design Build Institute of America (DBIA), SDSU College of Engineering Dean's Advisory Board, and Chair of SDSU Civil, Construction and Environmental Engineering Industry Advisory Board.



**Bobby Sokolowski, LEAD BRIDGE ENGINEER**

*bobby.sokolowski@tylin.com*

Bobby is a Lead Bridge Engineer specializing in parametric modelling and design of unique and complex bridges. He pushes the capabilities of design technology to streamline bridge analysis and design, especially for complex structures and geometries. Bobby has 15 years of industry experience which centers around the analysis and design of geometrically complex and aesthetically significant bridges. Prior experience in land surveying and civil design gives Bobby a deep understanding of all components of his projects and strengthens his ability to collaborate across disciplines. Bobby constantly leverages the latest technologies in the AEC industry to streamline bridge design, analysis, and plan production procedures.



**John Prince, PE, PMP, QSD, Lecturer**

*jprince@delanegroup.com*

Mr. Prince is Co-Owner/Vice President of DELANE Engineering with over 20 years of Site Civil Engineering and Site BIM Experience. John has been teaching at SDSU for over 10 years with 2 classes; Intro to Civil and Senior Design, and also serves on the CCEE Industry Advisory Board. John's initial goal and continued passion for teaching at SDSU is to enhance the industry involvement, helping bridge the gap between academia and profession and prepare students for their careers. John is an alumnus of SDSU where he met his wife (also a Civil Engineer). They have two children (both girls) who are very active skiers and enjoy the mountains.



**Paul Jackson, DBIA, Lecturer**

*pjackson@sdsu.edu*

Paul Jackson is a Program Manager in SDSU's Planning, Design, and Construction Department and has spent the last 5 years focused on SDSU's Mission Valley development including construction of Snapdragon Stadium and the Mission Valley River Park project. Paul has over 20 years in the construction industry beginning in the construction trades and spent 12 years as a construction manager for a local general contractor. In addition to the projects in Mission Valley, Paul has been involved with dozens of projects at SDSU including: Tenochca Hall Renovation, Maya & Olmeca Renovations, various Elevator modernization projects throughout campus, and classroom projects on the main campus and at the Calxico campus. He is actively working on the next phase of development in Mission Valley including the Fenton Parkway Bridge and collaborating with developers for the upcoming P3 residential and innovation district projects. He has been guest lecturing for students at SDSU and local high schools for years and is honored to lead the 1st year of Construction Management Students through the first CM Capstone Course. The future of construction management looks bright in the hands of these talented and hard working SDSU graduates!

## Electrical & Computer Engineering



**Barry L. Dorr, PE, Lecturer**

*bdorr@sdsu.edu*

Mr. Barry Dorr is a full-time lecturer in SDSU's Department of Electrical and Computer Engineering. Prior to that he worked for San Diego electronics companies for 35 years as a design engineer and project manager. Between 1995 and 2006 he owned a small product development firm creating digital radios, control systems and audio systems for local manufacturers. He holds eight patents for various communication, control, and calibration systems. Professor Dorr earned a Bachelor of Science in Electrical Engineering from California State Polytechnic University, San Luis Obispo and a Master of Science in Electrical Engineering from SDSU. He is a registered Professional Engineer in the State of California. Professor Dorr's Senior Design course (EE/COMPE 491/492) emphasizes practical applications of the fundamentals taught in the ECE curriculum completed within a framework of industry-standard project management practices and personal/team ethics.

## Mechanical Engineering



**Scott Shaffar, Ph.D., Lecturer**

*sshaffar@sdsu.edu*

Dr. Scott Shaffar is responsible for the development and implementation of the San Diego State University Mechanical Engineering Senior Design Capstone program including course content and program management through all phases from project definition to final system demonstration. This program includes project management, system engineering, research, ideation, detailed design, engineering analysis, fabrication, assembly, test, and customer delivery. Previously, Dr. Shaffar retired from Northrop Grumman Corporation after a 34-year career. In his assignment at retirement, Dr. Shaffar served as a senior director for Northrop Grumman Aerospace Systems, a premier provider of manned and unmanned aircraft, space systems and advanced technologies critical to our nation's security. Dr. Shaffar earned a Bachelor of Science in aerospace engineering from the California State Polytechnic University, Pomona, and a master's and doctorate in mechanical and aerospace engineering from the University of California at Irvine. He is a member of the American Society of Quality, Society of Automotive Engineering, and the American Society of Mechanical Engineers.







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Clean Water Solutions (Team 9) - <b>East County Private Wastewater Treatment Plant</b> <i>Sponsored by Kimley-Horn and Filanc Construction</i>
Coastal Ridge Roadworks (Team 1) - <b>Bachman Place Road Widening and Retaining Wall</b> <i>Sponsored by Group Delta and Latitude 33</i>

## Civil, Construction & Environmental Engineering (cont.)

Crow Construction & Engineering (Team 12) - **Oak Park Library Cost Evaluation/Design**

*Sponsored by Hoch Consulting*

Finish Line Construction - **Snapdragon Stadium**

*Sponsored by SDSU Planning Design and Construction Department*

FOOLPROOF Engineering (Team 6) - **SR-67 / Riverford Interchange Roundabout**

*Sponsored by Parsons, Caltrans, and County of San Diego*

Golden State Construction - **SDSU Stadium Analysis**

*Sponsored by SDSU Planning Design and Construction Department*

GOOD Engineering Inc. (Team 10) - **East County Private Wastewater Treatment Plant**

*Sponsored by Kimley-Horn and Filanc Construction*

Horizon Engineering (Team 7) - **SR-67/Riverford Interchange Roundabouts**

*Sponsored by Parsons*

Ingenium Engineering (Team 2) - **Bachman Place Road Widening and Retaining Wall**

*Sponsored by Group Delta and Latitude 33*

JAT Engineering Solutions (Team 14) - **San Vicente Hydroelectric Pumped Storage**

*Sponsored by Black & Veatch*

JHIANT Construction (Team 15) - **Manchester Convention Hotel-High Rise**

*Sponsored by KPFF Consulting Engineers and Bowman Consulting Group*

SOCAL BUILDING CO. - **Snapdragon Stadium Construction**

*Sponsored by SDSU Planning Design and Construction Department*

Precision Path Engineering (Team 21) - **Carroll Canyon Road Extension**

*Sponsored by Dokken Engineering*

Solid Build Construction (Team 4) - **Ramona Sheriff Station**

*Sponsored by County of San Diego*

STAGRS Engineering (Team 5) - **SR-67/Riverford Interchange Roundabouts**

*Sponsored by Parsons*

StoneCap Construction - **Aztec Stadium**

*Sponsored by SDSU Planning Design and Construction Department*

Tegrity Engineering (Team 3) - **Ramona Sheriff Station**

*Sponsored by County of San Diego*

## Electrical & Computer Engineering

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SDSU Hydrophone Agents (SHA) - **Acoustic Ocean Monitoring Device**

*Sponsored by SDSU Electrical and Computer Engineering*

Team CABLES - **Short Break Detector**

*Sponsored by Masimo*

Team CHESS - **Intelligent Chessboard**

*Sponsored by SDSU Electrical and Computer Engineering*

The Bode Bandits - **“Bode Analysis N’ Display of Instrument Testing” (BANDIT)**

*Sponsored by SDSU Electrical and Computer Engineering*

The People Counters - **Live Occupancy Automated Tracking System**

*Sponsored by SDSU Electrical and Computer Engineering*

V.O.L.T. Vipers - **Digital Multi-Range Voltmeter**

*Sponsored by SDSU Electrical and Computer Engineering*



## Electrical & Computer and Mechanical Engineering

AUV Pathfinders - **Autonomous Underwater Vehicle for Passive Sonar**

*Sponsored by SDSU Mechanical Engineering*

Dronely Raven - **California Unmanned Aerial Systems Competition (C-UASC)**

*Sponsored by SDSU Student Success Fee*

FlowTec - **Vortex Shedding Flowmeter**

*Sponsored by Fluidra*

FPP Force - **Fixed Power Payload Input/Output (FP PLIO)**

*Sponsored by Booz Allen Hamilton*

R.E.S.S.T. (Remote Earth Sea Systems Technology) - **Multi-Domain Vehicle Project**

*Sponsored by Systems Engineering Research Center and Stevens Institute*

RASC-GULLS - **NASA's Revolutionary Aerospace Systems Concepts – Academic Linkage (RASC-AL): Large Scale Lunar Crater Prospector**

*Sponsored by SDSU Student Success Fee*

Ring Around the R.O.S.I.E. - **Development and Integration of a 7th Axis Rail System for a Fusion Tokamak Robot**

*Sponsored by General Atomics*

SDSU WaveCure - **Climate Controlled UV Curing Chamber for 3D Printed Parts**

*Sponsored by Masimo*

Stealth Propulsion Systems - **Quiet UAV Test Device and Test Protocol**

*Sponsored by Systems Engineering Research Center and Stevens Institute*

Team ARES - **NASA Artemis 2024 Lunabotics and Beyond**

*Sponsored by SDSU Student Success Fee*

Team M.A.C.W.E.R.P. - **Automated Chemical Wiping System**

*Sponsored by Masimo*

Team Photron - **Automated UV Dispense & Cure Station**

*Sponsored by Masimo*

TRF Innovations - **Time-Resolved Fluorescence Reader**

*Sponsored by Ascential Technologies Medical & Life Sciences Division*

Trunk Tech - **The Trunk Tracker: An Elephant Behavior Monitoring Anklet**

*Sponsored by San Diego Zoo Wildlife Alliance*

Vital Metrix - **Physical Distress Monitor**

*Sponsored by Systems Engineering Research Center, Stevens Institute*

Wrap Tech - **Composite WiRE Wrap Robotic System**

*Sponsored by SDSU Electrical & Computer Engineering and SDSU Mechanical Engineering*

## Mechanical Engineering

Dex-Tecs - **Continuous Glucose Monitor G7 Test Fixture**

*Sponsored by Dexcom*

Exeggutor - **Palm Inspired Wind Turbine**

*Sponsored by SDSU Mechanical Engineering*

Light Track Technology - **Sun Tracking Reflectors with Comparison to GPS-Driven Solar PV**

*Sponsored by SDSU Mechanical Engineering*

LV8 - **Palm Platform - Vertical Transport Elevator**

*Sponsored by Max Enterprises*

MediMask Design Team - **Elastomeric Half Mask Respirator (EHMR) with Disinfection Box**

*Sponsored by Hiro PPE*

Quetzal - **3D Printed Aircraft Competition**

*Sponsored by SDSU Student Success Fee*

Refined Ergo-Jig - **Refined Driver Ergo-Jig**

*Sponsored by SDSU Aztec Electric Racing*

Team ASML- Optimized Venting - **Optimizing Venting for EUV Technology Testing**

*Sponsored by ASML*

Team AVIAN - **MQ-9 “Mojave” Remotely Piloted Aircraft (RPA) Manual Wing Fold System**

*Sponsored by General Atomics*

Team No Pressure - **Building Enclosure for the Chemical Vapor Deposition (CVD) Reactor and Assembly**

*Sponsored by SDSU Mechanical Engineering*

Team ShoreMobility - **Self-Propelled Beach Wheelchair**

*Sponsored by Quality of Life Plus*

Team W.A.L.T.Z (Water Activity Leg with Tenacious Zeal - **Snorkeling and Diving Leg Challenge**

*Sponsored by Quality of Life Plus*

Thermaphase (M.A.T.E.S.S.) - **Molten Aluminum Energy Storage with Supercritical CO2 Heat Transfer Fluid**

*Sponsored by SDSU Mechanical Engineering, Combustion and Solar Energy Laboratory, and Student Success Fee*

Titan Seals - **Gas Turbine Driveshaft Covers**

*Sponsored by Solar Turbines*

Wells Pourgo - **Automated One Well Plate Pourer**

*Sponsored by Cibus US LLC*

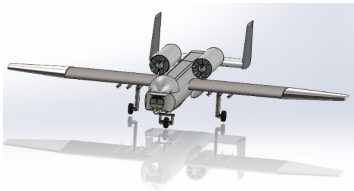


# AEROSPACE ENGINEERING

## Blackfin

MEMBERS: Mustafa Bahlool, Luke Brown, Ivan Jimenez, Kavan Morris, Connor Quinn, Patrick Zalameda

ADVISOR: Mr. Geoffrey Butler, SDSU



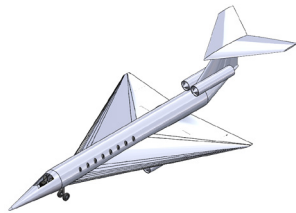
### **A-14 "THE ORCA"**

In this project, our team designed a Close Air Support (CAS) aircraft that must be able to complete two different combat missions. The aircraft must also comply with various constraints listed on the SRD sheet. In addition, multiple graphs and tables will be provided to support the claim on how the aircraft is safe and feasible. This means that the aircraft is stable, and it is capable of accomplishing the desired tasks in a favorable manner.

## Crustacean Supersonics

MEMBERS: Stephanye Garcia, Gabriela Gonzalez Ayala, Shawn Hogh, Jeremy Johnson, Jason Klemens, Austin MacGowan, Carlos Ortega

ADVISOR: Mr. Geoffrey Butler, SDSU



### **SHRIMP 1**

SHRIMP 1 is a conceptual design of a supersonic business jet. It is designed to accommodate up to 15 passengers and accomplish two primary flight missions. The first is to achieve a minimum range of 4000 nmi at optimum conditions. The second is to be able to accelerate to, and maintain, a maximum velocity greater than Mach 2.

## JetSetGo

MEMBERS: Carlos Gonzalez, Therese Dela Rosa, Justin Kuehn, Daniela Ramirez, Natalie Thiel, Brendan Uribe

ADVISOR: Mr. Geoffrey Butler, SDSU



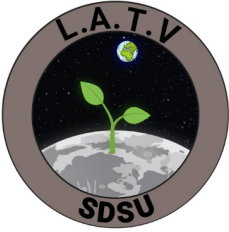
### **C-X LEVIATHAN**

C-X Leviathan is a heavy lift transportation aircraft design for AE-460 Aerospace Engineering Applications class as well as the American Institute of Aeronautics and Astronautics (AIAA) Heavy Lift Aircraft Design Competition.

## Lunar Agricultural Test Vehicle (LATV)

**MEMBERS:** Brandon Barr, Daniel Black, Jack Caron, Nicholas Fischetti, Antonio Garcia, Donte King, Kyle Kline, Shotaro Kusunoki, Ted Saenger, James Schultz, Trevor Taylor

**ADVISOR:** Dr. Pablo Machuca, SDSU



### **LUNAR AGRICULTURAL TEST VEHICLE**

The LATV (Lunar Agriculture Test Vehicle) is a proof-of-concept mission to research food crop cultivation in a lunar environment. Using a lunar regolith gathering and preparation process, food crops of various species will be planted and monitored to gain knowledge into sustaining human life in an extraplanetary environment.

## Lunar Communication and Positioning System (LCPS)

**MEMBERS:** Sandra Alwakeel, John Egan, Rowdy Houser, Blake Lipofsky, Christian Miller, Jose Molina, Steven Nikolov, Gunner Oakley, Brian Spinelli

**ADVISOR:** Dr. Pablo Machuca, SDSU



### **LUNAR COMMUNICATION AND POSITIONING SYSTEM**

With NASA's Artemis Program scheduled to re-establish a human presence on the Moon for scientific and exploratory purposes, the need for infrastructure to support these efforts has become apparent. We intend to provide a reliable means of lunar navigation and communication through the use of satellites in orbit around the Moon that can be used by humans, rovers, and robots as they traverse the lunar surface.

## Lunar Survey Mission (LSM)

**MEMBERS:** Daniel Alfaro, Leobardo Almodovar, Jerrin Concepcion, Walker Garcia, Stephen Heron, Thomas Hubbard, Jose Justimbaste, Fernando Pluma, DeVonta Stewart, Tommy Tran, Roberto Yano

**ADVISOR:** Dr. Pablo Machuca, SDSU



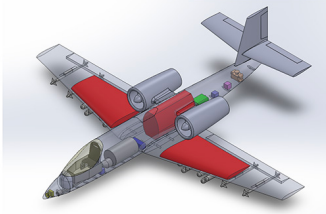
### **LUNAR SURVEY MISSION**

Our Mission aims to deliver a rover to the surface of the Moon that is capable of measuring environmental values that could have an effect on long term structures or human deployment. We aim to take simultaneous measurements of the conditions on the lunar surface and subterranean to make informative comparisons.

## Possum Works

MEMBERS: Matthew Diaz, Alejandro Vaquera Nava, Nick Orcino, Christopher Phillips, Marvin Reyes, David Rodriguez, Khang Tu

ADVISOR: Mr. Geoffrey Butler, SDSU



### **G2 THUNDER SKUNK**

This project is the conceptual design of a close air support aircraft and encompasses all aspects of aerospace previously taught such as aerodynamics, structures, propulsion, and stability and control. For the presentation, various views of the design will be pictured as well as highlighting key features.

## Project Katzalcoatl

MEMBERS: Daniel Black, Lillian Locken, Thomas Hubbard, Jeremy Johnson, Skylar Kinney

ADVISOR: Dr. Joseph Katz, SDSU



### **VTOL DELIVERY DRONE**

The VTOL Delivery drone project seeks to design and build a small unmanned aircraft capable of carrying a 6" x 8" x 10" 5-pound delivery package, demonstrate VTOL and hover capability, and be able to seamlessly transition from hover mode to a traditional horizontal mode mid-flight.

## Project Lavahound

MEMBERS: Cloud Cheung, Gabriel Cruz, Kenneth De Francia, John Hays, Seth Lundin, Derrick Martin, Alexander Melton

ADVISOR: Mr. Geoffrey Butler, SDSU



### **LAVAHOUND**

Our team here at Project Lavahound has designed a next generation close air support aircraft capable of not only meeting, but exceeding a difficult set of project standards. Some of these requirements include: having a range of 3,000 nautical miles, a top speed of Mach 0.85, a payload of over 11,000 pounds, aerial refueling capabilities, maintaining structural integrity across an operating range of -3.0 to 7.5g, neither the takeoff or landing can exceed 2,500 feet, a full life cycle cost analysis, and many others.

## SkyWalker

MEMBERS: Bader Jackson, Mikkelson Joseph, Prado Joshua, Tenner Aaron

ADVISOR: Mr. Geoffrey Butler, SDSU



### **SAGA 3: APT**

Design and Development of the Next Generation of Aircraft Pilot Trainer Jets. We designed and created a pilot trainer aircraft for the US Air Force based on requirements of design. This is a next generation aircraft capable of training pilots for real world missions with redundancies put in place for pilot safety. This aircraft was designed from the ground up based off other aircraft either previously or currently in existence.

## Space Debris Clean Up Team

MEMBERS: Skylar Kinney, Emilio Camarillo, Evan Chase, Juan Cruz, Nathalia Del Callejo, Rylie Hong, Lillian Locken, Rashad Mann, Nicholas Richards, Alejandro Rivera, Justin Santos

ADVISOR: Dr. Pablo Machuca, SDSU



### **OPERATION OPOCHTLI**

With the ever-increasing amount of space debris in Earth's lowest orbit the demand for an efficient system to eliminate space debris has never been higher. The Space Debris Clean-Up team is happy to announce operation Opochtli (Orbital Pollutant Oriented Clean-Up Help through Laser Impulse). Taking inspiration from the Aztec God Opochtli (God of Hunting), the Space Debris Clean-Up team aims to hunt down space debris in LEO to help ensure success in future space missions.

## Targeted Asteroid Reconnaissance and Surveillance (TARS)

MEMBERS: Marc Aeschelmann, Brock Bowers, Zachary Brown, Alonzo Covarrubias, Venia Ghazarian, Nicholas Hammond, Ryan Harrison, Kevin Lopez Gonzalez, Johnny McDonagh, Tyler Tiengard, Ricky Tran

ADVISOR: Dr. Pablo Machuca, SDSU



### **TARGETED ASTEROID RECONNAISSANCE AND SURVEILLANCE (TARS)**

Asteroids have the potential to contain valuable resources. The TARS mission is a low-cost satellite whose purpose is to determine an asteroid's composition and assess its utility for future missions.

## Valkyrie

MEMBERS: Aislinn Arias, Jaden Karger, Michael Kidane, James Lam, Jalen White, Cameron Whitfield

ADVISOR: Mr. Geoffrey Butler, SDSU



### ***ADVANCED CLOSE AIR SUPPORT DESIGN***

We would like to present what we are working on in our AE 460 Senior Design Class. We are looking into ways to advance a Close Air Support Aircraft.



# CIVIL, CONSTRUCTION & ENVIRONMENTAL ENGINEERING

## Absolute Builders Corporation (Team 19)

MEMBERS: Ryan Albin, Hasan Aljuboori, Zaid Almufti, Ryan Carson, Mawj Hasan, Marian Mirza-Hussein

ADVISOR: Mary Elizabeth Westrum and Gabby Hadzicki, Dokken Engineering  
Bobby Sokolowski, TY Lin International

SPONSOR: Dokken Engineering



### **CARROLL CANYON ROAD EXTENSION**

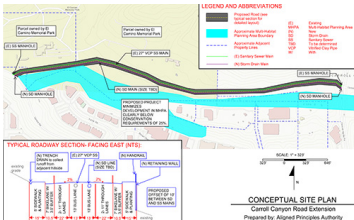
Extending Fenton Rd by 131 ft including 4 car lanes, 2 bus lanes, bike lanes, and sidewalks. We will design an extension that goes from Canyon Road to Camino Santa Fe.

## Aligned Principles Authority (Team 18)

MEMBERS: Grant Aukland, Rishi Chandiramani, Alex Kohlenberg, Alex Panduro, James Varela

ADVISOR: Mary Elizabeth Westrum and Gabby Hadzicki, Dokken Engineering  
Bobby Sokolowski, TY Lin International

SPONSOR: Dokken Engineering



### **CARROLL CANYON ROAD EXTENSION**

Providing engineering services involving a road extension for Carroll Canyon Road located in the southwest region of Mira Mesa. This project will consist building a Four-Lane Major Arterial Road. It will involve two designated 13-foot center bus lanes, two 11-foot through lanes, buffered bike lanes, as well as 5-foot sidewalks. This proposed roadway cross-section will be 131 feet wide.

## Apex Solutions (Team 17)

MEMBERS: Abdullrahman Alloughani, Kristian Chernov, Eric Fugit, Tyler John Peck, Nicholas Lloyd Miglio, Jason Isaac, Daniel Riley

ADVISOR: Elaine Fetene, Evan Lakin, and Silvana Jebraeil, KPFF Consulting Engineers  
Bobby Sokolowski, TY Lin International

SPONSOR: KPFF Consulting Engineers



### **MISSION TRAILS PEDESTRIAN BRIDGE FOR MAX**

Max Lenail, a 21-year-old college student and outdoorsman, died at the San Diego River Crossing Trail at Mission Trails Regional Park (MTRP) on January 29, 2021, during a flash flood. To honor his memory, his family has campaigned for the construction of a pedestrian and bicycle bridge at the site to offer safe passage and expanded access to Park users for generations to-come. A pedestrian bridge at that site has been part of the MTRP Master Plan for more than a decade. Funding was earmarked by the state of California.

## ATAMCO Engineering (Team 20)

**MEMBERS:** Christian Antonio, An Khang Diec, Tanner Ferguson, Matthew Lee, Omar Mahmalji, Andrew Tobia  
**ADVISOR:** Mary Elizabeth Westrum and Gabby Hadzicki, Dokken Engineering  
 Bobby Sokolowski, TY Lin International  
**SPONSOR:** Dokken Engineering



### **CARROLL CANYON ROAD EXTENSION**

The main goal of this project was to design a 1-mile road segment for a four-lane major arterial road that will be used to extend Carroll Canyon Road in the Sorrento Valley community of Mira Mesa. The scope of our project was to design the road extension in the most optimal way to address existing surrounding conditions, environmental impacts, and many other civil engineering aspects. The expected challenges of this project were creating the most cost-effective solution and mitigating negative environmental effects.

## Aztec Innovators (Team 11)

**MEMBERS:** Fahad Alberaidi, Abdullah Almaskati, Mohammad Alqallaf, Fadi Atesha, Mathew Jirjees, Marisol Rivas  
**ADVISOR:** Lena Bagnol and Dan Poulton, Hoch Consulting  
 Marlon Perez, City of San Diego  
**SPONSOR:** Hoch Consulting



### **OAK PARK LIBRARY COST EVALUATION/DESIGN**

The Oak Park Library will be a 30,000 sf addition to the San Diego Public Library system. The library will provide amazing views of the city to its visitors as it promises to be a community hub. With its sustainable design, the Oak Park Library will meet LEED Silver standards while providing commodity to its guests.

## Blueprint Engineering (Team 16)

**MEMBERS:** Klara Adwer, Rwzan Adwer, Abdullah Almutairi, Sarah Alshawi, Chelsea Gutierrez, Matthew Manabat  
**ADVISORS:** Tris Jones, Bowman Consulting group  
 Shaun Walters, KPFF Consulting Engineers  
 Jorge Gutierrez, Reid Middleton  
 Thais Alves, SDSU  
 Bashar Najar, Najars Engineering  
**SPONSOR:** KPFF Consulting Engineers and Bowman Consulting Group



### **MANCHESTER CONVENTION HOTEL-HIGH RISE**

Working with the Manchester Financial Group and KPFF Consulting Engineers, we plan to assist with the development of their planned hotel by aiding with extensive documentation of the surrounding site, planning overall construction and design of water management systems for the hotel. The hotel is a 34-story high rise that will have 1,035 hotel rooms that are 410 square feet. Other facilities at this hotel will include two ballrooms with 23,000 square feet of space, a fitness center, an ocean view pool deck, bars, and more.

### Book Worm Builders (Team 13)

MEMBERS: Bryce Clark , Riley Colvin, Tag Faulk , Rasheed-Garnett Ragonjan, Louis Santos, Phillip Scott  
 ADVISOR: Lena Bagnol and Dan Poulto, Hoch Consulting  
 Mark Filanc, SDSU  
 SPONSOR: Hoch Consulting



#### **OAK PARK LIBRARY COST EVALUATION/DESIGN**

The City of San Diego is working on a new project and is in need for a cost evaluation for the design and construction of the Oak Park Library. The main objective is to provide the City with a reasonable cost estimate for the construction of the Library. The project site is located on the north side of College Grove Dr., northeast of the intersection with 55th Street, in the City of San Diego.

### CADROW Water Inc. (Team 8)

MEMBERS: Hubert Anifowoshe, Athena Chaparro, Bremer Delacruz, Matthew Okazaki, Serenity Richardson, Jessica Wheeler  
 ADVISOR: Sarp Sekeroglu, Kimely-Horn  
 Gary Silverman, Filanc Construction  
 SPONSOR: Kimley-Horn and Filanc Construction



#### **EAST COUNTY PRIVATE WASTEWATER TREATMENT PLANT**

Our team is tasked to design a Wastewater Treatment Plant on a 4 acre lot in East County, San Diego. This plant will be designed with an average flow of 450,000 gpd, and will feature a Membrane Bioreactor, a relatively new technology that combines membrane filtration processes with the activated sludge process. As a result, this module of the plant will be more compact and produce a higher quality effluent. As this is a recent technology, designing a plant that utilizes a Membrane Bioreactor will be our main challenge.

### Clean Water Solutions (Team 9)

MEMBERS: Shane Chapman, Amber Elias, Tania Garcia-Acosta, Jake King, Meisha Myers, Polina Popova  
 ADVISOR: Gary Silverman, Filanc Construction  
 Sarp Sekeroglu, Kimley-Horn  
 Mark Filanc, SDSU  
 SPONSOR: Kimley-Horn and Filanc Construction



#### **EAST COUNTY PRIVATE WASTEWATER TREATMENT PLANT**

A private community located in East County San Diego requires an enhancement and enlargement of their wastewater treatment capacity. It has been resolved to construct a new facility at a site different from the existing one. This new facility will feature a state-of-the-art treatment system, incorporating a Membrane Bioreactor (MBR) process aimed at recycling water for community use. The project encompasses the design and configuration of a comprehensive wastewater treatment plant, including the selection and dimension.

## Coastal Ridge Roadworks (Team 1)

- MEMBERS: Ezekiel Isidro, Kevin Ramirez, Aidan Reinwald, Isaiah Valdez, Arteen Yamin  
 ADVISOR: Rob Stroop, Group Delta  
 Kyle Boyce, Latitude 33  
 Jim Haughey, SDSU  
 SPONSOR: Group Delta and Latitude 33



### **BACHMAN PLACE ROAD WIDENING AND RETAINING WALL**

To enhance accessibility to the newly redeveloped UCSD Hillcrest Campus, Coastal Ridge Roadworks. Will lead the design in 1) widening an 800-ft segment of Bachman Place, 2) demolishing two existing retaining walls and constructing a new retaining wall, 3) replacing an existing storm drain system, and 4) implementing a temporary traffic control plan. The basis of design is centered around the following disciplines: geotechnical, structural, stormwater, transportation, and construction.

## Crow Construction & Engineering (Team 12)

- MEMBERS: Antonio Bongiovanni, Ali Al Bahar, Madeline Clayton, Julia Estrada, Shelby Pletcher, Beili Ramos  
 ADVISOR: Lena Bagnol and Dan Poulton, Hoch Consulting  
 Thais Alves, Nensi Lakrori, and Julio Valdes, SDSU  
 SPONSOR: Hoch Consulting



### **OAK PARK LIBRARY COST EVALUATION/DESIGN**

This San Diego Oak Park Library project will include a 10,000 sf (first floor) to be used as a sorting facility, a 20,000 sf (second floor), a minimum of 50 parking spaces, landscaping, right-of-way improvement, solar photovoltaics, and EV parking spots. The project will include a balcony area for customers to enjoy the outside environment and view. The sorting facility on the first floor will have a direct access/egress road that is connected off the street, allowing for trucks to easily access the loading dock.

## Finish Line Construction

- MEMBERS: Dalton Elzey, Tyler Hubert, Ezequiel Salas-Diaz, Jeffrey Suter  
 ADVISOR: Paul Jackson, SDSU  
 SPONSOR: SDSU Planning Design and Construction Department



### **SNAPDRAGON STADIUM**

Construction Management of a 35,000 Capacity Multi-Use Stadium to start construction in 2024. As Design-Build CMs, Finish Line Construction created a target budget and schedule and managed the construction process through completion.

## FOOLPROOF Engineering (Team 6)

MEMBERS: Benicio Mateo Burkett, Brandon Doung Huynh, Daniel Kim, Gabriel Eduardo Garcia, Juan Manuel Lopez

ADVISOR: Matt Brash, Parsons  
Karina Cantero, Caltrans  
James R. Haughey and Sam Amen, SDSU

SPONSOR: Parsons, Caltrans, and County of San Diego



### **SR-67/RIVERFORD INTERCHANGE ROUNDABOUTS**

The Project is located in an unincorporated area of San Diego County within the Community of Lakeside. The Project will improve overall operations, circulation, and provide a more “complete street” that is accessible for all users at the SR 67 / Riverford Road interchange. The preferred alternative includes adding roundabouts which includes consolidating three existing intersections into two roundabouts, removal of signals, pavement widening and cold planning.

## Golden State Construction

MEMBERS: Ryan Horne, Diego Mendoza, Frankie Orona

ADVISOR: Paul Jackson, SDSU

SPONSOR: SDSU Planning Design and Construction Department



### **SDSU STADIUM ANALYSIS**

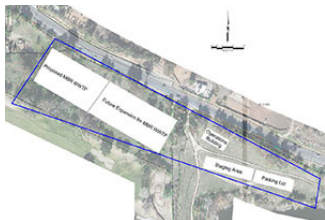
Golden State Construction developed and managed the construction process for SDSU's multi-use Stadium. Golden State developed a new target estimate based on current industry costs and used that estimate as a benchmark to compile a Guaranteed Maximum Price contract with SDSU. With the development of an accelerated schedule, site logistics plan, and processing of submittals, RFIs and other risk management, Golden State Construction is able to manage the construction of this complicated and important building for SDSU.

## GOOD Engineering Inc. (Team 10)

MEMBERS: Juan Garcia, Yousuf Georgees, Vanessa Gonzalez, Essa Kouraeeel, Cameron Maietto, Marco Pardo

ADVISOR: Snap Sekeroglu, Kimely-Horn  
Gary Silverman and Mark Filanc, Filanc Construction

SPONSOR: Kimely-Horn and Filanc Construction



### **EAST COUNTY PRIVATE WASTEWATER TREATMENT PLANT**

“Wastewater treatment MBR facility design with plans to double the capacity in the future. Project located in eastern edge of the Singing Hills Golf Course south of Dehesa Rd. at 3007 Dehesa Rd., San Diego CA, 92019. Project will treat wastewater for Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS) Nitrogen, Ammonia, Phosphate and Alkalinity as influential wastewater characteristics”

## Horizon Engineering (Team 7)

MEMBERS: Nick Gaughen, Cameron Leja, Kyle Leja, Kyle Seyler, Phuong “Ethan” Tran  
 ADVISOR: Matt Brash, Parsons  
 Richard Leja, WSP  
 SPONSOR: Parsons



### **SR-67/RIVERFORD INTERCHANGE ROUNDABOUTS**

The redesign of the Riverford Road and Woodside Ave intersections into a roundabout design and the incorporation of the surrounding area into a complete street design. This intersection currently operates at a failing Level of Service due to congestion of closely spaced intersections. To facilitate pedestrian and bicyclist friendly transportation, the incorporation of a complete system of sidewalks, crosswalks, and Class 2 sidewalks will be a cornerstone of our design.

## Ingenium Engineering (Team 2)

MEMBERS: Viviana Martinez, Ashley Sandoval Mendias, Alhondra Saucedo, Timothy Saucerman, Matthew Wagner, Eyra Zuniga  
 ADVISOR: Rob Stroop, Group Delta  
 Kyle Boyce, Latitude 33  
 James Haughey, SDSU  
 SPONSOR: Group Delta and Latitude 33



### **BACHMAN PLACE ROAD WIDENING AND RETAINING WALL**

Ingenium is eager to be a part of this development in hopes to improve Bachman Place by initiating a road widening project and construction of a new retaining wall in order to improve access to nearby facilities in Hillcrest, San Diego. A drainage system design will also be provided to help mitigate stormwater and maintain the road’s functionality throughout its lifespan. One of the biggest limitations faced in this project is maintaining Bachman Place as an operating road during construction.

## JAT Engineering Solutions (Team 14)

MEMBERS: Ayleen Acevedo, Jake Howick, Tasia Meyer, Jennifer Rodriguez, Cyrus Sberna  
 ADVISOR: Richard Trembath, Black & Veatch  
 SPONSOR: Black & Veatch



### **SAN VICENTE HYDROELECTRIC PUMPED STORAGE**

This project is a significant advancement in sustainable energy infrastructure for San Diego. This facility will meet the region’s growing energy needs with a projected daily generation capacity of 500 MW over an 8-hour period, enhancing grid reliability and flexibility. It will feature a new upper reservoir adjacent to the existing SVR, enabling excess power to be stored by pumping water to the upper reservoir during low demand periods and releasing it back through turbines during high demands.

## JHIANT Construction (Team 15)

MEMBERS: Isabella Bush, Joshua Navarro, Ngoc Nguyen, Alexandra Purdum, Hoang Tran, Toan Tran

ADVISOR: Shaun Walters, KPFF Consulting Engineers

Tris Jones, Bowman Consulting group

Lucy Egbe, Onni Group

Prof. Dowell, Prof. Dykstra, Prof. Lakrori, Prof. Mitropoulos, and Prof. Valdes, SDSU

SPONSOR: KPFF Consulting Engineers and Bowman Consulting Group



### **MANCHESTER CONVENTION HOTEL-HIGH RISE**

At 1,160 rooms across 36 stories, the Manchester Convention Hotel-High Rise is a current project that fulfills a highly requested demand of tourists wanting to visit San Diego for the city's sights, entertainment, and other beloved attractions, all while being at the waterfront of the downtown area. Our team is providing design and construction services for this project, with scopes of work in Structural, Geotechnical, Stormwater, Site Development, and Construction Engineering disciplines.

## SOCAL BUILDING CO.

MEMBERS: Oscar Canales, Blake Furby, Santos Perez, Erik Vaughn

ADVISOR: Paul Jackson, SDSU

SPONSOR: SDSU Planning Design and Construction Department



### **SNAPDRAGON STADIUM CONSTRUCTION**

Taking on the construction of Snapdragon Stadium in 2024: overseeing all aspects of the project, from managing contractors to crafting submittals. Prioritizing quality and timely delivery, we aim to create a facility that not only represents the university but also enriches the city of San Diego.

## Precision Path Engineering (Team 21)

MEMBERS: Ken Barber, Christopher Bugay, Nicole Gutierrez, Lily Martell, Jacob Mueller

ADVISOR: Mary Elizabeth Westrum and Gabby Hadzicki, Dokken Engineering

Bobby Sokolowski, TY Lin International

SPONSOR: Dokken Engineering



### **CARROLL CANYON ROAD EXTENSION**

This project connects a four-lane major arterial road between Pacific Heights Boulevard and Camino Santa Fe with a proposed roadway cross section of 131 feet including two 13-foot center bus lanes, two 11-foot through lanes in each direction, buffered bike lanes, as well as 5-foot sidewalks with parkways. This project has several impacts including a Multi-Habitat Planning Area, impacts to Carroll Canyon Creek, right of way acquisition, grading impacts, drainage, stormwater treatment needs, utility impacts, and cost.

### Solid Build Construction (Team 4)

**MEMBERS:** Nicholas Cooley, Walter Everardo Guzman, Josh Prosser, Gia Huy Ngoc Tran, Jennica Xiomara Vega, Ricardo Lorenzo Yoingco Jr  
**ADVISOR:** Steve Schmidt and Scott Christman, County of San Diego  
**SPONSOR:** County of San Diego



#### **RAMONA SHERIFF STATION**

The new Ramona Sheriff Station will be situated along the historic Main Street, specifically on Montecito Road within the San Diego County community of Ramona. Positioned at the current site of the existing sheriff station, the project encompasses an 18,000 square foot Sheriff Station Facility, doubling the size of the current establishment. Designated parking areas will accommodate both operational vehicles and privately owned vehicles (POVs), with an additional focus on incorporating a passive community park.

### STAGRS Engineering (Team 5)

**MEMBERS:** Baraka Aljean, Duenas Sean, Montero-Islas Giovanni, Norling Trevor, Ordonez Rafael, Seligson Sidney  
**ADVISOR:** Matt Brash, Parsons  
 Jim Haughey, SDSU  
**SPONSOR:** Parsons



#### **SR-67/RIVERFORD INTERCHANGE ROUNDABOUTS**

For this project STRAGS Engineering is tasked with improving the overall operation and usability of the intersection at SR-67 and Riverford Road. This project is located along a corridor that connects the community of Lakeside with Santee and El Cajon. We will submit a complete project design that will be used in the construction of the new interchange.

### StoneCap Construction

**MEMBERS:** Samir Rahimi, Taylor Beans, James Snoke, Jordan Farrell  
**ADVISOR:** Paul Jackson, SDSU  
**SPONSOR:** SDSU Planning Design and Construction Department



#### **AZTEC STADIUM**

StoneCap Construction has been selected by the University to provide Design-Build construction for the 35,000 capacity stadium. This includes creating a target estimate to update the project to 2024 industry costs and provide a schedule for design and construction. StoneCap Construction managed the construction process from subcontractor selection and contracting, safety, site logistics, submittal process, and RFIs to project closeout and completion for an on time and on budget successful project.



## Tegrity Engineering (Team 3)

MEMBERS: Jerome Cabangangan, Nicole Gee, Devon Head, Imerda Mokili, Pedro Salas, Miguel Suarez

ADVISOR: Steve Schmidt and Scott Christman, County of San Diego  
Prof. Bayasi, James Haughey, Dr. Valdes, and Prof. Zink, SDSU

SPONSOR: County of San Diego



### ***RAMONA SHERIFF STATION***

The County of San Diego has partnered with Tegrity Engineering to design a new and renovated Sheriff Station for the community of Ramona. Our design envisions a space that meets the needs of both the law enforcement and the public it serves by constructing a new community park, promoting trust and interaction between the two. Our team will address project challenges with collaboration and innovation to deliver a project that not only meets but exceeds expectations, enriching the Ramona community for years to come.

# ELECTRICAL & COMPUTER ENGINEERING

## SDSU Hydrophone Agents (SHA)

MEMBERS: Jana Gonzalez, Gabriel Lang, James Timothy O’Shea, Hien Phan, Abraham Shalash, Cristian Zuniga

ADVISOR: Prof. Barry Dorr, PE

SPONSOR: SDSU Electrical and Computer Engineering



### **ACOUSTIC OCEAN MONITORING DEVICE**

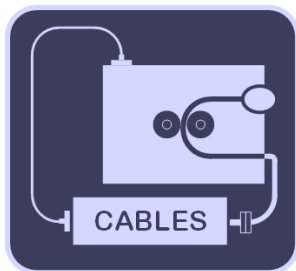
Our device targets the frequency spectrum of whale songs as well as other sounds in the ocean. This is achieved by the implementation of both hardware and software that works together to amplify sound, mitigate noise interference, output sound that can be listened to, and transcribes the data into a form that can later be used in additional audio processing.

## Team CABLES

MEMBERS: Arvin Aquino, Scott Le, Rand Mirza, Brent Son

ADVISOR: Prof. Barry Dorr, PE  
Mr. Glenn Pohly, Masimo

SPONSOR: Glenn Pohly, Masimo



### **SHORT BREAK DETECTOR**

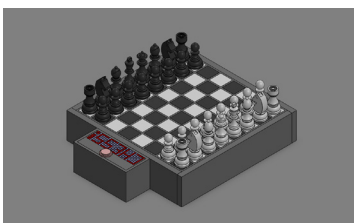
The Short Break Detector, designed for MASIMO, is a portable, compact system that enhances cable testing efficiency by automating fault detection. It integrates with a cable bend test machine, supports AC/DC power, and uses an ATmega4809 Microcontroller for continuity checks; stopping tests upon fault detection. Data is recorded to an outputted document file for analysis. Its touchscreen display allows for easy operation and monitoring, streamlining the testing process with improved reliability and data accuracy.

## Team CHESS

MEMBERS: Jacob Anderson, Christopher Gonzalez, Noor Jazwari, Josue Rodriguez, Kevin Tran

ADVISOR: Prof. Barry Dorr, PE

SPONSOR: SDSU Electrical and Computer Engineering



### **INTELLIGENT CHESSBOARD**

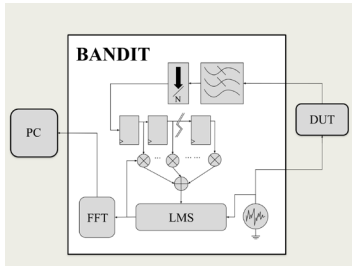
Intelligent Chessboard is an interactive chessboard that integrates artificial intelligence into a physical board. Designed to help learn or hone skills, the user can play against another user with or without the assistance of AI. Intelligent Chessboard uses a button to change the difficulty of the AI and scan the board for the current piece location using RFID technology. Through AI, the board illuminates LEDs under the board tiles to project all possible and the best possible moves when a piece is lifted.

## The Bode Bandits

MEMBERS: Christian Abella, Arianna-Sarahi Bergado, Joshua Cole, Joseph De Vico, Lance Reyes

ADVISOR: Prof. Barry Dorr, PE

SPONSOR: SDSU Electrical and Computer Engineering



### “BODE ANALYSIS N’ DISPLAY OF INSTRUMENT TESTING” (BANDIT)

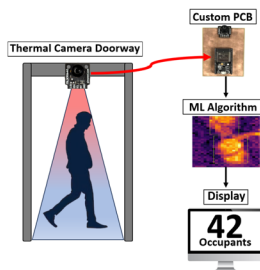
BANDIT is a small, portable, and inexpensive device aimed at providing rapid assessments of a system’s transfer function assisting in filter design as well as arbitrary system characterization. Analysis can be performed between 20 Hz and 250 kHz in a variety of preset ranges within +/- 15% of calibrated reference instruments. The BANDIT offsets the lack of absolute accuracy by being extremely low cost, \$40 per unit, and executing full characterizations in under 1 second. These runtimes are achieved by diverging from traditional analog tone-sweep methods and utilizing a fully digital adaptive filter method. On the fly adjustment of error tolerances, analysis resolution, and the visualization of real time results can be done via a fully cross platform Python interface. Fully USB powered, and tightly integrated, BANDIT coupled with the appropriate probes or transducers is a powerful tool for both the lab and on the go.

## The People Counters

MEMBERS: Jack Curley, Leon Duong, Rani Jabbar, Hayden Thai, Afnan Yousuf

ADVISOR: Prof. Barry Dorr, PE

SPONSOR: SDSU Electrical and Computer Engineering



### LIVE OCCUPANCY AUTOMATED TRACKING SYSTEM

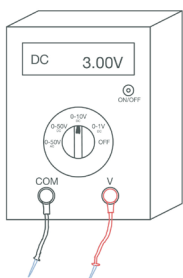
The People Counter’s project tracks the number of occupants within a confined area in real-time. We employ a thermal camera and machine learning algorithms to recognize when entrants pass through our fabricated doorway. It accurately counts when individuals enter or exit the area thus automating the tedious job of manually counting occupants. Our design is portable, and scalable to multiple entry points.

## V.O.L.T. Vipers

MEMBERS: Aghared Al Yousif, Isaac Castro, Fernando Garcia, Brian Hamler, Raul Hernandez, Cade Webb

ADVISOR: Prof. Barry Dorr, PE  
Vidya Rangaswamy, SDSU

SPONSOR: SDSU Electrical and Computer Engineering



### DIGITAL MULTI-RANGE VOLTMETER

The Voltage Vipers team have been tasked with designing and creating a digital voltmeter. A voltage selector switch will help select AC and 3 DC voltage ranges. Input voltage will be filtered using an anti-aliasing filter to reduce noise during the sampling of the signal. The AC voltage will be measured using a true RMS algorithm, enabling the device to be capable of measuring sinusoidal and non-sinusoidal waveforms such as square or triangle waves. Lastly, the device will feature an LCD screen to display the measurement to the user.

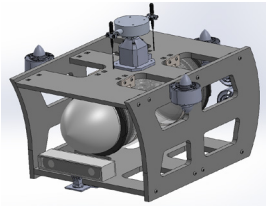
# ELECTRICAL-COMPUTER & MECHANICAL ENGINEERING

## AUV Pathfinders

**MEMBERS:** Arenzana Tristan, Brillantes Richard, Ludkevicz Brenden, Sanabria Gonzalez Alan, Sanchez Steven, Waltermire Luke

**ADVISORS:** Dr. Zahra Nili Ahmadabadi, Prof. Barry Dorr, and Dr. Scott Shaffar, SDSU

**SPONSOR:** SDSU Mechanical Engineering



### ***AUTONOMOUS UNDERWATER VEHICLE FOR PASSIVE SONAR***

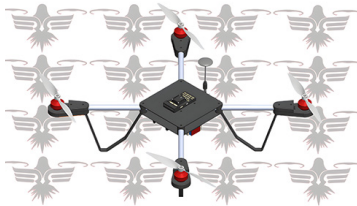
AUV Pathfinders was tasked with designing and manufacturing a fully autonomous underwater vehicle (AUV). This AUV is to have a rotating hydrophone array. The hydrophone array will allow the user to capture acoustic data of marine environments.

## Dronely Raven

**MEMBERS:** Lana Ayyash, Ryan DaWood, Patrick Moore, Hector Olmos-Pantoja, Kaia Ralston, Madison Rogers, Suhail Saqan, Saif Shinkar, Sean Wolf

**ADVISORS:** Oscar Correa, Prof. Barry Dorr, and Dr. Scott Shaffar, SDSU

**SPONSOR:** SDSU Student Success Fee



### ***CALIFORNIA UNMANNED AERIAL SYSTEMS COMPETITION (C-UASC)***

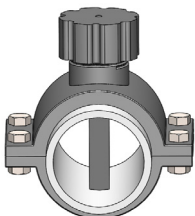
This project involved designing, manufacturing, and integrating an Unmanned Aerial System (UAS) for the California Unmanned Aerial Systems Competition. The UAS is designed for autonomous flight, waypoint navigation, object detection/classification/localization, and delivery of an undamaged payload at a marked target.

## FlowTec

**MEMBERS:** Saqer Alghanem, Nicholas Barrozo, Tobias Booth, John Frisch, Fabian Gutierrez Juarez, Kevin Kakkary, Nicholas Palmer, Lorena Penney, Naomi Walther

**ADVISORS:** Mark Bauckman and Mark Smith, Fluidra  
Dr. Scott Shaffar and Prof. Barry Dorr, SDSU

**SPONSOR:** Fluidra



### ***VORTEX SHEDDING FLOWMETER***

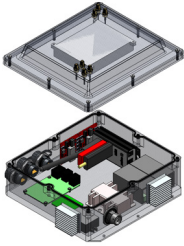
The Vortex Shedding Flowmeter is a single hole prototype design that can withstand up to 40 psi of internal pipe pressure and accurately read across a range of 10-100 gpm flow with an accuracy of 5%. The design utilizes a saddle like clamp system with the bluff body and piezoelectric sensor inserted through a 3/4" hole in a 2" schedule 40 PVC pipe. The system utilizes a PCB board with an integrated LCD screen, microcontroller and RS-485 to control and monitor the flowmeter.

## FPP Force

**MEMBERS:** Tanner Hurst, Samuel Kneale, Kieran Looney, Samuel Lucas, Andy Lucio, Arely Nieblas, Alejandro Soto, Riley Stewart, Justin Taing

**ADVISORS:** Prof. Barry Dorr and Dr. Scott Shaffar, SDSU

**SPONSORS:** Booz Allen Hamilton



### ***FIXED POWER PAYLOAD INPUT/OUTPUT (FP PLIO)***

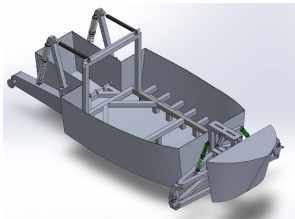
Booz Allen's Fixed Power Payload Input Output (FP PLIO) system serves as a universal translator for third-party sensors. Specifically, the FP PLIO is applied on Booz Allen's unmanned surface vehicle (USV), the Man-Portable Tactical Autonomous System (MANTAS). On the MANTAS, the FP PLIO controls all of the additional systems including sensors, cameras, and other components. It enables the ability to deliver key information to critical military personnel while increasing the safety of personnel as the vehicle is unmanned.

## R.E.S.T. (Remote Earth Sea Systems Technology)

**MEMBERS:** Shane Agena, Gerardo Cerpa, Alexis Chavez, Faris Griffin, Brian Herrin, Bryan Maldonado, Ramses Montes, Adam Rigney, Travis Tran

**ADVISORS:** Mr. William Shepherd, Systems Engineering Research Center, Stevens Institute  
Dr. Scott Shaffar and Prof. Barry Dorr, SDSU

**SPONSORS:** Systems Engineering Research Center, Stevens Institute



### ***MULTI-DOMAIN VEHICLE PROJECT***

The Multi-Domain Vehicle is an amphibious vehicle that will operate in sea, surf, and land with an advanced three position extendable suspension and propulsion system to successfully navigate the transition between sea and land. The electrically powered scaled vehicle design will accommodate for traction, enable water propulsion, and provide a transition between land and sea tactical operations.

## RASC-GULLS

**MEMBERS:** Melmar Almodiel, Samson Ande, Jay Diorio, Adeline Guizar, Dominic Malanga, EJ Milan, Steven Navarro, Lorans Taqian, Zaid Yasin

**ADVISORS:** Oscar Correa, Prof. Barry Dorr, and Dr. Scott Shaffar, SDSU

**SPONSOR:** SDSU Student Success Fee



### ***NASA'S REVOLUTIONARY AEROSPACE SYSTEMS CONCEPTS – ACADEMIC LINKAGE (RASC-AL): LARGE SCALE LUNAR CRATER PROSPECTOR***

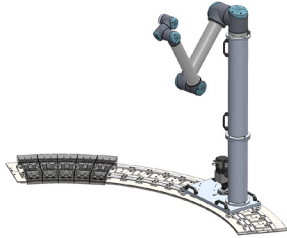
RASC-AL is a national NASA competition to develop a solution for exploring the harsh craters of the lunar south pole for a full year in search of frozen ice. The RASC-GULLS have developed a concept for a self-sustaining rover that is able to perform power-intensive prospecting tasks with the support of a power-beaming satellite overhead, tens of kilometers away, as well as a physical rover-tracker model to demonstrate this concept. The concept will be able to gather new and conclusive evidence about the moon's subsurface.

## Ring Around the R.O.S.I.E.

**MEMBERS:** Kai Hespeler, Gabriel Lang, David Mauzey, Michael Perez, Hien Phan, Abraham Shalash, Maria Shamoon, Alec Stobbs, Joseph Tipane

**ADVISORS:** Karl Schultz, General Atomics  
Prof. Barry Dorr and Dr. Scott Shaffar, SDSU

**SPONSOR:** General Atomics



### **DEVELOPMENT AND INTEGRATION OF A 7TH AXIS RAIL SYSTEM FOR A FUSION TOKAMAK ROBOT**

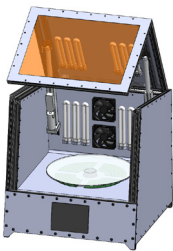
DIII-D National Fusion Facility, operated by General Atomics, is pioneering the science and innovative technology that will enable the development of nuclear fusion as an energy source for the next generation. A 6-axis robotic arm nicknamed ROSIE is currently used in the DIII-D program to weld studs and take measurements inside the vacuum vessel. This project aims to extend ROSIE's capabilities by adding a circular rail and powered cart system, and integrating the cart into ROSIE's control system as a 7th axis.

## SDSU WaveCure

**MEMBERS:** Talal Alkhashti, Willie Arroyo Alva, Benjamin Daluz, Maxwell Lee, Esmeralda Marquez, Ryan McKnight, Amber O'Brien, Ethan Taylor

**ADVISORS:** Austin Pike, Glenn Pohly, and Jake Prittie, Masimo  
Dr. Scott Shaffar and Prof. Barry Dorr, SDSU

**SPONSOR:** Masimo



### **CLIMATE CONTROLLED UV CURING CHAMBER FOR 3D PRINTED PARTS**

SDSU WaveCure has partnered with Masimo to design, document and fabricate a UV Curing Chamber for 3D printed parts. With a climate control system, hands-free access and hybrid UV-CFL, UV-LED technology, the UV curing chamber will operate for a set and controlled duration as inputted by the user on the touchscreen interface. The chamber features a rotating turntable for controlled uniform UV exposure to enhance a post-print UV curing process to stabilize material properties of parts printed using DLP, SLA, and MSLA.

## Stealth Propulsion Systems

**MEMBERS:** Alejandro Ballesteros, Juan Flores, Muhammed Jaafar, Kylie Kimura, Zachary Lester, Khaled Mohieddin, Lia Selena Baluran, Ethan Tift, Ethan Van Buren

**ADVISORS:** Sean Malone, Army Special Operations Robotics Division  
Scott Moore, United States Army Special Operations Command Force Modernization Center  
Edward Pernotto, Systems Engineering Research Center  
Michael DeLorme and William Shepard, Capstone Marketplace  
Prof. Barry Dorr and Dr. Scott Shaffar, SDSU

**SPONSOR:** Systems Engineering Research Center, Stevens Institute



### **QUIET UAV TEST DEVICE AND TEST PROTOCOL**

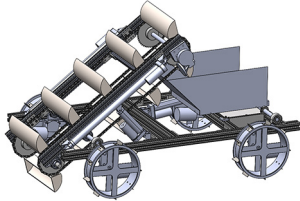
This project introduces a test rig that will be used for evaluating the noise generation for various propulsion systems and models. The test rig incorporates advanced sound output sensors, joint mechanisms, and data acquisition systems to simulate various flight scenarios, allowing engineers to analyze the UAV's acoustic signature response. Innovative toroidal propellers are used while optimizing shape and geometry to reduce the noise signature of the propulsion system and increase stealth technology.

## Team ARES

**MEMBERS:** Montserrat Castel, Hannah Hong, Christian Monroy, Patricia Munn, Sara Pirasteh, Stuart Pollmann, Jack Riffle, Scott Shoupe, Jack Volponi, Andrew Vu

**ADVISORS:** Prof. Barry Dorr and Dr. Scott Shaffar, SDSU

**SPONSOR:** SDSU Student Success Fee



### ***NASA ARTEMIS 2024 LUNABOTICS AND BEYOND***

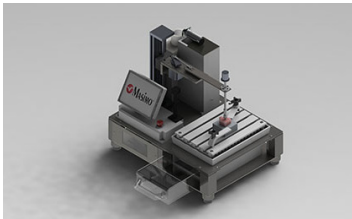
Team ARES (Aztec Regolith Environment Sculptor) is representing San Diego State University in the NASA Lunabotics 2024 Competition. The team is tasked with the design and build of a telerobotic rover capable of traversing, excavating, transporting, and depositing lunar regolith. This supports NASA's Artemis missions, in which they plan to use in-situ resources for lunar construction. The team will travel to Kennedy Space Center to compete in a simulated deployment mission against other national universities.

## Team M.A.C.W.E.R.P.

**MEMBERS:** Seba Alkandari, Abraham Arana, Jeanette Arratia, Aaron Ayala, James Burton, Cesar Casas, Allen Juliano, Donald Luu, Samuel Martinez, Jason Ramirez

**ADVISORS:** Jack McCorkle, Desmond Mok, Jake Prittie, Glenn Pohly, and Jonathan Truesdell, Masimo Dr. Scott Shaffar and Prof. Barry Dorr, SDSU

**SPONSOR:** Masimo



### ***AUTOMATED CHEMICAL WIPING SYSTEM***

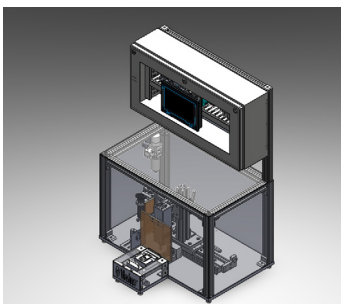
This project, sponsored by Masimo, aimed to create a standardized testing system for chemical resistance on medical monitoring products. It employs a fluid delivery mechanism for cleaning agents followed by wipes under constant pressure. Controlled through a touch-screen panel, it regulates parameters such as speed and cycles, equipped with a camera for progress monitoring and memory for test recall. The user can adjust parameters like wipes, cycle intervals, fluid volume, and duration.

## Team Photron

**MEMBERS:** Ethan Anderson, Wade Anderson, Steven Awakem, Brandon Cabatu, Mason Cayaban, Kyle Desamito, Vidal Marquez, Marco Montano, Trent Nguyen, Zachary Payne

**ADVISORS:** Stanley Chang, Brendan Green, Marc Laidet, Glenn Pohly, and Pratul Singh, Masimo Prof. Barry Dorr and Dr. Scott Shaffar, SDSU

**SPONSOR:** Masimo



### ***AUTOMATED UV DISPENSE & CURE STATION***

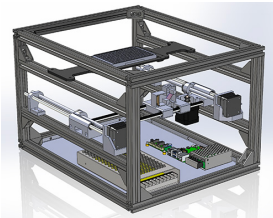
Masimo's health-care products require light pipes to provide a path for light to travel from the inside to the outside of a device. Current assembly of these light pipes require production-grade manufacturing equipment for large scale operations. Team Photron was tasked to create a lightweight and cheaper solution for small scale operations. Using positioning tables along with a combination of pneumatic and manual guide rails, this device will be capable of producing light tubes with a repeatability of 0.005".

## TRF Innovations

**MEMBERS:** Amber Carreno, Madison Darnauer, Jacob Giesing, Jason Gumbayan, Luan Lam, Justin Lee, Adam Reyes, Cyrus Rouzitalab, Ethan Zaro

**ADVISORS:** Victor Escobedo, Dusty Fisk, Kris Gaard, Dr. Al Kellner, and John Reep, Ascential Technologies  
Prof. Barry Dorr and Dr. Scott Shaffar, SDSU

**SPONSOR:** Ascential Technologies Medical & Life Sciences Division



### ***TIME-RESOLVED FLUORESCENCE READER***

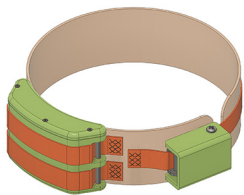
In collaboration with Ascential Technologies, our team has developed a device to measure biomarkers like Europium (III) from samples in a standard 384-well microplate. Central to our design is an optical module focusing UV light onto samples and capturing their red fluorescence emissions. Our device serves as a platform to accelerate medical research and development; biomarker measurement is crucial in cell biology assays, and our device proves as a cost-effective yet highly sensitive and precise instrument for this.

## Trunk Tech

**MEMBERS:** Courtney Chase, Alexander Cherry, Jacob Flaxman, Rachel Gerrard, Ryan Kiok, Connor Martorana, Roberto Montano Bermudez, Eduardo Tovar, Anthony Vasquez

**ADVISORS:** Katie Garwood, Ian Ingram, and Kyra Swanson, San Diego Zoo Wildlife Alliance  
Dr. Scott Shaffar and Prof. Barry Dorr, SDSU

**SPONSOR:** San Diego Zoo Wildlife Alliance



### ***THE TRUNK TRACKER: AN ELEPHANT BEHAVIOR MONITORING ANKLET***

The San Diego Zoo Wildlife Alliance has partnered with Trunk Tech to create an anklet for African elephants to record their movement and behavior patterns. The device uses LoraWAN technology to transmit data logging status and contains an accelerometer for data collection. The tamper-proof enclosure is capable of withstanding elemental factors present in desert conditions and is water and high-impact resistant. The sponsor aims to use this technology to protect wild elephant populations at their partner site in Kenya.

## Vital Metrix

**MEMBERS:** Javier Cortes, Marshall Eucker, Mohammad Farah, Joshua Garcia, Ramez Ghattas, Ali Hashim, Joseph Hotto, Davin Kelly, Nicholas Smith

**ADVISORS:** Glenn Pohly, Masimo  
Dr. Scott Shaffar and Prof. Barry Dorr, SDSU  
Christopher Wilkerson and William Shepard, Systems Engineering Research Center

**SPONSOR:** Systems Engineering Research Center, Stevens Institute



### ***PHYSICAL DISTRESS MONITOR***

Sponsored by the Systems Engineering Research Center and in collaboration with Masimo, this project aims to create a wearable device for health monitoring of military personnel during training or operations. Utilizing non-invasive sensors to measure vital signs like pulse oximetry, body temperature, and galvanic skin response for hydration, the device will use machine learning to detect signs of physical distress early. Its design focuses on ensuring the safety and well-being of soldiers by providing real-time health data for immediate response.

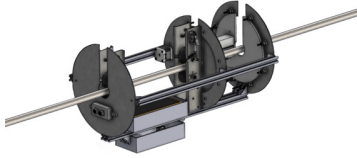


## Wrap Tech

MEMBERS: Jonathan Arabo, Andrew Deguzman, Brad Leroy DelaLlana, Tuong Do, Audrey Meador, Victor Reyes, Richard Rosengren, Brendon Swierczewski, Mario Velez

ADVISORS: Dr. Saeed Manshadi, Dr. Zahra Nili Ahmadabadi, Prof. Barry Dorr, and Dr. Scott Shaffar, SDSU

SPONSOR: SDSU Electrical & Computer Engineering and SDSU Mechanical Engineering



### **COMPOSITE WiRE WRAP ROBOTIC SYSTEM**

The Composite WiRE Wrap Robotic System addresses the critical need to enhance the efficiency of power transmission by mitigating the issue of power line sag. This project stands to revolutionize repair methods, potentially saving millions in replacement costs and reducing wildfire risks. We have developed a user-friendly, autonomous robotic system to wrap a composite material, resin-coated carbon fiber fabric, around existing lines, strengthening infrastructure and decreasing power losses.

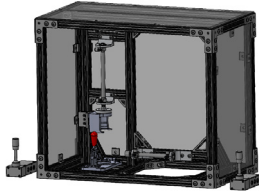
# MECHANICAL ENGINEERING

## Dex-Tecs

MEMBERS: Kevin Degeatano, Marco Gutierrez, Dylan Kuta, Selena Nguyen

ADVISORS: Eric Harper, Dexcom  
Dr. Scott Shaffar, SDSU

SPONSOR: Dexcom



### **CONTINUOUS GLUCOSE MONITOR G7 TEST FIXTURE**

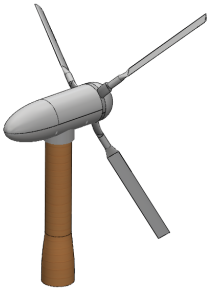
This project aims to develop a specialized test fixture for the Dexcom G7 Continuous Glucose Monitor Applicator. Designed to enhance operator consistency and reduce fatigue, the fixture will refine how the device is held, aligned, compressed, and deployed. By ensuring precise deployment of the G7 applicator, it will enable more accurate analysis of glucose level readings, guaranteeing reliable data collection and interpretation for optimized product performance and user experience.

## Exeggutor

MEMBERS: Wences Banting, Robert Johnson, Bradley Rittmann, Arman Sarkoob

ADVISOR: Dr. Asfaw Beyene and Dr. Scott Shaffar, SDSU

SPONSOR: SDSU Mechanical Engineering



### **PALM INSPIRED WIND TURBINE**

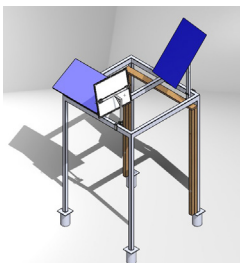
The objective of this project is to design a nature-inspired wind turbine to improve energy capture efficiency and durability. Most turbines turn in wind, and when wind speeds exceed 50 mph, the wind turbine automatically shuts off for safety. To address this, the team designed a horizontal axis wind turbine inspired by the behavior of palm fronds. The blades are mounted to the turbine on bases made of a flexible material that bends inward with increasing wind speeds, improving durability and maintaining functionality.

## Light Track Technology

MEMBERS: Jesus Flores, Nicholas Gabrielson, Milos Skrbic, Alyssandra Steier

ADVISORS: Dr. Asfaw Beyene and Dr. Scott Shaffar, SDSU

SPONSOR: SDSU Mechanical Engineering



### **SUN TRACKING REFLECTORS WITH COMPARISON TO GPS-DRIVEN SOLAR PV**

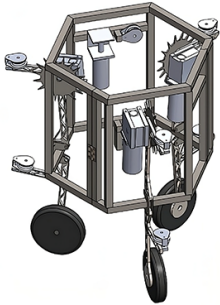
The project, which is sponsored by Dr. Asfaw Beyene from the Mechanical Engineering Department, is the development of a sunlight-reflective mirror to make solar energy capture less dependent on angles and space availability. The team is to design, manufacture, and test the system to determine the effect of concentrated sunlight on the stationary PV panel as well as compare the performance and cost of the system with the reflective mirror versus the GPS-driven system.

## LV8

MEMBERS: Matthew Custodio, Carl Michael Garcia, Ritish Gupta, Lizbeth Rodriguez

ADVISORS: Marek (Max) Winiarz, Max Enterprises  
Dr. Scott Shaffar, SDSU

SPONSOR: Max Enterprises



### ***PALM PLATFORM - VERTICAL TRANSPORT ELEVATOR***

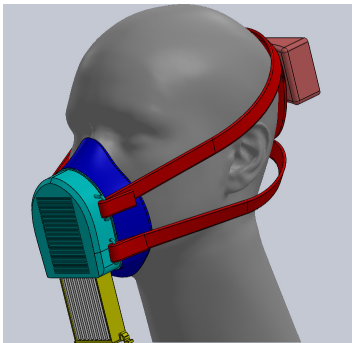
The Palm Platform is designed to replace human climbers and make trimming safer, faster and cheaper. The Vertical Transport Elevator is the movement and positioning component of a device to trim palms robotically. The elevator will carry a payload to trim palm fronds in the future. Team LV8 has designed, fabricated, and tested a system to adapt to the tree's diameter while maneuvering on the palm tree. The operator will be capable of controlling the system remotely from a safe distance on the ground.

## MediMask Design Team

MEMBERS: Fawaz Hakim, Tyler Jacobs, Jessica Munoz, Katie Naretto

ADVISORS: Dr. Mike Frank, Hiro PPE  
Dr. Scott Shaffar, SDSU

SPONSOR: Hiro PPE



### ***ELASTOMERIC HALF MASK RESPIRATOR (EHMR) WITH DISINFECTION BOX***

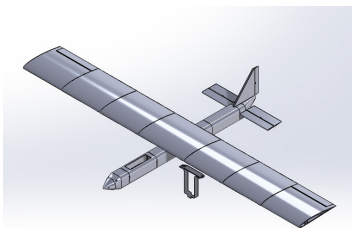
The Elastomeric Half Mask Respirator (EHMR), sponsored by Hiro PPE, seeks to provide a more breathable protective mask for individuals in polluted environments and healthcare professionals. The EHMR incorporates a filter made of pleated electrospun nanofibers, supplied by Hoff Engineering, and integrates gas sensors to provide information on air quality. Designed to accommodate five different CDC/NIOSH 3D-scanned head shapes, the EHMR utilizes silicone molding to enhance user comfort and facial fit.

## Quetzal

MEMBERS: Alonso Perez, Charles Locke, Edgar Flores, Ralvin Estacio

ADVISOR: Dr. Chuck Norris, Oscar Correa, and Dr. Scott Shaffar, SDSU

SPONSOR: SDSU Student Success Fee



### ***3D PRINTED AIRCRAFT COMPETITION***

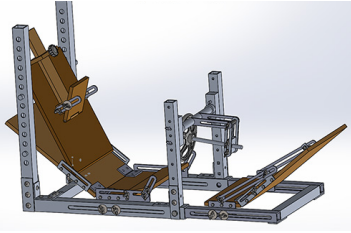
Team Quetzal have designed and manufactured a 3D printed aircraft with the purpose of entering the 3D Printed Aircraft Competition (3DPAC) hosted by Cal State Los Angeles. 3DPAC includes 3 separate competitions: flight, design and simulation. Per competition guidelines all lifting surfaces and aircraft components must be 3D printed except for electronics and select hardware. The aircraft is limited to 8 seconds of powered flight and must fly within a restricted area of 300 x 160 feet and remain under 35 feet.

## Refined Ergo-Jig

MEMBERS: Andrew Boskovich, Bernice Gudino, Mehraj Khawaja, Cameron Senner

ADVISORS: Eli Uva, Aztec Electric Racing  
Dr. Scott Shaffar, SDSU

SPONSOR: SDSU Aztec Electric Racing



### **REFINED DRIVER ERGO-JIG**

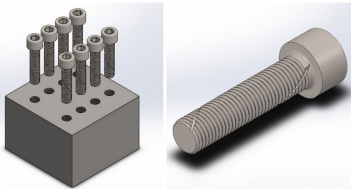
Aztec Electric Racing is in need of an ergonomics jig to help with the predesigned testing for their race car. They would like to have the ergonomics jig be easy to store in a locker in their workshop. AER should be able to manipulate the position of these components in order to get a good idea of the cockpit layout. The jig needs to be reusable and easy to store.

## Team ASML- Optimized Venting

MEMBERS: Oliver Blasband, Sofia Escobedo Solis, Cassandra Morris, Elijah Sowunmi

ADVISORS: Brandon Verhoff and Kent Bruzzone, ASML  
Dr. Scott Shaffar, SDSU

SPONSOR: ASML



### **OPTIMIZING VENTING FOR EUV TECHNOLOGY TESTING**

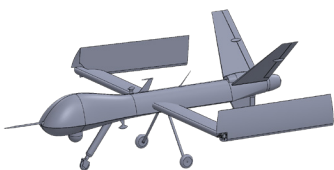
ASML develops Extreme UltraViolet (EUV) lithography light sources using Laser Produced Plasma technology. EUV light is generated by vaporizing small Tin droplets with a Co2 laser, in which the light gets reflected off a large multilayer mirror into the scanner. Team ASML- Optimized Venting has been tasked with delivering an optimized validated design solution to achieve optimal pump down and outgassing parameters for a venting path used in bolted hole sizes: 4mm, 6mm, and 8mm.

## Team AVIAN

MEMBERS: Alexander Bautista, Grant Butsko, Tallon Mcdonough, Andres Mendoza

ADVISORS: Chris Aguilar, Travis Burns, John Callaway, Chris Sam, and Eshan Sinha, General Atomics  
Dr. Scott Shaffar, SDSU

SPONSOR: General Atomics



### **MQ-9 “MOJAVE” REMOTELY PILOTED AIRCRAFT (RPA) MANUAL WING FOLD SYSTEM**

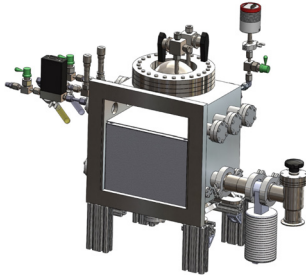
Team AVIAN Engineering delivers a wing fold system for General Atomics “MQ-9 Mojave” Remotely Piloted Aircraft (RPA). The goal of the project is to reduce the aircraft’s wingspan, allowing for increased stowage capability in aircraft carriers and hangars. The design incorporates a hinge with a unique axis of rotation while maintaining the structural integrity for flight. Additionally, a locking mechanism secures the wing for flight and incorporates an indication flag to notify the ground crew in an unlocked position.

## Team No Pressure

MEMBERS: Devin Seyfarth, Norman Stone, Ahmad Taleb, PJ Thomas

ADVISORS: Dr. Meysam Heydari Gharahcheshmeh and Dr. Scott Shaffar, SDSU

SPONSOR: SDSU Mechanical Engineering



### ***BUILDING ENCLOSURE FOR THE CHEMICAL VAPOR DEPOSITION (CVD) REACTOR AND ASSEMBLY***

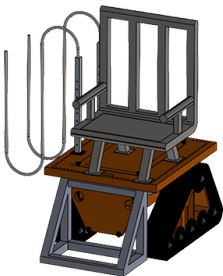
Team No Pressure was supplied by AMED Labs with a homebuilt out-of-service reactor to be used in the process of Chemical Vapor Deposition (CVD). Using the reactor's existing design as a baseline, the team has retrofitted the reactor with functioning subsystems, and modified the reactor chamber to allow for a more efficient reaction process, with less precursor waste. The response time of the pressure transducer and thermocouples were optimized to give more accurate control over the reactor's subsystems.

## Team ShoreMobility

MEMBERS: Xavier Arambula, Nicholas Constantino, America Hernandez-Guillen, Idil Nunow

ADVISORS: Scott Huyvaert, Quality of Life Plus  
Dr. Scott Shaffar, SDSU

SPONSOR: Quality of Life Plus



### ***SELF-PROPELLED BEACH WHEELCHAIR***

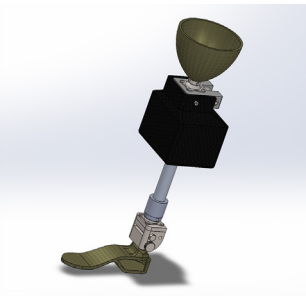
Team ShoreMobility was challenged with a project by Quality of Life Plus, a national organization dedicated to assisting disabled veterans, and AmpSurf, a non-profit that provides adaptive surf therapy to those with disabilities. The project aims to design a self-propelling beach wheelchair, controllable by a joystick. This chair will allow adaptive surfers to navigate through the beach without assistance, which will allow them more independence. It is also designed to easily withstand wet and sandy terrains.

## Team W.A.L.T.Z. (Water Activity Leg with Tenacious Zeal)

MEMBERS: Hadia Bayat, Calvin Fletcher, Brenna Gallagher, Shaun Seko

ADVISOR: Scott Huyvaert, Quality of Life Plus  
Dr. Scott Shaffar, SDSU

SPONSOR: Quality of Life Plus



### ***SNORKELING AND DIVING LEG CHALLENGE***

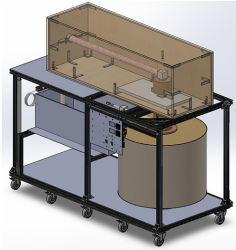
The team has been tasked with the creation of a waterproof prosthetic leg for an individual who underwent a transfemoral amputation. The person has a specific preference for a leg that is buoyant, waterproof, and suitable for aquatic activities like snorkeling and scuba diving. Drawing upon our expertise from San Diego State University, the team has effectively designed and developed a leg that fulfills these requirements through innovative design approaches.

## Thermaphase (M.A.T.E.S.S.)

MEMBERS: Jorge Balvaneda, Aden Hussein, Jason Nguyen, Brandon Wells

ADVISORS: Dr. Fletcher Miller and Dr. Scott Shaffar, SDSU

SPONSOR: SDSU Mechanical Engineering, Combustion and Solar Energy Laboratory, and Student Success Fee



### ***MOLTEN ALUMINUM ENERGY STORAGE WITH SUPERCRITICAL CO<sub>2</sub> HEAT TRANSFER FLUID***

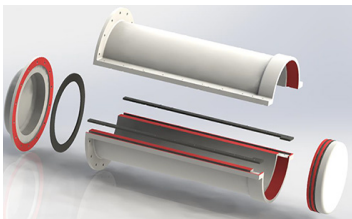
The US Department of Energy is invested in supercritical CO<sub>2</sub>-based thermodynamic cycles, often paired with solar heat. Consequently, implementing a storage system is crucial for the off-peak operation of such a cycle. The SDSU Combustion and Solar Energy Lab possesses substantial numerical modeling of the high-temperature, latent storage using molten aluminum silicide. However, experimental validation is pending. This system is vital for verifying calculations and material suitability in challenging conditions.

## Titan Seals

MEMBERS: Shane Arana, Alan Beal, Ignas Kasulaitis, Edward Muollo

ADVISORS: Jordan Ferreira, Priscilla Ng, Gregor Robertson, Solar Turbines  
Dr. Scott Shaffar, SDSU

SPONSOR: Solar Turbines



### ***GAS TURBINE DRIVESHAFT COVERS***

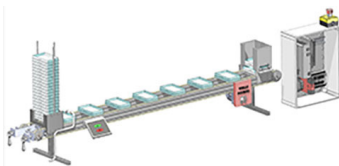
Solar Turbines produces turbine packages consisting of a turbine engine, driven equipment and a coupling assembly. The coupling covers prevent outside contact with the rotating driveshaft and seal in lubricating oil. The current coupling cover design is prone to leakages which can result in unwanted package shutdowns and fires. Team Titan Seals engineered a new coupling cover design that seals existing leak paths while decreasing cost and weight by using composite materials and specialized gaskets.

## Wells Pourgo

MEMBERS: Rhold Angelo Flauta, Derek Crowley, Troy Robinson, Kazem Shawwa

ADVISORS: Chuck Tweedy, Cibus US LLC  
Dr. Scott Shaffar, SDSU

SPONSOR: Cibus US LLC



### ***AUTOMATED ONE WELL PLATE POURER***

In support of Cibus US LLC, an agricultural trait development company, Team Wells Pourgo worked to automate the filling of one-well Petri dishes with plant culture medium. Custom mechanisms were designed and tested to carefully relay the plates through the process. The system can de-stack, fill, and cool the plates before re-stacking them for packaging. Full autonomy is achieved using object sensors to trigger events and stepper motors for actuation. A safety controller monitors e-stop buttons and manages power to the motors.