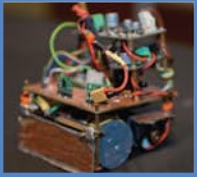




SAN DIEGO STATE
UNIVERSITY

College of Engineering



2020 VIRTUAL ENGINEERING DESIGN DAY

May 6, 2020, from 11:00am - 12:30pm

Please join us for the Zoom event:

<https://sdsu.zoom.us/j/683519243>

ENGINEERING & INTERDISCIPLINARY SCIENCES

WELCOME



In these uncertain times surrounding COVID-19, here at the SDSU College of Engineering, we are doing our part to keep our students and community members safe and healthy. In compliance with the restrictions prohibiting gatherings of people in San Diego County, for the first time in the history of our Engineering Design Day event, we are bringing our annual Design Day event to you, in a virtual format.

Please save the date for our 2020 Virtual Engineering Design Day event which will be held via Zoom, on Wednesday, May 6, 2020, from 11:00am-12:30pm. Please join us for the Zoom event:

<https://sdsu.zoom.us/j/683519243>

We are proud to still have our undergraduate students showcase their design project work completed during the 2019-20 Academic Year. There will be teams representing our Senior Design classes in Aerospace Engineering, Civil, Construction & Environmental Engineering, Electrical & Computer Engineering, and Mechanical Engineering.

Please join me in congratulating our student teams on their innovative design projects which represent the culmination of the technical knowledge they have developed during their time at San Diego State University's College of Engineering. These projects provide the students with real-world experience that involve design constraints, budgets, reviews, and deadlines. Through these projects our students learn to apply and develop their critical thinking skills, recognize human and societal needs, and design novel, sustainable engineering solutions.

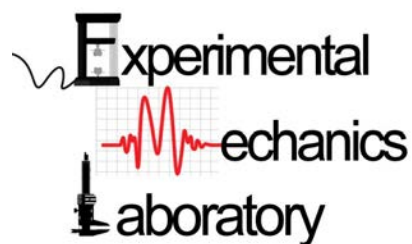
We are grateful to our many sponsors for their generous support of these student projects. Our sponsors include: ASML, City and County of San Diego, Delane Engineering, Dexcom, D&K Engineering, Michael Baker International, NASA, NAVWAR, and Zodiac Pools. Many of these sponsors are integrally involved with the student design teams and serve as mentors to the teams. This provides meaningful projects of value, and instills a professional orientation in the student teams. We appreciate all of our sponsors and their support for the student teams.

We hope to see you virtually on May 6, to join and enjoy the SDSU's Spring 2020 College of Engineering Virtual Design Day.

I hope that you and your families remain safe and healthy during these challenging times.

Eugene Olevsky, Ph.D.
Dean
College of Engineering

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THANK YOU TO OUR SPONSORS



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Mechanic Mastiffs - Self-Deployable 3D Printed Structures
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The Overlays - Dexcom Overlay Patch Performance Characterization
The Penguins - 3D Printed Aircraft Competition
Pool Boys - Total Dissolved Solids Filtration System
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The Water Benders - LED Laminar Pool Jet

The Wise Camels - Development of Solar Indoor Lighting system

Astraea

MEMBERS: Alex Bailey, Travis Ferguson, Yu Fan Lin, Arnold Phu, Avery Schilling
 ADVISOR: Dr. Ahmad Bani Younes - SDSU
 SPONSOR: SDSU SPACE Lab, AE460, Aerospace Engineering Department



Formation Flying of a Two-CubeSat Virtual Telescope

In this project, a mission design is laid out for a novel approach to searching for earth-like planets by use of a virtual telescope. The virtual telescope will be composed of two small satellites utilizing precision formation flying (PFF) and relative position sensing and control to act as a tandem telescope where one satellite carries the optics and the other carries the detector. By utilizing dual- spacecraft flying in tandem, focal-lengths that have never been achieved in space are possible and will allow for many advantages over current imaging techniques.

Sat3

MEMBERS: Paul Anderson, Paul Fuerte, Luke Hedberg, Jarod Heise, Marcus Reed
 ADVISOR: Dr. Ahmad Bani Younes - SDSU
 SPONSOR: SDSU SPACE Lab, AE460, Aerospace Engineering Department



Soteria Laser Communication Satellite

Laser communication does an incredible job of outputting mass amounts of data over a short period of time. It is also much more difficult to intercept and decode because of the point to point nature of lasers. That is why the idea of a satellite relay station is currently being developed by the Sat3 team. The proposed mission would involve a CubeSat structure being launched into the geosynchronous orbit that would allow satellite to satellite communication as well as satellite to ground communication in clear skies.

SDSU RadSat

MEMBERS: Trevor Allen, Zach Fischer, Shaan Heugly, Jamie Lynn Blockey, Dalton Williams
 ADVISOR: Dr. Ahmad Bani Younes - SDSU
 SPONSOR: SDSU SPACE Lab - Aerospace Engineering Department

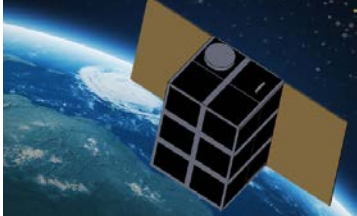


San Diego State University RadSat

SDSU RadSat functions as a testbed to allow companies to fly their hardware to a radiation-rich environment and test the equipment's durability in space. This allows the companies to sell their products as a "Flight Proven" or Technology Readiness Level 9 component. This increases the likelihood that a customer will purchase this component, and in the case of component failure, the manufacture can redesign without disabling a customer's satellite.

SpaceCarbs

MEMBERS: Walker Davidson, Steven Deng, Cesar Dominguez, Stephen Yu
ADVISOR: Dr. Ahmad Bani Younes - SDSU
SPONSORS: Dr. Ahmad Bani Younes - SDSU SPACE Lab, AE460, Aerospace Engineering Department, Paul Gill - NASA Marshall Space Flight Center, Systems Engineering Office



Atmospheric Characterization Carbon Dioxide

Although being an important greenhouse gas, high concentrations in our atmosphere drives global warming, disrupting the natural climate cycles. SpaceCarbs-1, a 12-U CubeSat, was designed by SpaceCarbs at SDSU as a reliable and cost-effective first iteration to support a payload sensor that can measure the amount of carbon dioxide in the Earth's atmosphere in consideration of places that are known as major sources and sinks.

Space Coroner

MEMBERS: Francis Apalisok, Juan Gadd, Jason Horosny, Arthur Jollymour, Alec Richter
ADVISOR: Dr. Ahmad Bani Younes - SDSU
SPONSOR: Dr. Ahmad Bani Younes - SDSU



Envisat Deorbit Mission

Mission to rendezvous and forgo the European Space Agency's Envisat as a proof of concept for future space debris removal mission.

Alesia Associates Inc.

MEMBERS: Abdibasid Ali, Abdulaziz AlShaye, Rostin Amirani, Ammar Metwalli, Natalia Odish, Rita Odish
 ADVISOR: Philip Kern - Engineering Project Manager, City of La Mesa
 SPONSOR: Philip Kern - Engineering Project Manager, City of La Mesa



Spring Street Transit Station - High Street Crossing

The project goal is to connect High Street with Spring Street in the most cost and time efficient way. Our group of engineers at Alesia Associates came up with the following alternative: High Street will connect to the transit station at the same elevation and become an intersection. After that, the elevation differences are to be evened out through filling pit material and then building a road on top of the man-made soil. Finally, the intersection will then connect to the parking lot through a sloped down road.

AMET Construction

MEMBERS: Patricia Gonzales, Cassandra Kleitsch, Willow Lark, Norberto Martinez, Ferdinando Roldan, Matthew Sutton
 ADVISOR: Mark Filanc - Filanc Construction



511 Pump Station Design-Build

AMET Construction has completed a redesign of the Oceanside 511 Pump Station including a new pipeline and three new pumps for increased output. The project will provide an additional 4.5 million gallons of water per day to homes and businesses in the City of Oceanside.

Aztec Design and Construction

MEMBERS: Chris Carcido, David Colera, Blake Detata, Ryan Garofalo, Landon Gastelum, Julio Lopez
 ADVISOR: City of San Diego
 SPONSOR: City of San Diego



UCSD - City SD Fire Station

The City of San Diego is seeking to acquire Design-Build services for the UCSD-City SD Fire Station to provide for the design and construction of a new permanent 3-bay fire station of approximately 10,500 square feet. The facility will accommodate three fire apparatus and a crew of nine to eleven fire personnel, onsite surface parking for fire-rescue personnel, apparatus bays, dorm rooms, kitchen, watch room, ready room, station alerting system, IT data network, wet and dry utilities, electrical, and mechanical systems.

Civil Creations Inc.

MEMBERS: Aya Alaboosi, Lara Al Isso, Ayat Alobaidi, Mina Ghareeb, Hani Nori, Mustafa Rasheed
 ADVISOR: James Haughey - SDSU
 SPONSOR: City of Coronado - Sam Katzenstein

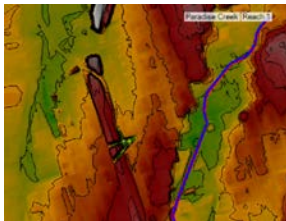


Coronado NAB Pedestrian Tunnel

Naval Amphibious Base Coronado is a naval installation located in Coronado, California. The base, situated on the Silver Strand, between San Diego Bay and the Pacific Ocean, is a major Navy shore command, supporting over 30 tenant commands, and is the West Coast focal point for special and expeditionary warfare training and operations. The City of Coronado would like to replace the existing at-grade pedestrian crossing with a safe pedestrian-friendly tunnel under SR-75.

Coastello Engineering

MEMBERS: Marina Balcazar, Ehrick Costello, Cheyenne Graves, Sophia Jorge, Michelle Melkonians, Julia Moore
 ADVISOR: Dr. Christy Dykstra - SDSU
 SPONSORS: Julio Garcia - DMax Engineering, Roberto Yano - National City



Paradise Creek Flood Mitigation

San Diego experiences seasonal king tides between the months of December and February, which is also the rainy season. These tides can rise to more than 9' above sea level, which when combined with heavy season rainfall, causes significant flooding problems for low lying areas. This project evaluated four alternatives for their ability to mitigate the flooding in National City south of Kimball Park.

Concept Construction

MEMBERS: Khalid Alajeel, Mohammed Alazamy, Wael Ali, Abdullah Alomor, Abdulrahman Alshayegi, Ammar Batta (PM)
 ADVISOR: Philip Kern - Engineering Project Manager, City of La Mesa
 SPONSOR: Philip Kern - Engineering Project Manager, City of La Mesa

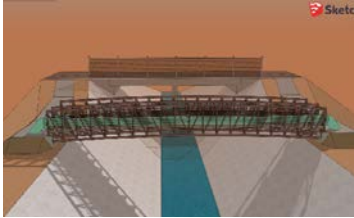


La Mesa Blvd. Complete Streets/Roundabouts

Our plan for this project is to reconfigure La Mesa Blvd. into a multi-modal, transit-friendly corridor. The plan will reduce the roadway into two lanes, replace traffic signals with roundabouts, add buffered bike lanes, provide landscaped spaces and enhanced transit stops. Implantation will reduce speeds, improve walkability, increase transit and bicycle use, and enhance access to key destinations. The goal for this project is to provide a preliminary design for two lanes "complete street".

Donovan & Associates

MEMBERS: Andrew Bartleet, Haley Donovan, Dakota Newsome, Thong Nguyen, Sheena Sinigayan, Bryan Tran
 ADVISOR: Mark Filanc, PE, DBIA - J.R. Filanc Construction Company, Inc.
 SPONSORS: City of Escondido, HNTB, Kleinfelder

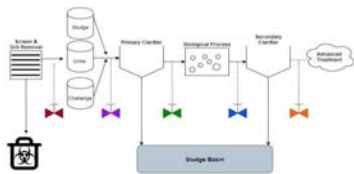


Escondido Pure Water Pipeline Creek Crossing

The City of Escondido is constructing a new water treatment facility requiring a new 24" diameter pipe that will cross through a lined trapezoidal channel. The options for crossing the channel include building a new pipe bridge to support the steel 24" pipe or utilizing a "jack and bore" under the channel to install the new 24" pipe. Our team will look at both options and provide the City with a design that we believe will be the best alternative.

FLASH Engineering

MEMBERS: Stephanie Chao, Kylie Metkiff, Delaney Sisk, Harlowe Steele, Liz Winterton
 ADVISOR: Dr. Christy Dykstra - SDSU

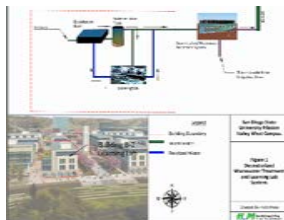


SDSU Mission Valley Campus Learning Lab

Design of a decentralized Wastewater Treatment Learning Lab for the new San Diego State Mission Valley Campus. This lab will provide research and education opportunities for undergraduate, graduate and doctoral students in the field of Environmental Engineering, and will include a modular system designed to incorporate innovative treatment technologies.

H2M Environmental Science and Technology

MEMBERS: Hannah Bertsch, Eva Curiel, Holly Hays, Tyler Myers, Sarah Perkins, Martin Valerocasas
 ADVISOR: Black & Veatch, SDSU Mission Valley Campus Learning Lab



SDSU Mission Valley Campus Decentralized Wastewater Treatment System & Learning Lab

Our team has designed a decentralized wastewater treatment system for the student learning lab for the new Mission Valley SDSU Campus. The system will treat the waste produced from the 20,864 square foot engineering building and provide a modular hands-on system for students and researchers. The system will provide researchers the ability to study sludge, water reuse, and the effectiveness of a system with additional contaminants injected.

K9 Engineering

MEMBERS: Jake Brown, Peter Caggiano, Abdulrahman Harami, Hanadi Jarrar, Jasmin Kazak, James Valdez
ADVISOR: Mark Filanc, PE, DBIA - J.R. Filanc Construction Company, Inc.
SPONSORS: City of Oceanside, Ron Lutge - Water Utilities Department, Gary Silverman - J.R. Filanc Construction Company, Inc.



City of Oceanside - 511 Pump Station

The City of Oceanside is seeking Design-Build Entities for the complete design and construction of a potable pump station to deliver treated groundwater from the Mission Basin Groundwater Purification Facility to a 511 pressure zone via an effluent pipe. As a detail-oriented team focused on providing reliable success for clients, K9 Engineering will successfully maximize the utilization of Oceanside's local groundwater resources through completion of this project with maximum considerations for sustainability.

Level 17 Engineering

MEMBERS: Hifzeen Ali, Jodie Montano, Evan Rossi, Badr Suleiman, Riley Thomas, Melany Vina
ADVISOR: Timothy Smith, PE - Otay Water District
SPONSOR: Jennifer Fan, PE - Metropolitan Water District of Southern California



MWD Gene Camp Water System and Site Improvements

Level 17 Engineering has been tasked with completely renovating the existing water systems at the Gene Camp Pump Station. This includes optimizing and refurbishing the current water treatment system to ease facility operation and maintenance, as well as designing a new, code-compliant water distribution network for potable water and sewer/septic utilities. In addition, site improvements will be made for the neighboring Gene Camp village with roadway developments and a new recreational facility.

M&M Engineering

MEMBERS: Nicolette Blas, Shailainne Ellaine Esteller, Edna Ferrer, Alicia Keomany, Neimann Lorenzana, Tina Trinh
ADVISOR: James Haughey, PE - Michael Baker International



NAVWAR SANDAG Grand Central Station

NAVWAR and SANDAG are collaborating to construct a Grand Central Station located in Old Town San Diego. Marine & Mainland Engineering is contracted to provide professional services to develop the proposed Site 1 mixed-use facilities. This project will include modern and sustainable residential, commercial, and office buildings.

Masterworks Engineering

MEMBERS: Allan Abutin, Erik Quezada, Ray Robles, Ahmed Sayed, Daren Tith, Mark Wambua
ADVISORS: John Prince, PE – Delane Engineering, Chris Vonk, PE – Group Delta Consultants, Inc., Wyatt R. Henderson, PE, SE – Magnusson Klemenic Associates
SPONSORS: Garrett Van Leeuwen Gensler, Matt Gerard – Clark Construction, Diana Nelson, Bob Schulz – SDSU, Demetra Thornton, Danielle York



Aztec Stadium Structure

The first project of the new SDSU Mission Valley Campus will be the 35,000 seat Aztec Stadium. The new stadium will bring San Diegans together at its centralized Mission Valley location. Masterworks Engineering was tasked with designing the stadium's structural system for the East Stands. The team performed an in-depth geotechnical analysis to provide a sound foundation system to guarantee structural integrity. Additionally, the team generated an optimal construction plan that will minimize costs and impacts.

Nero Consultants

MEMBERS: Connor Cornelius, Rory Cornelius, Courtney Harr, Sydney Johnson, Ryan Shivley, Cassidy Thornbury (PM)
ADVISORS: Mark Filanc, PE, DBIA & Gary Silverman - J.R. Filanc Construction Company, Inc., Carollo Engineers, Inc., Nensi Lakrori - SDSU, Thomas Zink - SDSU
SPONSOR: City of Oceanside



511 Oceanside Pump Station Project

The City of Oceanside 511 Pump Station Design-Build project consists of the design of a new potable water pump station and distribution pipeline that is to meet the increased flow capacity at the Mission Basin Groundwater Purification Facility. The scope of this project involves thorough evaluation of existing systems, a hydraulic analysis, project planning and scheduling, pump station and pipeline design, construction, and cost analysis.

Parallel Pipes Construction, Inc.

MEMBERS: Tiffany Clonts, Charli Eiseler, Allison Harizal, Arey Marquez, Caleb Mulick, Madison Rumic
ADVISOR: Mark Filanc, PE, DBIA - J.R. Filanc Construction Company, Inc.



Escondido Creek Pipe Crossing

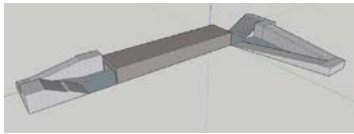
Parallel Pipes Construction, Inc. is determining and designing the most efficient, sustainable and high-quality system to cross a water pipe over Escondido Creek. The water will be used to ensure that the City of Escondido's agricultural industry has sufficient water to thrive.

Prestige International

MEMBERS: Emanuel Guerrero (CAD Lead, Construction), Stefanos Jerjees (Geotechnical), Carlos Lopez (Project Manager, Site Civil), Rachelle Manalaysay (Transportation), Minerva Munoz (Stormwater), Robert Villota (Structural)

ADVISOR: Coronado Naval Amphibious Base

SPONSOR: Mark Kaems - California Department of Transportation



Coronado NAB Pedestrian Tunnel

Prestige International took on the challenge to design a pedestrian tunnel connecting both sides of the Coronado Naval Amphibious Base separated by the SR-75. The purpose of the project is to improve pedestrian safety by eliminating the need for a cross-walk while simultaneously improving the traffic flow. The tunnel will measure approximately 180 feet, include stairs and ADA accessible ramps at both entry points, and include the necessary drainage design to ensure that there will be minimal flooding.

Prestige Worldwide Engineering

MEMBERS: Michael Bailey, Ryan Dinh, Joseph Horsey, Hugo Mora, Andres Perez, Aryobimo Wibowoputro

ADVISORS: James Haughey, PE - Michael Baker International, Nensi Lakrori - SDSU

SPONSOR: The City of San Diego



UCSD - City SD Fire Station

Prestige Worldwide Engineering is composed of (1) Construction Engineering and (5) Civil Engineering students with an immense passion for all of the Civil Engineering disciplines. The UCSD - City Fire Station encompasses numerous facets of what we will encounter in the industry. We calculated, designed, drafted, scheduled, and managed the entire project throughout the semester to accommodate the (9-11) fire personnel that will soon occupy this 10,500 sq.ft. structure.

San Diego Student Designs

MEMBERS: Brendon Anderson, Melissa Hamendi, Emilio Japelli, Chrestina Mansoor, Philip Niver, Jack Wagner

ADVISORS: John Prince, PE - Delane Engineering, Inc., Bijan Shakiba - Bureau Veritas North America

SPONSORS: Philip Kern - City of La Mesa, Kristopher Patron-Soberano - The Sage Project



High Street Crossing

The purpose of our project is re-engineering High Street Crossing near Spring Street Transit Station in the City of La Mesa. The main goals of the project are shortening the emergency response time for the military residence on High Street, promoting the use of transit, and reducing the associated carbon footprint. San Diego Student Designs' approach for the project is to design two alternatives and evaluate them, based on practical, social, and environmental aspects, and then use the optimum design to address the project goals.

SD Pacific Construction

MEMBERS: Hussian Alkhaja, Brianna Billings, Eric Chang, Saul Lopez Martinez, Ulisses Rodriguez, Perla Torres, Josh Villones
ADVISOR: John Prince, PE - Delane Engineering, Inc.



Aztec Stadium

New SDSU stadium at Mission Valley. Specifically, the design and construction of the East Stand. Our project will encompass the scopes of geotechnical, structural, and construction.

SEAM-less Engineering

MEMBERS: Emma Blankenship, Kevin Endo, Anaïs Gaunin, Sara McGaugh, Mark Anthony Relon
ADVISOR: Timothy Smith, PE - Otay Water District



Paradise Creek Flood Mitigation

SEAM-less Engineering has been hired by National City to explore, develop, and design mitigation measures that will be implemented for flooding in Paradise Creek that is caused by tidal influence. The major components of this project include hydrology models, hydraulic calculations, design drawings, regulatory and permitting analysis, and cost analysis. The goal of this project is to design sustainable infrastructure that will effectively reduce flooding in and around Paradise Creek.

United Engineering

MEMBERS: Yossef Alahmad, Abdulrahman Aljeemaz, Duaij Alsabab, Juan Perez, Ruqayyah Ramadhan, Haya Tifouni
ADVISOR: James Haughey, PE - Michael Baker International



Coronado NAB Pedestrian Tunnel

Design, Engineering, and Construction services to establish a new pedestrian tunnel across SR-75 for the City of Coronado. The pedestrian tunnel will serve as a safer alternative for pedestrian traffic from the Naval Amphibious Base Coronado to cross SR-75. Moreover, the pedestrian tunnel will serve as an opportunity to improve vehicular traffic at the intersection of SR-75 and Tarawa Rd.

WATERCOR Inc.

MEMBERS: Fawaz Alqattan, Kyle Butler, Josh Gaddis, Josh Maxwell, Navid Nasirpour, Abdulilah Shatta

ADVISOR: Mark Filanc, PE, DBIA & Matt Appleton - J.R. Filanc Construction Company, Inc.



Escondido Pure Water Pipeline Crossing

Our team is taking on the design and construction of a section of pipeline for the new Escondido recycled water treatment plant. At WATERCOR, we understand that as the City of Escondido expands, one of the most valuable resources for development and advancement is clean water. The Escondido Pure Water Pipeline Creek Crossing is a vital and demanding project to the expansion of Escondido and the success of the new recycled water treatment plant.

Breathe Well

MEMBERS: Rami Alsayeq, Neever Kryakos, Alejandro Martinez-Bueno, Albert Rafou, Peter Sadik, Karam Saleem
 ADVISOR: Dr. Yusuf Ozturk - SDSU
 WEBSITE: <https://sites.google.com/view/breathewell?hl=en>



Breathe Well - Respiratory Monitoring Device

We plan to create a respiratory monitoring belt that will track breathing related health issues such as asthma, bronchitis, sleep apnea, and other similar diseases at an affordable price for the everyday consumer. Devices similar to this have a price tag so high, that most people shy away from making the purchase. In the professional scene, our designated market would most likely be geared towards doctors, athletes, and nutritionists who are in need of an accurate and lightweight device.

Drone Automated Mesh Network

MEMBERS: Michael Bukowski, Michael Fox, Matthew Houser, Liam Rapoza, Donovan Rowzee, Dean Wedeking, Logan Jay Williams
 ADVISORS: Andy Bushnell - ARRS Technologies, Dr. Chris Mi - SDSU
 WEBSITE: <https://aztecengineering20.wixsite.com/dronemeshnetwork>



Drone Automated Mesh Network

To extend the effective range of utility drones, we conceptualized a network of permanent, self-powered, RF connected charging platforms. For any drone, we can install a battery pack and charger mount to allow wireless charging at any platform. This enables a drone to travel any arbitrary distance along the platform network, only limited by the density of the platforms. A landed or passing drone could also communicate and transmit data to platforms, which can relay the data back to a base station for analysis.

Ed, Edd, n Eddy Currents

MEMBERS: Brady Bounds, Austin Hoang, Zachary Morey
 ADVISOR: Dr. Sridhar Seshagiri - SDSU
 WEBSITE: <http://eecurrents.com/>



Eddy Current Dynamometer

Aztec Racing's powertrain development team currently utilizes a Dynapack Chassis Dynamometer provided by a current sponsor to measure horsepower, torque, and load on the engine to calculate efficiency. However, the Dynapack has too high of an input torque threshold, creating inaccurate engine loading scenarios and therefore inaccurate measurements. Our project attempts to remedy this by designing a dynamometer that has a lower input torque threshold in order to achieve more accurate measurements.

G.A.P.S.

MEMBERS: Jacob De Loa, Tom Jimenez, Sara Kouyoumjian, Jordan Trinh
 ADVISOR: Dr. Duy H. N. Nguyen - SDSU
 SPONSOR: Robert Kane - Street Fair Foods, Inc.
 WEBSITE: <https://sarakatrina816.wixsite.com/gaps/team>

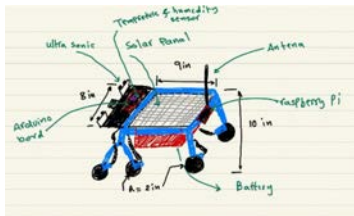


Garage Assisted Parking System

With the goal in mind to focus on home automation and design, our team has envisioned a new device implementation for the home car garage, G.A.P.S., the Garage Assisted Parking System. The G.A.P.S. system seeks to update modern car garage technology, by opening garage doors with web application and RFID. It also includes parking distance detection as well as active motor detection ensuring the safety of the driver from possible carbon monoxide poisoning that result in multiple accidental deaths every year.

Kaladesh

MEMBERS: Aqeel Aoro, Raymar Asanas, Duraid Gorgies, Ferdinand Mateo, Mark Bryan Navarro, Juan Raya, Rasha Shaaya
 ADVISOR: Dr. Ying-Khai Teh - SDSU
 WEBSITE: <https://kaladesh-lotus2.weebly.com>

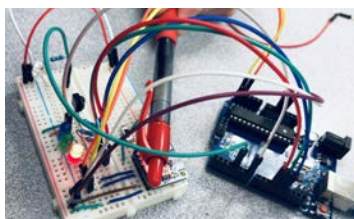


Lotus 2.0

The Lotus 2.0 is a partially autonomous rover that will roam the Salton Sea to take data measurements using a number of sensors, including temperature, humidity, and object detection. The user will have control over the rover's target destinations while the rover takes measurements as it locates to the desired destination. It will be battery-powered, which will be charged through a solar panel. The user will also be able to monitor the rover's power consumption to make the best use of its runtime before it has to charge up.

MakerKids

MEMBERS: Luke Draney, David Angelo Felipe, Christopher Frutos, Justen Hitchcock, Benjamin Maldonado, Nicholas Sullivan, Matthew Tarantino, Xuong Truong
 ADVISORS: Kenneth Arnold - HTE, David Grossman - Northrop Grumman
 SPONSOR: MakerKids
 WEBSITE: <https://sites.google.com/view/maker-kids/home>



MakerKids

MakerKids is franchising and is in search of gadgets to display in their lobby that is appealing to new clients, while helping children build a positive relationship with technology.

Power-Trip

MEMBERS: Christopher Alsheikh, William Cushing, John Deubler, Tanzeem Salim
 ADVISOR: Dr. Reza Sabzehgar, SDSU
 WEBSITE: <https://chrisalsheikh97.wixsite.com/teampowertrip>

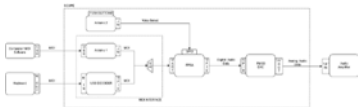


Power-Trip - Smart Circuit Breaker

The Power-Trip module monitors the load of each circuit of a residence at the breaker. The measurements are then hosted to a web server via a Raspberry Pi for access via both smartphones and personal computers. The data is displayed visually for historic usage as well as numerically for current power usage. In this way, consumers are able to both remotely view power consumption on a per circuit basis to better determine where power is being wasted, while keeping an eye on their usage throughout the day.

SAR-D1

MEMBERS: Omar Ahmed, Uvaldo Resendez, Jessica Stensby
 ADVISOR: Professor Barry Dorr - SDSU



Frequency Modulated Digital Synthesizer

The SAR-D1 digital synthesizer is an easy-to-use synthesizer, created with affordability and portability in mind. This device is a way to introduce people to the world of electronic music production, but still provide enough power and features to entice even the most veteran of music producers. The core is based on Xilinx Artix-7 FPGA, and information will be stored on an Arduino. Buttons will allow anyone to select their sound preference based on stored presets, and from there one can plug in and play.

Smart Leaf

MEMBERS: Siamak Doraghi, Hanieh Moein, Nika Nizharadze, Emilio Nuno
 ADVISOR: Dr. Saeed Manshadi - SDSU



Smart Greenhouse

The Smart Greenhouse project offers the agricultural world, a fully autonomous and controlled environment where desired crops are being monitored and control systems come to the rescue, whenever needed. With implementation of a variety of sensors, different key factors like temperature, humidity, light and soil moisture levels are measured and using proper machine learning algorithms, irrigation, ventilation and other systems cover the needs of the crops. The user interface allows the farmers to closely monitor the crops.

Smile Cloud9

MEMBERS: Jayson Del Moral, Sky Johnson, Ben Leeds, Fate Alexis Lumba, Evans Nik Matabwa, Joseph-Eli Omengan, Jed Vargas
 ADVISOR: Dr. Junfei Xie - SDSU
 WEBSITE: <https://smile9cloud.wixsite.com/webforseniordesign>



Distributed Computing Frameworks for Unmanned Ground Vehicles

Our team will be creating a group of unmanned ground vehicles that will be able to execute power intensive tasks such as matrix multiplication through wireless distributed computing, which will solve the common drone problem of needing to off load such tasks to a remote site for computation.

Smile Mobile

MEMBERS: Ramiz Hanan, Jorome Macedo, Rigoberto Macedo, Michael Olivas, Leo Peralta, Wraith Dylan
 ADVISOR: Dr. Junfei Xie - SDSU



Autonomous Vehicle

Today, autonomous driving vehicles are very popular but many consumers cannot afford such a pricey car. The expense of these vehicles comes from the hardware and software components in these vehicles which can be priced up to \$8000 alone per "auto-pilot" package. If these components could be completely disposed of, then the overall cost of making an autonomous vehicle could be drastically lowered, allowing for great advancements in making autonomous vehicles available to people of all economic backgrounds.

Solar Powered Induced Charging Race Car

MEMBERS: Abdulmohsen Alshewaish, Markell Lindley, Jared Renard, Mojtaba Turkmani, Nafeis Weixelman
 ADVISOR: Dr. Saeed Manshadi - SDSU
 WEBSITE: <https://solarpoweredrc.myportfolio.com/>



Solar Powered Induced Charging Race Car

Our team is designing a wireless charging system that will be powered by solar panels. With this design, our charging station can be lightweight and portable, providing charging capabilities for your remote controlled car wherever you are. The car will drive onto the charging platform, pressing down on two push button sensors, which will initiate the current to flow from the transmitter coil and subsequently into the receiver coil and into the car's battery.

Your Engineering Solutions (YES)

MEMBERS: Jawa Alaskar, Abdullah Alrasheed, Ahmad Alsarhan, Mohammad Alzamami, Adam Draxler, Brandon Fong, Lorans Hirmez, Joseph Morga, Charles Sotto

ADVISOR: Dr. Chris Mi, Fellow IEEE & SAE, Professor & Chair, SDSU Dept. of Electrical and Computer Engineering

SPONSOR: <https://www.gofundme.com/f/senior-design-project-renewable-energy>

WEBSITE: <https://dualpowergeneration.sdsu.edu/>



Dual Power Generation via Wind and Photovoltaic Energy

With the world's increasing population there is an increase in daily required energy. Earth itself cannot change in a way to provide the needed energy to supply the services to satisfy social and economic development, welfare and health. With the use of renewable energy resources, we can help supply the energy demand for future generations. Our attempt to find a solution is our design of a dual power generation system which can be implemented on busy roads, railway networks and highways.

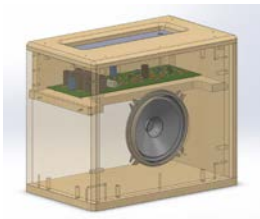
Amplified Engineering

MEMBERS: Thomas Buchanan (ME), Jesus Cuen Reyes (ECE), Viceroy Nieva (ECE), Abdulla Obaidan (ME), Matthew Smith (ECE), Robert Vallejo (ME), Clayton Woodward (ME)

ADVISORS: Dr. Scott Shaffar, SDSU and Professor Barry Dorr, SDSU

SPONSOR: Professor Barry Dorr - San Diego State University

WEBSITE: <https://amplifiedengineering.info/>



Guitar Amp and PCB Starter Kit

The Guitar Amplifier and Printed Circuit Board Starter Kit is a high school level STEM project intended as an introduction to electronics and engineering. The starter kit comes with the necessary components and a step-by-step procedure for the amplifier and its assembly. The assembled product is an acoustically sound and aesthetically pleasing guitar amplifier or speaker.

Complicity

MEMBERS: Sarah Cartwright (ME), David Knight (ECE), Anthony Lam (ECE), Anna Stahlak (ME), Garen Stein (ME), Savannah ter Veer (ME), Aaron Tran (ECE)

ADVISORS: Mr. Jeff Wield and Mr. Minh Duong, Simplexity, Dr. Baris Aksanli, SDSU, Dr. Scott Shaffar, SDSU

SPONSOR: Mr. Minh Duong - Simplexity



DX Demo - Mechatronics Bio-Tech Diagnostics Testbed

The DX Demo - Testbed is a device that combines innovative biological processes to demonstrate the ability to rapidly decrease the time of accurate diagnosis. In the future, this product would be used to analyze blood samples to assist medical professionals to diagnose and choose successful treatment plans. Currently, the goal of this project is to demonstrate how combining standard biology lab practices with automation can advance the medical field and improve the quality of healthcare.

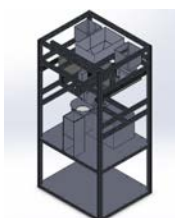
The Granola Boys (ME)/Smart Granola Kiosk (ECE)

MEMBERS: Anthony Alkatib (ME), Thomas Durso (ME), Tristan Kaskoun (ME), Miles Kiefer (ME), Wenjie Kuang (ECE), Jiuzhang Peng (ECE), Gustavo Torres (ECE), Austin Whitaker (ME)

ADVISORS: Mr. David Burney, D&K Engineering, Victor Escobedo, D&K Engineering, Professor Ken Arnold, SDSU, Dr. Scott Shaffar, SDSU

SPONSOR: D&K Engineering

WEBSITE: <https://tonykwong69.wixsite.com/smartgranolakiosk>



Smart Granola Kiosk

The goal of this project is to design, analyze, build, and test a machine that allows customers to select the toppings of a granola that is then mixed and distributed straight to them, all within a short amount of time. The Smart Granola Kiosk produces 20 one-pound servings of customizable granola made up of a base granola and multiple different toppings. The final production model of this kiosk would be utilized in a grocery store.

Baja Blast

MEMBERS: Matthew Heywood, Jacob Hicken, Andrew Kenton, Kyle Soto, Paige Trevisan
ADVISOR: Dr. Scott Shaffar, SDSU
SPONSOR: Aztec Baja Racing - San Diego State University
WEBSITE: <https://www.aztecbaja.com/>



Four-Wheel Drive Drivetrain

The goal of this project is to develop a competition-ready, four-wheel drive system for the Aztec Baja Racing Team's 2020 car. In previous years, the fastest recipe for a mini baja car has been a two-wheel drive layout. However, due to a Baja SAE rule change for the 2020 season, the team has decided to implement its first ever four-wheel drive system. This car will compete at three Baja SAE competitions in the United States against teams from around the world.

BioShield

MEMBERS: Kelly Bernal, Tatyana Guerrero, Jade Sommers, Sophia Stepp
ADVISORS: Ms. Annemarie Orr, QL+, Dr. Scott Shaffar, SDSU
SPONSOR: Quality of Life Plus (QL+)
WEBSITE: <https://qlplus.org/>



Protective Cap for Upper Extremity Osseointegration

Osseointegration is a direct bone implant that allows for the attachment of an external prosthesis that provides many prosthetic users with an increased comfort and range of motion. When the prosthetic limb is not attached there is a risk of injury or discomfort to users. Our team was tasked with the design and manufacturing of a protective cap to be worn in lieu of an upper extremity prosthetic. The cap will provide protection, comfort, and support to facilitate our challenger's return to leisure and sport activities.

Condensation Organization

MEMBERS: Daniela Cantor, Jacob DeBartoli, Mike Hoving, Daniel Verga
ADVISORS: Mr. Nick Bauer, Mr. Dan Riedel, Dr. Scott Shaffar, SDSU
SPONSORS: Mr. Nick Bauer, Mr. Dan Riedel



Water Desalination Tray

There are 785 million people who do not have access to an improved water source, according to the World Health Organization. With 40% of the world's population living near the coast, many of these people have access to saltwater but have no way of making this water potable. The Condensation Organization has designed a device that aims to solve this problem using nothing but the power of the sun. Portable, durable, and simple, the water desalination tray provides an innovative solution to people in need.

Energizers

MEMBERS: Gilberto Aldrete, Adrian Alvarez, María Lerena, Carlos Tellez
 ADVISORS: Dr. Kevin Wood, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering

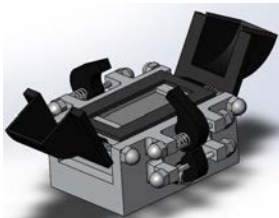


Operando Optical Microscope

As part of SDSU's Interface Design Lab research strategy, operando optical microscopy is an essential technique that provides mechanistic insight into the behavior of complex systems. An ultra high resolution microscope with multiple analysis orientations and the capability of recording 4K video has the potential to unlock never before understood phenomena. This newly engineered system provides better performance and more customization than other commercially available systems, at a fraction of the cost.

Engineered Greatness

MEMBERS: Abdullah AlMutairi, Hussain Ani, Anthony Forsberg, Nathan Hall, Samuel Virgil
 ADVISORS: Dr. Kevin Wood, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering



Airtight Transfer Vessel for SEM Usage

To conduct research on Lithium(Li)-ion batteries, uncontaminated samples of Li need to be analyzed with a scanning electron microscope (SEM). The sponsor's Li samples spoil by reacting with air while transferring the sample from its container to the SEM vacuum chamber. The sponsor needs an airtight vessel to transfer the Li and then open inside the vacuum chamber once evacuated, without remote and/or electronic control, to reveal the sample.

Foam Busters

MEMBERS: Jonathan Ethridge, Christopher Khoury, Antonio Maldonado, Brandon Winsatt
 ADVISORS: Dr. George Youssef, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering

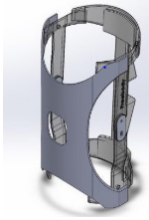


Fabrication and Characterization of Reduced-Density Impact Mitigating Foams

The Experimental Mechanics Laboratory at SDSU has patented an environmentally-friendly manufacturing process to create reduced-density impact mitigating polyurea foam. The current applications for this polyurea foam include reducing concussion rates via direct head impact playing football, reduced impact on the soles of runners, and reduced impact on armor plating. The need is to develop and further reduce the density in the polyurea foam so that it can be light and highly compressible for these applications.

Freebody

MEMBERS: Abdullah Almulla, Ebrahim Altaher, Rene Arvizu, Alejandro Ibarra, Richard Martinez, Jeffrey Vaquera
 ADVISORS: SDSU ZIP Launchpad, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Lavin Entrepreneurship
 WEBSITE: <https://freebodybrace.com/>



Freebody Knee Brace

This project is to develop a knee brace for skiers to assist those who ski and suffer from knee injuries or joint pain such as arthritis as well as prevent those who ski from developing knee problems.

Frequent Flyers

MEMBERS: Brian Bowling, Taylor Burgess, Ally Hardy, Zakary Harrison, Connor Hill
 ADVISORS: Dr. Scott Shaffar, SDSU, Mr. Mike Morgan, Mr. Charles Norris
 SPONSORS: University of Texas, Arlington, MorganTech

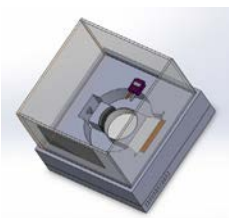


3D Printed Aircraft Competition

The goal of this capstone senior design project is to design and manufacture a 3D printed aircraft to compete in the 4th annual 3D Printed Aircraft Competition (3DPAC) hosted at the University of Texas Arlington in July, 2020. The aircraft is allowed five seconds of powered flight, after which, it competes for the longest flight duration under 30 feet of altitude. All lifting surfaces and aircraft components must be 3D printed, except for electronics, the propeller, and some hardware.

Good Vibrations

MEMBERS: Matthew Ariyasu, Jordan Lee, Kevin Lolly, Nathaniel Schons
 ADVISORS: Dr. Parag Katira, SDSU, Dr. George Youssef, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering



Protein Alignment System via Ultrasonic Vibrations

For the purpose of stem cell application on complex organs, stem cells must be loaded onto a tissue base, or scaffold, composed of polymer fibers like collagen. The polymer fibers in the scaffold must be aligned or patterned in such a way that they adapt to the organ and extracellular matrix, allowing the stem cells to prosper. While previous alignment methods exist, they face major limitations. Our design will test if ultrasonic vibrations can be used instead, and whether it can be done more accurately and quickly.

Gyro Landers

MEMBERS: Yacoub Alhuwaidi, Abdullah Alkhalifah, Jeremiah Nacorda, Peter Temprendola
 ADVISORS: Mr. John Rountree, Popular Rotorcraft Association, Dr. Scott Shaffar, SDSU
 SPONSOR: Popular Rotorcraft Association

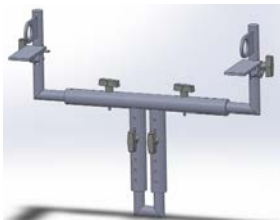


Anti-tip Over Landing Gear for Gyroplanes

The project goal for Team Gyro Landers is to design a landing gear for a "Genesis Solo" G1sa 0011 Gyroplane, which is a type of rotorcraft. The group is sponsored by the Popular Rotorcraft Association (PRA), in order to create a capable lightweight "stop and drop" landing gear. The goal for the landing gear is to allow for the gyroplane to safely drop to the ground from altitude; furthermore, the gyroplane must not tip over when travelling over uneven surfaces.

Handlebar Heroes

MEMBERS: Matthew Buoncristiani, Jacob Dayton, Olivia Di Santo, Christian Mercado
 ADVISORS: Ms. Annemarie Orr, QL+, Dr. Scott Shaffar, SDSU
 SPONSOR: Quality of Life Plus (QL+)



Bicycle handlebars for a below elbow amputee user

Our team was tasked with creating bicycle handlebars for a bilateral below the elbow arm amputee to enable him to once again ride a bike. Our design geometry is shaped similarly to a football field goal and is coupled with rider adjustable with pins. This allows the rider to raise, widen, or change the angle of the handlebars. The rider's prosthetics attaches by rings at the top of the handlebars, allowing him to easily and safely connect and disconnect the handlebars. In addition, armrests are featured for comfort.

High Efficiency Internal Combustion Engine

MEMBERS: Zachary Arellano, Alexander Graham, Josue Gutierrez, Julio Leyva, Andy Smith
 ADVISOR: Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Students

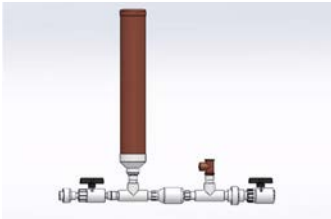


High Efficiency Internal Combustion Engine; Waste Heat Recovery

In an attempt to increase the thermal efficiency of a modern internal combustion engine, the team is building a system of effective heat recovery. With the addition of a steam system, the team is incorporating a heat-exchanger and piston driven steam engine to generate electrical power.

Hydraulic Hitters

MEMBERS: Dan Inocencio, David Orozco Gamez, Cameron Sacks, Christian Solorzano
 ADVISORS: Dr. Asfaw Beyene, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering

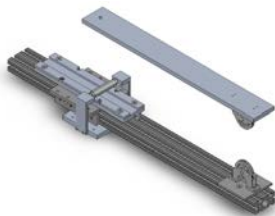


Innovative Hydram

A hydraulic ram pump (hydam) is a water lifting device without the use of external power. It utilizes the kinetic energy through the water hammer effect to pump water to a higher elevation. Our objective is to create an innovate hydram that increases pump height, distance, and efficiency through the use of methods including thermal infusion to the pressure chamber, as well as cascading multiple systems. Through these improvements, our design can be utilized to pump water off-grid over a significant distance.

The Labelers

MEMBERS: Devon Anable, Sean Estabrooks, Nicholas Greene, Sheridan Irvine, Mark Reyes
 ADVISORS: Mr. Nirav Bhatt, Dexcom, Mr. Lenny Barbod, Dexcom, Dr. Scott Shaffar, SDSU
 SPONSOR: Dexcom



Dexcom Labeling and Adhesive Material Comparison Post Sterilization Testing

For this project, the team paired up with the medical device company Dexcom, whose main product is a continuous glucose monitoring device. The purpose of this project is to test the effects of Ethylene Oxide sterilization in combination with environmental conditioning to simulate shipping and distribution on different label and substrate combinations. Furthermore, a specialized fixture was developed to mimic the varied angle that occurs when a label is peeled off the substrate.

Mechanic Mastiffs

MEMBERS: Fahad Almarzooqi, Samuel G. Bumatay, Jr., Jeffery Leigh, Brandon Pires
 ADVISORS: Dr. George Youssef, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering

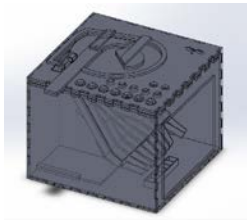


Self-Deployable 3D Printed Structures

CubeSats are satellites that are standardized to a 10x10x10 cm volume. The goals of this project are to: (1) research and record the 3D printing process using the provided 3D printer and flexible filament to produce a document that has detailed steps on 3D printer operation, and (2) develop a fully mechanical 3D-printed self-deployable panel system that increases the surface area and is compatible with the sponsor's custom CubeSat design using the techniques researched. All the components must be 3D printed.

Mo Pills? No Problem.

MEMBERS: Erika Antonio, Tatiana Gonzalez, Karen Morales, Dani Phan, Tasha Stephens
 ADVISORS: Ms. Annemarie Orr, QL+, COL Art Yeager, QL+, Dr. Scott Shaffar, SDSU
 SPONSOR: Quality of Life Plus (QL+)

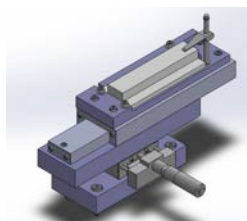


Pill Dispenser

Our team has been tasked with designing and manufacturing a device for people with daily prescriptions that will simplify the process of organizing different types of pills and number of pills into specific days of weekly pill containers. This battery operated, hardwired device will reduce the need for fine motor skills and utilize inputs that are easy for the user to control.

The Overlays

MEMBERS: Jaber Alyami, Brandon Lopez, Noor Othman, Laura Morcillo Romero
 ADVISORS: Mr. Lenny Barbod, Dexcom, Dr. Scott Shaffar, SDSU
 SPONSOR: Dexcom

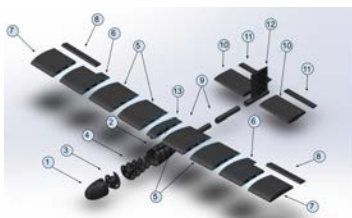


Dexcom Overlay Patch Performance Characterization

Dexcom would like to understand overlay patch performance, which are patches used to adhere their continuous glucose monitors on skin. Comparisons are made between a controlled bench test with the overlay adhered to a substrate that simulates skin, and an actual on body test. We have created a bench test fixture and an on body fixture. Data collected from both tests were compared to understand real life issues of the overlay patch on skin, and how patch adhesion longevity can be improved in the future.

The Penguins

MEMBERS: Kevin Baca, Aaron Cordoba, Brenden Edwards, Jason Locko
 ADVISORS: Dr. Scott Shaffar, SDSU, Mr. Mike Morgan, Mr. Charles Norris
 SPONSORS: University of Texas, Arlington, MorganTech



3D Printed Aircraft Competition

The goal of this capstone senior design project is to design and manufacture a 3D printed aircraft to compete in the 4th annual 3D Printed Aircraft Competition (3DPAC) hosted at the University of Texas Arlington in July, 2020. The aircraft is allowed five seconds of powered flight, after which, it competes for the longest flight duration under 30 feet of altitude. All lifting surfaces and aircraft components must be 3D printed, except for electronics, the propeller, and some hardware.

Pool Boys

MEMBERS: Nick Aiello, Alejandro Del Castillo, Brian Milner, Alex Smith
 ADVISORS: Mr. Hwa Heng and Mr. Mark Bauckman, Zodiac Pools, Dr. Scott Shaffar, SDSU
 SPONSOR: Fluidra - Zodiac Pools

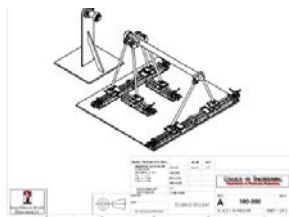


Total Dissolved Solids Filtration System

The Total Dissolved Solids Filtration System reduces the amount of calcium present in the water of saltwater pools while keeping sodium levels constant. Calcium builds up in pipes and on the walls of the pool and can only be removed by draining the pool and cleaning the calcium manually. Sodium, however, is necessary to create chlorine to keep the pool water clean. This system lowers calcium levels in the pool with each cycle so pool owners no longer need to drain their pools for cleaning, saving time, money, and energy.

Project Eclipse

MEMBERS: Alexandra Gonzalez, Holly Hagen, Lucas Massey, Ken Ramirez
 ADVISORS: Mr. Matthew Ostiguy, Ms. Jennifer Jaramillo and Mr. Michael Samuelian, Solar Turbines, Dr. Scott Shaffar, SDSU
 SPONSOR: Solar Turbines

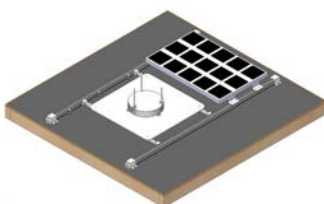


Drivetrain Alignment System

The drivetrain alignment system, sponsored by Solar Turbines, is a project that aims to develop, fabricate, and test a new way to align turbine engine drivetrains to their gearbox counterparts. Traditionally, shims are used to adjust alignment, using a process that takes up to 3 days to reach desired tolerances. The new system utilizes struts with adjustable locations and a supporting software tool to output the exact adjustments needed to achieve drivetrain alignment in less than an hour.

RV ARMS

MEMBERS: Martin Ahumada Padilla, Daniel Gutierrez, Austin Halog, Miguel Loza, Bailey Ward
 ADVISOR: Dr. Scott Shaffar, SDSU
 SPONSORS: SDSU Students and Dr. Scott Shaffar

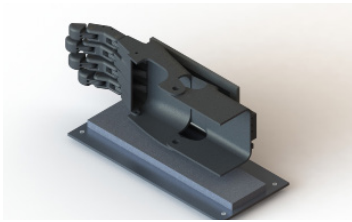


Recreational Vehicle Accessory Roof Mounting System (RV ARMS)

RV ARMS is a modular mounting system that holds roof accessories for recreational vehicles. The mounting system is able to be secured to all types of RV roofs, in addition, it is able to accommodate the hundreds of different types of roof mounted accessories that are currently out on the market today such as solar panels, wifi antennas, and satellites.

Second Chance Engineers

MEMBERS: Brian Doyle, Miguel Duarte, Jonathan Gaasch, Bryan Maldonado López, Jason Neumann
 ADVISOR: Prof. Jeff Wield, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: Prof. Jeff Wield

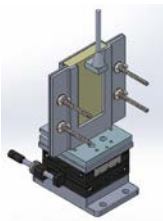


Prosthetic Glove - Phase 2

The objective of this project is to design, fabricate, test and deliver a purely mechanically driven prosthetic glove for a disabled adult. This person has a number of amputated fingers, coupled with suffering from severe arthritis. The glove will enable the person to do typical daily activities such as picking up everyday items and pursuing their hobbies.

Shears for Fears

MEMBERS: Grant Brannigan, Max Lopez, Jarret Nelson, Jameel Zaki
 ADVISORS: Ms. Teresa Nguyen, Dexcom, Mr. Lenny Barbod, Dexcom, Dr. Scott Shaffar, SDSU
 SPONSOR: Dexcom

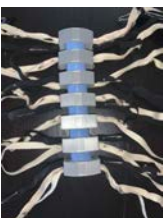


Adhesive Patch to User Shear Force Quantification

This project included the development of test methods to enable a medical device company to evaluate material properties associated with a product for continuous glucose monitoring in support of diabetes patients. The test method and associated test fixture developed helps quantify the shear forces between an adhesive patch and the patient's skin. Such information will enable improvements in device performance capabilities and ease of use for the patient.

The SilverBacks

MEMBERS: Ellie Ekstrom, Will Hail, Regan Lindberg, Austin Majors, Ryan Sutherland
 ADVISORS: Dr. George Youssef, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering
 WEBSITE: <https://youssef-lab.sdsu.edu/>

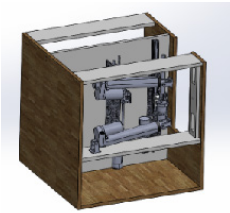


Exoskeleton Biomechanics Research Platform

The Exoskeleton Biomechanics Research Platform is a mechanical device that is intended to mimic the movements of the spine during everyday activities. The exoskeleton is composed of rigid and flexible bodies simulating the vertebrae and intervertebral discs. Sensors exist within the exoskeleton that measure ranges of motion at specified locations of the spine, providing biomechanical analysis of routine movements. The exoskeleton will be incorporated as a research tool in Dr. George Youssef's SDSU research lab.

Skyscraper

MEMBERS: Saoud Alasfar, Khalid Almajed, Abdulrahman Alobaidly, Huy Nguyen
 ADVISOR: Dr. Scott Shaffar, SDSU
 SPONSORS: ASME, SDSU, Students



ASME E-fest Student Design Competition 2020

The American Society of Mechanical Engineers annually hosts student design competitions with multiple design problems. This year's challenge is to design and build an engineering system capable of manufacturing a paper tower. The need is to develop a compact engineering system capable of manufacturing a tower, exclusively out of standard-sized sheets of paper. Design will be evaluated based on manufacturing speed, height of the tower, and the capacity to support a load.

Splinter Cell

MEMBERS: Connor Chaney, Paulina Nguyen, Sophia Nguyen, Tri Nguyen, Bryan Tan
 ADVISORS: Ms. Annemarie Orr, QL+, Dr. Scott Shaffar, SDSU
 SPONSOR: Quality of Life Plus (QL+)

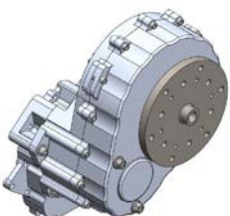


Military Grade Radial Nerve Palsy Wrist Splint

Splinter Cell is tasked to design and fabricate a Military Grade Radial Nerve Palsy Wrist Splint with the help of David Bazan, a USN Surface Warfare Officer, to provide support for individuals with radial nerve palsy while on active duty during recovery. Damage to radial nerve could cause inability to return fingers to extended position after flexion. The most important requirements include high durability, consideration for various operation environments, and a low-profile aesthetic.

Team Aztec Flight

MEMBERS: Dillon Devore, Duong Nguyen, Daniel Templeman, Jose Thompson, Kyle Ryan
 ADVISORS: Mr. John Rountree, Popular Rotorcraft Association, Dr. Scott Shaffar, SDSU
 SPONSOR: Popular Rotorcraft Association



Yamaha Engine Adaption to Gyroplane

Team Aztec Flight was tasked by Popular Rotorcraft Association (PRA) of San Diego to adapt an alternate engine to replace the current expensive 2-stroke engine used by most gyroplanes. By using a less expensive 4-stroke engine it allows the hobby to become more affordable, while increasing the powertrain reliability. To adapt the 4-stroke engine, Team Aztec Flight designed and manufactured a reduction drive gearbox capable of handling the 80hp of the motor while reducing the engine output from 7,700 RPM to 3,000 RPM.

Team Bandicoot

MEMBERS: Mitch Mahowald, Steven Malley, Jonathan Navarrete, Brian Sperry
 ADVISORS: Dr. Scott Shaffar, SDSU, Mr. Mike Morgan, Mr. Charles Norris
 SPONSORS: University of Texas, Arlington, MorganTech



3D Printed Aircraft Competition

The goal of this capstone senior design project is to design and manufacture a 3D printed aircraft to compete in the 4th annual 3D Printed Aircraft Competition (3DPAC) hosted at the University of Texas Arlington in July, 2020. The aircraft is allowed five seconds of powered flight, after which, it competes for the longest flight duration under 30 feet of altitude. All lifting surfaces and aircraft components must be 3D printed, except for electronics, the propeller, and some hardware.

Team Decomposition

MEMBERS: Mohammed Alajmi, Brennen Baron, Jeremy Brunnenmeyer, Sulayman Mohamed, Eduardo Vera
 ADVISORS: Dr. Fletcher Miller, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering



Carbon Particle Generator

The Carbon Particle Generator is a pressure chamber used to produce and funnel carbon into another device called a solar receiver. The pressure chamber contains a flat-flame burner, which is used to heat the liquid fuel up to 1500 degrees celsius. By preventing combustion, the Carbon Particle Generator can pump carbon as needed.

Team Jumpman

MEMBERS: Dustin Drummer, Austin Gurule, Nikola Modrusan, Kenneth Murillo, Charles Winkowski
 ADVISORS: Mr. John Rountree, Popular Rotorcraft Association, Dr. Scott Shaffar, SDSU
 SPONSOR: Popular Rotorcraft Association

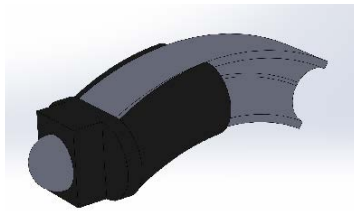


Gyroplane Jump Take-off

The goal of this project is to develop a system that can transmit power to the rotor blades of an autogyro. Normally, these aircrafts require a runway to spin the rotor blades and provide lift, the jump take off system will allow the aircraft to take-off vertically without the need for a runway.

Team Touch

MEMBERS: Harrison Clark, Jacob Hoffer, Brandon McGoey, Steven Schneider
 ADVISORS: Ms. Annemarie Orr, QL+, Dr. Scott Shaffar, SDSU
 SPONSOR: Quality of Life Plus (QL+)



Touchscreen Solution

The team designed, built, and tested a device to boost the quality of life for a bilateral prosthesis user who is unable to use most types of touchscreens effectively due to a lack of dexterity and incompatible point of contact. The device is non-invasive, and enables the user to effectively interact with every touch screen device found in the real world with ease.

Too Hot to imPress

MEMBERS: Mesab Alasfour, Esraa Alsaad, Joshua Brennan, Nnamdi Nzeadibe
 ADVISORS: Dr. Eugene Olvesky, SDSU, Ms. Maricruz Carrillo, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering

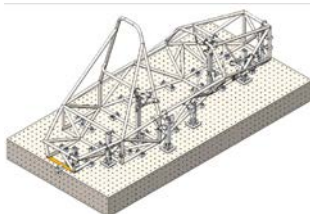


Hot Press - Tube Furnace Solution

The Powder Technology Lab requires a hot press to be created from a pre-existing tube furnace and Instron press. These two components present a high temperature environment and heavy loading. These components must be joined together in order to create the hot press which will be used in experimental mechanics applications for research purposes in the laboratory. Structure and custom tooling must be designed and manufactured around the tube furnace in order to accomplish this goal in the given constraints.

Totally Tubular

MEMBERS: Emily Bidgood, Brandon Black, Cameron Curet, Jarod Diaz, Carmen Marques
 ADVISOR: Dr. Scott Shaffar, SDSU
 SPONSOR: Aztec Electric Racing, San Diego State University
 WEBSITE: <http://aztecelectricracing.com/>



Aztec Electric Racing - Chassis

Design, manufacture, and test Aztec Electric Racing's spaceframe chassis for the 2020 FSAE competition. The team also designed a reusable chassis fixture system - a series of supports to hold all tubes of the chassis in place during welding. The chassis interfaces with all other systems and therefore was designed and built with system integration in mind.

Under Pressure

MEMBERS: Francisco Carvajal, Michael Chiavacci, Steven Parker, Cody Rahders
 ADVISORS: Mr. John Rountree and Mr. Charles Tucker, Popular Rotorcraft Association, Dr. Scott Shaffar, SDSU
 SPONSOR: Popular Rotorcraft Association

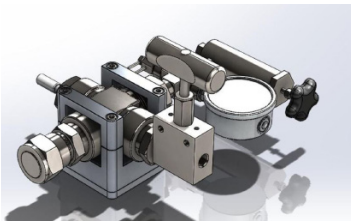


RAF-2000 Gyroplane Fuel System Safety Redesign

The safety redesign consists of a new fuel tank, secondary fuel pump, fuel delivery system, and supporting electronics. The original system faced issues with ethanol-induced tank seam failure, and the aircraft nose pitching down under throttle. The new system addresses these issues while improving fuel level monitoring, accommodating auxiliary fuel payloads, and creating flexibility for different powerplant and auxiliary tank configurations.

Under Pressure

MEMBERS: Sophia Dowell, Kalina Malech, Haley Pipkin, Darcy Wuhrmann
 ADVISORS: Dr. Joaquin Camacho, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering



Carbon Dioxide Pressure Chamber

Carbon dioxide (CO₂) emissions are a major contributor to global warming. This chamber has been built to aid in researching methods of decreasing atmospheric levels of CO₂. The Earth's bedrock has been identified as a possible CO₂ sequestration solution, as its' high pressure and temperature environment enables the conversion of gaseous CO₂ into solid carbonate. This chamber replicates the supercritical CO₂ pressure and temperature conditions of 4,000 psi and 200°C required for this conversion.

Under the Microscope

MEMBERS: Bashar Ablahd, Blake Haslam, Jeffrey Johnson, Raid Yousuf
 ADVISORS: Dr. Wenwu Xu, SDSU, Dr. Scott Shaffar, SDSU
 SPONSOR: SDSU Mechanical Engineering



Rotating Magnetic Field with Microscope

Thrombosis is a disease that causes blood clots inside blood vessels and leads to serious health risks. Dr. Xu, an Asst. Prof. of ME Department, is researching a new way of removing the clots using a Rotating Magnetic Field (RMF), instead of invasive surgery. Our team was tasked with designing, building, and testing a RMF device. The design accommodates a specimen, placed in the center of the RMF, and it's observed via a microscope. Our team used a 2-Axis Helmholtz Coils model to build the RMF.

V.O.I.D.

MEMBERS: Shayne Landis, Alexis Oyawale, Saray Robles, Hadeer Sekeb
 ADVISORS: Mr. Joe Bendik, ASML, Dr. Scott Shaffar, SDSU
 SPONSOR: ASML - Cymer

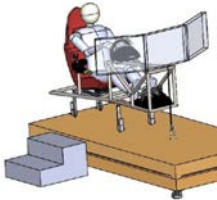


Quick Release Locking Mechanism for Vacuum Viewport

The objective of this project is to design, fabricate and test a quick release locking mechanism for a testing chamber that is used in the development of an extreme ultraviolet lithography system. This lithography system is the most advanced semiconductor fabrication solution in the world today. The quick release locking mechanism must hold a vacuum seal of at least 10^{-2} Torr and be able to release and seal within 15 minutes. The design must also be able to mount a simulated metrology load measuring 10 cm.

VRoOoOm

MEMBERS: Abdrhman Binsheha, Noah Braman, Julia Gurfinkel, Kim Saldana
 ADVISORS: Mr. Ben Marson, Themed Entertainment Association, Dr. Scott Shaffar, SDSU
 SPONSOR: Themed Entertainment Association, San Diego State University
 WEBSITE: <https://teasdsu.wixsite.com/teasdsu>

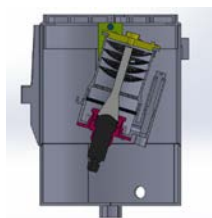


VR Motion Simulator (3-DOF)

VRoOoOm is a team of mechanical engineering students who have been tasked with creating a motion simulator for driving and flight simulation games, sponsored by the Themed Entertainment Association on campus. It features a F1 style race chassis driven by linear-actuators, and a VR headset for added user experience. The main challenge of this task is to make the actuators move the chassis in a way that best tricks the user's inner ear to make the simulation feel as realistic as possible.

The Water Benders

MEMBERS: John Chillemi, Charles Dudley, Tristan Morales, Jarod Ramirez
 ADVISORS: Mr. Matt Golman and Mr. Mark Bauckman, Fluidra, Dr. Scott Shaffar, SDSU
 SPONSOR: Fluidra - Zodiac Pools



LED Laminar Pool Jet

The LED laminar pool jet creates a stunningly smooth arcing jet of water up to 7 feet high & 8 feet wide that gently enters the pool or spa. The LED light allows for complete illumination of the water jet, and allows for the user to create their own adjustable breathtaking light display into their pool or spa. This particular design reduces the size of Fluidra's original Laminar Pool Jet, while also incorporating a newer and smaller LED light platform.

The Wise Camels

MEMBERS: Abdualaziz Alammar, Abdul Majeed Al Bulushi, Abdulrahman Alfairooz, Abdulaziz Alhazaa, Ghdeer Alhamad
ADVISORS: Dr. Sung-Yong Park, SDSU, Dr. Scott Shaffar, SDSU
SPONSOR: SDSU Mechanical Engineering



Development of Solar Indoor Lighting system

People tend to use a conventional lighting system rather than using an indoor solar lighting system. According to researchers, 30% of the electricity used in the United States is consumed by the usage of conventional lighting systems in the building sectors. Furthermore, the main purpose of the project is to reduce the high lighting power consumption caused by the usage of a conventional lighting system. An electrowetting-driven indoor solar system would be used with the method of constant light illumination.