COLLEGE OF
ENGINEERING

DESIGN DAY

SPRING 2014

MONTEZUMA HALL
AZTEC STUDENT UNION

MAY 9, 2014
2:00 - 4:00 PM

WELCOME

Welcome to the College of Engineering's Spring 2014 Design Day at the Conrad Prebys Aztec Student Union. We are proud to have our undergraduate students showcasing their design project work completed during the Spring 2014 semester. There are teams representing our capstone Senior Design classes in Aerospace, 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 project 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, design novel, sustainable engineering solutions, and create value through their entrepreneurial efforts.

We are grateful to our many sponsors for their generous support of time and funding for these student projects, including among others Cubic Corporation, NASA, National Science Foundation, and San Diego Gas & Electric. 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.

Enjoy SDSU's Spring 2014 College of Engineering Design Day. Thank you for being a part of this culminating event.

Morteza Monte Mehrabadi
Dean
College of Engineering

THANK YOU
TO OUR SPONSORS

Our sponsors generously support the college students and project teams. Thank you for providing your time, experience, and financial support that help make our program a success.

ASCE, BoneSim, Computational Thermodynamics Lab, Cort Graiepy, General Coatings, Harvest, Dr. Karen May-Newman, Karen Prescott, KEMA Architect, Mechanical Engineering Microgravity Flame Spread Project, Michael Sloan, NetBurner, Normal Heights Community Planning Group, NSF Engineering Research Centre, San Diego County Water Authority, SDSU, SDSU Baja SAE, SDSU ECE Senior Design, SDSU Mechatronics, SDSU Formula SAE, SDSU Presidential Fund Grant, Sarah Bettencourt, Dr. Satchi Venkatraman, Schilling 3D Inc., Solar Energy Lab, Dr. Subrata Bhatacharjee, and Unmanned Aerial Solutions (UVS).

CONTENTS

MECHANICAL ENGINEERING 35

- ASL Tech - “Knuckle Sensor for Voice“
- Assistive Robotic Arm - “Assistive Robotic Arm”
- Aztec Energy - “Green Energy Challenge”
- Bio-Potential Electrode Mechanical System - “Bio-Potential Electrode Mechanical System”
- BPS - “Pseudo-Touch Bracer (PTB)”
- The Claw - “The Claw”
- Closed-loop orthotic robotic limbs - “Closed-loop orthotic robotic limbs“
- Cool Runnings - “Knuckle Sensor Housing“
- Deep Sea Benthic Microbial Fuel Cell - “Deep Sea Benthic Microbial Fuel Cell“
- The Doors - “Bluetooth Automatic Door “
- Elite Engineering - “The Robotic Leg Brace“
- EMG Skateboard - “EMG Skateboard“
- EndState - “Assisted Running Mechanical Apparatus“
- Enginerds - “Neuro-Drive“
- The ERA of Crushing - “Mechanical Crushing of Honeycomb Cores for Tapered Sandwich Closeouts“
- Glass Seal Engineering - “Sealing Glass Window Test Vessel“
- Ignition Research Apparatus - “Ignition Research Apparatus“
- Industrial Plant Emulator - “Industrial Plant Emulator“
- Mechatronics - “Mechatronics AUV - Chassis“
- Mechantronics Robosub Dropper & Manipulator Arm - “ROBOSUB Dropper/Manipulator Arm“
- No Cords Attached Chargers - “Wireless Ultrasound Energy Transmission Test“
- Passive Solar Design Team - “Zero Energy Building Design“
- Pedal-Based Power Meter - “Pedal-Based Power Meter“
- Rock Wall - “Bouldering Wall“
- Running Support Device - “Running Support Device“
- SDSU Cogeneration Plant Inlet Air Purification - “SDSU Cogeneration Plant Inlet Air Purification“
- SDSU Flame Tower - “Flame Tower Depressurization“
- Team Backbone - “Portable Spinal Position Monitor“
- Team SAD - “Shock Absorber Dynamometer“
- Thermoacoustic Refrigeration System - “Thermoacoustic Refrigeration System“
- Torpedo and Launch Platform - SDSU Mechatronics Club (Team #8) - “Torpedo and Launch Platform“
- Two-Phase Counter Flow Energy Conversion System - “Two-Phase Counter Flow Energy Conversion System“
- Ultra-Rapid Manufacturing of Nano Scaled Components - “Ultra-Rapid Manufacturing of Nano Scaled Components“
- W.E. Do Good - “Teff Thresher Development“

AEROSPACE ENGINEERING

2013-2014 Design/Build/Fly Team

Members: Dorian Anderson, Paul DeGuzman, Davidson Grady, Tom Hackleman, Rocio Hernandez, Chris Long, Steve Micallef, Jay Munoz, Terry Ngo, Lauren Parrett, Edward Sanchez, Daniel Silva, and Jeromy Suko

Advisor: Dr. Satchi Venkatraman

Sponsors: Northrup Grumman and Solar Turbines

SDSU 2013-2014 DBF Entry

AIAA's DBF competition is a contest where teams from around the world design and manufacture radio control aircraft. The planes are judged on speed, weight, and carrying capacity. This year SDSU placed 8th.

3DR/UVS Collaboration

Member: John Blaske

Advisor: Dr. Nagy Nosseir

Sponsors: Unmanned Aerial Solutions (UVS) and 3D Robotics

Iris AQ

Fully autonomous quadcopter capable of multi-waypoint missions, and landing/takeoff on solid ground or water.

A-15 Viper

Members: Nathan Bader, Davidson Grady, Richelle Latorre, Takuma Nishimura, Jason Plaisted, and Katelyn Weddle

Advisor: Dr. Nagy Nosseir

A-15 Viper

Aerospace Engineering Senior Design Project to design a mission performing, reliable conceptual close air support aircraft. The U.S. Military services are currently struggling with the challenge of providing close air support for ground troops on the battlefield of the future. Mid-to high-intensity conflict will be chaotic, intense, highly lethal, and widespread, with operations conducted around the clock. Air power is needed to interdict attacking battlefield forces to slow or halt advancement as well as for flexible, responsive air support to overcome ground force firepower shortfalls by exploiting qualitative advantages. The close air support aircraft must be capable of responsive delivery of effective ordnance in close proximity to friendly ground forces during the day, night, and under-the weather environment during mission execution. Near-continuous ground operations correspondingly require high sortie rates and rugged, reliable aircraft capable of operating with little or no maintenance for long periods of time.

SDSU Rocket Project

Advisor: Carl Tedesco

Sponsors: Solar Turbines, Flometrics, NetBurner, and Galactic Unite

SDSU Rocket Project

A student led team primarily consisting of engineers that built a liquid fueled rocket. Currently we are building an approximately 22' tall rocket using a YLR101-NA3 vernier regeneratively cooled Rocketdyne motor and fueled by liquid oxygen and RP1 kerosene. The team is broken into different subsections that each have a small team of student engineers designing and manufacturing their part. The subsections are airframe, recovery, fins, motor, tanks, and electronics.

This project offers hands on experience to all students and provides a pseudo real world working experience where they must communicate with other engineers to develop a cohesive and seamless system.

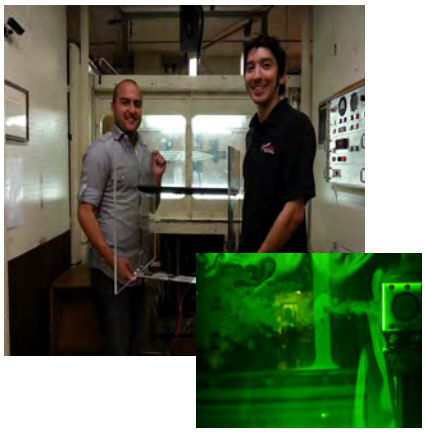
Synthetic Jets

Members: Ramon Guerra and Ricardo Torres

Advisor: Dr. Gustaaf Jacobs

Sponsor: Solar Turbines

Experimental study on the use of synthetic jet actuators for lift control



Using zero net mass flux actuators, commonly called synthetic jets, the lift and drag characteristics of an Inlet Guide Vane (IGV) are improved.

.

Team 460

Members: Fransisco Candido, Scott James, Terry Ngo, Jeromey Suko, and Daniel Taughinbaugh

Advisor: Dr. Nagy Nosseir

AE460 Senior Design Aircraft

Jet design modeled for our AE460A and AE460B classes.


CIVIL
ENGINEERING

9 Iron Design

Members: Adam B. Caroon, Leona Chow, Daniel Ochs, Ryan Peterson, and Christine Reynolds

Advisor: Jim Haughey

Sponsor: Jim Haughey

Riverwalk Golf Course Redevelopment

The Riverwalk Golf Course located in Mission Valley is planned to be developed into a high density residential living community with office spaces and a fire station. The Golf Course is surrounded by Mission Valley Road to the east, Friars Road to the north and Hotel Circle N to the south. The 9 Iron Design Group has been hired by Capstone to design the Riverwalk Development and complete related project studies and reports. Due to the already high number of developed commercial buildings in the area, the 9 Iron Design group will focus on creating a comfortable and desirable living destination while having minimal impacts on the surrounding environment. Incorporating the natural environment with the built environment will make the Riverwalk Development stand out.

ACE Consulting

Members: Ryan Brooks, Jordan Gray, Mason Lewis, Marco Lopez, and Andrew Thies

Advisors: Alison Moss and Ryan Zellers, P.E.

Sponsors: RBF Consulting and KTU+A/Normal Heights Community Planning Group

Normal Heights Bike Trail

Normal Heights Community Planning Group is considering making trail connections between Normal Heights and the San Diego River Trail. The trail is to accommodate both pedestrians and bicyclists. The elevation change is great requiring mitigation for steep slopes. The project would have to consider connections to other existing and proposed bike routes/paths, connections to transit, other beneficial connection points, intersection treatments, proposed grades to get from Normal Heights to Mission Valley, property acquisition, crossing the San Diego River, and environmental impacts.

Aloha Consulting

Members: Joshua Bielik, James Botica, Alyssa Carveiro, Phil Giori, Bilal Oriqat, and Peter Zheng

Advisors: Jeremy Clemmons and John Ferris

Sponsor: Black & Veatch

San Diego State University Water Conservation

The purpose of this project is to examine the feasibility of water conservation efforts for San Diego State University. Aloha Consulting is tasked with providing an effective and creative design to help the University conserve water and trim costs. All design recommendations are the product of analysis of the existing potable and non-potable water systems, projected water demands and cost information, and San Diego County hydrology.

ASC Competition: Marine & Technical Structures

Members: Andrew Lowe, Mitchell O'Neill, Mike Shea, and Roy Stinson

Advisors: Richard Cardett, Mark Stuessy, and Dale Bergman

Sponsors: General Coatings, Manson Construction Co. and Nova Group

Pitt River Bridge

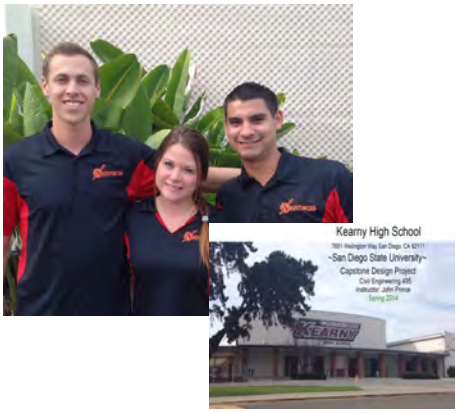
The Pitt River Bridge is a 1,250 foot cable-stayed bridge that spans the Pitt River in British Columbia, Canada. The bridge first opened on October 4th, 2009 and totaled more than $200M which includes the Mary Hill Interchange. The bridge features (6) 185' pylons, (6) 300' driven piles, and 2 enormous pile caps. During the entire duration of the project it was difficult to keep river travel unobstructed and maintain flow of commuter traffic. It was a challenge to complete the bridge safely, on time, while protecting the environment.

Aztec Energy – Design Build

Members: Gustavo Maldonado, Tim McElwee, and Masha Volhina

Advisors: Panagiotis Mitropoulos, Thais Alves, and Karen Prescott

Sponsor: NECA San Diego



Kearny High School – Gymnasium Retrofit

The Green Energy Challenge is a student competition in which universities across the country compete by designing an energy retrofit of an existing structure. The project that our team chose is the Kearny Mesa High School, which is located in San Diego. We will be dedicating our contracting/consulting services to make this structure as energy efficient as possible. The gymnasium was built in 1956 and is a big draw on the electrical bill of the campus. As of now, the building has limited natural light, out dated plumbing and mechanical equipment, and inefficient lighting. We will be conducting an audit of the power and lighting systems and developing a plan to reduce this building's energy consumption. We will also be designing a new photovoltaic array, and propose a sub-metering plan to support monitoring and feedback. All upgrades to the existing structure will be provided with a detailed cost estimate, which will aid in deciding which systems to install. An economic analysis will also be done in order to understand how these upgrades will offset energy costs and provide savings to the client. In addition, our team will reach out to the students of Kearny High in order to spread awareness of energy consumption and strategies to reduce waste. The potential savings for this project is immense and Aztec Energy is excited to deliver the proposal to the client.

CDG & K Engineering Group

Members: Anastacio Castillo, Chris Farano, Gabriel Gilman, Dany Kakos, Kareem Maraqa, and Kevin Yacoub

Rose Canyon Bridge

A design and build project to connect Regents Road from University City to La Jolla over Rose Canyon. CDG & K Engineering Group will design, plan the timeline for construction, and cost for building the Rose Canyon Bridge. CDG & K analyzed the area, environmental concerns, and feasibility of the project and selected the bridge that will benefit the area's residents. Three possible designs were analyzed before final selection. Based on the regional traffic, the geographical area of the bridge was designed to have minimal environmental impact, allow faster emergency service response, and a safe pedestrian access to both University City and La Jolla. A bridge connecting the north terminus of Regents Road in La Jolla to the south terminus in University City will benefit both the residents, alleviate traffic delays, and ensure faster response for emergency services.

Chameleon Developers, Inc.

Members: Aaron Brinkman, Charlie Coll, Casey Judge, Mike Manneh, and Brett Ohr

Advisor: Jim Haughey, P.E.

Sponsors: RBF Consulting

Riverwalk Development

The Riverwalk Development is a mixed-use redevelopment endeavor located in Mission Valley area of San Diego, just North of Interstate 8. The land is currently a premier 27-hole golf course with pristine natural surroundings. The golf course was only planned to be a temporary facility and is taking up prime real estate in the middle of San Diego. The land can be used to foster growth in the surrounding communities by providing more jobs and desirable living spaces. The development is comprised of commercial, office and high-density residential housing. The development will require moderate infrastructure improvements to existing City of San Diego public roads and facilities. The desire is to maximize the number of office units and housing units, as there is commercial development in the area to support the growth. A sizeable land donation will also be made to the City of San Diego for a new fire station in Mission Valley. A trolley stop will also be placed on the site, which will connect to the city's bus lines thus making high quality public transportation accessible. The purpose of this project is to develop commercial, office and high-density residential housing in Mission Valley by taking into account environmental impacts and the vast flood plain.

Civil V Consulting

Members: Jordyn Drake, Casey Jumanan, Justin Listar, Alec Rivera, and Lauren Young

Advisors: Jim Haughey, P.E., John Price, P.E., and Jeniene Knight

Sponsors: RBF Consulting and ASCE

Riverwalk Redevelopment

The project consists of demolition of the existing Riverwalk Golf Club structure and the construction of commercial, high-density residential, and office developments. The project is located northwest of the I-8/SR-163 Interchange. This location is divided by the San Diego River and is also within close proximity of the Rose Canyon fault zone. The existing golf course will require little demolition; however a major portion of the project will consist of earthwork in order to recreate the existing floodplain in order to maximize land usage. The improvements will consist of construction of approximately 70 acres of high-density residential developments, 30 acres of commercial developments, 20 acres of office developments, and a fire station. The project also includes the infrastructure required to access and service these developments.

Commercial/Virtual Design & Construction

Members: George Arreguin, Kevin Hokanson, Alan Hurtado, Boris Morales, Nho Pham, and Francisco Ruiz-Tatum

Advisors: Daniel Shirkey and Kevin Legge

Sponsors: Balfour Beatty Construction and Clark Construction Group

San Francisco Museum of Modern Art (SFMOMA)

The Commercial/VDC team is composed of members of the Commercial Construction, and the Virtual Design & Construction competition teams that competed in the 2014 ASC student competition in Reno, Nevada. We combined our teams for two reasons: 1. Only two members of the Commercial Team, and four members of the VDC team are in this capstone class. 2. This was an opportunity for members of the one team to learn the technical skills required to compete in the opposite competition. Essentially our plan to combine the deliverables required for both competitions and complete them for one project together as a team. The project we are planning to use is called the San Francisco Museum of Modern Arts Expansion Project. This project is a real construction project that served as the basis of the 2014 VD&C competition in Reno, Nevada. The deliverables we plan to complete include: complete design & construction budget, general conditions budget, staffing plan & responsibility matrix, site utilization plan, CPM schedule & 4D simulation, project risk analysis, quality control plan, safety plan and project QA/QC plan (constructability review & clash detection). The concept of our project is we are a team assembled by our company's management to plan the construction of the San Francisco Museum of Modern Arts Expansion Project (SFMOMA). We are under a Lump Sum contract implementing a Design-Build delivery method. Our deliverables are to be completed as if they are to be presented to our upper management in a progress meeting 80% into the design process (80% CD).

JBMD Engineering

Members: Joe Gogol, Daniel Quinones, Monica Thornton, and Ben Wong

Advisor: Jim Haughey, P.E.

Riverwalk Redevelopment

The Riverwalk Development is divided into 6 separate projects. The northwest corner is dedicated to commercial development. East of the retail space will be a 6 acre park. The northeast corner is dedicated to sports facilities and will include: a hockey rink, basketball gymnasium, soccer field, and driving range. Between the trolley line and San Diego River will be condominium units. South of the San Diego River will be a residential neighborhood with 100 + houses. The last and most vital project is to alleviate potential damages of the 100 year flood plain of the San Diego River by rechanneling the existing conditions and lining with flood walls for safety insurance.

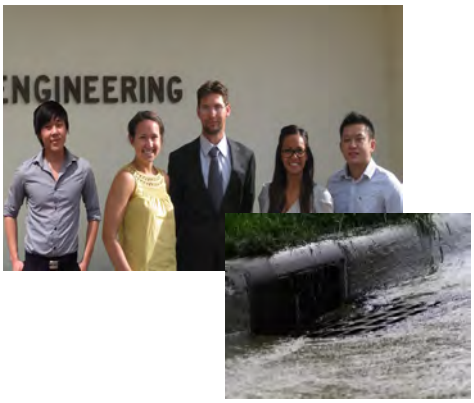
Potable Stormwater Initiative

Members: Allison Gokbudak , Brian Johnston, Ray Luu, Arianne Reyes, and Thien-Long Tran

Advisors: Jeremy Crutchfield and Vic Bianes

Sponsor: SD County Water Authority

Regional Municipal Stormwater Reuse System



This Project will create new avenues for stormwater to be collected and reused within the City of San Diego. Using current storm drain systems, we will utilize wastewater treatment techniques to treat stormwater to benefit San Diego. Currently stormwater is diverted to the ocean and is not collected for use in everyday needs.

Preconstruction Team

Members: Kevin Donohue, Juan Ruiz, Andrea Fagerstrom, and Amanda Tyer

Advisor: Sam Myovich

Sponsor: C.W. Driver

Southern California Entertainment Group Attraction

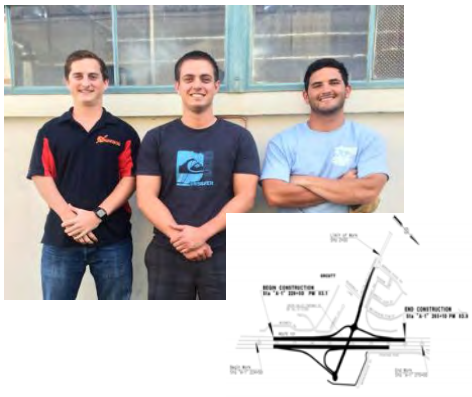
A Southern Californian Entertainment group has requested our team to provide preconstruction services for their new attraction. The project will become a land mark entertainment destination. The site sits on 100% reclaimed land, directly in the middle of an operating tourist destination. The project will consist of a Main Entertainment Facility and multiple retail buildings that support the guest experience at the Facility. As part of our team's Preconstruction service, our client requires: preconstruction budget, accelerated schedule, site logistics plan, and alternative solutions.

SDSU Heavy Civil Team

Members: Franz Fischer, Cameron Reid, and Brendon Seitz

Advisors: Bryan Seeger and Carlos Gomez

Sponsor: Flatiron



Union Valley Parkway

The Union Valley Parkway is a new arterial roadway located on the 101 in Santa Barbara County. This work consists of the construction of a new interchange with on and off ramps in both directions.

Seismic Design Consultants

Members: Janine Khrista Andres, Cesar Brambila, Luis Cantabrana, Ibrahim Hassan, Ryan Stull, and Randolf Trajano

Advisor: Timothy Johnson

Montain View Tower Project

For the past three years San Diego State University has had a group of students compete in the Undergraduate Seismic Design Competition held at the EERI Annual Meeting. The competition is intended to have students design a building according to a problem statement and to verify the seismic load resistance. Each school is required to build a scaled balsa wood model representative of the real building design and expose it to three ground motion test simulating difference earthquakes. This year we have gathered a team to design and construct a balsa wood model that will surpass our previous teams. In order to do this the team will apply engineering design practices, conduct outside research, analysis using a variety of software, and develop a construction plan. The end goal is to have a completed design that complies with the EERI Undergraduate Seismic Design Competition rules.

sp^3 Engineering

Members: Sarah Child, Gabriela Handley, Margaret McCormick, Annah Rulon, and Jason Williams

Advisors: Tim Smith and Kyle McCarty

Sponsor: Black & Veatch

SDSU Water Conservation Measures

This project consists of 3 sub-projects, focused around ways for SDSU to recycle and reuse its own water, thus reducing the need for imported water. The first part of this project consists of taking greywater from 4 on campus housing dorms and treating the water to be used for irrigation. The second part of the project takes stormwater from the campus and treats it for irrigation. The third part takes the school's wastewater and uses it for the school's cooling towers. These three projects combined will drastically minimize the school's need for imported water, as well as save the school thousands of dollars per year.

Steel Roots Co.

Members: Matthew Tallone, Kelsey Beyer, Karen Islas, Annette Porras, Genoveva Romero-Márquez, Anna Lucia Uribe, and Chris Bender

Advisors: John Prince, Matthew Capuzzi, Jennifer Roy, Leo Espelet, Stephen Manganiello, and John Quenzer

Sponsors: Kimley-Horn and Associates, Inc., D-Max Engineering, and National City Engineering Staff

Downtown Green Streets – National City

Goal is to improve walking experience for pedestrians on W Plaza Blvd in National City, CA by slowing incoming traffic from the I-5 N off ramp, improving sidewalk conditions, and overall beautification of the streets through artwork and green areas. Site extends from Coolidge Ave to National City Blvd, our proposed design was generated after researching current and projected conditions, running all-way stop warrant analysis and reports based on traffic models. Steel Roots Co. implementations include alteration of lanes, diagonal street parking, crossing pedestrian lights, bulbouts with ADA curb ramps and grates through these bulbouts to create small bioretention areas. Decision-making was based on two grants National City received: SANDAG Smart Growth Grant from TransNet Smart Growth Incentive Program (SGIP) which funds transportation-related infrastructure improvements and planning efforts that support smart growth development, and Prop. 84 Stormwater Grant (SWGP) from the State Water Board to mitigate water pollution caused by stormwater runoff. Our proposed design with alternatives had minimal impacts, quality criteria with the minimum required standards, and cost estimation for the best available solutions. Downtown Green Streets National City Project was part of The Sage Project: Community Engagement for Sustainable Cities held in April 2014 at San Diego State University where it was evaluated by San Diego County staff, SDSU faculty/staff, and community members.

Team Tejeras

Members: Karen Casteloes, Kensey Daly, Ana Lopez, and Jordan Owen

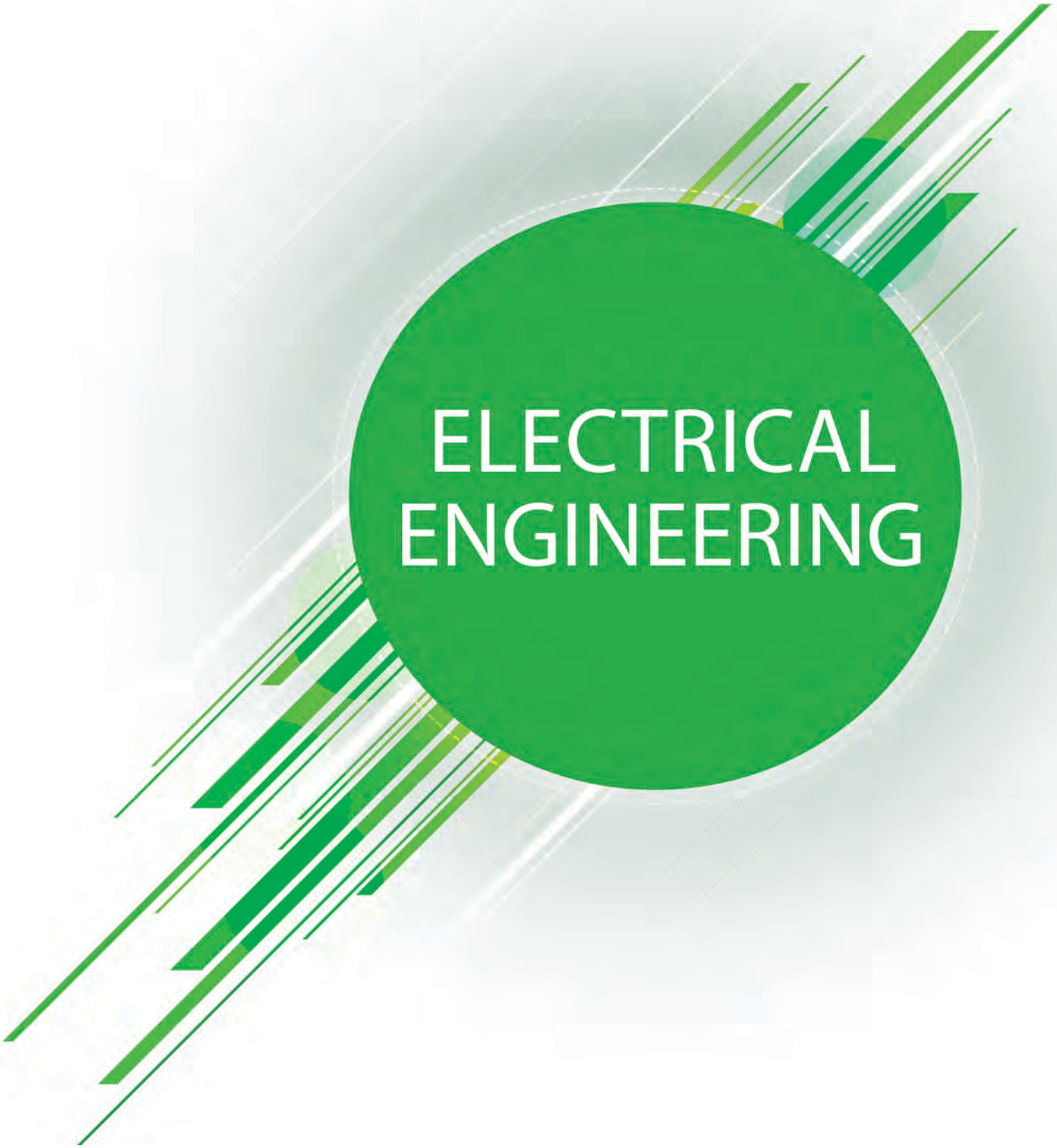
Advisors: Laura Robinson, Tim Smith, and John Daly

Sponsor: Moxie Foundation

Agua Para Siempre (Water for Always)

Tejeras is a small rural farming village in Honduras with a fast growing population of about 700 residents. Currently, the pipe network in Tejeras provides water to about 110 households. Due to lack of engineering expertise, the distribution line fails to provide a sufficient amount of water to the expanding community. Team Tejeras is partnered with a local nongovernmental organization, Association of Water Committees of the Southern Buffer Zone (AJAASPIB) to assist Tejeras and other surrounding communities in the region in gaining access to water security for future generations. Team Tejeras adopted this project from Engineers Without Borders San Diego State University chapter.

Team Tejeras performed a full-scale pipe network analysis using Bentley's WaterGEMS and AutoCAD to model the community's system and design for improvements that will optimize the system. A training manual was created for AJAASPIB and community members to learn proper engineering techniques for laying distribution pipe. The construction plan created and implementation of the new design is planned for winter 2015. Team Tejeras has currently reached half of their funding goal of $40,000 and is actively seeking sponsorship for the project.

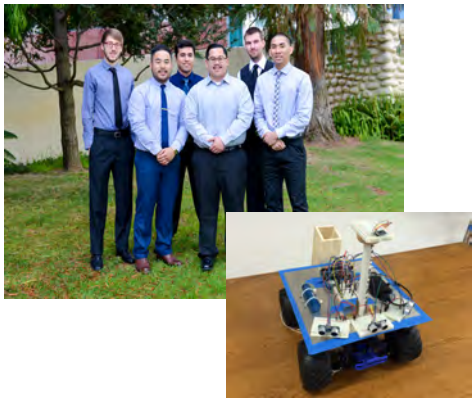

ELECTRICAL
ENGINEERING

Alternative Innovations

Members: Neil Abadejos, Bernen Alba, William Dorrance, Scott Lewis, Hugo Mayoral, and Mark Novilla

Advisors: John Kennedy and Dr. Lal Tummala

Sponsor: ECE Senior Design



Autonomous Payload Delivery Challenge

Alternative Innovations has fabricated a fully autonomous vehicle, LILRO, which will be able to utilize several key components to drop payloads at each of the GPS locations. Our vehicle was created to have an advantage at both speed and accuracy. With the brain of our vehicle, the microcontroller, as well as a GPS module and a magnetometer, our vehicle is able to calculate the distance and direction to each of the target locations. Then our antenna will detect the beacon and continue to move closer until we reach a threshold, and then drop the payload. On LILRO's route towards the target locations, we have implemented three ultrasonic sensors to avoid any obstacles. With our hard work, we hope to meet our target specification goals. Let our innovation be the only alternative.

BioComm

Members: Jesus Guerrero, Jay Wilson, Joseph Mouawad, Mathew Kochevar, James Northup, Jason Schiedermayer, Jack Powell, Henok Tadesse, Michael Scherer, Patrick Belon, Thien Nguyen, Yang Jiao

Advisors: Richard Lane and Hugh Molesworth

Sponsor: WestHealth

Wireless Human Area Biometric Sensor Network

BioComm's project is a human area network for the purpose of biometric sensing and monitoring. Several wireless nodes are placed throughout the body to monitor vital signs such as pulse, temperature, Sp02, etc. This data is sent via the skin to a main aggregator unit which transmits the data to a phone using Bluetooth Low Energy. The phone then places this data in a back-end SQL database for retrieval.

Capsule Corp

Members: Matt Acosta, Ahmad Algharabally, Carlos Infante, Niles Li, Darryl Obdianela, and Steve Truong

Advisors: John Kennedy & Dr. Lal Tummala

Sponsor: ECE Senior Design

Autonomous Payload Delivery Challenge

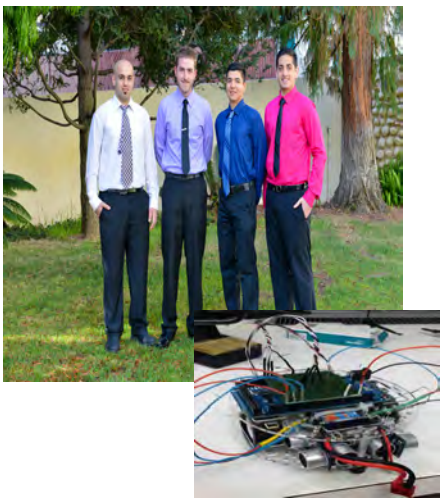
Capsule Corp will be designing a robot for the Autonomous Payload Delivery Challenge at. Our robot will use GPS coordinates to find beacons placed randomly in a field. If our system detects an object in our path using ultrasound, it would use the differential drive system to make very precise turns to circumvent it and then continue towards the beacon. Once near the beacon, the custom built antenna system, two antennas mounted on opposite ends of the front chassis, will pinpoint its exact location. This is done by finding the exact point at which both antennas pick up the same signal strength, while rotating on the spot using the differential drive system. Once close to the epicenter, the rear-mounted, servo operated delivery system will drop a payload directly on target before moving on to the next beacon using the GPS coordinates. After all the beacons have been delivered a payload, the robot will return to the starting location which it finds by calculating the return vector. All the computations are made by a programmed STM32 discovery board hooked up to all of its components, providing a single focal point for all signals.

DeadMou5

Members: Evan Jina, Sami Elias, Jeff McGarrah, Willy Herrera

Advisor: Dr. Gordon Lee

Sponsor: ECE Department



DeadMou5: The Autonomous Maze Solving Robot

In order to navigate an unknown maze and retrieve a signal, Team DeadMou5 designed a small autonomous robot that met the criteria of the official IEEE Micromouse Competition. The robot traverses the maze deterministically with the help of encoders and proximity sensors. Using a mapping algorithm it locates the center of the maze and retrieves a signal. The signal is then recorded and the robot proceeds back to the starting position using the shortest path available. This competition tested our design skills in a practical way.

HUMIA

Members: Rommel Cabal, Spencer Cadden, Derrick Celestino, Eric Leon, and Michael Spinali

Advisor: Dr. Gordon Lee

Sponsor: SDSU

Human Machine Interface Application

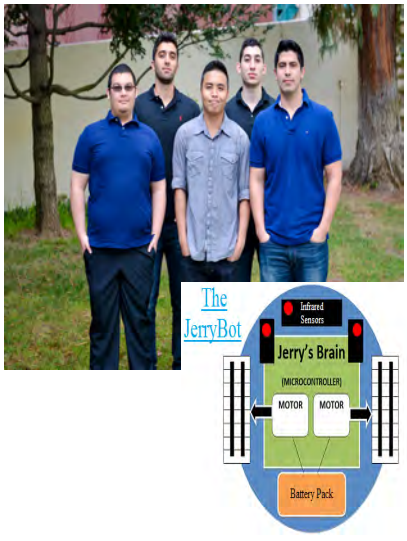
There is a lot of general information that students need to know in order to graduate from San Diego State University with an Electrical Engineering degree. Many students are forced to do their own research or ask an administrator, and often times students are still confused on the necessary actions that they need to perform. We plan on bridging the gap between the university and students by creating a robotic head that will be able to listen to questions regarding the requirements to earn an Electrical Engineering degree. The user will be able to ask questions using a microphone, and the robot will produce the necessary output using a microcontroller and various servo motors. The robot will consist of a microcontroller that will produce the necessary pulses to communicate with the various servo motors, which will mimic facial expressions and speech.

JerryBot

Members: Mark Isidro, Nathan Purta, Bardia Rashidi, Danny Toma, and John Zakharia

Advisor: Dr. Gordon Lee

Sponsor: Dr. Gordon Lee



Micromouse Competition

The Micromouse competition is a competition where the small robotic mice solve an 8ft x 8ft maze. The mice are completely autonomous robots that keep track of its whereabouts, discover and avoid walls as it moves, and detect a signal from an infrared beacon when it has reached the goal. The goal will be in the middle of the maze. Afterwards, the mouse must traverse back as fast as it can to the start of the maze and deliver the recovered signal. Each team will have three test runs and one actual run with the maze. The mouse that traverses the maze and brings back the signal from the beacon the fastest wins the competition.

Project Mercury

Members: Mohammad Iqbal, Kyle Rodrigues, Rami Brikho, Jack Kennedy, Bao Phan, and David Trinh

Advisors: John Kennedy and Dr. Lal Tummala

Sponsor: ECE Senior Design

Autonomous Payload Delivery Challenge

The challenge is to design and build a vehicle that can autonomously navigate in an open space and deliver a small payload (golf balls) to 3 predetermined locations. The project will consist of multiple teams competing to design and fabricate the fastest and most accurate delivery system possible on a fixed budget. The delivery locations will be given as GPS coordinates specified as longitude and latitude. In order to augment the limited accuracy of low cost GPS receivers, each delivery location will be marked with a crude transmitting beacon. The transmitting beacon will be comprised of a loop of wire driven by a small pulsing current. The competition will be scored on both speed and accuracy.

Sharknado

Members: Alex Egg, Andrew Goria, Alvin Lacdan, Jeff O'Brien, Kevin Shinkle, and Daniel Tarantino

Advisors: John Kennedy and Dr. Lal Tummala

Sponsor: ECE Senior Design

Autonomous Payload Delivery Challenge

Sharknado is charged with the task of designing and building an autonomous payload delivery robot that will be able to locate different beacons, travel to the locations, deliver the payload (in the case of the challenge, golf balls), and return to the starting location in under two minutes. In the past engineering teams have bought their chassis and used the motors and wheels that had come with it. Sharknado has decided to design our own chassis made from aluminum and buy our own motors and wheels and integrate them on our own. Our goal is to design and build the autonomous robot that will fall under the given requirements in the most efficient way possible.

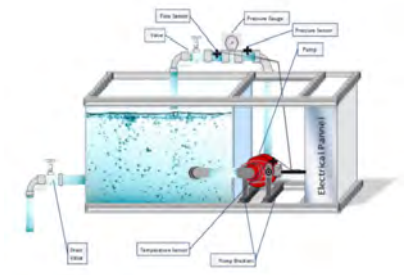
V.I.C.E. (Hardware and Software Team)

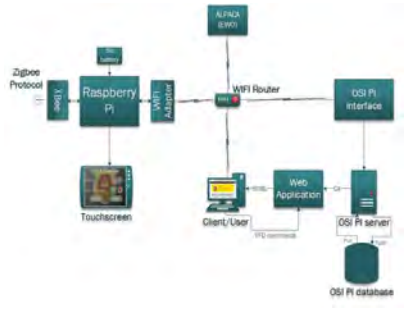
Members: (Hardware Team) - Matt Belden, Arash Ebad, Cesar Elizondo, Matthew Garcia, Darren George, Cynthia Lopez and Louis Tiger

(Software Team) – Thomas Gerstenberg, Chad Higgins, Kristin Makowski, Mark Parangue, and Robert Paulino

Advisors: Alan Dulgeroff, Giovanna Belanger, Steven Prsha, and Daniel Smith

Sponsor: SDG&E





Autonomous Payload Delivery Challenge

Energy is an invaluable resource that everyone needs to live their daily lives. The demand for energy is high and most households are not using renewable energy, so there is a need for more low energy solutions. In order to keep household energy usage low, some people have started using Variable Frequency Drives (VFD) which is already common in industrial settings. A VFD is a device that outputs varying frequencies to control AC motor speed. When a motor runs at a lower frequency and thus a lower speed, it consumes less energy while still operating effectively. An added benefit of running a motor at a lower speed is that it increases the life of the motor. Because we understood the value of a VFD, our group has designed a demonstration to prove that a VFD in a residential setting can reduce power usage and thus reduce monthly energy bill costs for the user.

To prove the VFD saves consumers money, we created a 10 gallon tank with a water pump to imitate a pool. Our system will monitor the frequency the motor is running at, the flow rate the pump is creating, the pressure of the water flowing in to the tank, and power usage. Sensors on the tank system send values to an Arduino microcontroller which adds the values to a data packet which is sent wirelessly, via Zigbee protocol, to a Raspberry Pi microcontroller, which acts as the hub of our software communication in our system. These sensor values are then sent via WIFI protocol to an OSI PI server and database to be stored. In order for our users to access and make sense of these values, we have created a web application interface where the user can view the status of the system and change the desired flow rate and motor frequency. As an added user interface, we have implemented a touch screen controlled by our Raspberry Pi which has the same controls but displays fewer values. Our web interface will then demonstrate the energy and cost benefits of using a VFD to control household motors.

MECHANICAL ENGINEERING

ASL Tech

Members: Chris Harris, Nick Lage, Robert Marsh, and Robert Schult

Advisor: Dr. Kee Moon

Sponsor: Engineering Research Center

Knuckle Sensor for Voice

The knuckle sensor, funded by the Engineering Research Center can be used for many applications, such as inputting data for wireless gaming and computers. We will be using it to translate sign language into English, thus giving the audibly impaired a voice. The knuckle sensor is a device that uses infrared LED's to determine the position of the fingers. That data is then interpreted to a voice output.

Assistive Robotic Arm

Members: Juddson Frost, Tim Mikal, Allen Tan, and Anthony Tilley

Advisor: Dr. Kee Moon

Sponsor: Dr. Kee Moon

Assistive Robotic Arm

Wheelchair mounted robotic assistive device that will help those with weakened limbs accomplish light duty tasks. Through torque sensors embedded in the motors, the user's movement is detected. Once the motion is detected from the user, the system applies additional current to the respective motor sensing that motion. This increase in current translates to an increased assistive motion towards a user's direct target location. This increase in assistive motion could help the user regain strength capacity to move on their own.

Aztec Energy

Members: Andrew Bache and Aaron Nickovich

Advisor: Dr. Thais Alves

Sponsor: Karen Prescott

Green Energy Challenge

This project is part of a competition hosted by NECA and ELECTRI International. The competition is based on choosing a building on any campus and proposing a design to retrofit it with building systems that are more energy efficient or contribute to conservation. The systems we are required to consider are: 1) Electrical; 2) HVAC, and 3) Miscellaneous Retrofits. We must also devise a plan to estimate the costs and find grants or loans as well as relevant incentives to help the client pay for the project.

Bio-Potential Electrode Mechanical System

Members: Jospeh Kiefert, Tuan Le, Carlos Martinez, and Andrew Werdowatz

Advisor: Dr. Kee Moon

Sponsor: Engineering Research Center

Bio-Potential Electrode Mechanical System

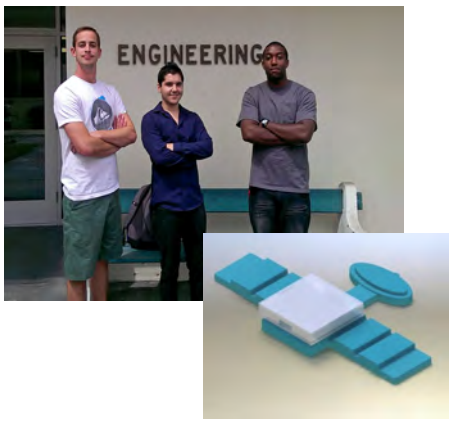
The Bio-Potential Electrode Mechanical System (BPEMS) combines the attributes of both wet and dry electrodes. This is accomplished by eliminating the undesired messy effects that come with handling wet electrodes and correcting the high electrical impedance of dry electrodes. We aim at advancing the field of neurological research by developing a device that improves brain activity readings and data collection. The BPEMS would allow for improved treatments on patients experiencing various brain disorders such as Parkinson's disease.

BPS

Members: David Boydston, Tim Perry, and Marcus Sumrall

Advisor: Dr. Kee Moon

Sponsor: Engineering Research Center and 3D Robotics



Pseudo-Touch Bracer (PTB)

The PTB uses photoplethysmographic (PPG) technology to detect the movement of the fingers. PPG measures changes in blood flow by detecting the change in wavelength from a source as the blood vessels expand or contract. The sensors are housed and placed in the back of the hand over the tendons that move each finger. The housing also includes an Inertial Measuring Unit (IMU) to sense the orientation and movement of the hand. The sensors will send the signals back to the bracer, where the circuit boards are stored and the data is then sent through a Radio Frequency (RF) transmitter to a computer. The resulting readings show response to the movement of the fingers and the IMU readings are implemented successfully to show the unlimited possibilities of this bracer. It clearly shows that PPG technology can be a viable alternative that can enable a user interface that is more suited to the growth of touch-based applications.

The Claw

Members: Ronick Apostol, Tyler Getz, Adrian Hernandez, and Sonny Tigno

Advisor: Dr. Kee Moon

Sponsor: Engineering Research Center

The Claw

Design and create a system that will utilize EMG (electromyography) sensors placed on an individual's skeletal muscles to actuate a robot arm in a human-like manner. The robot arm and electronic components were off-the-shelf items which were modified to suit the goals of our project. The project required basic mechanical assembly and fabrication, but the team was also tasked with learning, understanding, and applying electrical and programming skills to implement the Arduino microcontroller and its software. The outcome of a year long journey is a product that demonstrates a platform for fun and exciting muscle rehabilitation activity and entertainment.

Closed-loop orthotic robotic limbs

Members: Ignacio Gil and Alicia Salvador

Advisor: Dr. Kee Moon

Sponsor: Engineering Research Center

Closed-loop orthotic robotic limbs

The project selected for this year is the Closed-loop orthotic robotic limbs. A previous group already designed, manufactured and tested the robotic limbs. However, the main issue is to be able to use this device in a suitable environment, allowing the patient to perform their required exercise in a treadmill. Our main goal is to locate this limb in a device where the potential patient would be able to walk in safe conditions.

Cool Runnings

Members: Royce Ramos, Greg Sullivan, Kyle Vander Schaaf, and Andy Wood

Advisor: Dr. Kee Moon

Sponsor: Engineering Research Center

Knuckle Sensor Housing

Our project aims to create a housing for phototransistors and LED lights in order to use photoplysmographic (PPG) technology, similar to pulse oximetry used in hospitals. Our primary focus was to develop the housing and secondary focus was electronics. The goals of the device are to include a durable and comfortable design, universal, accurate fit, and include removable features for cleaning and adjustment. Teaming up with graduate student aiming to house her circuit in order to get a clean output signal.

Deep Sea Benthic Microbial Fuel Cell

Members: Lucas Bultema, Jonathan Cheng, and Erik Starace

Advisor: Professor Mansfield

Sponsor: SPAWAR

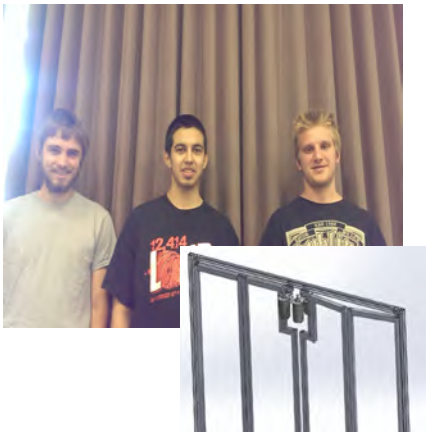
Deep Sea Benthic Microbial Fuel Cell

- Goal to deploy a deep -sea benthic microbial fuel cell (BMFC) to depths of 1000 meters.
- Create an anaerobic environment on the sea floor to generate electricity in order to power small sensors.
- Shallow water systems exist, but there are no unassisted devices for deep water.
- C reating an unassisted, self-establishing BMFC will make deployment both easier and cheaper, while also allowing deployment in deeper waters.
- H aving BMFCs at deep sea depths will allow monitoring that currently does not exist.

The Doors

Members: Ryan Banks, Alberto Larrazolo, and Evan Schoening

Advisor: Dr. Kee Moon



Bluetooth Automatic Door

The goal of this project is to have a door that automatically opens when the user is in close proximity. Bluetooth in the user's phone will be used to detect proximity and tell the door to open. A bi-folding door design is used which opens from the center, which allows the door to be opened quickly and without the risk of injuring a bystander. The door is controlled by an Arduino device with a Bluetooth module. Range of motion of the door will be powered by two DC motors which will drive a pinion gear that will move along a rack gear.

Elite Engineering

Members: Jeremy Caplan, Jeremiah Cox, and Nick Sorensen

Advisor: Dr. Kee Moon

Sponsor: The National Science Foundation

The Robotic Leg Brace

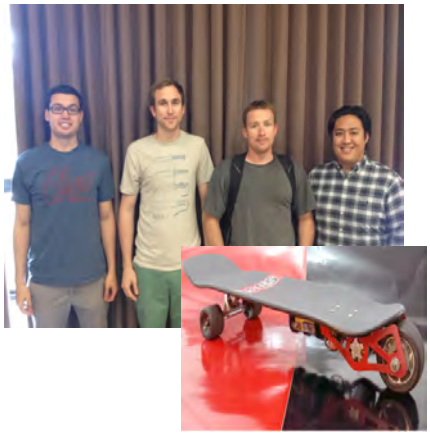
The Robotic Leg Brace, sponsored by the National Science Foundation, has been under development at SDSU since 2012. The primary goal of the project is to assist with the clinical rehabilitation process of patients who have suffered from spinal cord injuries, cerebral palsy, strokes, Parkinson's disease, or other age related neurological disorders. The leg utilizes pneumatically actuated pistons, an Arduino microcontroller, digital position sensors, and 3D printed brackets. The body of the brace is made of a twenty-ply carbon fiber composite. During the Spring semester of 2014, our work has been focused on dynamically integrating the leg with a rolling walker, as well as redesigning the circuit and wiring schemes.

EMG Skateboard

Members: Joey Kramer, Jeffrey Reid, Alexander Torio, and Ryan Zellers

Advisor: Dr. Kee Moon

Sponsors: Engineering Research Centre, Robo3D, and Westpak Inc.



EMG Skateboard

The ERC Tech Sandbox Program at SDSU creates an open-ended environment, allowing students to be creative in the function of their design. Under the Tech Sandbox Program, students must develop fun demonstration projects utilizing human motion or thought-sensing equipment. This project involves the use of Electromyography (EMG) sensors, wireless communication between microcontrollers, and dynamic analysis. Expanding on our basic knowledge of controls, dynamics, circuitry design, and material science we are developing a fun human interactive personal transport device. The purpose of our project was to develop a fun and distinct demonstration using either human motion or thought-sensing equipment. Our design varies from current electric skateboards on the market; with our key features being sensor controlled acceleration, as well as an innovative three-wheeled design.

EndState

Members: Kevin Bui, David Grey, Edgar Harmes, and Megan Schilling

Advisor: Dr. Kee Moon

Sponsors: Engineering Research Centre and Schilling 3D Inc.

Assisted Running Mechanical Apparatus

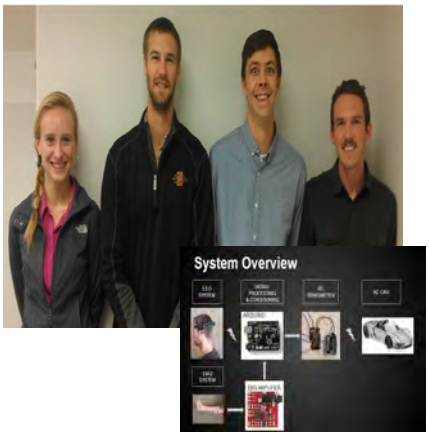
This team has taken on the task of building a basic running frame that is adaptive and responsive to Sarah Bettencourt, a former United States Marine. Sarah has a rare undiagnosed neurological disorder where lesions of inflammation on her brain come and go causing her to lose function of the corresponding body part. Her permanent losses are constant vertigo, as well as no sense of coordination, for example, up, down, left or right. Sarah described herself as floating in space. Sarah's number one request is to be able to run. The device we created gave Sarah stabilization as well as support needed to achieve her primary desire.

Enginerds

Members: Andrew Gilstrap, Kendal Hanel, Christopher Wagner, and Amanda Willis

Advisor: Dr. Kee Moon

Sponsor: Engineering Research Centre



Neuro-Drive

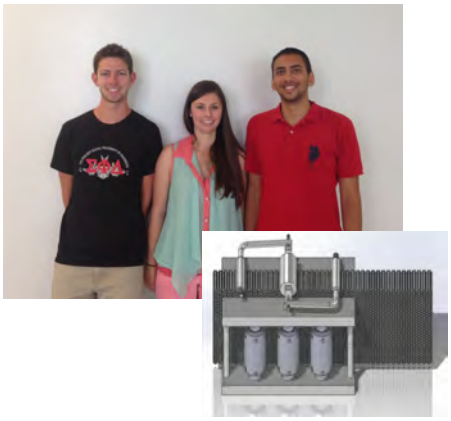
We are designing a mind and muscle controlled R/C car using EMG and EEG sensor technology. The EEG records electrical activity in the brain through biopotential sensors attached to the scalp to map concentration and brain wave patterns. The EMG measures the potential difference across muscle fibers. They are incorporated through an Arduino microcontroller used to process the signals to control the steering and speed of the R/C car.

The ERA of Crushing

Members: Alec Brunson, Elizabeth Fortin, and Ramy Judeh

Advisors: Dr. Satchi Venkataraman and Professor George Mansfield

Sponsor: Dr. Satchi Venkataraman



Mechanical Crushing of Honeycomb Cores for Tapered Sandwich Closeouts

Sandwich composites employ low-density cellular materials as cores to increase distance between facesheets to attain high specific bending stiffness. The composites are tapered at their ends to create a bolting region. Since the volume of the core is decreasing in the tapered region, it is often the site of fatigue delamination failure. Recent research has shown that using a denser core with spatial grading at tapered closeouts can eliminate such failures. The goal of this project is to create a hand held mechanical device for crimping/edge rolling a honeycomb cores capable of producing crushed honeycomb cores with specified density gradients. The device needs to be compact, adjustable, and able to recreate desired crush densities. Our team has created a design that follows the above design criteria. The device consists of a crushing roller, to crush the core, clamping rollers, to hold the honeycomb core in place, and stabilizing rollers, to keep the device rolling along the core.

Glass Seal Engineering

Members: Adnan Ansar, Jeff Loos, and Michael Sorenson

Advisor: Dr. Fletcher Miller

Sponsors: U.S. Department of Energy and Solar Energy Lab

Sealing Glass Window Test Vessel

The scope of our project is to create testing equipment and procedures to engineer sealing systems for the fused quartz glass window on the Small Particle Heat Exchanger Receiver (SPHER). The SPHER will be a high temperature Brayton cycles that transfers the heat of light to the fluid medium in a solar/turbine power plant. The topics that will be tested on various windows and window mounts are: friction coefficient of high temperature seals, hydrostatic pressure with and without heat loading, and heat flux loading. In order to do this our group has fabricated a test vessel that will simulate the pressure stresses and temperature encountered by the receiving portion of the SPHER

Ignition Research Apparatus

Members: Jin Choi and Kenneth Keivens

Advisor: Dr. Subrata Bhattacharjee

Sponsor: Computational Thermodynamics Lab

Ignition Research Apparatus

The ignition research apparatus is a design project used by the Computational Thermodynamics Laboratory to study the ignition of solid fuels. The apparatus utilizes a linear actuator to vary the experimental distance of the ignition wires. In addition, the ignition circuitry is a combination of transistors, low pass filters, sensors, and an arduino. Utilizing these components, the apparatus is capable of varying the power through the ignition wires which allows the researcher to study the required heat flux for ignition to occur.

Industrial Plant Emulator

Members: Brice Faulwetter and Justin Schreiter

Advisor: Greg Berkeley

Sponsors: Greg Berkeley and Brice Faulwetter

Industrial Plant Emulator

The Control Systems Lab requires a representative, relevant experiment to bridge the gap between theory and real world applications. The DC motor platform will enable students to test and manipulate the response of a DC motor system through a series of experiments that are tailored to ME 330 course material. Features include: 1) LabView Based; 2) Compact, Robust design; 3) Affordable, Student Safe; and 4) Easy-to-use Interface

Mechatronics

Members: Elijah Auer, Rod and Andrew Orellano

Advisor: Mike McRory

Sponsors: CYMER, SeaConn, hp, GA, intel, Solidworks, Mathworks, Industrial Metal Supply, and San Diego Seals Inc.

Mechatronics AUV - Chassis

The project is to research, design, analyze, fabricate and test a chassis for an AUV. The autonomous underwater vehicle (AUV) is a project under the Mechatronics club for the Robosub competition.

Mechatronics ROBOSUB Dropper & Manipulator Arm

Members: Alex Ben and Matthew Inderbitzen

Advisor: Mike McRory

Sponsor: SDSU Mechatronics

ROBOSUB Dropper/Manipulator Arm

490A: Design a dropping mechanism to be a sub-system of the overall SDSU Mechatronics autonomous robotic submarine. Dropper will be fully autonomous and drop 2 weights from the submarine.

490B: Design a manipulating arm to perform a delegated task for next year's competition.

No Cords Attached Chargers

Members: Zach Espinoza, Konstantin Ivanov, Kyle Knapp, and Ryan Stock

Advisor: Dr. Kee Moon

Sponsors: Dr. Moon, Syndaver Labs, SimSkin, BoneSim, and CAE Healthcare

Wireless Ultrasound Energy Transmission Test

Team NCAC tested the feasibility of wirelessly transmitting energy for powering implanted biomedical devices, such as a pacemaker, using ultrasound. The design of the experiment was to simulate the conditions of the application using inorganic materials. The challenge was sourcing synthetic materials that matched the characteristics of human tissues. The tests found two synthetic materials matched organic properties and that ultrasonic wireless charging is possible.

Passive Solar Design Team

Members: Sofia Gomez Garrido, Maria Nygren, Tony Nylander, and Jovana Poduje

Advisor: Dr. Fletcher Miller

Sponsor: KEMA Architect

Zero Energy Building Design

Design a low Carbon Emission, optimal comfort hour Passive Solar office space for the Design Optimization Competition U.K. Design office space for competition with Design Builder software, the most advanced software in zero net energy building design. Design and build a small-scale model of a Passive Solar thermal chimney. Test the natural convective airflow in thermal chimney using thermocouples and acquire and analyze data using MCCDAQ USB 2416 data acquisition Software and Lab view.

Pedal-Based Power Meter

Members: Lauren Bailey, Steven Lillig, Andrew Mudge, and Robert Ramirez

Advisor: Dr. Kee Moon

Sponsor: Itsa Bike Shop

Pedal-Based Power Meter

As a group of engineers, as well as athletic individuals, we appreciate taking a quantitative approach to training. Our team's goal was to create a power meter used in cycling training to compete with expensive commercial alternatives. This allowed us to gain experience in mechanical design, manufacturing, and programming. The final design has the following capabilities: 1) Accurately measures the rider's pedaling force; 2) Converts this data to a power reading; 3) Transmits wirelessly to user's smartphone; and 4) Logs data for later analysis.

Rock Wall

Members: Jeffrey Geoghegan, Aaron Liu, and Taylor White

Advisors: Professor George Mansfield and Jim Lustig

Sponsors: Cort Gariepy and Aztec Recreation Center

Bouldering Wall

Four engineers with a passion for climbing wanted to design and build a bouldering wall for the members of the Aztec Recreation Center (ARC). With the help of Jim Lustig and the sponsorship of Rockwerx this project can be accomplished. The project will consist of drawings produced through Solidworks and 3D Auto CAD, and an analysis will be down through a combination of simulations in MatLab and Solidworks.

Running Support Device

Members: Julia Calish, John Cedarquist, Max Lightman, and Mark McAuliffe

Advisor: Dr. Kee Moon

Sponsors: Sarah Bettencourt and ERC

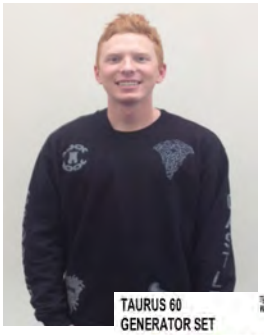
Running Support Device

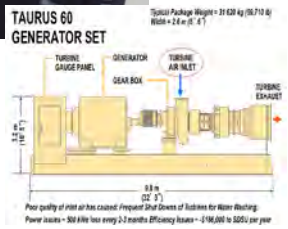
The goal of this project is to design a support superstructure to allow users with a diminished sense of balance, lower extremity disabilities, or similar challenges, to walk or run. The device's capabilities include supporting a user up to their full body weight so that it can be used for rehabilitation and recreational purposes.

SDSU Cogeneration Plant Inlet Air Purification

Member: Michael Wofford

Advisor: Dr. Asfaw Beyene





SDSU Cogeneration Plant Inlet Air Purification

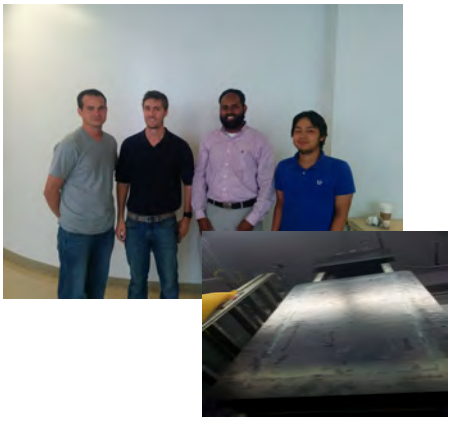
The atmosphere contains chemicals, particulates, and biological materials. The concentration of these elements can be particularly high in and around urban environments, especially near freeways, highways, and industrial process areas. The inlet air of the San Diego State cogeneration plant, located in the northeast corner of campus and directly above the Interstate-8, is recognizably affected by the air quality of the surrounding area. This project entails the prevention of unwanted build up within the compressor section of the two Taurus 60 Single-Shaft Gas Turbines found the in Cogeneration facility by feeding cleaner air through the filtration house. The goal of the project is to design a system that the SDSU Facilities Services cogeneration plant will operate without frequent downtime for costly cleaning, and sustain without power loss for lengthier periods of time.

SDSU Flame Tower

Members: Nicholas Fiutek, Yussuf Hussein, Bryant Pham, and Isaac Walther

Advisor: Dr. Subata Bhattacharjee

Sponsors: Mechanical Engineering Microgravity Flame Spread Project and NASA



Flame Tower Depressurization

Our senior project will be to improve upon the existing design of Professor Bhattecharjee's current flame tower. The current design consists of a 2 story sealed metal casing at 1 atmosphere. Inside this casing a small flame sample is dropped and lifted while being monitored to find different extinguishing points for different flames. Our job will be to bring the pressure down to 0.5 atmospheres. This requires reinforcing the casing in order to prevent the collapsing of the 2 story metal box, new door design that can tolerate the vacuum pressure and redesign door hinges that will enable transfers and rotational motion while helping in sealing the tower completely. We must monitor the pressure and regulate it in order to monitor the accuracy of our readings.

Team Backbone

Members: Matt Burbaum, Anthony Guevara, and Mark Smith

Advisors: Dr. Kee Moon and Dr. Gombatto

Sponsor: Engineering Research Centre

Portable Spinal Position Monitor

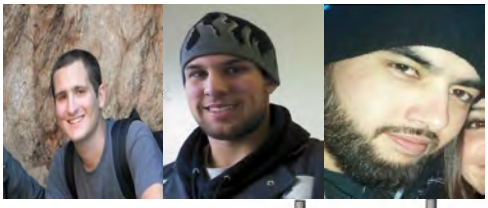
The purpose of the Portable Spine Position Monitor is to accurately measure spinal position over a 12 hour period. The data collected from the Portable Spine Position Monitor can help doctors more accurately diagnose the cause of lower back pain in patients.

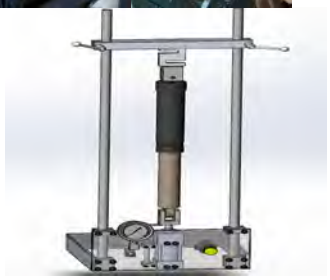
Team SAD

Members: Joey Gonzalez, Joe Tralongo, and Simon Weber

Advisor: Dr. Kee Moon

Sponsors: SDSU Formula SAE and SDSU Baja SAE





Shock Absorber Dynamometer

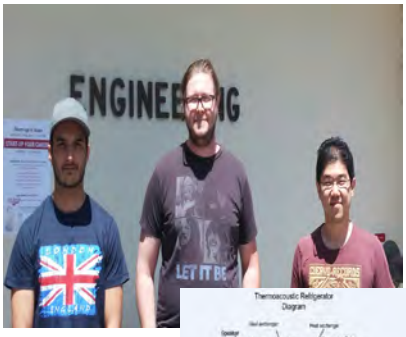
Our senior project is building a shock dynamometer (shock dyno) capable of measuring dampening forces of shocks as a function of shock velocity. This data will be helpful in both the Formula and Baja SAE team's suspension tuning. With a properly tuned suspension, the teams hope to have better performing cars able to be more competitive at their respective competitions.

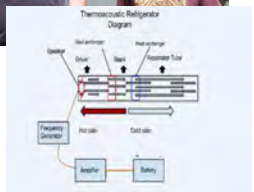
Thermoacoustic Refrigeration System

Members: Joaquin Contreras Dominguez, Mike Czagany, and Fumi Sato

Advisor: Stuart Thomas

Sponsor: Stuart Thomas





Thermoacoustic Refrigeration System

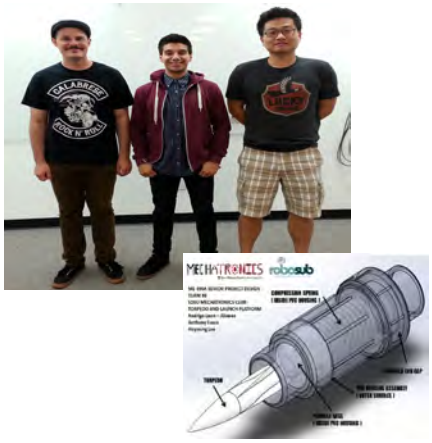
Building a device that removes heat from the system in order to cool down an environment. Sound waves will be used to transfer heat from one end to another of a resonator tube, forcing gas molecules to pass through a stack, which is made out of a material that has low thermal conductivity and a high thermal conductivity material for two heat exchangers, one at each end of the stack. A speaker will be our drive. Powered by an amplifier and a battery. The system is essentially a heat pump with a speaker as the work input.

Torpedo and Launch Platform – SDSU Mechatronics Club (Team #8)

Members: Anthony Fusco, Hoyoung Lee, and Rodrigo Leon-Alvarez

Advisors: Professor George Mansfield and Mike McRory

Sponsors: General Atomics, Cymer, Solidworks, Seacon, Boeing, Harvest, Intel, HP, Altium, Mathworks, Industrial Metal Supply Company, and PNI Sensor Corporation



Torpedo and Launch Platform

490A: To design and fabricate a spring-loaded torpedo and launching platform assembly that will be used on an autonomous robotic submarine which will be competing in the AUVSI Foundation's ROBOSUB 2014 Competition.

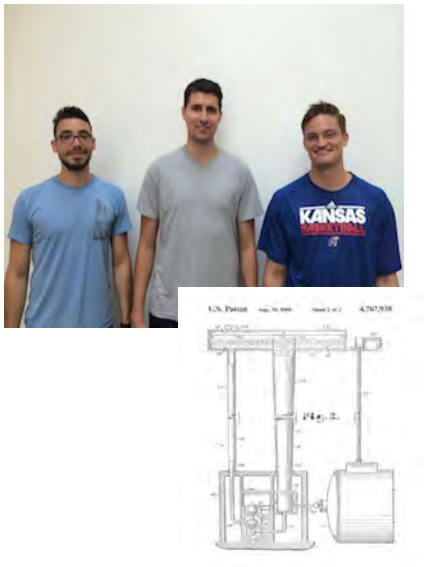
490B: To design and fabricate a self-powered and self-propelled torpedo that will be used in the ROBOSUB Competition in 2015. This torpedo will be propelled with a small DC motor that will be activated using a magnetic switch.

Two Phase Counter Flow Energy Conversion System

Members: Weston Daigle, Zach Lawless, and John Muha

Advisor: Dr. Asfaw Beyene

Sponsors: Ford Bohl



Two-Phase Counter Flow Energy Conversion System

Peak shave/energy conversion device that uses a two-phase counter flow system to store and produces electrical energy. Compressed air creates a density imbalance in the system that creates a dynamic effect.

Ultra-Rapid Manufacturing of Nano Scaled Components

Members: Daniel Cavero and Sumedha Weerasuriya

Advisors: Dr. Khaled Morsi and Dr. Kee Moon

Sponsors: SDSU Presidential fund grant and ASCO Numatics

Ultra-Rapid Manufacturing of Nano Scaled Components

It was hypothesized, that a projectile moving through a molten metal film would pick up a thin coating of the metal. Should this coating be separated from the projectile, a thin walled component would be produced. To test this hypothesis, a preliminary, proof of concept experiment was designed and conducted. An ABS plastic pellet traveling at an average speed of 155 ft. /s was made to puncture a thin film of molten tin. The film was generated by deflecting a stream of molten tin (at 262 Celsius) on a smooth aluminum plate. This crude experiment, i.e. with little control over experimental conditions, yielded a structurally stable, thin walled, hemispherical component. Scanning electron microscope imaging, revealed component thickness ranging from 500 nano meters to 1.6 microns.

In order for this provisionally patented technology to be a viable nano component manufacturing technique a more controlled investigation must be carried out. It is believed that through rigorous control of experimental parameters, uniform nano components may be produced.

In an attempt to achieve this, a complex and versatile experimental setup is currently being built. The two key sub-systems of the setup are, 1) A rail launcher capable of accelerating projectiles to super-sonic speeds (greater than 1000 ft. /s), 2) A furnace capable melting tin and producing a uniform thickness thin film. Thus far the project has received a presidential award in the SDSU student research symposium and will be showcased in the CSU research symposium in May 2014.

W.E. Do Good

Members: Ezequiel Galindo, Ryan Medina, Robert Schneider, and Kevin Semo

Advisors: George Mansfield and Michael Sloan

Sponsor: Michael Sloan

Teff Thresher Development

W.E. Do Good is developing an extremely affordable, human powered mechanical thresher to improve the difficult, time-consuming, and resource-inefficient harvesting of teff for farmers in Ethiopia.