

COLLEGE OF ENGINEERING

DESIGN DAY SPRING 2016

MONTEZUMA HALL AZTEC STUDENT UNION MAY 4, 2016 | 1:30PM - 3:30PM

with special thanks to NORTHROP GRUMMAN

SAN DIEGO STATE UNIVERSITY

WELCOME



Welcome to the College of Engineering's Spring 2016 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 2015-16 Academic Year. There are teams representing our 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 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 time and funding for these student projects. Our sponsors include: Black & Veatch, DEC Engineering, NASA, National Science Foundation, Northrup Grumman, San Diego Gas & Electric, and Solar Turbines. 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 2016 College of Engineering Design Day. Thank you for being a part of this important event.

Monte M. Mehrabadi, Ph.D. Dean College of Engineering

SAN DIEGO STATE UNIVERSITY

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SMARTBOARD TEAM - "SMARTBOARD"

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AEROSPACE ENGINEERING

AE 460 SENIOR DESIGN PROJECT

MEMBERS: Dorian Andersen, Ace Elacio, Marlon Gerson ADVISOR: Greg Marien SPONSOR: SDSU



AE 460 SENIOR DESIGN PROJECT

This AE 460 A/B project is the conceptual design of a Close Air Support (CAS) 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 CAS 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.

DESIGN BUILD FLY

MEMBERS: Dorian Andersen, Jason Eakin, Ace Elacio, Marlon Gerson, Israel Lopez, Javier Navarro ADVISOR: Dr. Xiaofeng Liu, Assistant Professor, SDSU Department of Aerospace Engineering SPONSORS: Northrop Grumman, NeoThings, NeuMotors



DESIGN BUILD FLY

DBF (Design/Build/Fly) is a competition held every year by AIAA, Cessna Aircraft, and Raytheon Missile Systems. Each year students are required to design, build, and fly a new aircraft according to the rules set out by Contest Directors. Student teams will design, fabricate, and demonstrate the flight capabilities of an unmanned, electric powered, radio controlled aircraft which can best meet the specified mission profile. The goal is a balanced design possessing good demonstrated flight handling qualities and practical and affordable manufacturing requirements while providing a high vehicle performance.

SAN DIEGO STATE UNIVERSITY ROCKET PROJECT

MEMBERS: Ben Beckwith, Wesley Brookman, Ryan Callahan, Jacob Dodson, Immanuel Marinas, Noah Nutter

ADVISOR: Carl Tedesco - Flometrics

SPONSOR: Carl Tedesco - Flometrics



GALACTIC AZTEC

The Galactic Aztec is a liquid fueled rocket capable of producing 1,000 pounds of thrust. The rocket will feature a 2-stage recovery system, several data acquisition devices, monopropellant roll control system, and a thrust vectoring gimbal.

CIVIL, CONSTRUCTION & ENVIRONMENTAL ENGINEERING

521 CONSTRUCTION

MEMBERS: Landon Alvarado, Clint Gibson, Samantha Kleinschimdt, Jake Neeley, Kosta Papadopoulus, Alex Rittenburg, Belen Soltero, Christina Stewart

ADVISOR: James Haughey - Michael Baker International



521 BREWERY

521 Construction will be in charge of the planning and designing of a sustainable brewery. This includes the development of an estimate, schedule, site plan, SWPPP, Stormwater Quality Plan, hydrology study and a hydromod plan, along with designing a water filtration and water reuse system for the facility.

A GOOD RAIL ENGINEERING

MEMBERS: Daniel Arredondo, Oscar De La Cruz, Jonathan Harris, Samuel Jordi, Alexa Zapata ADVISOR: Brandon Liesemeyer, Skanska USA Civil SPONSOR: Bruce Smith, SANDAG



LOSSAN - SORRENTO MIRAMAR PHASE 2

The second phase of the Sorrento to Miramar Double Track Project will add two miles of second main track to the San Diego region's coastal rail corridor between Interstate 805 (I-805) and Miramar Road in the City of San Diego. The project also will allow increased train speeds by straightening sharp curves that currently slow existing passenger and freight rail services on Miramar Hill.

ABDUCO

MEMBERS: Nicholas Aybar, Matthew Bouchard, Lauren Bray, Sannisha Castillo, Donald Keffer, Sandy Khounphet, Stacy Preve

ADVISOR: Kathy Haynes - HDR



NORTH CITY PURE WATER PIPELINE

The project is part of the City of San Diego's Pure Water Program. Both San Vicente and Miramar Reservoir are alternatives considered to receive treated recycled water coming from the North City Water Reclamation Plant and yet-to-be-built Advanced Water Purification Facility. The project compares the monetary, environmental, and societal costs of a pipeline conveying 30 million gallons per day of purified water to either reservoir based on technical analysis of each alternative. Ultimately, this project will determine which reservoir is best suited for the purified water.

AEONIX ENGINEERING

MEMBERS: Abdulrahman Aloudah, Firas Alrakhayes, Nora Castro, John Joshua Magsino, Alex Sandoval, Yvonne Velasco

ADVISOR: Bruce Smith - SANDAG



LOSSAN RAIL CORRIDOR: SORRENTO TO MIRAMAR PHASE 2 IMPROVEMENTS

The Sorrento to Miramar Phase 2 (SM2) project proposes to straighten out the dramatic curves on the LOSSAN Rail Corridor on the steepest grades in Soledad Canyon in San Diego County. AEONIX Engineer is developing two possible designs as a solution:

1) Alternative 1c along the existing tracks on the south side of the canyon

2) Alternative 6 crossing the canyon twice with bridges on the North Alignment

Our goal is to determine which alternative is the Least Environmentally Damaging Practical Alternative (LEDPA) and why this alignment should advance to the final design stage.

ALL AROUND ENGINEERING

MEMBERS: Corbin Brown, Kaysie Frizell, Lexi Kammeyer, Alan Lutehard, Nicole Miller, Kyle Peebles,

Krystal Reyes

ADVISOR: Mark Tarrall - Dokken



WOODSIDE AVE-SR 67 ROUNDABOUT SANTEE

The intersection of Woodside Avenue and SR 67 off ramp in Santee is experiencing high traffic volumes and queuing. Our team will study the feasibility and design a traffic roundabout to replace the current 4-way stop intersection. The roundabout will handle the existing traffic volumes as well as future volumes. To be included: traffic analysis, geometric analysis, right-of-way analysis, drainage analysis, construction planning, preliminary design and a design report.

AMBITION BUILDERS

MEMBERS: Elijah Elliott, Blake Gregor, Jacob Jordan, Gunnar Ohlund, Aryan Rahimzadeh ADVISOR: James Haughey - Michael Baker International SPONSOR: Red Hat Coffee



SANDAG MULTI USE & BUS STOP STOPOVER FACILITY

The goal of the stopover facility is to provide a permanent offstreet location for buses to park between runs, provide a central location for driver breaks, free up on-street parking spaces, and preserve existing spaces. The project would accommodate existing local bus routes and Rapidservices that currently park on the street in western downtown, thereby making more on-street parking available to residents and businesses.

BAY BUILDERS

MEMBERS: Errol Browning (PM), Cari Campbell, Kyle Nelson, Garret Vargas, Miller Westfall ADVISOR: James R. Haughey - Michael Baker International SPONSOR: James R. Haughey - Michael Baker International



PORT OF SAN DIEGO HARBOR ISLAND REDEVELOPMENT

To provide storm water, sewer, hydrology, traffic, and SWPPP reports for the purpose of redevelopment on East Harbor Island.

CALCON

MEMBERS: Mario Colón, Cody Dubravetz, Scott Heaviside, Peter Lee, Alexa Rizeq ADVISOR: Jim Lewis - Swinerton Builders



MODESST

MODESST, when complete, will utilize state of the art advance membrane technology treatment to ensure the facility will maintain the ever improving standards of water quality. This water campus, estimated at \$110,000,000, will include 13 buildings including an influent pump station, fine and coarse screen headworks building, process basin and control building, UV disinfection facility, and dewatering building. Also included on site will be maintenance and administration buildings that will be LEED certified.

CIVIL EDGE ENGINEERING

MEMBERS: Aaron Cunningham, Max Douglas, Andrew Lelja, Joseph Marin, Michael McFadden, Kevin Smith

ADVISOR: Walter Musial, Linscott, Law & Greenspan, Engineers



HARBOR ISLAND REDEVELOPMENT

The proposed redevelopment is located within the East Basin Industrial Subarea, also known as Harbor Island. This redevelopment encompasses approximately 48 acres, which will include a 10-story hotel, several retail storefronts and commercial businesses, a brewery, multiple restaurants/eateries, two multi-story parking garages. The hotel will consist of 300 guest rooms, multiple conference and meeting areas, an event room, pool and spa, restaurant and bar, which will be placed in the existing southwest portion of our project location.

The project focuses on a series of studies which include, traffic impact, water/sewer, geo-technical study, and storm-water report. These are in effort to build an Environmental Impact Report (EIR) for the surrounding area.

COTAN ENGINEERING

MEMBERS: Alexis Armijo, Nick Avlani, Carlos Gil-Marroquin, Tyler Inderwiesche, Alejandro Soriano ADVISOR: Richard Trembath - Black & Veatch



MORENA SEWER PUMP STATION AND PIPELINE

The Morena Pump Station and Pipeline project is part of the San Diego's Pure Water Program.

The City is executing this major program to reduce the reliance on imported water and diversify the portfolio of water supply to the region. The concept of Pure Water is to further treat tertiary wastewater to drinking water standards, store this water in a reservoir and then route as raw water into a City water treatment plant. This concept is called Indirect Potable Reuse (IPR).

The \$100M Morena Pump Station and Pipeline project will pump raw wastewater to the North City AWT through a 37mgd pump station and, 11 mile long pipeline. Our Capstone team has analyzed the project and prepared a design to meet this objective.

CRAVOS ENGINEERING

MEMBERS: Othman Alfakhri, Ahmed Drebi (PM), Christelle Olu-Coker, Victor Hernandez, Rona Belle Quimbao, Shane Smith

ADVISOR: Samuel Waisbord - Nasland Engineering



ANTIGUA BLVD ROAD DIET

The scope of the project resides in the Tierrasanta Residential Neighborhood. Antigua Boulevard is a 4-lane road with a turning center lane located between Santo Road and Via Valarta. The surrounding structures are an elementary school, church and park. Complaints from community regarding current road width and vehicular speed leads to unsafe conditions which limits access to bikes and pedestrians. In addition, operations and maintenance cost is unnecessarily high for the number of vehicles using the road. Reconfiguration of the road is advised to resolve these issues.

LOWCAL ROADWAYS

MEMBERS: Alan Fitt, Tommy Hogle, Jose Moreno-Pinete, Sean Papenhausen, Kristen Snyder, William Valle ADVISOR: Sam Waisbord - Nasland Engineering SPONSOR: Bill Valle - City of Chula Vista



ANTIGUA BOULEVARD - A COMPLETE STREET

Antigua Blvd is an existing street in a semi-suburban neighborhood in the community of Tierrasanta in the City of San Diego. Antigua Blvd is a 4-lane road with a center two-way-left-turn lane. There are complaints from the community that the road is unsafe for cyclist and pedestrians. In addition, there is an elementary school, park, and trailheads located along this section of road to be considered.

A reconfiguration involves converting a large multi-lane roadway into one with fewer and smaller lanes. The reallocated space is used for other modes of travel such as bikes, pedestrians, possibly on-site stormwater treatment, wider meandering paths, passive spaces, and/or parking.

PRECISION CONSTRUCTION & ENGINEERING

MEMBERS: Anthony Abalos, Steven Bayooz, Alejandro De La Torre, Elizabeth Figueroa, Jesus Garcia (PM), Rogelio Ruiz



SAN DIEGO EAST HARBOR ISLAND REDEVELOPMENT

The San Diego Port District has voted for the planned redevelopment of East Harbor Island. The redevelopment will replace the abandoned use of rental car agencies that have recently vacated Harbor Island to move to a new airport garage next year on Pacific Highway. The purpose of the redevelopment is to increase used by the public and generate much needed revenue to the port district, which is still recovering from the loss of control of Lindbergh Field and its income a decade ago. The redevelopment of East Harbor Island will include a mixture of hotels, retail operations, entertainment venues or other amenities. The redevelopment includes approximately 48 acres of land between Lindbergh Field and San Diego Bay along East Harbor Island.

SPECTRAL ENGINEERING

MEMBERS: Roqayah Akbar, Alberto Correa, Ricardo Ramirez, David Riley, Mahmood Taqi, Paola Uriarte ADVISOR: Jim R. Haughey, P.E. LEEP AP



SANDAG MULTI-PURPOSE BUILDING & BUS STOPOVER FACILITY

SANDAG is proposing a new multi-use high rise building to be constructed in one of the 5 sites that they own in downtown San Diego. It will include underground parking, residential apartments, SANDAG offices and the bus stop over facility which will be dedicated to bus stop offices to serve transit employees.

TEAM 6 PRIESTMAN AND PARTNERS

MEMBERS: Yousef Arriat, Tyler Craddock, John Dumaran, Ryan Priestman, Ryan Shook, Paul Soutzin, Cole Thomas

ADVISORS: John Prince, James Haughey



HARBOR ISLAND REDEVELOPMENT

We will be designing a redevelopment on Harbor Island, San Diego, CA. The redevelopment will include a hotel, parking lots, a boardwalk plaza with small business shops, a ferris wheel, and a park. There will be studies done in the following areas for the work including, traffic analysis, storm water, plumbing and domestic water, site utilities, cost, schedule, and construction phasing.

UNDER CONSTRUCTION

MEMBERS: Yahya AlSalam, Melissa Cortel, Carlos Cruz, Edward Padilla, Ramin Safavi, Lam Van, Rani Yamlikha

ADVISORS: Kenny Nguyen - CalTrans

Elmer Dulay, Feryal Moshavegh and Huy Nguyen - City of San Diego Public Works



PORT OF SAN DIEGO - SEAPORT VILLAGE REDEVELOPMENT

Under Construction, a contracting and engineering firm, is tasked with creating supporting documents to assist with the complete renovation and redevelopment of Seaport Village in San Diego, CA. The redevelopment plan will include a 300room hotel, 5 major restaurants, 50 specialty shops, multiple fast food chains along with other facilities, including parking accommodation for users and tourists. The main goal of this redevelopment plan is to increase the use of the public, ultimately generating much needed profit. Our proposal will include preliminary drawings, scopes analysis and EIR supporting documents to be able to create an initial EIR.

ELECTRICAL & COMPUTER ENGINEERING

ACE

MEMBERS: Abukar Abdirahim, Dan Bernstein, Maryann Dalal, Cody Nnamani, Erika Serrano, Ryan Torres, Joseph Villanueva

ADVISORS: Professor John Kennedy and Dr. R. Lal Tummala, Professor

WEBSITE: http://teamace.sdsu.edu/



AUTONOMOUS CANDLE EXTINGUISHER (ACE)

Fire "Fighting" Robots is a new engineering competition established at SDSU. The competition consists of building a robot that will be able to autonomously find and extinguish the flame as quickly as possible in the competition course while avoiding obstacles and "false flames." Team ACE plans to build a robot that will meet desired specifications to compete against the other SDSU firefighting robots by the end of the semester. ACE's overall goal is to build the fastest, most precise robot than the other SDSU senior design teams using design elements such as sensors, motors, microcontrollers, and last but not least: our engineering knowledge and skills.

AZTECFEC

MEMBERS: John Brinsko, Armando Flores, Omar Flores, Elbert Guico, Arash Moradinejad,

Charles Plank, Ryan Rivera, Ricardo Rivero

ADVISORS: Tianze Kan and Shuai Mao SPONSOR: IEEE WEBSITE: http://ifec.sdsu.edu/



HIGH DENSITY POWER SUPPLY

The goal of this project is to build an AC/DC converter, taking an input of 90-264Vac and applying power factor correction techniques to control an output of 400Vdc. The need for high power AC/DC conversion is becoming more important as more demand is placed upon data centers, microgrids, and electric vehicle infrastructure. At the same time, this project also supports our school's first submission to the International Future Energy Challenge 2016.

EVOLVE

MEMBERS: Zachary Brady, Sam Bustillos, Patrick Casilang, Andrew Ingle, Izzy Jimenez, Asma Khan, Jonathan Lobue, Leslie MacAulay, Daniel Marsden, Justin Mifflin, Leonardo Mura, Antonio Nevarez, Ian Stuart, Miranda Turner, Plamen Vasilev, Jeremy Villena

ADVISORS: Darren George and Drew Smith - SDG&E

SPONSORS: Steven Prsha, Joseph Saldana and Daniel Smith - SDGE&E

WEBSITE: http://evolve.sdsu.edu



ELECTRIC VS. GAS CHALLENGE

The project will be simulating a race between two users that select a vehicle based on a pre-game mini survey. The players will have to complete missions throughout the race while accumulating points based on their "on the spot" decisions. The main goal of the game is for the driver to be as efficient as possible by using an electric or gas vehicle. The consumer will be able to compare electric vehicles to other types of vehicles, giving them an unbiased view of the car options available to them. In order to effectively get this information across, the system will have an interactive game component and physical small scale city and highway environment to make the experience entertaining and educational.

HAAVOCC ROBOTIC

MEMBERS: Salaheddin Al-khawaja, Samer Arabo, Elena Collantes, Eymard Cruz, John Ho, Anthony Oghassabian, Bernardo Valdez

ADVISOR: John Kennedy

SPONSOR: SDSU College of Engineering



FIRE "FIGHTING" ROBOT

The Fire Fighting Robot competition is comprised of two phases, both in which each robot must locate and extinguish a single flame source from a candle (3" to 6" tall) located in the arena as quickly as possible and avoid decoy candles (LED light). The robot must perform these tasks autonomously and will be equipped with 100mL of water as a fire fighting agent, which can be deployed by any method. Deploying the firefighting agent on a decoy will cause a run to be terminated. In phase 1, robots will traverse the arena alone. In phase 2, the course will be reconfigured and in phase 3, all competing robots will traverse the arena simultaneously. Engaging other robots is allowed and encouraged.

MATHWIRE

MEMBERS: Qorane Ahmed, Roy Bost, Robert Buchanan, Elizabeth Hatfield, Tim Jordon, Vieri Mattei, Hunter Young

ADVISORS: Richard Lane & Hugh Molesworth, MCWE Legacy Center

WEBSITE: http://mathwire.sdsu.edu/

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LOCATION AWARENESS

A wireless location system that will provide tailored content specific to an exhibit visitor by utilizing facial detection, ultrasonic range detection and RFID identification to identify a visitor.

POSEIDON

MEMBERS: Leban Ali, Brady Anderson, Trevor Blazek, Blair Chantrill, Mark Dimaano, Bao Hoang, Jonah Mariano, Jeffrey Miller, Shideh Naderi, Uros Obradovic, Cavan Page, Emmanuel Palafox, Davy Phakdy, John Salamat, Sebhat Yidelwo, Nutdanai Swangpattaraphon

ADVISOR: David Barnes - Mechatronics

WEBSITE: http://poseidon.sdsu.edu



UNDERWATER ACOUSTIC MODEM

A half-duplex modem for communication between two AUVs in a short range, noisy, shallow water environment. The AUVs will send essential information to each other in data packets that will be decoded and encoded by the modems placed in each AUV.

SIO

MEMBERS: Will Alarcon, Joshua Black, Alex Friedman, Victor Ho, Joe Nunez, Alvin Somvilay, Mike Yao ADVISORS: Hugh Molesworth - XPI Design LLC, John Kennedy - San Diego State University SPONSOR: Hugh Molesworth - XPI Design LLC



GYROSCOPIC BASED HAND STABILIZATION TO HELP THOSE WHO SUFFER FROM PARKINSON'S DISEASE AND ESSENTIAL TREMOR.

The goal of our project is to develop a gyroscopic based glove design that can allow those who suffer from Parkinson's disease and essential tremor to regain fine motor control. Our goal is to allow those who use our device to utilize a computer mouse and for our project to be expandable to other applications.

UFIREX

MEMBERS: Seimon Arcinue, Andres Chung, Edward Culanag, Richie Pedrena, Lauren Peppard,

Alejandro Zavala

ADVISOR: John Kennedy - SDSU

WEBSITE: http://volta.sdsu.edu/~ufirex/



FIRE FIGHTING ROBOT CHALLENGE

The challenge is to design a fully autonomous robot that can navigate through the given course, find a lit candle, then extinguish it all while avoiding decoy candles.



MECHANICAL ENGINEERING

ACL TEAR PREVENTION

MEMBERS: Falon Manns, Randy Nguyen, Nika Sedghi, Scott Walling ADVISOR: Tom Abdenour - Head Athletic Trainer, San Diego State University SPONSOR: Will Sevening - National Basketball Athletic Trainers' Association



TEAR PROOF

The idea of Tear Proof explores the possibility of refining how weak lower ligaments are identified by using precision sensors to track the movement in rotation and deflection of the knee. One of the most common injuries, especially in athletes, is an Anterior Cruciate Ligament tear (ACL). An ACL tear can be caused by unnatural maneuvering and pivoting of the knee, leading to surgery and a long road to recovery. Through the programming of two IMU sensors, a device that is able to measure the strength of the posterior gluteus maximus was created. The sensors' information is transmitted wirelessly to a laptop and is displayed in a Python GUI format for an intuitive and interactive user interface.

ADAPTIVE MOTION SURFBOARD FINS

MEMBERS: Ryan Burks, Sam Delaney, Trevor Knapp ADVISOR: Dr. Asfaw Beyene, Professor, SDSU Department of Mechanical Engineering



ADAPTIVE MOTION SURFBOARD FINS

Using the principles of adaptive motion that were recently used to design morphing blades for vertical and horizontal axis wind turbine blades, we have developed partially flexible high performance surfboard fin prototypes. Surfboard fins experience similar flow conditions to horizontal axis wind turbine blades, and a higher lift to drag ratio for the fins correlates highly with surfboard performance in design conditions.

AUTOMATED SMART WHEELCHAIR

MEMBERS: Anthony Cazabat, Ruben Cornejo, David Felix, Carlos Schmidt ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering SPONSOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



AUTOMATED SMART WHEELCHAIR

Computer automation and development of sensor based functionality are the main objectives of this project. The main resource provided for the project was a joystick controlled drive only power wheelchair. Our goal has been to create an intelligent control system for the power wheelchair that provides different control interfaces to accommodate the varying levels of disability of those in need assisted mobility. This makes it possible for those individuals with varying disabilities to control the chair through a speech recognition control interface and an electroencephalogram control interface that detects signals generated by the brain. The power wheelchair control system will also utilize Lidar for autonomous navigational function allowing for the chair to interact with its environment.

BAJA TRANSAXLE TEAM

MEMBERS: Jessica Brown, Lauren Daley, Dylan Delonzor, Zachary Goodrie

ADVISORS: Mark McMillin - McMillin Realty and McMillin Racing

SPONSORS: Mario Gutierrez - Aztec Baja Chief Engineer, Mark McMillin - McMillin Realty and McMillin Racing



TRANSAXLE TEAM

In order to be more competitive in the international collegiate offroad racing competition, it was decided to design a transaxle customized specifically for the Baja SAE buggy that was lightweight, optimized to the engine power output, and able to withstand the roughness of the course.

C.M.M.L.

MEMBERS: Cody Carl, Mark Damore, Michael Diomartich, Lauren Parrett ADVISORS: Jake Heimaster and Jesse Sandoval - San Diego Gas & Electric



UTILITY POLE JACKING SYSTEM

The objective of the project was to design a device that can aid SDG&E in the assembly/disassembly of utility poles. Utility poles come in two sections: a shorter stub section placed in the ground followed by the top section which can vary in height. The device can disassemble the two pole sections, and assemble two new pole sections together, all without creating damage to the pole. The device uses two sub-assemblies, separated by 180 degrees, that attach to the preexisting welded nuts on the pole. Two hydraulic cylinders are used to control the two subassemblies in parallel. The hydraulic cylinders are connected to the lineman's utility truck's hydraulic tool circuit.

CELL MEMBRANE BIOREACTOR

MEMBERS: John Cifelli, Markus Grauer, Dalton Rosenberger ADVISOR: Dr. Karen May-Newman, Professor, SDSU Department of Mechanical Engineering



CELL MEMBRANE BIOREACTOR

Our goal is to create a bioreactor that simulates the conditions in the heart following the implantation of a Left ventricle Assist Device (LVAD); specifically, our group is looking at the potential causes for aortic valve dysfunction at the cellular level.

COMPUTER CONTROLLED SMART-TOUCH FINGERS

MEMBERS: Julius Exner, Garrett Reinickie, Myles Taccini, Saiid Zamingir ADVISOR : Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



COMPUTER CONTROLLED SMART-TOUCH FINGERS

Our project is a demonstration in the manipulation of touch-capacitive devices by control of a prosthetic hand. Use of common-place technology including smartphones or tablets presents many obstacles which require innovative solutions. Finger gestures such as swipes or scrolls, for example, require a blending of disciplines including kinematics, mechatronics, and data acquisition, while the fabrication of such a device necessitates teamwork in machining and prototyping.

We are hoping the advances brought forth by our project will help those in immediate need, as well as future prosthetic designs in incorporating touch-capacitive capabilities.

DRS TEAM

MEMBERS: Pablo Baturone, Unai Echegaray, Santiago Napal ADVISOR: Dr. George Youssef, Assistant Professor, SDSU Department of Mechanical Engineering SPONSOR: Mitchel Burton - Aztec Racing Team

WEBSITE: http://fsaeaztecracing.wix.com/aztec-racing



DRS PROJECT

The DRS allows to vary the aerodynamic forces, maintaining downforce while turning and reducing drag while driving in a straight line.Our final concept was to make a whole pack of Steering Wheel+DRS considering the necessity of controlling the system from the steering wheel. The aim of the steering wheel is, not only to incorporate the DRS's push button, but allow the introduction of new electronics in the future. The main specifications for the DRS system are that it has to be fast, light, cost effective,aerodynamic friendly and meet the FSAE requirements. For the steering wheel, the design has to be light, ergonomic, upgradable and also meet the FSAE requirements.

EDDY CURRENT DYNAMOMETER

MEMBERS: Rida Alvi, Adam Lane, Daniel Williams, Edmund Zhang ADVISOR: Eric Zugner - Zugner, LLC SPONSORS: SDSU Formula SAE - Aztec Racing, Achates Power, Futek, Zugner, LLC



EDDY CURRENT DYNAMOMETER FOR FORMULA SAE

An eddy current dynamometer uses the principles of electromagnetism to apply a braking force to a motor in order to determine the power the motor produces at a given rotational speed. These devices are commonly utilized by an engine tuner to optimize the performance of an internal combustion engine. This team designed and fabricated a custom dynamometer for the SDSU Formula SAE team to aid in powertrain development and design. Access to dynamometers that can absorb the power of a small internal combustion engine is difficult and can hinder the overall development of the Formula SAE race car. The addition of an eddy current dynamometer to Aztec Racing's tool set will provide a competitive edge against collegiate teams from around the world.

ELECTROMYOGLOVE

MEMBERS: Melia Asucan, Joshua Hardin, Brian Hirst, Duong Nguyen ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



ELECTROMYOGLOVE

The purpose of our project is to design a stylish, durable, and functional product that uses electromyography and other sensors to recognize gross-motor movement and common gestures of the human hand. Our project uses surface EMG sensors placed on the hand near the thumb muscles in order to minimize interference due to adipose tissue while allowing our motion sensors to capture the overall motion of the hand. The EMG sensors will be housed in a 3D printed casing to protect from abrasion and placed in the first pocket slot near the thumb. The glove is a one-piece wrap-around style constructed out of an elastic material to maximize comfort, ease of use, and to adapt the glove to various sized hands.

EMG SENSOR GLOVE

MEMBERS: Minjin Jin , Alejandro Macil, Nick Martin, Jordan Tencati ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering SPONSOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



EMG SENSOR GLOVE

Surface Electromyography (sEMG) is a measurement process of the muscular activities produced by skeletal muscles on the surface of the skin. In our project, the sEMG sensor, provided by Dr. Kee Moon who is the professor and adviser for our senior project, has been designed into a wireless glove. The sensor consists of a wireless EMG chip, accelerometer, and gyroscope. With these components of the sensor and EMG readings from electrode channels placed on the varying muscles, the EMG sensor glove will be able to read and record varying hand movements. With the hand movements being recorded, they then can be translated into various recreational and therapeutic uses.

ENERGY ANALYSIS OF A COMMERCIAL BUILDING

MEMBERS: Jonathan Dukat, Tung Luong, Maseeh Siddiqui, Jwan Zada ADVISOR: Jason Adams, Sun Belt Controls SPONSOR: Chris Deck, DEC Engineers



ENERGY ANALYSIS OF A COMMERCIAL BUILDING

The purpose of this project is to perform an energy analysis on a commercial building and create a graphical user interface to measure the energy consumption of the building overtime and realtime.

ENERGY RECOVERY

MEMBERS: Natalia Ermolaeva, Aaron Leftwick, Joe Uhde ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering SPONSOR: Energy Recovery



ENERGY RECOVERY SYSTEM

The project captures kinetic energy otherwise lost when braking. This design is implemented on a tricycle that was manufactured by the team with use of a Kelly regenerative motor controller and a bicycle wheel hub motor assembly purchased on Amazon.

FORMULA ONE INSPIRED TRIKE

MEMBERS: Connor Courtney, Mario Pardi, Jonathan Strohl ADVISOR: Drew Dominique - DREWFAB SPONSOR: DREWFAB



FORMULA ONE INSPIRED TRIKE

To design and build a high performance, Formula One inspired gas powered tricycle that combines the mechanical and manufacturing techniques learned through our undergraduate degree at SDSU.

HI.BOTICS

MEMBERS: Zachary Brungard, Branden Hinkle, Thomas Hopkins, Austin Wyatt Smyers ADVISOR: Bruce Westermo - PLTW California Professor SPONSOR: Bruce Westermo - PLTW California Professor



ELEVATED AUTONOMOUS TELEPRESENCE ROBOT

The invention consists of a lightweight track system, suspended from the ceiling or off of wall brackets, and includes one or more relatively small, robotic, self-propelled cars that move along the overhead track(s) in either remote control or autonomous modes. The robot will be capable of a multitude of tasks such as telepresence and surveillance which is through a mounted screen on an automated pan/tilt mount). It will be controllable through a variety of devices from hand held controllers to a web based platform interface.

KEG TEAM

MEMBERS: Michael Brekke, Ryan Mitchell, Bryan Sims, Everett Wolfe

ADVISOR: Dr. Peiman Naseradinmousavi, Assistant Professor, SDSU Dept. of Mechanical Engineering SPONSOR: Keg Team



THERMOELECTRIC KEGERATOR

A well insulated all-in-one keg system that is thermo electrically cooled.

KINETIC CELL PHONE CHARGER

MEMBERS: Steve Antunes, Eric Brunh, Abram Gil ADVISOR: Julian Espinoza - SDSU



KINETIC CELL PHONE CHARGER

Multi-magnet, multi-coil power generator with two-way USB port. To provide a practical form of re-charging in the absence of electrical supply or in case of an emergency.

PROSTHETIC HAND

MEMBERS: Bader Balubaid, Carlos Brambila, Zachary Fowler, Brett Musolf ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering SPONSOR: Dr. Karen May-Newman, Professor, SDSU Department of Mechanical Engineering



PROSTHETIC HAND

The goal of this project is to create a prosthetic hand having the characteristics of being a simple biomimetic, cost-effective, low maintenance, and rapid prototyping with the functions of individual finger and thumb control, and one-directional wrist motion. Our design will incorporate a flexible polyurethane elastomer within the phalanges. A series of wires extending into the four fingers will mimic tendons in the human hand and to allow for a smooth gripping motion of objects.

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RIKERS

MEMBERS: Fahad Alsifran, Ghaith Althobaiti, Cameron Candalla, Wesley Episcopo ADVISOR: Dr. Peiman Naseradinmousavi, Assistant Professor, SDSU Dept. of Mechanical Engineering



SURVIVAL MULTI-TOOL

A compact multi-tool that comfortably fits on the waist or in a pocket and can produce fire, purify water and generate light.

SDSU MECHATRONICS: ROBOSUB

MEMBERS: John Hernandez, Harry Ho, Sokheng Lek, Austin Owens ADVISOR: Dr. Kaveh Akbari Hamed, Assistant Professor, SDSU Department of Mechanical Engineering SPONSOR: Austin Owens - Mechatronics WEBSITE: http://www.sdsumechatronics.org/



ROBOSUB

The objective for our project is to reduce the overall weight of the robotic sub while increasing the buoyancy. Also to create a buoyancy shifting mechanism which adjusts the center of buoyancy. After completion of these mechanisms we needed to install them as well as edit the controls systems to allow for smooth translation and rotation of the sub in water.

SMART HEADPHONE

MEMBERS: Leah Aguirre, Fahad Alharbi, Joey Powers, Mohamed Sufi, Glenn Wang ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering SPONSOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



SMART HEADPHONE

To design a headphone with retractable wheels.

SMARTBOARD TEAM

MEMBERS: Mohammad Al-Tabtabaei, Hesham Alotaibi, Marshall Draper, Mary Vasquez ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering SPONSOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



SMARTBOARD

This SmartBoard is a personal transportation device developed to aid in the transportation of small and medium cargo and can be controlled remotely by electromyography (EMG) or by tracking and following the users' movements. At the heart of this project is a rugged and modular design that can assist future students in learning programming and robotics for years to come.

SMARTBOARD TEAM

MEMBERS: Kevin Bayan, Jeffrey Cantada, Gabriel Dariano, Jared Galligar ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



SMARTBOARD

The Smart Board will utilize National Instruments' myRIO microcontroller to ultimately provide various modes of transportation and enhance the industrial experience. Designed with the user in mind, the Smart Board presents many potential solutions for those with limited capabilities of movement by allowing maneuverability through confined and cluttered areas with ease. In addition to providing transportation to those with limited mobility, the Smart Board can serve as a motorized dolly that can assist with heavy cargo in warehouses or for personal use.

SOCAL SHIFTERS

MEMBERS: Mason Payne, Arturo Sotomayor, Alex Suares, Edwin Taygon ADVISORS: Dr. Fletcher Miller, Professor - SDSU Department of Mechanical Engineering, Joel Mawhinney - Meggitt Controls Systems San Diego SPONSOR: Michael Begley - Breakaway Bikes, Firgelli Technologies



AUTOMATED GEAR SHIFTING FOR COMMERCIAL BICYCLES

An automated gear shifting device designed to be consumer friendly, universal, and cost efficient to turn a manual geared bicycle into an automatic geared bicycle. Changes in gearing will be based on environmental conditions and user preferences and therefore the optimal gearing ratio will be selected for max efficiency and comfort.

TEAM EOG

MEMBERS: Rebecca Gloria, Cesar Romero, Chris Samson, Phillip Truong ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



WIRELESS ELECTROOCULOGRAPHY (EOG) DESIGN

Electrooculography is a technique used to measure the resting electrical potential that is generated between the cornea and Bruch's membrane (front and back of the human eye). Electrodes are placed on the face in designated locations around the eye, and eye movement is able to be recorded. The purpose of this project was to develop a wireless eyewear device that incorporates EOG technology with possible applications in medical or communication devices. Emphasis was placed on a modern aesthetic design that is easy to use, adjustable, and can perform accurate readings.

THERMAL SYSTEM DESIGNS

MEMBERS: Corinne Allen, Eli Ebanks, Andrew Nagel ADVISOR : Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering SPONSOR: Dr. Subrata Bhatacharjee, Professor, SDSU Department of Mechanical Engineering



FLAME TUNNEL IGNITION SYSTEM

Ignition system for solid fuel samples that is compatible with the combustion lab's flame tunnel. System must be able to ignite different solid fuel samples of various thickness and at different airflow velocities, also needs to safely ignite with the press of a button on a GUI.

WIRELESS EEG HEADSET TEAM

MEMBERS: Carly Cole, Kevin San Andres, Dallas Scaggs, Evan Tully, Corey Van De Hey ADVISOR: Dr. Kee Moon, Professor, SDSU Department of Mechanical Engineering



HEEGPHONES

Our goal is to create a fashionable, wearable EEG headset device to complement existing wearable devices. We want to create a product that utilizes brain activity to be used not just for medical and health-monitoring purposes but also for handsfree remote controlling and entertainment. hEEGphones were designed with optimal sensor positions in mind. A 10-20 EEG placement system is utilized (meaning it will fit proportionally to many head sizes). Electro-conductive gel is delivered through the electrode mesh, allowing the electrodes to be more sensitive to your brain waves, making hEEGphones perform more accurately and consistently. hEEGphones are a revolutionary tool that double as a brain-wave communication device and fully-functional headphones that take wearable electronic devices to the next level!