College of Engineering & Computer Science
Spring 2018 Senior Design Showcase
Team Project Descriptions

Mechanical Engineering Projects

Outdoor Breezeway between Santa Clara and Riverside Halls (1 – 4 pm)

Ar500 Steel Target System

This is a target system of pure mechanical design. The system operates and resets under impact. For use on firing ranges, the project itself has limited hazards. The purpose of this project is to mitigate risk in more hazardous environments [i.e. shooting ranges, private ranges, etc.]

Team Members: Michael Chubbuck, Juan Meza, Juan Rivera, Daniel Parlee
Faculty Advisors: Dr. Rustin Vogt, Dr. Steven Fernandez, Prof. Michael Bell

Conveyor Belt Box Sorting

This project develops a small-scale model of a box sorting system. It is driven by a conveyor belt and controlled by an Arduino and distance sensor.

Team Members: Salam Abdulhameed, Chris Nelson, Daniel Sokol, Nikolay Zhalybin
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Fatigue Testing in Corrosive Environment

This project will serve as a tank attachment to the Instron vertical fatigue tester. It will allow a standard fatigue test to be ran within a corrosive environment such as water and hot oil. The data from the corresponding tests will be used to test for SCC (Stress Corrosion Cracking) within various materials. The attachment will also serve as a viable tool for standard fatigue test operation without the presence of a corrosive environment.

Team Members: Anthony Braderick, Bradley Redmond, Jordan Santos, Joey Tax
Faculty Advisor: Dr. Rustin Vogt, Prof. Michael Bell

Fermentation Room Pressurization

The goal of the project is to route air from the current HVAC system at the Monk's Cellar into the open fermentation room to create a positive pressure environment inside to reduce or eliminate contamination of the beer due to outside air.

Team Members: Nick Peno , Blaine Petersen, Peter Platon, Clint Syftested
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell
Client: The Monk's Cellar

Filament Extruder

This project uses recycled HDPE plastic and extrude it into 1.75 mm 3-D printing filament.

Team Members: Brian Lee, Armando Sanchez, Rajivir Sigh, Marc Thillois, Alejandro Uribes
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Fire Power

Fire Power is a portable thermoelectric generator that is capable of producing 150W of electricity by burning solid fuels such as wood or foliage. Fire Power is designed for outdoor environments where its fuel source is readily available. When the fuel source is depleted, there are internal batteries that can provide up to one hour of use at maximum power. Fire Power's only mechanical components are four cooling fans so it never needs maintenance and can run continuously for as long as fuel is supplied. Its fuel chamber features an open top design that allows it to be used to boil water, cook food, or provide warmth to a campsite.

Team Members: Mohamed Allahabi, Gurpal Lally, William Maldonado, Adam Rodriguez, Dawei Yao
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Roadside Emergency Device (R.E.D)

A device is being developed, geared towards law enforcement use, that will replace road flares in the event of an accident on roadways. This device will extract and retract when needed, installed LEDs on the frame, and a sensor will be installed in the event a vehicle runs over the device.

Team Members: Drew Gabriel, Ramon Gildo, Jaime Herrera, Ritchie Pallaya
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Formula SAE Brakes Redesign Team

The Formula Society of Automotive Engineers (FSAE) Team at CSUS is downsizing the wheel diameter on the 2018 Formula Car from 13" to 10". This requires all components within the wheel (rotor, hub, brakes, etc.) to be redesigned to fit within the new geometric constraints. This senior design team has redesigned the brake system to fit within the 10" wheel, while maintaining the previous year's brake performance.

Team Members: Kevin Leonardo, Zachary Putzig, Richard Valdez, Anthony Villanueva, John Worthington
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell
Client: CSUS Formula SAE

Handheld Coffeemaker

Handheld, 4x12 cylinder boils water using a submersible heating element. The design incorporates a water reservoir that heats 8 ounces of water, a DC motor to grind coffee, and a filter and cup to brew. The project runs off 12 volts using rechargeable batteries housed in series.

Team Members: Tanner Davis, David Doroshuk, John Mercado, Arytoom Olifir
Faculty Advisor: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Human Powered Vehicle

The American Society of Mechanical Engineers (ASME) Human Powered Vehicle Club plans to compete in the annual competition to build a recumbent tricycle that will be practical for future means of transportation in under-developed countries. The project's overall goal is to reduce the amount of automated vehicles to reduce carbon emissions in the environment. At the event, there are four different competitions planned, which include men's speed, women's speed, innovation, and endurance.

Team Members: Brett Babigian , Steve Diamond, Sabrina Martin, Lucas Melville, Hoa Van
Faculty Advisors: Dr. Rustin Vogt, Dr. Tim Marbach, Prof. Michael Bell

Hyperloop Propulsion

Using a high output VFD Motor, this project will act as a testing dynamometer to explore the upper limits of the Hornet Hyperloop drive wheel. In order to be used in the Hyperloop competition all components must have testing documentation supplied with them; this project will test the upper limits of the polyurethane drive wheels in order to gain comprehensive testing data.

Team Members: Marius Avril, Christopher Browning, Daniel Christiansen, Robert Dayringer
Faculty Advisor: Dr. Rustin Vogt, Prof. Michael Bell

Landfill Flare and Corrosion Mitigation

A standard LFG flaring system operates with temperatures as high as 2,000°F in the combustion area. The main objective is to implement an effective design solution to reduce corrosion and to improve overall durability of the flaring system. Various materials were tested for quantifiable dependability from each material of corrosive, oxidation, and high-temperature resistance characteristics. These materials used were hexoloy, mild steel, 304, 316, as well as a super alloy inconel. The end-result is high longevity of landfill flaring systems, reducing maintenance costs. A condensate is injected into the combustion chamber, comprised of chemicals to replicate the corrosive degradation within the landfill flare. This will provide an accurate representation to analyze and improve upon the existing flare.

Team Members: Fredric Allen, Zane Atkins, Justin Hall, Ayyaz Mahmood, Noah Kolaei, Bryan Ngo
Faculty Advisor: Dr. Rustin Vogt, Prof. Michael Bell
Client: Sacramento County (Kiefer Landfill)

Microalgae Cultivator: Carbon Sequestration in a Hybrid Photobioreactor

This project aims to design a closed-system photo bioreactor capable of cultivating microalgae for the purpose of carbon sequestration. The system will be composed of PVC, acrylic tubing, and tygon tubing, with a peristaltic pump, and a stainless steel wort chiller submerged in water as a heat sink.

Team Members: Brandon Kitelinger, Brian Mckee, Andrew Michaelson, Wesley Near, Sarah Roudon
Faculty Advisor: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Light Rail Vehicle Train Line

In this project, the testing device created will perform a Static Functional Verification Test on train line operations from a single laptop. Data transfer from the device into a laptop will reduce the time it takes for two technicians to perform the test per Light Rail Vehicle (LRV) from 10 hours to under 3 hours. The device will require only one technician from inside of the train rather than having one in the e train and another by the coupler. There is an existing device that costs $60,000 but the testing device produced from this project will only cost $10,000. In addition, reducing the amount of technicians will furthermore reduce the company's cost for the remaining San Francisco trains. This device will reduce labor hours, testing costs and will create an easier testing process.

Team Members: Dillion Blake, Jerruz Calzado, Andre Henry, Cesar Vega
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell
Client: Siemens

Parking Lot Car Counter

Project will use cameras to count vehicles entering and exiting Parking Lots 9 and 10 on campus. These cameras will each have a maximum power consumption of 4W, powered by solar panels.

Team Members: Marco Bonanni, Timothy Hagen, Caitlin Planchard, Lauren Rice, Kevin Staebler
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell
Client: University Transportation and Parking Services (UTAPS)

Reverse Osmosis

This project creates a transportable water filtering system using reverse osmosis. A pump will pull brackish water into the system and supply enough pressure to push this water against the Ro membrane. The pump will run off a motor connected to a power outlet of estimated 12ov.

Team Members: Maverick Deguzman, Haleigh Jarvis, Daniel Hagman, Michael Murphy, An Ngyen, Robert Williams
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell
Client: Blue Fountain Water

Scaled Down Wind Turbine Experimental Kit Thermal-Science Labs

A mini-wind turbine that will be used with wind tunnel and/or purchased fan to give hands on experience with wind turbine dynamics. A fan will provide sufficient air velocity to rotate the rotor blades and create a measurable power generation (measured with a multi-meter).

Team Members: Arthur Ingraffia, Kun Lee, Victor Quijas, Eduardo Quininero
Faculty Advisor: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Shell Eco-Marathon Energy Efficient Vehicle

This project involves building an energy efficient vehicle from the ground up to enter into the 2018 Shell Eco-Marathon competition in Sonoma, CA.

Team Members: Jacob Fveas, Nick Gasparro, Shavn Lin, Caiitlin Porter, Sara Wadell
Faculty Advisor: Dr. Rustin Vogt, Prof. Michael Bell
Client: Mark III Construction

Solar Powered Boat (Solar Regatta)

This project is a solar-powered boat to compete in the 2018 SMUD Solar Regatta.

Team Members: Daniel Saldana, Sai Yang, Corey Xiong
Faculty Advisor: Dr. Rustin Vogt, Prof. Michael Bell
Client: SHPE (Society of Hispanic Professional Engineers)

Solar Powered Electric Go-Kart

This project is to redesign a solar electric go-kart (Mototec), which is currently available in the market. The team redesigned the go-kart from 150 lbs maximum rider weight to 250 lbs maximum rider weight, and a maximum speed range of 12 to 15 mph.

Team Members: Sean Hang, Mahdi Jahami, Xin YI Kong, Yueching Liu, Ger Vang
Faculty Advisor: Dr. Rustin Vogt, Prof. Michael Bell

Stormwater Treatment

The treatment of stormwater through the use of a bioswale and a Dry-well. This project will be located at Camp Pollock and will be used to treat stormwater as well as be an educational tool for those who visit Camp Pollock.

Team Members: Madison Elliott, Lilly Greatorex, David Keema
Faculty Advisors: Dr. Rustin Vogt, Prof. Michael Bell

Traffic Redirecation Barricade

Traffic redirection mechanism, scissor mechanism, LEDS, PVC, Delrin, two posts and a voltage source at the base.

Team Members: Juan Echeverria , Dillon Gass, Sunmi Lee, Luis Villagran
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Two-Point Laser Distance Meter

HSBS two class II Laser rangefinders, a stepper motor with a Hall Effect encoder, and a raspberry PI 3 to determine the distance between the two points the laser are pointed at. A battery is enclosed in the device to power the system.

Team Members: Jon Avalos, Mark Crittewdon, Eric Macgregor, Alberto Serrano Jr.
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell

Universal Subsea Gasket Installation / Removal Tool

This project develops a hydraulically-driven tool to securely install and remove gaskets from subsea oil wells. The project uses a tripod style design which can adjust to a range of diameters.

Team Members: Sonja Croce, Jose Iniguez, Hana Macahilas, William Yit
Faculty Advisors: Dr. Rustin Vogt, Dr. Farshid Zabihian, Prof. Michael Bell
Client: Technip FMC Schilling Robotics

Vertical Axis Wind Turbine

This project develops a vertical axis wind turbine for lab use.

Team Members: Simran Chattha, Levi Hagerty, Rose Pardede, Kelsey Tamboaon, Nick Votino
Faculty Advisor: Dr. Rustin Vogt, Prof. Michael Bell

Computer Engineering/Electrical and Electronic Engineering Projects

University Union, Redwood Room (2 – 5 pm)

AI-based Maze Solving Robot (Hermes)

This project explores reinforcement-based artificial intelligence (AI) as a solution to spatial mapping and surveying. This application is pursued in the context of a competition with well-known standards and restrictions, namely the IEEE Micromouse rule set. The application is also presented as a means of providing an opportunity for students to learn about the up-and-coming field of artificial learning, with plans to include user interfaces to enable the observation of the effect each learning parameter on the system.

Team Members: Sudhakar Alla, Breeana Proffit, Vikram Saroay
Faculty Advisor: Dr. Fethi Belkhouche

Autonomous Smart Wheelchair

The Autonomous Smart Wheelchair helps people with disabilities, who cannot use their limbs, to safely navigate indoors. The product consists of three main features: 2-D mapping, autonomous navigation, and collision avoidance. It also has a battery monitoring system. In addition, the wheelchair will have smaller components like headlights to improve visibility and speakers for alerting the user.

Team Members: Quan Au, Benson Co, Timothy Mulvey, Kenneth Nguyen
Faculty Advisor: Dr. Fethi Belkhouche

Chemotherapy Efficacy Patch

A sensor has been designed that can help determine the effectiveness of chemotherapy over a span of time.

Team Members: Nora Ali, Alejandra Domingnez, Alex Reiter, Christonne Thomas
Faculty Advisor: Dr. Suresh Vadhva

Auxiliary Crutch Load Monitoring Device

Dr. Toran Macleod in the the Department of Physical Therapy pitched an idea where the force adult patients apply when utilizing crutches would need to be measured. One of the main aspects of this project is to utilize a sensor (uniaxial load cell) that can detect load on crutch and record it over a week. Two different items are recorded: the clock time (e.g. 4:30 p.m.) and the magnitude of the force on the crutch itself. This information will be displayed in real time using a program such as Matlab, Excel, or Lab View while gathering data using a Bluetooth/internet data collection procedure that would relay the information to one of these programs.

Team Members: Abobaker Hamid, Peter Le, Chandler Ocapan, Alex Gabriel Paraiso
Faculty Advisor: Dr. Suresh Vadhva

Child Safety Response System (CSRS)

Since 1998, there have been over 700 child deaths due to children being left unattended in vehicles. As ambient temperatures start to rise, it produces a situation where the car's internal environment becomes deadly for a child or other occupants that do not have enough self-independence to respond by exiting the vehicle or rolling down a window. The Child Safety Response System (CSRS) is a device that reacts to a child in the internal environment of a parked car. One solution to this problem is to put in place a first response system of automatic sensors that will detect an occupant in the vehicle, monitor the interior thermal environment of the automobile, and intervene in the event a child is left unattended in a parked car under rising thermal temperatures. The CSRS will alert the driver to check the rear seats for possible occupants when the vehicle engine is shut down. The design can also remotely start the vehicle and manipulate the vehicle temperature controls to bring the interior temperature down to a safe range. This puts the occupant in a safer position until authorities and paramedics arrive at the scene.

Team Members: Ricky Le, Jacob Maag , Adrian Torres
Faculty Advisor: Prof. Russ Tatro

comBATS (Bicycle Anti Theft System)

This project reduces the impact of bicycle theft by providing a theft deterrent and recovery mechanism. The system consists of two units: the tracker and the lock, both of which communicate with each other. The tracking unit has GPS and text messaging functionality, which is concealed inside the bicycle. The U-lock unit contains redundant mechanism to deter tampering with the lock. The two units communicate with each other to notify the bicycle's owner of the bicycle's location and the lock's status. The user can also request this information directly via SMS. All the logical features and functionalities of the systems have been successfully prototyped and tested. Moving forward, the device will be slim-lined and made more appealing to the public.

Team Members: Thor Bakken, Blake Ramos, Tasneel Singh, Ian Wollenslegel
Faculty Advisor: Dr. Fethi Belkhouche

Optical Recognition Neural Network

This system detects and recognizes handwritten digits, through a camera input. The system has two modes: learning and testing.

Team Members: Svdhakor Alla, Feristhta Ansari, Vikram Saroay, Breeana Proffit
Faculty Advisor: Dr. Fethi Belkhouche

Electronic Stethoscope

The electrical stethoscope is a medical device to be used by medical practitioners to acquire various internal sounds in the human body in a manner similar to the traditional stethoscope. The device provides users the feature of sound enhancing, noise cancellation, wireless connection, sound recording and file storage. Uses are able to control the volume of the sound that they are listening for a better-detailed understanding of the sound. With wireless feature, doctors will be able to increase the distance between themselves and a patient during physical exam. By implementing this feature, disease cross-contamination might be significantly decreased in the hospitals and clinics. Nurses will be able to perform the exam preliminary including recording the sound and storing the file under patient profile. The preliminary exam will provide doctors enough information about the patients, so that doctors and patients can spend more time on discussing the illness. Meanwhile, doctors will be able to visit more patients within a certain amount of time. This electrical stethoscope has the ability to improve efficiency of medical staff and provide high quality biological sounds in a variety of medical settings.

Team Members: Guangyao (Simon) Chen, Edward Isham, Gustavo Martinez
Faculty Advisor: Prof. Russ Tatro

Prosthetic Arm Monitor

The Shriners Hospitals for Children provide many services to children including artificial limbs to amputee patients. Artificial arms can be expensive with motor-driven fingers controlled by the patient's electromyogram signals. To better tailor the services to the children, the doctors at Shriner's Hospital desire a system that monitors the use of the prosthetic limbs to confirm the artificial limb is in practical use. The task of this project was to build an artificial arm monitor that tracks how often the arm is being used within a two-week time-span. This artificial limb wear data will be encrypted and saved in encrypted form onto a microSD card. The doctors can accept the SD card by a number of methods – mail, physical courier or perhaps even by electronic transmittal. Through a Graphical User Interface (GUI) application the project team created, the medical provider will be able to decrypt the patient information sensitive data and review the patient's wearing of the artificial limb.

Team Members: Reynald Garcia, Erik Gonzalez, Ann Thirakoune, Jimmy Tran
Faculty Advisor: Prof. Russ Tatro
Client: Shriner's Hospital

R2D2Y Robo

The goal of this project is to make a fully functioning delivery robot that will come to a user with a click of a button. An app has been developed which will be available to the user to create profiles and order necessary items. The robot uses a home location during idle state.

Team Members: Mulugeta Engdaw, Mckayla Glaves, Jasjit Gill, Javanika Naik
Faculty Advisor: Dr. Suresh Vadhva

Rehabilitation Device Monitor to Measure Physical therapy treatment Adherence

For this project, a trilateral force sensor or a load cell is used to monitor the force applied by a patient using the support device over a one-week period. This modification to the support device will not only detect the percentage of the load the patient app lies to the device, but also whether r the patient is actually using the device as recommended. The sensor r system will allow the physical therapy department t to verify that the patient is performing the correct dosage required for rehabilitation.

Team Members: Joseph Cherry, Julian Gonzalez, David Rav, Aman Shankar
Faculty Advisor: Dr. Suresh Vadhva

REPP (Robotic Embellishment Parking Painter) Bot

Jobs that require workers to paint lines on the ground contain an inherent burden in demanding a painstaking amount of time and resources that do not seem efficient to manually perform. This group set out to automate this particular task by creating an autonomous line-painting robot system. A device was envisioned that will need minimal aid of a human supervisor to accomplish the task of painting the necessary designs on the ground. Painting car parking lots is a time-consuming task that does not utilize human resources in the most efficient manner. It often requires multiple people working long hours and does not necessarily guarantee accurate work. This problem is addressed by automating the task with a robot. The robot is implemented with a rover design that is easy to use and can be easily expanded to perform other tasks that require painting the ground. Painting a parking lot will be more convenient and less time-consuming with the line-painting robot.

Team Members: Ferishta Ansari, Eric Klenner, David Ryan, Chanechiew Saeteurn, Absalom Yemane
Faculty Advisor: Dr. Fethi Belkhouche

RescueBot

The robot must be equipped with cameras running OpenCV to perform detection and mapping. It will also be equipped with microphones and sensors to detect sound, surrounding air condition, and temperature/humidity. In addition, the robot must be able to communicate fast and effectively back to base. It must have a master operating system that write/read data and communicate with all the microcontrollers. Lastly, the robot must have sufficient energy to successfully complete its task. There will be a power supply backup circuit for the operating system to prevent data from being corrupted.

Team Members: David Collier, Toua Lee, Raymond Quader, Danny Yang
F**aculty Advisor:** Dr. James Cottle

Road Quality Surveyor

This project consists of building a road quality surveyor using a small computer, accelerometer and GPS together to measure and map the number and severity of bumps in the road.

Team Members: Andrew Enright, Ellis Nguyen, Jason Su, Alexander Tomaso
Faculty Advisor: Dr. Suresh Vadhva

Situationally Aware Wheelchair

Powered wheelchairs are used in daily routine and commutes of those in need of mobility assistance. While the powered wheelchair present an advanced solution for many, they still have several disadvantages and limitations. One disadvantage of the powered wheelchair is the reduced safety; it is mechanical and can have limits to when and where it can go, and how it does so. However, the Situationally Aware Wheelchair is equipped with sensors and assistive technologies that can take the features seen on high-end cars and provide the same function on a smaller scale. This wheelchair will introduce features such as collision detection, collision avoidance, decline/drop detection, unsafe tilt detection, advanced motor controls, alert systems, location query, and event notifications – all of which will help with user safety and convenience.

Team Members: Nurthin Aziz, Khalil Javed, Amarjit Singh, Paramvir Singh
Faculty Advisor: Dr. Fethi Belkhouche

Smart Cart

The SmartCart was designed by the greatest team of all time in order to improve the overall shopping experience in brick and mortar stores. Using RFID technology, it will keep track of all items once placed into the car allowing customers to check out on the touchscreen mounted. It will also have brakes, proximity, and GPS sensors in order to avoid collisions as well as protect store owners from both shoplifting and cart theft. It will do all this very smoothly.

Team Members: Adam Al-Antably, Matteen Helward, Ryan Peck, Jacob Petersen
Faculty Advisor: Dr. Fethi Belkhouche
Client: Intel

Smart Greenhouse

Greenhouses are controlled-area-environment to grow plants. It is a structural building with different types of covering material, such as a glass or plastic roof and frequently glass or plastic walls. It heats up because plants, soil, and other things inside the greenhouse absorb incoming visible solar radiation from the sun. Greenhouses are important because they can be used to grow plants under controlled climatic conditions for optimal production. Automated greenhouses involves the automatic monitoring and controlling of climatic parameters which directly or indirectly govern the plant growth and hence their production.

Team Members: Dip Amin, Lincoln Gallegos,
Faculty Advisor: Dr. Suresh Vadhva, Dr. James Cottle

Smart Lock

The Smart Lock is an electromechanical device that is designed to be attached to any hinged door and provide a more convenient and secured mean of locking a building. Unlocking and locking functions are performed using two-factor authentication, which will include Bluetooth technology, Fingerprint, NFC Scanning, and voice recognition. In addition, the Smart Lock will work with a mobile application that will display statistical information to the user and grant keyless access to authorized users.

Team Members: Marlon Cabuawas, Ethan Kinvon, Nicholas Orfitelli, Fernando Truillo
Faculty Advisor: Dr. James Cottle

Smart Music Heartbeat Wearable

The Smart Music Heartbeat Wearable will use pulse oximetry to determine the amount of oxygen in a person's body. It will also be able to find the person's heartbeat, which will be used to speed up or slow down music. The user will be able to control their music and view their heart rate and blood oxygen percentile through a user interface on an application.

Team Members: Lyudmida Lacap, Nicholas Nguyen, Sang Nguyen, Grace Pope
Faculty Advisor: Dr. Suresh Vadhva

ThoughtChair

The ThoughtChair is an electric wheelchair whose movement is controlled by the user's thoughts using an electroencephalography (EEG) sensor. The sensor can map out one's thoughts and send a thought pattern to a computer using a program called Emotive Xavier that interprets the thought pattern as an action command. The user can see this thought command signal on a computer display for confirmation of a desired wheel chair movement. Using a program called EmoKey, this command signal is converted into an ASCII symbol which is then input into Arduino IDE which directly instructs the wheelchair move in the desired direction. The electric wheelchair is equipped with five SHARP infrared sensors for obstacle avoidance, two temperature and force sensitive resistor sensors around the battery, and two rear view mirrors. The IR sensors, when triggered, will stop the wheelchair and help the user avoid nearby obstacles. Both the temperature sensors and the FSR sensors will shut off the motors when triggered by out of bound battery conditions. The rearview mirrors are adjustable and allow for 135° of rear view awareness. The entire project is programmed on Arduino IDE with assistance from both Emotive Xavier and Emokey.

Team Members: Anthony Egbujor, Angel Figueroa, David Gomez, Jesse Polio
Faculty Advisor: Prof. Russ Tatro

Tiny Home

This project involves home automatic on for the Sacramento State Tiny Home. Sensors are engineered at various locations in the tiny home that will measure numerous statistics including: CO_2, CO, humidity, temperature, water/ air flow etc., and will be presented via multiple displays around the premise of the home. A sway detection/ prevention unit will start the breaks automatically at dangerous angles, as well as a backup camera that will improve the maneuvering of the tiny home via a trailer.

Team Members: Tayyib Fayyaz, Jose Montanez, Miguel De Sousa, Calvin Trueman
Faculty Advisor: Dr. Suresh Vadhva

Electrical and Electronic Engineering Projects

University Union, Redwood Room (2 – 5 pm)

Automatic Reclosing concerns and Protection Against "Out-of-Phase" Reclosing on Distribution Systems with Distributed Energy Resources (DER)

This project investigates problems associated with "out-of-phase" reclosing on unintentionally formed electrical "islands" in distribution systems.

Team Members: Jonathan Armstrong, Jose Garcia-Venegas, Denis Korneyenko, Brodie Shearer
Faculty Advisor: Dr. Mohammad Vaziri

Effectiveness of Pole-Mounted Capacitors and Alternate Methods for Power Factor Correction

This project evaluates the effectiveness of power factor correction for a municipal utility, using traditional pole-mounted capacitors. Alternate methods of addressing power quality concerns using Rule 21 generators, load shifting, and behind-the-meter technologies are also investigated.

Team Members: Joseph Kassel, Edward Millimore II, Mike Nzundi, Richard Ruan
Faculty Advisor: Prof. Jay Mearns

Line Loading and Voltage Regulation Related Concerns on Distribution Networks with High Penetration Levels of Distributed Resources

This project investigates various methods of voltage control and reactive power requirements in a distribution network, and investigates the need for modifications when penetration levels of distributed resources increase.

Team Members: Jake Blaevoet, Joshua Espinoza, Frank Xiong, Branden Yee
Faculty Advisor: Dr. Mohammad Vaziri

Load Prediction for Distribution Systems with High Levels of Residential Solar Generation

This project evaluates the capability of software tools to predict shifts in residential electric energy use, based on rooftop solar energy collection. The model concentrates on substation feeder data to perform predictions from small data sets, including public domain weather data.

Team Members: Amanda Aguirre, Josh Campbell, Benn Gizicki, Daniel Martinez, Matthew Perez

Optimal Operation and Scheduling of Storage Batteries Along With Distributed Generation for Industrial Loads

This project investigates cost and viability of battery based energy storage to reduce industrial electrical load peak time-of-use energy charges.

Team Members: Gomez Analiss, Nguyen Phat Tien, Quinn Sean, Rivers Stephanie
Faculty Advisor: Dr. Mohammad Vaziri

Peak Shaving using Battery Storage for Industrial Electrical Loads

This project investigates cost and viability of battery based energy storage to reduce industrial electrical load peak time-of-use energy charges.

Team Members: Vina Chandra, Ricky Chin, Yu Min Cho, Allan He, Faizan Ibrahim, Nate Pinger
Faculty Advisor: Prof. J. Mearns

Protection Methods to Detect Islanding in Distribution Systems with Distributed Energy Resources (DER)

This project investigates active, passive and hybrid methods for detecting the formation of, and protection from, energy "islands" in Distribution Systems.

Team Members: Abdalwahab Alqarni, Elias Delgado, Kevin Garnham, Farrah Taheri
Faculty Advisor: Prof. J. Mearns

Self-Sustaining Microgrids for Critical Power Requirements

This project evaluates feasibility of deploying combined local generation and energy storage to meet critical power requirements of high value infrastructure (hospitals, water treatment, schools, police/fire stations, military bases).

Team Members: John Cooper, Parker Difuntorum, Cody Mossberg, Jose Reyes, Joe Swain
Faculty Advisor: Prof. J. Mearns

Thermal Energy Storage using Molten Salt as a Method for Advance Renewable Power Generation

This project investigates feasibility and cost of using molten salt thermal energy storage, as a means to meet peak electric load demand. The efficiency of this method is compared to traditional greenhouse gas (GHG)-based forms of meeting peak electric energy demands.

Team Members: Abdul Rahman Almeaikel, Mohamed Alnaqbi, Mishal Alshehri, Ahmad Azarg, Ulies Jimenez
Faculty Advisor: Prof. J. Mearns

Viability of Solar Power and Energy Storage Systems for Residential Use

This project evaluates the implementation and cost of both individual and planned community residential electrical energy storage projects.

Team Members: Erwin Barrientos, Moshriq Jamel, Peter Kelleher, Samir Klaffa, Stephanie Torres
Faculty Advisor: Prof. J. Mearns