



**Santa Clara
University**

School of Engineering

49TH ANNUAL

SENIOR

DESIGN

CONFERENCE

MAY 9, 2019 2 P.M.

ENGINEERING *with a* MISSION

WELCOME

Dear students, alumni, parents, partners, and friends:

Welcome to the 49th Annual Senior Design Conference. We are delighted to have you with us for this exhibition of our students' work.

At the School of Engineering, our goal is to transform students' lives through distinctive engineering education that reflects both our Jesuit, Catholic tradition and Silicon Valley's innovative, entrepreneurial ethos. We aspire to educate engineers who advance technological innovation and entrepreneurship in the service of humanity. Today's presentations showcase the hands-on, practical experience and theoretical learning that enable our students to graduate with the knowledge, skills, and vision necessary to make a difference in their communities and in the world.

Through a wide range of capstone projects—everything from fire-resilient housing design to engineering a synthetic antibody for cancer detection—our students have spent their senior year applying their knowledge to complex problems for the benefit of society, putting theory into practice while working collaboratively.

After moving into improved facilities for the School of Engineering at the beginning of the year and breaking ground on a transformational STEM facility, the Sobrato Campus for Discovery and Innovation, we are mindful of the ever-growing community of Bronco engineers who bring distinction to Santa Clara University. We congratulate our seniors for bringing their projects to fruition, and we thank those of you who have contributed to their success and to that of the School of Engineering.

Sincerely,

Ronald Danielson, Ph.D.
Interim Dean
School of Engineering

PROGRAM

12 - 1:30 p.m. Judges' Registration
California Mission Room, Benson Center

12:30 - 1:45 p.m. Judges' Lunch*
Ronald Danielson, Interim Dean
School of Engineering
California Mission Room, Benson Center

1 p.m. State of the School Address*
Ronald Danielson, Interim Dean
School of Engineering
California Mission Room, Benson Center

1:45 p.m. Judges' Welcome and Orientation
Ronald Danielson, Interim Dean
School of Engineering
Sarah Kate Wilson, Acting Associate Dean of Undergraduate Studies, School of Engineering
California Mission Room, Benson Center

2:15 - 5:30 p.m. Senior Design Presentations
*Benson Center, Bergin Hall, Heafey Hall,
The Harrington Learning Commons and
Orradre Library*

5 p.m. Project Demonstrations
Santa Clara Mall

6 p.m. Dinner
Locatelli Student Activity Center

**Due to space constraints, this event is open only to conference judges and invited guests.*

BIOENGINEERING SESSION 1

Learning Commons 129

Viewing & Taping A

Engineering a Synthetic Antibody for Pancreatic Cancer Detection

2:15-2:45

Madison Beary, Kyle Carter, Nathaniel Girma

Advisor: Zhiwen (Jonathan) Zhang

We aim to purify a synthetic antibody that incorporates the unnatural amino acid L-DOPA to take advantage of sugar binding interactions between antibody and antigen, with strength comparable to a monoclonal antibody. This will greatly improve upon the potential diagnostic and therapeutic applications for this disease.

CERVIS: Cervical Cancer Early Response Visual Identification System

2:50-3:20

Claire Hultquist, Julia Lanoha, Rosie McDonagh, Hallie McNamara

Advisors: Prashanth Asuri, Michele Parker, Craig Stephens

Our project aims to address the high rates of cervical cancer in the developing world. We are trying to develop a low-cost, minimally invasive, visual identification device that tests for bacterial changes in the vaginal microbiome as an indication of cervical cancer.

Noninvasive Screening of a Fecal Biomarker for Human Necrotizing Enterocolitis (NEC)

3:30-3:55

Daniela Campa, Kyle Sullivan

Advisors: Zhiwen (Jonathan) Zhang, Guo-Zhong Tao

Our project is discovering a biomarker for NEC, an often-fatal disease affecting approximately 10% of premature neonates. Currently, diagnosis of NEC is based on relatively nonspecific clinical and radiographic markers. The biomarker of interest would ultimately facilitate early diagnosis through a definitive diagnostic test, and consequently increase survival rate.

Anti-infective Mechanism-Based Drug Discovery by Targeting Sortase A

4:05-4:35

Huong Chau, Leepakshi Johar, Alice Matsuda

Advisor: Zhiwen (Jonathan) Zhang

The objective of our senior design project is to confirm that Vitamin B12 will act as the single most efficient drug candidate in vitro to identify virulence factors from gram-positive bacteria. Ultimately, the main long-term goal of this project is to develop more effective drugs to treat MRSA.

Personalized Protein Corona

4:45-5:10

Karl Baumgartner, Madeline Eiken

Advisors: Prashanth Asuri, Korin Wheeler

Engineered nanoparticles have broad applicability in drug delivery, bioimaging, and medical devices. However, applications are limited by incomplete understanding of how binding of plasma proteins to nanoparticles affects their interactions in the body. We intend to explore the impact of varied protein modifications on nanoparticle biochemistry and toxicity.

BIOENGINEERING SESSION 2

Learning Commons 133

Viewing & Taping B

High-Throughput, Portable Microfluidic Aptamer Assay

2:15-2:40

Matthew Curtin, Atticus McCoy

Advisors: Emre Araci, Steven Suljak

We aim to develop a microfluidic assay platform capable of high-throughput aptamer-based analysis. We intend to perform all steps of the assay on chip. Therefore, the assay will utilize normally closed valves so the chip can be transported without external pneumatic pressure.

Microfluidic Chip for High Efficiency Microinjection of C. elegans

2:50-3:20

Delaney Gray, Alex Hadsell, Jessica Talamantes

Advisors: Emre Araci, Leilani Miller, Don Riccomini

Our microfluidic chip conducts high efficiency microinjection of C. elegans. Traditional microinjection is a tedious and error-prone procedure requiring an expert. Our chip seeks to increase microinjection efficiency, consistency, and accessibility to researchers of all experience levels in order to advance genetics research and genetic engineering technology in C. elegans.

Nebu-Flask: Advancing Usability of Nebulizers to Increase Patient Compliance

3:30-4:00

Murray Bartho, Michael Breshock, Megan Nolte

Advisor: Prashanth Asuri

Nebulizers on the market today do not address the needs of patients as they are difficult to travel with and uncomfortable to use in public. Inspired by a local pediatrician, our design looks to improve on current issues in portability, usability, and social stigma associated with existing nebulizers.

Assessment of Hand Gestures Using Wearable Sensors and Fuzzy Logic

4:05-4:35

Angel Cardenas, Ryan Messersmith, Will Newcomb

Advisors: Emre Araci, Prashanth Asuri

In modern motion sensing of upper extremity motions for rehabilitation, there exists a lack of justification for the selected adhesives and interfacing methods. Our team's objective is to identify a specific combination of sensor placement and adhesion that enables us to distinguish motion patterns using the fewest number of sensors.

CIVIL ENGINEERING SESSION 1

Heafey Hall 122

Anderson Dam Spillway Design

2:15-2:40

Douglas Jones, Marcos Sanjines

Advisor: Edwin Maurer

Our Senior Design Project is to design a spillway option for the proposed Anderson Dam that would account for the same cavitation that Oroville Dam experienced in 2017.

Groundwater Irrigation System for Sustainable Agriculture

2:50-3:20

Peter Koros, Ricky Matthews, Clara Murphy

Advisors: Laura Doyle, Edwin Maurer

This project aims to design and build a replicable, sustainable irrigation system to help communities kickstart their agricultural economy. This system will allow villagers to grow crops such as cassava, okra, and squash during the dry season to help alleviate food insecurity while providing a source of income for farmers.

Design of a Denitrification Bioreactor for St. Francis Retreat Center

3:30-3:55

Monique Hansen, Ashton Politz

Advisor: Laura Doyle

We have created a design that includes plans, a cost estimate, and a schedule for implementation of a bioreactor at the St. Francis Retreat Center. This will filter water from an existing well that contains three times the legal limit of nitrates to a currently dry reservoir.

Sustainable and Potable Water for Valle Del Paraíso

4:05-4:30

Angela Chang, Nikhita Jingar

Advisor: Laura Doyle

Implementing sustainable, affordable, and local water filtration devices in a rural community located in Puebla, Mexico. These individual household-scale devices provide a reliable means for the families to collect and filter rainwater throughout the year, replacing their weekly expense of purchasing water bottles from the main city.

CIVIL ENGINEERING SESSION 2

Heafey Hall 125

Fire Resilient Housing

2:15-2:45

Brianna Eremita, Karin Komshian, Sedona Leza

Advisor: Reynaud Serrette

The intent of this project is to model a house that can better mitigate fire damage, with reference to the damage incurred in Paradise, California, at the end of the 2018 fire season. The focus includes structural and non-structural material selection as well as town-wide measures, such as sprinkler systems.

Sustainable Design Mixed-Use Complex

2:50-3:20

Joao Etrusco, Marek Kossik, Spencer Larsen

Advisor: Reynaud Serrette

We are designing a sustainable mixed-use complex across the street from Westfield Valley Fair Mall, utilizing modern innovations and in-depth design work. The goal is to create a residential complex with an emphasis on the establishment of a connected community.

Tiny Home Innovations: Alternative Uses and Designs with the San Jose Bridge Housing Community

3:30-3:55

Jackson Bordelon, John O'Hagan

Advisor: Tonya Nilsson

Our project investigates, analyzes, and develops alternative tiny home uses for the City of San Jose's Bridge Housing Community Initiative. This includes detailed retrofit modifications to the current cabin design if the program is discontinued and a fully engineered modular design if the program is expanded.

Complete Streets in Venice, California

4:05-4:30

Fabian Chavez, Jordan Cho

Advisor: Rachel He

Redesigning street layouts on Venice and Abbot Kinney Boulevard in Los Angeles, California, to reduce vehicular collisions with pedestrians and bicyclists.

COMPUTER ENGINEERING SESSION 1

Heafey Hall 202

The Original Beat: Web-based Harmonizing for Electronic Music

2:15-2:45

Matt Kordonsky, Christian Quintero, Eli Yale

Advisor: Maya Ackerman

The Original Beat is a web based, co-creative system to allow beginners and pros alike to easily create electronic digital music. Users may input simple melodies and the system will generate accompanying, harmonizing layers to be downloaded as midi files.

Solemate: A Music App for Runners

2:50-3:20

Arshi Jujara, Samantha Lee, Samantha Song

Advisor: Maya Ackerman

Solemate is a mobile application designed to enhance the running experience through music. Our feedforward algorithm sets the runner's pace by playing music that varies in tempo. By encouraging the user to match their steps to the beat, our application cultivates a run that feels natural and inspires intrinsic motivation.

N.O.V.I. : Note Organizer for the Visually Impaired

3:30-3:55

Axel Perez, Cesar Tesen

Advisor: Yi Fang

Visually impaired students face extra challenges when it comes to basic note taking. While current solutions create a dependency on others, our solution enables them to study independently through an iOS application that offers intuitive, convenient, and comprehensive management of notes through voice prompts.

A Questioning Agent for Literary Discussion

4:05-4:30

Robbie Culkin, Tim Shur

Advisor: Yi Fang

We propose a system that engages users in conversation about an academic topic for the purpose of collecting ideas and constructing an argument. The system asks informed questions that prompt further discussion. Once the conversation is concluded, the system provides users with a discussion report.

Mind Music

4:45-5:10

Rachel Goldstein, Andrew Vainauskas

Advisor: Maya Ackerman

In today's busy modern life, many individuals suffer from stress. Mind Music uses EEG technology and a musical improviser system to allow users to engage in improvisation sessions by controlling the generation of music with their brain activity, thereby achieving both creative expression and relaxation.

COMPUTER ENGINEERING SESSION 2*Heafey Hall 111***SCU Courses**

2:15-2:40

Conner Davis, Matthew Wong

Advisor: Daniel Lewis

A web app for students at Santa Clara that helps them sign up for classes each quarter by suggesting schedules designed around their needs.

Bronco Books

2:50-3:20

Vineet Joshi, Terry Shih, David Taylor

Advisor: Darren Atkinson

Bronco Books is a mobile application that creates a centralized platform where SCU students can sell any textbook regardless of demand, and can set their own price. The application integrates barcode scanning to auto-fill the book information fields, and Apple Pay/Google Pay to remove the need for physical transactions.

Promarc

3:30-3:55

Connor Carraher, Victor Yu

Advisor: Darren Atkinson

Promarc is a web-based forum and marketplace for people on university campuses to advertise their projects and connect with potential team members with relevant skills. Skill requesters and skill providers can communicate with one another on the platform through posts and instant messaging.

The Labyrinth

4:05-4:35

Derek Nakamura, Marko Trapani, Robert Walker

Advisor: Darren Atkinson

The Labyrinth is a VR puzzle game that leverages the additional dimension of virtual reality to provide a more challenging and immersive puzzle game experience. Within each level of the game, the user must solve a series of surreal puzzles displayed in virtual reality.

VR Physics Scenarios

4:45-5:10

Thomas King, Patric Zhang

Advisor: Daniel Lewis

Our project is a mobile-based virtual reality application designed to help students visualize concepts while learning physics. Students can interact with objects in a 3D environment and see visualization of data about the physics of objects in the scenario.

COMPUTER ENGINEERING SESSION 3*Heafey Hall 112***DeadDropBox**

2:15-2:45

Robert Herriott, Nathaniel Kragas, Peter Paulson

Advisor: Ahmed Amer

A configurable time-locked safe which aims to aid the privacy-minded traveler.

H.E.A.R.T.

2:50-3:20

Jake Day, Yutong Li, Sam Rietz, Brendan Watamura

Advisor: Ahmed Amer

HEART is a low-cost VR mobile application designed to provide accessible parental empathy. It will educate users on the danger of raising children in an environment with low emotional resilience. It aims to promote healthy parenting and psychological strengths that buffer the impact of high risk community environments.

Top Level Mesh

3:30-3:55

Tristen Islam, Matt Jasaitis

Advisor: Behnam Dezfouli

We are designing a management system for mesh networks. Our solution allows users to easily understand and control the flow of data packets via a web interface.

NavSense: Computer Vision for the Visually Impaired

4:05-4:35

Michael Dallow, Daniel Okazaki, John Ryan

Advisor: Behnam Dezfouli

For our project, we propose an assistive device that improves navigation for the visually impaired in day-to-day life, and supplements existing technology. Our product, NavSense, provides near real time object identification and context to the user through both tactile and auditory feedback.

Courses++

4:45-5:10

Ronak Gajrawala, Asa Jacob

Advisor: Ahmed Amer

A powerful yet easy-to-use course scheduling web app that helps students put together quarterly course schedules with multiple fallbacks based on course history, student availability, program requisites, course evaluations, and more.

COMPUTER ENGINEERING SESSION 4*Heafey Hall 203***GalápaGuide**

2:15-2:45

Paul Ahrens, Mason Bruce, Stephen Pacwa, Neel Sampemane

Advisor: Silvia Figueira

GalápaGuide is a system designed for the Galápagos Islands' Ministry of Tourism. It will enable ecology/tourism guides to report issues around the islands, which will be tracked and reported by an aggregation tool.

UFEEL

2:50-3:20

Paul Jin, Robert Kresge, Macdara O'Sullivan

Advisors: Silvia Figueira, Michele Parker

We are creating a mobile mental health application for Santa Clara University students. The application, UFEEL, will try to break the social stigma around mental health and will combine Cowell Center resources and research from other mental health professionals to provide better mental health aid.

GalápaGo!

3:30-4:00

Jeffrey Nguyen, Sally Park, Manuel Sanchez

Advisor: Silvia Figueira

The Galápagos Islands are a tourism hub in Ecuador that greatly benefit economically from the tourism industry. GalápaGo! will assist tourists with navigating the island by providing information on hotels, restaurants, tourist attractions, and cultural customs.

Home Book

4:05-4:35

Stephen Poth, Simon Stauber, Jake Vargas

Advisor: Silvia Figueira

Our project is a mobile application that uses GPS coordinates to generate a permanent address, which can then be shared with other people and services. These addresses will be stored on the application, and can be viewed alongside details of the location at any time by the users.

Agora App

4:45-5:15

Sam Burns, Daisuke Kurita, Casey Xuereb

Advisor: Silvia Figueira

An interactive mobile app to provide online courses to educators in Lima, Peru, through the organization, Agora. The courses will encourage educators to continue their own education and teach their students with new methodologies such as project-based learning.

COMPUTER ENGINEERING SESSION 5*Heafey Hall 106***Hearsay**

2:15-2:40

Maddee Martin, Pedro Sanchez Munoz

Advisor: Yuhong Liu

Hearsay is a social media platform built for iOS that strives to connect its users to their local community while upholding the principles of free speech by guaranteeing total anonymity.

Keyboard Hero

2:50-3:15

Connor Lucier

Advisor: Ron Danielson

Keyboard Hero aims to transform the complex process of learning the piano into a fun video game. The game will help break down barriers to entry, and it will help pianists of all skill levels track their progress as they learn their favorite songs and discover new songs to master.

Edge-to-Fog Computing for Color-Assisted Moving Object Detection

3:30-4:00

Payton Bradsky, Zach Bellay, Glen Chandler, Brandon Craig

Advisor: Ying Liu

Future Internet-of-Things technology will involve ubiquitous and pervasive vision sensors that generate enormous amounts of video data to be analyzed in real time. To meet the demands of future video surveillance, our project combines color-assisted background modeling with an edge-to-fog computing framework to achieve higher object detection accuracy in less time.

AI Remote Medical Diagnosis

4:05-4:30

Gregory Maulick, Juliana Shihadeh

Advisors: Silvia Figueira, Tokunbo Ogunfunmi, Yuling Yan

We've developed an app with a machine learning based backend that brings medical care to patients who don't have accessible health care facilities. Our app is focused on diagnosing skin cancer, and allows anyone anywhere to take a picture of a mole and get a pre-mature checkup on the spot.

COMPUTER ENGINEERING SESSION 6

Heafey Hall 107

Optimal Itinerary Generator

2:15-2:40

Andrew Nguyen, Osama Shoubber

Advisor: Behnam Dezfouli

A travel application to optimize one's vacation itinerary considering travel time, wait time at attractions, and time spent at each place.

The Student-Professor Interfacing Assistant (SPIA)

2:50-3:20

Ben Brown, Francesco Petrini, Alfredo Sepulveda

Advisor: Behnam Dezfouli

A low-cost, IoT-powered, multi-purpose platform created to bridge the gap in communication that exists between professors and their students. The platform's primary functions are based around a touchscreen equipped with sensors and a camera capable of performing facial recognition, displaying announcements, and displaying a professor's public calendar.

Doorbell for the Hearing Impaired

3:30-3:55

Shannen Edwin, Dominic Magdaluyo

Advisor: Behnam Dezfouli

We aimed to design an architecture for an affordable doorbell system for the hearing impaired. Present solutions are expensive or are not taking advantage of current technology. Our solution hopes to allow hearing impaired individuals to be more involved in their communities and homes.

Synergy

4:05-4:30

Sarah Johnson, Pearce Ropion

Advisor: Behnam Dezfouli

Synergy is a modular Energy Monitoring and Visualization system that monitors your electrical energy usage securely and then displays that data in real time. The system can be used in single residences, expanded to larger complexes that monitor the electrical energy usage of multiple buildings at the same time.

ELECTRICAL ENGINEERING SESSION 1

Learning Commons Training and Instruction 203

My House

2:15-2:45

Johann Espinosa, Coby Jacobson, Michael Lau, Daniel Torre

Advisor: Maryam Khanbaghi

MyHouse is an apparatus used to distribute the energy consumption of a house in time while minimizing the cost of energy based on utility pricing. This will be accomplished by managing the scheduling of household appliances, usage of a battery, and energy provided by solar panels.

WASP (Wireless Analog Sensor Platform)

2:50-3:20

Tyler Hack, Cole Hunter, Daniel Webber

Advisors: Sarah Kate Wilson, Behnam Dezfouli

WASP's goal is to augment and eventually replace the bulky, costly, and inefficient data acquisition systems used for vibrational reliability tests on satellites. This will enable precise testing of conditions on a smaller timeframe and at a lower cost.

Switched Capacitor Voltage Converter

3:30-3:55

Anne Hsia, Bradford Kidd

Advisor: Shoba Krishnan

This project supports IoT development by reducing the power consumption and physical footprint of voltage converters. Our switched-capacitor IC design steps down an input of 0.9-1.3V to 0.6V at 90% efficiency for up to 30uA load currents.

Sensor Platform for Rescue Robot

4:05-4:30

Emir Kusculu, Alexander Moran

Advisor: Sally Wood

A scanning and imaging system capable of relaying humanoid lifefoms inside rooms to a remote user. Designed to be deployed before first responders in a structurally compromised building, our project is a proof of concept that will scan a room with minimal debris and a few humanoid figures inside.

INTERDISCIPLINARY SESSION 1*Bergin Hall 116*

PAVED: Platform for Autonomous Vehicle Education and Development

2:15-2:45

Cody Berdinis, Cole Christman, Hannah Sheldon

Advisors: Timothy Healy, Christopher Kitts, Jessica Kuczenski

The first year of a multi-year project to create an autonomous vehicle platform for Santa Clara University that would allow students to gain experience and develop skills that they need to excel in the field of autonomous robotics.

Shearwater Project

2:50-3:25

Alex Cherekdjian, Kayleigh Dobson, Trevor Liu, PJ McCurdy, Vinny Sicat

Advisors: Christopher Kitts, Sally Wood

The project goal is to design and manufacture a proof-of-concept variable buoyancy system for a hybrid autonomous-underwater/unmanned-aerial vehicle (AUV/UAV). The system controls the vehicle's depth, pitch, and roll while the vehicle is submerged. This is part of a multi-year effort with the Monterey Bay Aquarium Research Institute.

Swimming in Viscous Fluids

3:30-4:05

Brent Hosoume, Daniel Plascencia, Oliver Silverberg, Connor Tisch, Nikhil Trivedi

Advisors: Emre Araci, Christopher Kitts, On Shun Pak

Swimming at the microscopic scale encounters stringent constraints due to the dominance of viscous over inertial forces in the fluid (i.e. a low Reynolds number fluid environment). We design a low-Reynolds-number swimmer and develop a dynamically similar, macroscopic swimmer as a proof of concept to investigate its propulsion characteristics.

INTERDISCIPLINARY SESSION 2*Learning Commons Training and Instruction 205*

Design of an Urban Garden Aquaponics System

2:15-2:45

Riley Albright-Borden, Sydney Thompson, James Wang

Advisors: Laura Doyle, Hohyun Lee, Sarah Kate Wilson

A low-maintenance soil-less vegetable and fish farming system intended to increase nutrition for food insecure communities in San Jose, California. This aquaponics system is off-the-grid and powered by solar panels with an integrated sensor network that measures different water conditions and transmits information to the end user.

JustRun: A Motivational Running Companion App

2:50-3:20

Riley Bergin, Maggie Cai, Simran Judge, Grace Ling

Advisors: Yuhong Liu, Yuling Yan

JustRun is a motivational running companion app that seeks to gamify the running experience through a social interactive GPS-based mobile game. Players can design their own running routes to share with their friends, like and comment on their friend's runs, and race against them.

Lactic Acid Threshold Stimulator (LATS)

3:30-4:00

Justin Brackett, Karen Carreon, Fernando Guerra, Malyna Sanchez

Advisors: Ahmed Amer, Sarah Kate Wilson

A wearable and mobile application that alleviates discomfort during the most intense parts of workouts. The system consists of a heart rate monitor to detect the lactic acid threshold, a garment that is worn to stimulate muscles using electricity, and an app that allows the user to monitor their data.

AutoDraft

4:05-4:35

Matthew Belford, Keith Dorais, William McCullen

Advisors: Jessica Kuczynski, Walter Yuen

AutoDraft is an automated drink delivery service that is designed to reduce wait times and increase sales during surge times at large venues, stadiums and arenas.

INTERDISCIPLINARY SESSION 3

Learning Commons 316, St. Clare Room

E.P.I.C.: Examining Patch Impedance Characteristics

2:15-2:45

Shane Buck, Jyotsna Gopinath, Kyle Markfield

Advisors: Prashanth Asuri, Shoba Krishnan

In our work for Proteus Digital Health, our team is investigating the various mechanisms that lead to high impedance values seen in the biowearable patch component of their Digital Medicine System.

Machine Learning Solution to Organ-At-Risk Segmentation in Radiotherapy Planning

2:50-3:20

Brie Goo, Katrina May, James Olivas, Haobo Zhang

Advisors: Ying Liu, Julia Scott

Segmentation of organs-at-risk is an imperative step in radiotherapy treatment. Radiotherapy planning by a specialist technician is time-consuming, labor intensive, and prone to human error. Our goal is to automate CT image segmentation to improve its efficiency, accuracy, and precision, by building, training, and evaluating a convolutional neural network.

Control System of a Prosthetic Arm Using EMG Signals

3:30-3:55

Dana Suri, Elissa Yang

Advisors: Daniel Lewis, Sally Wood, Yuling Yan

Our goal is to improve current day prosthetic arms in both functionality and affordability. We will create a non-invasive prosthetic control system using EMG signals that attach to the shoulder to predict intended arm movements. The signals are then filtered and processed by a neural network to produce the results.

Human-centered Electric Prosthetic (HELP) Hand

4:05-4:35

Jamie Ferris, Shiyin Lim, Michael Mehta, Evan Misuraca

Advisors: Prashanth Asuri, Christopher Kitts

Design of an electrically powered, bio-controlled prosthetic hand for amputees in India. A versatile, single actuator prosthesis that can be easily manufactured in India at a dramatic cost reduction from the current standard while maintaining performance measures near those found in other modern prostheses.

MECHANICAL ENGINEERING SESSION 1

Benson Center, Williman Room

Frugal Bicycle Transportation in Puebla, Mexico

2:15-2:45

Sean Flanagan, Alesis Gonsalves, Tianhao Jiang, Brenden Stone

Advisor: Gaetano Restivo

Our project was to create a two-passenger attachment for a standard bicycle. This attachment connects to any standard bicycle at the seat, has storage capabilities, and provides an alternative to walking on muddy unpaved roads. Our goal was to create an affordable, durable, and easily serviceable attachment.

Power-Assist Wheelchair Attachment

2:50-3:20

Ryan Boyce, Rosemary Cole, Matthew Marks, Catherine van Blommestein

Advisors: Robert Marks, Gaetano Restivo

The goal of this project is to create a power-assist attachment for manual wheelchairs. The attachment combines the best attributes of electric and manual wheelchairs without the financial and physical burdens associated with them.

Pedal 4 Purification

3:30-4:00

Jonathan Keyes, Matthew LoGrasso, Coleton Rodd, Cory Yamagata

Advisors: Gaetano Restivo, Walter Yuen

Pedal 4 Purification is a universally adaptable water purification and transportation system optimizing the centripetal pedal force of a bicycle. Partnering with Maya Pedal Guatemala, a non-profit organization focused around helping those in need to gain access to potable drinking water while promoting community involvement of women and children.

Medical Assistance Bed

4:05-4:35

Michelle Callson, Andrew Chen, Deborah Flores, Devin Meadows

Advisor: Gaetano Restivo

We are building a customizable medical bed for adults with special needs. The purpose of this bed is to minimize the physical labor involved in helping an adult get in and out of bed, and have the bed be elevated for adults who wear diapers, requiring multiple diaper changes per day.

MECHANICAL ENGINEERING SESSION 2

Benson Center, Conference Room 21

Heat Control for Thermionic Power Generation

2:15-2:45

Patrick Kearney, Charlie Markusen, Jaydon Zimmerman

Advisor: Walter Yuen

Heater and controller for the thermal management of a thermionic energy converter for portable power generation.

Portable Thermoelectric Cooler

2:50-3:20

Barry Bishop, Bernardo Quevedo, Michael Tuttle

Advisor: Hohyun Lee

Developing a Portable Thermoelectric Cooler that implements an insulated enclosure, a heat removal system, and a voltage regulation system operated by a power tool battery. Our goals are to overcome a 20°C temperature difference and have an operating time of 4+ hours.

Seedling Sanctuary

3:30-4:00

Fiona Bell, Christopher Carpio, Alex Kosaka

Advisors: Jessica Kuczynski, Hohyun Lee

The Seedling Sanctuary is an automated cold frame greenhouse designed for Gardner Academy. The purpose of the cold frame is to increase garden efficiency by maintaining ideal growing conditions to ensure seedling germination and to act as an educational tool for 4th and 5th graders.

MECHANICAL ENGINEERING SESSION 3

Benson Center, Parlors B & C

WeighstEd

2:15-2:45

Vincent Heyman, Timothy Jaworski, Tatianna Schluep

Advisors: Timothy Hight, Lindsey Kalkbrenner

WeighstEd is a data collection system designed to aid the SCU Center for Sustainability with its food waste reduction goal of 10% by 2020. The system identifies, collects, and weighs wasted food, compiles food waste data for each meal served in Benson, and analyzes trends to create sustainable initiatives.

SwiftScene DMX Control

2:50-3:20

JV Ating, Tiernan O'Rourke, Hannah Sisney

Advisors: Timothy Hight, Michael Taylor

SwiftScene DMX Control is a modular, DMX-controllable device capable of moving set pieces designed for live theatrical productions in educational and community theaters. Presented is a scale model of the device as a proof of concept that is controlled by DMX technology to automate scene changes.

Romaine Robotics: Automatic Lettuce Trimmer

3:30-4:00

Jonathan Borst, Chuck Culberson, Andrew Torrance

Advisor: Christopher Kitts

The Romaine Robotics Automated Lettuce Trimmer is a machine designed to help mid- to large-sized farms overcome the growing labor shortage in the agricultural industry by automating the time consuming trimming step in the cut-trip-pack harvesting process of romaine lettuce heads.

Environment Chamber for Shape Memory Alloy Testing

4:05-4:35

Luis Acevedo, Joseph Bodo, Nicholas Fernandes

Advisors: Robert Marks, Christopher Kitts

This is a temperature-controlled environment chamber, compatible with tensile testing machines in the Materials Science Laboratory, for the purpose of studying deformation behavior of novel shape memory alloys at elevated temperatures. It will be used to identify microstructural transition temperatures and strain recoverable via the shape memory effect.

We wish to thank the following alumni, friends, and industry partners of the Senior Design Conference.

Jeff Abercrombie '84 Caltrans Structure Construction	Erik Burd '05 Delta Analytics	Chris Freitas '84 Santa Clara County Planning and Development Services Office	Brian Janjic '89 IBM
David Aguilar Rodriguez '18 Whiting-Turner	Michael Burke '82 Adobe, Inc.	Michael Freitas '70 Freitas + Freitas Engineering, Inc.	Shachi Kakkar, MS '19 E*Trade
Brad Allen, MS '00 Moog CSA	Michael Callan '62	JJ Galvin '17 ACCO Engineered Systems	Brady Knowles '10, MS '12 Intuitive Surgical
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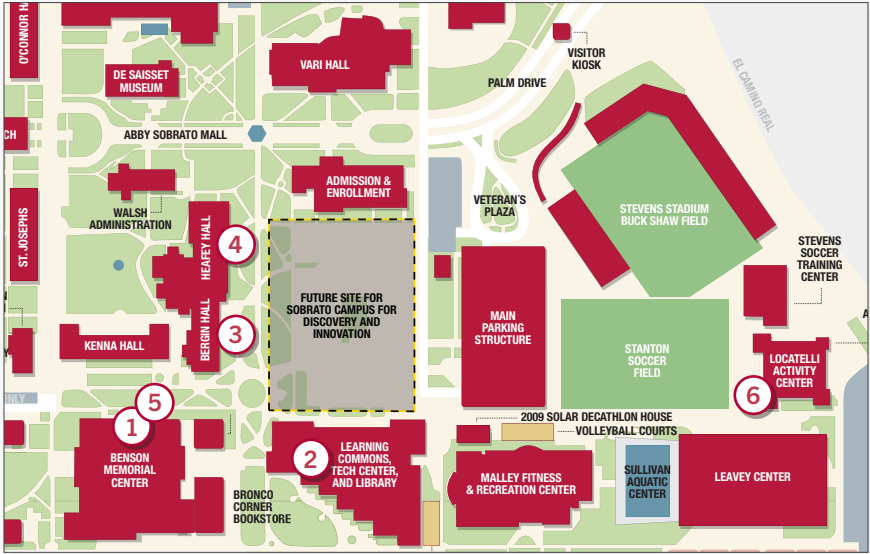
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SENIOR DESIGN CONFERENCE MAP



① BENSON MEMORIAL CENTER

- Judges' Registration
- Judges' Lunch and State of the School Address
- Judges' Welcome and Orientation
- Senior Design Presentations
 - Mechanical Engineering Session 1, 2, 3

② THE HARRINGTON LEARNING COMMONS & ORRADRE LIBRARY

Senior Design Presentations

- Bioengineering Session 1, 2
- Electrical Engineering Session 1
- Interdisciplinary Session 2, 3

③ BERGIN HALL

Senior Design Presentations

- Interdisciplinary Session 1

④ HEAFEY HALL

Senior Design Presentations

- Civil Engineering Session 1, 2
- Computer Engineering Session 1, 2, 3, 4, 5, 6

⑤ SANTA CLARA MALL

Project Demonstrations

⑥ LOCATELLI ACTIVITY CENTER

Senior Design Presentations

- Interdisciplinary Session 3