

52ND ANNUAL
SCHOOL OF ENGINEERING

SENIOR DESIGN CONFERENCE

MAY 12, 2022 | 2:00 P.M.



Santa Clara
University

School of Engineering

ENGINEERING WITH
A MISSION



WELCOME

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

Welcome to the 52nd Annual Senior Design Conference. We are excited to be back in person and to have you join us for this exhibition of our students' work.

At the School of Engineering our mission is to prepare diverse students for professional excellence, responsible citizenship, and service to society. We look to educate the whole person with distinctive academic programs that are designed to produce engineers who approach their profession with competence, conscience, and compassion. Today's presentations showcase 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 an intelligent water filtration system created for primary school students across Latin America to a helmet that uses infrared LED light therapy to treat symptoms from Parkinson's, Alzheimer's, anxiety, and more—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.

With the opening of the new Sobrato Campus for Discovery and Innovation we are reinspired to connect, collaborate, and create with our ever-growing community of Bronco engineers. We appreciate those of you who have come back to help with the conference today and we congratulate our seniors for bringing their projects to fruition. Thank you to everyone who has contributed to their success and to that of the School of Engineering.

Sincerely,



Elaine P. Scott, Ph.D.
Dean
School of Engineering



PROGRAM

12–1:15 p.m. Judges' Check-in

Locatelli Student Activity Center

12:30 p.m. Judges' Lunch and State of the School Address*

Elaine Scott, Dean
School of Engineering

Locatelli Student Activity Center

1:45 p.m. Judges' Welcome and Orientation

Elaine Scott, Dean
School of Engineering

Ruth Davis, Associate Dean of Undergraduate Studies
School of Engineering

Locatelli Student Activity Center

2:15–5:30 p.m. Senior Design Presentations

*Benson Center, Bergin Hall, Heafey Hall,
The Harrington Learning Commons,
Orradre Library and Sobrato Campus for
Discovery and Innovation*

5 p.m. Project Demonstrations

*Sordello Family Courtyard at Sobrato Campus
for Discovery and Innovation*

6 p.m. Dinner

Locatelli Student Activity Center

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

Hydrogel Therapeutics for Protein Drug Delivery

4:05–4:30

Francesca Briggs, Daryn Browne

Advisor: Prashanth Asuri

Hydrogels are water-based polymers with the potential to act as efficient and non-invasive drug delivery systems. Throughout our experiment, we investigate different hydrogel properties that can affect drug release rates as well as how crosslinking hydrogels can potentially improve therapeutic protein delivery systems.

BIOENGINEERING SESSION 2

Learning Commons 133, Viewing & Taping B

Wearable Health Sensor Platform

2:15–2:40

Kelley McCarroll, George Kouretas

Advisor: Unyoung (Ashley) Kim

This project aims to develop a wearable, open-source, and low-cost health sensing platform that accurately analyzes relevant biometric signals to identify early stages of illness. This will help prevent hospitalizations and severe cases of COVID-19 or other related diseases by promoting early diagnosis among significantly impacted populations.

Gastrointestinal Myoelectric Phantom (G-MAP) for Benchtop Testing

2:50–3:20

Laura Apolloni, Takumi Simon, Vindhya Mullapudi

Advisors: Prashanth Asuri, Emre Araci

Our Gastrointestinal Myoelectric Phantom (G-MAP) is a benchtop testing tool that will be used in G-Tech Medical's preclinical studies to simulate the clinical data collected through in vivo models. This phantom allows G-tech to test the efficacy of their product in reading EMG signals produced from the gastrointestinal tract.

Minimally Invasive Continuous Glucose Monitor

3:30–3:55

Eduardo Quintero, Justin Wong

Advisor: Unyoung (Ashley) Kim

Our project revolves around increasing the resolution of our microneedle arrays as a minimally invasive continuous glucose monitoring system. It is designed to be able to penetrate the dermal layer of the skin where it will measure glucose concentration in interstitial fluid.

Shear Detection of Microencapsulated Cells for Monoclonal Antibody Production Scaleup

4:05–4:30

Dwight Johnson, Kendall Defelippi

Advisor: Maryam Mobed-Miremadi

Scale the reported hydrodynamic shear values in industrial bioreactors for monoclonal antibody production to the shear stress measured in our custom microneedle prototype by extruding microencapsulated CHO cells. A correlation between the number of extrusion loops to reduction in cell viability enables a scalable screening method for bioprocessing efficiency.

CIVIL, ENVIRONMENTAL AND SUSTAINABLE ENGINEERING SESSION 1

Sobrato Campus for Discovery and Innovation 3302

Street Redesigns in San Francisco and Santa Clara

2:15–2:45

Noah Wong, Tigran Markaryan, Patrick Maguire

Advisor: Rachael He

Traffic design can account for human failure and prevent traffic deaths. This project is a street redesign of 19th Avenue in San Francisco and El Camino Real in Santa Clara. In these redesigns, past crash incidents, pedestrian needs, vehicular needs, and biking needs are addressed.

Water Storage Analysis and Design Portfolio for Nocaima, Colombia

2:50–3:20

Gisselle Paz-Ortiz, Lola Martin Uribe, Philip Bortz, Claudia Newell

Advisor: Laura Doyle

Residents of Nocaima, Colombia need a reliable water storage system to use during annual periods of reduced water availability. The team provides a water portfolio including two storage and filtration solutions utilizing rainwater for domestic and agricultural usage, and an analysis of water usage.

Supetai Well Water Purification

3:30–4:00

Claire Russon, Nicole Valdivia, Giovanni Usher

Advisor: Aria Amirbahman

A community in rural Kenya needs a reliable potable water source. Their current water sources are a distant spring of unknown quality or a centrally located well with high levels of fluoride. This project is addressing the need by designing a water purification system integrated with the well.

CIVIL, ENVIRONMENTAL AND SUSTAINABLE ENGINEERING SESSION 2

Sobrato Campus for Discovery and Innovation 3301

Saint Joseph Retrofit

2:15–2:40

Jordan Masutomi, Martin Duran

Advisor: Tonya Nilsson

A structural retrofit of Saint Joseph Hall and a renovation seeking to improve the building's sustainability. Our group seeks to propose possible solutions to bring Saint Joseph Hall up to current earthquake code and improve campus energy efficiency while doing so.

Emergency Relief Structure for Natural Disaster Evacuees and the Homeless Population

2:50–3:20

Rodrigo Mendez, Margaret Tolan, Madeline Yee

Advisors: Reynaud Serrette, Rachel He

Due to the lack of resources for natural disaster evacuees, the team developed two modular relief structures, each composed of different building materials, utilizing prefabricated panels. The design team realized that the versatile relief structure could be applied towards the homeless population and developed an interim housing community.

Home Ranch—A Single Family Residential Development in Gilroy, CA

3:30–3:55

Luke Lazzarini, Patrick Hagerty

Advisor: Rachel He

Provide a housing development plan for the Home Ranch site to aid the City of Gilroy's increased housing need in alignment with the City's 2023 Housing Element.

Affordable Farmworker Housing

4:05–4:30

Daniel Garrett, Liam Anderson

Advisors: Rachel He, Tonya Nilsson, Nick Pera

Our project looks to solve the problem of the lack of affordable farmworker housing available, particularly in California. We took a possible location to design a complex, and our intention is for the housing to be a reproducible design.

**COMPUTER SCIENCE AND ENGINEERING
SESSION 1**

Heafey Hall 125

AI Music-Based Emotional Regulation (AMBER)

2:15–2:45

Uma Bahl, Betty Hou, Xavi Anderhub, David Krakauer

Advisor: Maya Ackerman

We are developing a music-based emotional regulation application to investigate the use of artificial intelligence and machine learning techniques in music therapy.

Collage Art Therapy Bot

2:50–3:20

Dyllon Au, Roland Afaga, Jeremy Reyes, Alayna Wong

Advisor: Maya Ackerman

Our Collage Art Therapy bot acts as another accessible mental health resource for users. While the user creates a collage, the bot asks questions to help the user get a better understanding of their emotions and feelings.

OliveAI

3:30–4:00

Beckett Johnson, Ben Kummert, Alex Lewis

Advisor: Zhiqiang Tao

Our project, OliveAI, is oriented towards exploring the creativity and applicability of generative artificial intelligence technology through its application to food recipe creation and illustration. OliveAI has the overarching goal of inquiring how humans can seamlessly interact with this powerful emerging technology such that it can impact their daily lives.

Brilliance Bias in GPT-3

4:05–4:35

Nicole Lawson, Ashley Troske, Edith Gonzalez

Advisor: Maya Ackerman

With GPT-3's growing popularity, it's critical to correct bias in its generations. The Brilliance Bias imposes the idea of "brilliance" being a male trait. Our analysis reveals substantial Brilliance Bias in GPT-3. We develop Brilliance-Equalizer which counters the presence of this bias.

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COMPUTER SCIENCE AND ENGINEERING SESSION 2

Sobrato Campus for Discovery and Innovation 1308

BRASS: Bandwidth Reservation on Arista Switching Systems

2:15–2:45

Conrad Park, Angelus McNally, Tyler Tivadar

Advisor: Behnam Dezfouli

Our project is a programmable, controller-based, resource reservation handler for remote Quality of Service (QoS) enforcement. This handler serves as a low-cost alternative to enterprise solutions and is targeted toward resource-limited Local Area Networks (LANs) handling mission-critical applications.

EMT: Software-based Energy Management Tool for WiFi IoT Devices

2:50–3:20

Nidusha Kannan, Aastha Chawla, Sreya Goyalia

Advisor: Behnam Dezfouli

EMT is a novel tool that will collect, analyze, and monitor the energy consumption of IoT devices in a low-cost, scalable, and entirely software-based manner. EMT will track the battery usage of a user’s devices and provide energy-efficient recommendations and insights to the user.

Smart Container Migration in Wireless Mesh Networks

3:30–4:00

Gagan Gupta, Kyle Fenole, Siddarth Venkatesh, Eason Liu

Advisors: Behnam Dezfouli, Christopher Kitts

Containers provide robust ways to deploy programs on various machines. After establishing a wireless mesh network with Raspberry Pi's, our system can perform live migration of containers as users move from various parts of the network, ensuring their program is constantly accessible.

NetCon: Dynamic Resource Allocation to Containers Running on Network Switching Appliances

4:05–4:35

Siena Hanna, Justin Lee, Tania Pham

Advisor: Behnam Dezfouli

Keep track of how busy a WiFi access point is. When it is sufficiently free, run containers on it (prioritizing mission-critical applications). Migrate the containers back to the cloud (starting with less critical applications) when the WiFi access point starts to become busy again.

BARK: A Programmable and Extendable Smart Home Network Security System

4:45–5:10

Rahul Mannikar, Sukanya Tiwari

Advisors: Behnam Dezfouli, Yuhong Liu

BARK is a network security system for smart home devices. It includes an open-source, extendable software program based on packet switching with seamless, user-friendly installation. The BARK web portal offers an intuitive GUI for monitoring network activity, customizing rules, and viewing alerts.

COMPUTER SCIENCE AND ENGINEERING SESSION 3

Sobrato Campus for Discovery and Innovation 1301

SengaSafe

2:15–2:45

Patrick Zhang, Matthew Hall, Matthew Brunkhorst

**College of Arts & Sciences Students: Madison Hoffman, Annika Disney,
Kristen Hanlon, Lara Fernandes**

Advisors: Silvia Figueira, Michele Parker

SengaSafe is an educational application that is easy to understand and user friendly for young women in Uganda. An important goal of SengaSafe is to normalize sexual health education so people aren't so afraid to talk about it and/or seek help with their problems.

Large Scale Database Audio Collection of Tuberculosis Patients

2:50–3:20

JT Vinolus, Jordan Randleman, Daniela De La Torre, Aimee Kerr

Advisor: Silvia Figueira

A large-scale database of cough audio samples from tuberculosis patients.

Santé le Match: Education Hygiene Application

3:30–4:00

Evan Chou, Matthew Tolosa, Krizia Araracap

College of Arts & Sciences Students: Shelby Tadaki, Reha Shah,

Carly Kellner, Kristina Yin

Advisors: Silvia Figueira, Michele Parker

We are building a mobile-based game application aimed to teach children in Senegal about health in a fun and innovative way with a team that consists of 3 senior computer engineers, 3 public health students, and an art student.

AidBase

4:05–4:30

Jeremy Mekker

Advisor: Silvia Figueira

Global database of non-profit and non-government organizations.

**COMPUTER SCIENCE AND ENGINEERING
SESSION 4**

Heafey Hall 122

Autonomous and Interactive Control of a Mobile Robot

2:15–2:45

Tanner Kaczmarek, Stephen Tambussi, Dylan Hoover, Kevin Molumphy

Advisor: Christopher Kitts

A perception and control system has been developed for controlling a mobile robot that operates in indoor environments of interest to a corporate partner. System software supports functions to include autonomous navigation, touch-interface motion control by human collaborators, and obstacle/collision avoidance enabled by advanced sensors.

EasyCompost: Improving Reality with Augmented Reality

2:50–3:15

Andrew Bredar, Jonathan Nguyen

Advisor: David Anastasiu

An object detection model to differentiate between various classes of waste (e.g. trash, recycling, & compost) in real-time to facilitate the proper disposal of waste in public settings.

Interpnet: Neural Network Interpretability for Autonomous Vehicles

3:30–3:55

Casey Nguyen, Raghav Kapoor

Advisor: David Anastasiu

Understanding and analyzing a neural network's black box nature through penalty functions.

Expanding Neuro-Symbolic Artificial Intelligence for Strategic Learning

4:05–4:30

Dorian Clay

Advisor: David Anastasiu

Using hybrid artificial intelligence models to learn and reason about game strategy. Neuro-symbolic AI separates detecting objects in a game from reasoning about what to do with the objects to accomplish a goal.

Orion Plus: An Online Multivariate Time Series Segmentation Algorithm

4:45–5:10

Rishabh Chittaranjan

Advisor: David Anastasiu

Orion Plus is a time series analysis tool which segments and models a streamed-in multivariate time series using a set of representative patterns. These representative patterns change based on received, streamed-in data, providing insight for the overall behavior of the underlying system.



COMPUTER SCIENCE AND ENGINEERING SESSION 5

Heafey Hall 129

Improving Diversity in Journalistic Sources with Computer Vision

2:15–2:45

Sabiq Khan, Austin Johnson, Carlos Mercado

Advisor: Yi Fang

Leveraging different APIs, we aim to aid in the source diversity dashboard project by adding levels of accuracy to the gender and ethnicity predictions using computer vision on an image of the speaker.

Shuffle Debug—An Investigation of Immersive Debugging Experience

2:50–3:20

Abhinav Gokhale, Dillon Kanai, Ryan Summers, Daren Liu

Advisor: Sharon Hsiao

This project aims to help early programming students develop their debugging skills by creating an interactive and immersive environment through the use of augmented reality to simplify console error messages and help the user locate and fix the root cause of these errors.

Orient: Teaching OOP with AR

3:30–3:55

Shivangi Kar, Stephanie Lu

Advisor: Sharon Hsiao

Our senior design project explores the potential for immersive technology to enhance computer science education. Through interactive examples, our augmented reality application helps middle and high school students visualize the object-oriented programming concepts of inheritance and polymorphism, which are fundamental to developing computational thinking skills.

Operating Machine Learning to Identify Tools For Resource Recommendation To Apply To Androids

4:05–4:35

Sebastian De La Cruz, Grant Schorr, Jason Chavez

Advisor: Sharon Hsiao

We plan to create a machine learning model to identify everyday hand tools, such as power drills and wrenches, by utilizing image datasets. This project is a proof of concept as the main feature for a future application designed for tool safety.

COMPUTER SCIENCE AND ENGINEERING SESSION 6

Sobrato Campus for Discovery and Innovation 3116

SmartNIC Compatible Blockchain

2:15–2:45

Eish Kapoor, Gavin Jampani, Vivek Ponnala

Advisor: Sean Choi

Our project aims to integrate SmartNICs (smart network interface cards) with blockchain to explore its performance on SmartNIC hardware and how SmartNICs can assist in blockchain applications like Bitcoin & IOT security.

Donation Pick-up and Tracking App for Colombian Food Bank

2:50–3:20

Arren Leung, Adrian Ramirez Lopez, Alex Fang, Rodrigo Mejia

Advisor: Angela Musurlian

A mobile application made for a Colombian food bank to log and track donations and donors, and serves as a platform for truck drivers to enter information for donations when picking up without the internet.

An Exploration of Modern Cross-Chain Communication Solutions

3:30–3:55

Connor Callahan, Bradley Lostack

Advisor: Yuhong Liu

Communication between blockchains remains incomplete. Present-day solutions all lack some capabilities. Commonly they lack speed or compromise on security. Our project is to explore and attempt to better understand these limitations and to possibly improve them.

MySyllabi—An Online Syllabus Repository

4:05–4:30

Aristos Xanthus

Advisor: Angela Musurlian

MySyllabi is a functional website that serves as a quick and accessible location to find course syllabi. Students can search, view, and download current or past syllabi for a particular class. This resource will help students make more informed decisions during the course selection process.

ELECTRICAL AND COMPUTER ENGINEERING SESSION 1

Learning Commons Training and Instruction 203

Emergency Hot Car Alert System

2:15–2:45

Alex Lopez, Ryan Marquis, Chris Park

Advisor: Dat Tran

We are designing an alert system that may be implemented in all types of vehicles to notify drivers and bystanders of a possible life threatening situation. Our device will help prevent deaths caused by heat stroke when temperatures become too hot inside a vehicle.

Cost Efficient Radio Telescope

2:50–3:20

Tyler Ikehara, Brian Benedicto, Nick Arroyo

Advisor: Kurt Schab

Designing and constructing a radio telescope to observe the movements of celestial bodies in our galaxy. These radio telescopes are typically very large and expensive. Our project will implement a Software Defined Radio in order to make our system more size efficient and less costly.

B2-B2: LiDar 2D Mapping Rover

3:30–4:00

Laurence Kim, Isaiah Youngblood, Quenton Turner

Advisors: Sally Wood, Maria Kyrarini

This project improves robot navigation in environments composed mainly of glass walls by integrating ultrasonic sensors in contrast to the default LiDar or camera systems, as they fall short due to the transparency of the glass. Our final product creates a 2D map of the environment onto Robotics Operating System.

Microgrid for SCU with Vehicle to Grid

4:05–4:30

Kurt Williams, Cameron Refae

Advisor: Maryam Khanbaghi

To design and simulate a complete energy management system with a microgrid for Santa Clara University campus with vehicle-to-grid functionality using SCU energy data and MATLAB.



ELECTRICAL AND COMPUTER ENGINEERING SESSION 2

Learning Commons Training and Instruction 205

Healthy Hive—A Beehive Health Management Tool

2:15–2:40

Kwadwo Amoako

Advisor: Andy Wolfe

With recent declines in honeybee populations, this project’s goal is to provide a tool to assist beekeepers to better care for their hives. By tracking metrics such as flight activity and temperature fluctuations through sensors and image processing, Healthy Hive analyzes the overall health condition of a bee colony.

Remote Crop Disease Detection System Using Deep Learning with IoT

2:50–3:15

Ivy Chung, Anoushka Gupta

Advisor: Tokunbo Ogunfunmi

Crop pests and diseases are major problems that cause low yield in farms. By developing a deep learning system to detect common tomato diseases through crop images, we anticipate our project to help increase crop yield, reduce food waste, and automate the tasks of detecting and caring for diseased crops.

Hardware and Software Infrastructure for an Agricultural Sensor Network

3:30–3:55

Mariela Zuniga, Bennett Dorsey

Advisor: Andy Wolfe

For this project, we are building the communication protocol for a bluetooth sensor network that is able to function in an agricultural setting. We will accomplish this by designing algorithms that tackle redundancy in the face of node failure and implement fault injection testing strategies to build resiliency.

Hardware Accelerated ECG Based TRNG

4:05–4:30

James Burrill, Sunny Jayam

Advisors: Sara Tehranipoor, Shoba Krishnan

We are designing and simulating an ECG based true random number generator on hardware in an attempt to provide increased security for implantable medical devices. Our goal is to maximize security while increasing resource efficiency in order to meet the demands of medical applications.

INTERDISCIPLINARY SESSION 1

Learning Commons 316, St. Clare Room

Detecting the Progression of Knee Osteoarthritis Using Vibration Sensors

2:15–2:45

Kailyn Wallace, Belen Blanco, Joseph Ford

Advisors: Behnam Dezfouli, Yuling Yan

We are creating a wearable device that detects joint stress and friction using vibration sensors in the knee in order for patients to more accurately assess the progression of their osteoarthritis.

BioAI for Anti-Infective Drug Discovery

2:50–3:25

Johann Fernando, Adam Weaver, Cameron Leong, Maria Esquivel, Anna Fisher

Advisors: Silvia Figueira, Zhiwen (Jonathan) Zhang

We developed an AI platform for efficiently discovering anti-infective drug candidates targeting the Sortase A protein on the surface of the gram-positive bacteria *Staphylococcus aureus*. We tested the predicted drug molecules *in vitro* using an optimized invasion assay to confirm their efficacy.

NeuroGen: EEG and Near-Infrared Light Stimulation Device

3:30–4:00

Louisa Mantilla, Michelle Wong, Samantha Perez

Advisors: Tony Restivo, Julia Scott, Jes Kuczenski

This photobiomodulation electroencephalography (EEG-PBM) helmet studies the effects of infrared light therapy, which has clinical applications in neurodegenerative diseases. The team was responsible for designing and integrating the LED arrays and the cooling system cohesively into the helmet for an effective and comfortable transmission of light therapy.

NeuroGen: EEG and Near-Infrared Light Stimulation Control System

4:05–4:35

Karina Sanchez, Sruthi Balaa Sakthivel, Evan Jennings, Michael Bose

Advisors: Sally Wood, Yuling Yan, Julia Scott

This project explores how targeted delivery of near-infrared photobiomodulation (PBM) can be enhanced by neurofeedback training. The team designed the dynamic neurofeedback-PBM signal control interface of an integrated quantitative EEG and transcranial LED stimulation device.

Machine Learning fMRI Autism Classifier

4:45–5:10

Nicholas Luckenbach

Advisors: Zhiqiang Tao, Lang Chen

We use functional magnetic resonance imaging data to search for abnormal connectivity throughout brain regions of subjects with Autism Spectrum Disorder (ASD). Machine learning may provide unique insights into the nature of ASD, improve diagnostic criteria, and aid in finding biomarkers: physiological indicators of ASD.

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INTERDISCIPLINARY SESSION 2

Benson Center, CA Mission Room

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Wage Wizard—Payment Tracking, Verification, & Support

2:15–2:45

John Davey, Kyle Mondina, Brett Rimmer

Advisors: Silvia Figueira, Jes Kuczenski

Wage Wizard is a mobile application for iOS and Android devices designed to help caregivers employed in Santa Clara County combat wage theft. It provides automatic, verifiable shift logging, expected payout information, and access to relevant, comprehensible, and trustworthy reference sources, with a focus on user privacy and accessibility.

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Modular Oceanic Autonomous Underwater Vehicle for Novel Actuation (MOANA) 2.0

2:50–3:25

Ryan Konrath, Eva Kennar, Jake Taylor, Andrew Knaus, Silas Kidd Myers, Daniel Gutierrez

Advisor: Christopher Kitts

The team has extended the design of an autonomous underwater vehicle by developing a distributed command and control system that enables the vehicle to perform oceanographic sensing while navigating along a three-dimensional trajectory. Additional extensions include a safety system, a surfacing support package, and a GUI for goal-directed mission specifications.

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A Low-Cost, Long-Range, and Solar-based IoT Soil Quality Monitor

3:30–4:00

Trina Nguyen, Julian Wong, Salvador Garcia, Markus Wong

Advisors: Behnam Dezfouli, Katie Wilson

A low cost, scalable system that relies on solar energy to collect data on soil quality, mainly for agricultural projects. It utilizes LoRa technology to handle long range wireless communication, so that the system could run in more rural areas, where access to widespread Wifi connectivity isn't readily available.

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Nautilus ROV Arm Attachment

4:05–4:40

Valeriya Chulyukina, Kekoa Blair, Noah Villar, Nathan Burke, Mandeep Singh

Advisor: Christopher Kitts

A removable robotic arm and sample storage, as well as control updates, for the Robotic Systems Lab's remotely operated vehicle (ROV), Nautilus. Nautilus previously had only limited imaging capabilities; its users, scientists mapping out the history of Lake Tahoe, would benefit from being able to retrieve sediment and rock samples.

LATAM Intelligent Filter for Education (LIFE)

4:45–5:25

Cynthia Jauregui, Andrew Lemus, Edison Yang, Daniel McCann-Sayles, Jonathan Woo, Linnea Rothi, Jordyn Quesenberry, Emily Nakata, Nicole Mossing

Advisors: Jessica Kuczenski, Kourosh Pahlavan

Our intelligent filter system engages primary school students across Latin America by demonstrating how STEM education can solve lack of clean water access. Our buildable, small-scale water filtration kit serves as a hands-on tool while our custom learning modules, offered wirelessly through a tablet, teach the students rudimentary STEM principles.

MECHANICAL ENGINEERING SESSION 1

Benson Center, Parlors B & C

RoboVac: A Combined Vacuum-Blower Toolkit for Agricultural Robots

2:15–2:45

Joe Galang, Ershad Forghany, Alessandro Zagni, Nico Urdanivia

Advisors: Manoj Sharma, Kourosh Pahlavan, Christopher Kitts

Robotics and automation are the multi-billion dollar future of farming, but many labor intensive tasks including bug and moisture control are still performed by hand. The new RoboVac toolkit will streamline and economize these operations as one neat compact system.

Mars Rover Crash Vehicle Test Article

2:50–3:25

**Peter Habelt, Gavin Maloney, Stanley Lieberman-Bulux,
Benjamin Rupp, Reid Whitney**

Advisors: Drazen Fabris, Nikola Djordjevic

Design, engineer, and fabricate a test article of a crash vehicle that protects a model Mars rover in the contingent case of partial failure in the parachute and thruster entry, descent, and landing systems.

Coconut Oil Space Cooler

3:30–4:00

Alex Fessler, Largim Zhuta, Hannah Covington

Advisor: Hohyun Lee

Creating a room cooling device that utilizes properties of latent heat storage to efficiently supplement an HVAC system or provide cooling for rooms without HVAC. The end goals are to shift energy usage to off-peak hours and provide an electricity saving cooling method.

Victoria Relief Foundation Kitchen Appliances

4:05–4:40

Guillermo Escobar, Ben Voelz, Seth Brown, Shane Murphy, Leslie Valenzuela

Advisor: Godfrey Mungal

Women in rural Cameroon spend hours processing leafy greens that are a staple in their daily diet and a major source of income. This project aims to create two manual kitchen appliances that will drastically reduce the physical effort and processing time needed to accomplish these daily tasks.

Preserving Flowers via Heat Treatment Using Waste Heat and Refrigeration

4:45–5:15

Matthew Wei, Robin Waymouth, Will Shearer, Vincent Cervantes

Advisor: Hohyun Lee

For this project, a flower preservation system was designed and built to help farmers enter and endure the volatile flower industry. The system utilizes refrigeration and the resulting exhaust heat to prolong the life of flowers in a cost effective, sustainable manner.

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MECHANICAL ENGINEERING SESSION 2

Benson Center, Williman Room

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San Francisco Space Saving Bike Rack

2:15–2:45

Silas Viskovich, Webster Mertke, James Mertke, Evan Josa

Advisor: Pete Woytowitz

Busy and crowded cities like San Francisco must maximize the minimal floor space that they have available. For this project, a bike rack will be designed to turn the bike vertically with minimal user input. By turning the bikes vertical, space will be saved.

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Autonomous Vending Automobile (AVA)

2:50–3:25

Alec Lindeman, Antonio Matusich, Jordan Hibbs, Jagos Jovanovic, Nick Elwell

Advisor: Godfrey Mungal

A solar powered, mobile vending machine designed to provide caffeinated beverages around college campuses. The current version of the AVA is remotely controlled by an operator. To avoid collisions with people and objects, the AVA employs automatic braking. Drinks are kept cold through using thermoelectric cooling and effective insulation.

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Smart Bike Rack

3:30–4:00

Santiago Hinojosa Andonegui, Connor McGoldrick, Max Luna, August Rosedale

Advisor: Godfrey Mungal

Our team is constructing a proof of concept for an automatic Smart Bike Rack with a three point locking mechanism, which will allow a user to lock their bike and all of its components with the simple tap of a card.

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Dual Axis Solar Tracker with Automated Cleaning System

4:05–4:40

**Matthew Kelley, Nicholas Gallo, Jonathan Lung, Kevin Ehlers,
Justin Eng, Brian Weitzenkamp**

Advisor: Peter Woytowitz

Our project seeks to maximize the efficiency of a standard sixteen square foot photovoltaic surface by combining two axes of solar tracking with an automated water based cleaning system.

Cart Loader

4:45–5:20

Sean McCauley, Dalveer Grewal, Nick O'Brien, Ishan Kumar, Hayelom Fitsum

Advisor: Robert Marks

A device designed to increase the speed at which materials can be unloaded/loaded into a semi-truck. It is essentially a rolling platform that locks on to the top of a lift gate and expands the surface area significantly. For a start-up company called Dishcraft Robotics.

We wish to thank the following alumni, friends, and industry partners whose participation as judges contributes greatly to the success of the Senior Design Conference.

Jeff Abercrombie '84
California Dept of Transportation

David Aguilar Rodriguez '18
Level 10 Construction

Kishore Akshintala '14
Hewlett Packard Enterprise

Gabriel Alcantar '08
Mott MacMcDonald

Brad Allen, MS '00
Retired Moog CSA

Michael Amato '07, MS '11
Apple

Ernesto Avila '83
Avila and Associates Consulting Engineers, Inc.

Cathy Avila '86
Avila and Associates Consulting Engineers, Inc.

Sargon Benjamin '05
Amazon Web Services

Leah Benschung '16
Hazen and Sawyer, P.C. New York

Eva Bouzos '18, MS '22
Cepheid

Erik Burd '05
Abbott Diabetes Care

Steve Burdick '86
Tetra Tech

Bill Carter-Giannini '97
Ronin Product Development Labs

Louis Chen '10
Amazon

Rosemary Cole '19
Intuitive

Paul Davison '08
Home

Nayana Dawalbhakta '00
Criterion Networks

Mike DeKlotz '89
Stellar Solutions, NASA

Sripriya Devarajan '16

Brian Faith '97
QuickLogic

Victoria Figueroa, MS '17
Intuitive

John Giddings '91
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Richard Grabinski
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Eden Hensley '94
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Brent Hosoume '19
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Surbhi Jain
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Justyn Li '18
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Ruth Madsen '89
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Tanner Malkoff '15, MS '16
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Neha Mathur
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Erik McAdams '14
Degenkolb

Patrick McGuire '81
AMD

Matt McKay '16, MS '18
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Mirazun Mitu '18
SitelogIQ Inc

Hesham Naja '16
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Valley Water

Christine Nolan-Brady '02
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Anjolaoluwa Omoniyi
Meta

Kortney Opshaug
Blue Ocean Gear

Richard Pardini '67
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Alaskan AirVentures

Urvashi Reddy '13
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Dilip Simha
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Craig Stevens
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Noel Tamayo '90
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Claire Wemp '14
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Jose Ysaguirre '79
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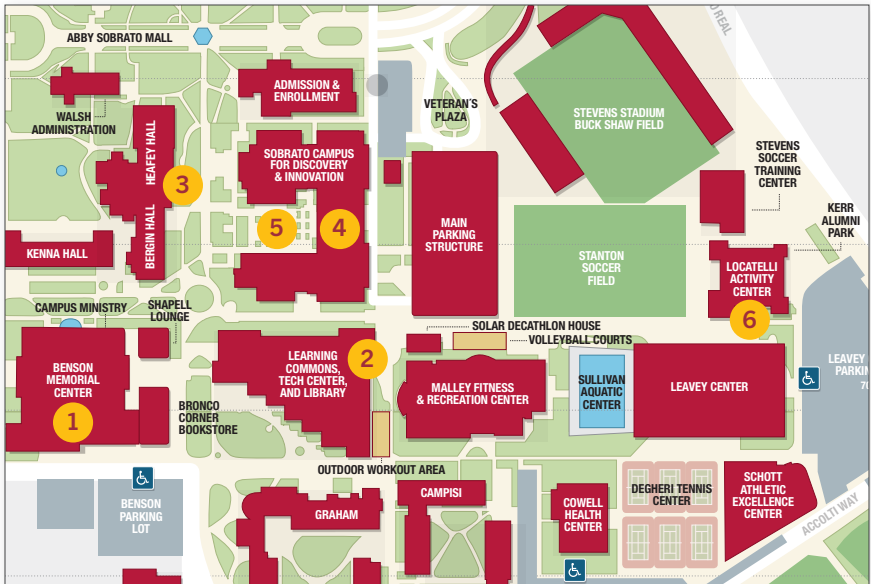
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1 BENSON MEMORIAL CENTER
Senior Design Presentations

- Interdisciplinary Session 2
- Mechanical Engineering Sessions 1, 2

2 THE HARRINGTON LEARNING COMMONS & ORRADRE LIBRARY
Senior Design Presentations

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- Electrical and Computer Engineering Sessions 1, 2
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3 HEAFEY HALL
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4 SOBRATO CAMPUS FOR DISCOVERY AND INNOVATION
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5 SCDI SORDELLO FAMILY COURTYARD
Project Demonstrations

6 LOCATELLI ACTIVITY CENTER
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Judges' Lunch and State of the School Address

Judges' Welcome and Orientation
Dinner