Santa Clara
School of Engineering

56th Annual
School of Engineering

SENIOR DESIGN Conference

May 8, 2026
2:15 P.M.

ENGINEERING WITH
A MISSION

WELCOME

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

Welcome to the 56th Annual Senior Design Conference! We are thrilled to have you join us as we celebrate and showcase the outstanding work of our senior engineering students. Today's event marks my second Senior Design Conference as the Dean of the School of Engineering.

In the School of Engineering, we are dedicated to preparing a diverse and talented student body for professional excellence, responsible citizenship, and service to society. Through distinctive academic programs, we strive to educate the whole person, developing engineers who lead with competence, conscience, and compassion.

Today's presentations are a testament to that mission. They highlight the cohesive integration of hands-on experiences and theoretical learning, equipping our students with the skills, knowledge, and vision needed to make meaningful contributions to their communities and the world. These same skills also provide a strong foundation for successful and impactful careers in industry, academia, and other professional sectors.

These projects exemplify the spirit of collaboration and the application of knowledge that define our program, where students turn ideas into action and learning into leadership. Over the past 56 years, the scope and ambition of our Senior Design Conference have expanded tremendously. Our dedication to sharing student innovation with the Bronco engineering community remains as strong as ever.

To everyone who helped make today's event possible, thank you! And to our graduating seniors—congratulations! Your achievements inspire us, and we are confident that you will continue to drive positive change as engineers and leaders.

Sincerely,

Kendra Sharp, Ph.D.
Dean
School of Engineering

PROGRAM

12:00–1:15 p.m. **Judges' Check-in**
Locatelli Student Activity Center

12:30 p.m. **Judges' Lunch and State of the School Address***
Kendra Sharp, Dean
School of Engineering

Locatelli Student Activity Center

1:30 p.m. **Judges' Welcome and Orientation**
Kendra Sharp, Dean
School of Engineering

Jes Kuczenski, Associate Dean of Undergraduate Studies
School of Engineering

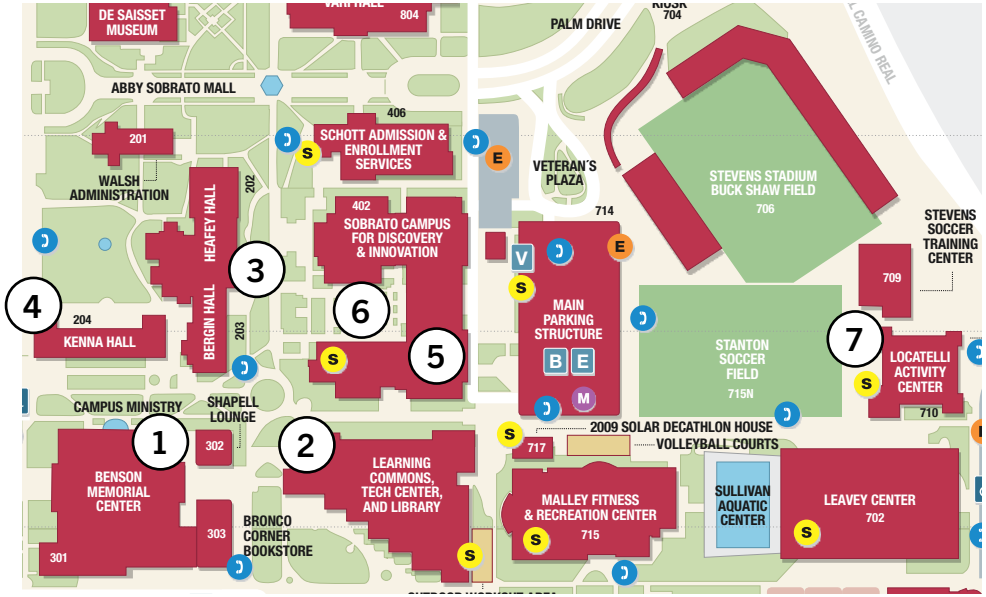
Locatelli Student Activity Center

2:15–5:10 p.m. **Senior Design Presentations**
Benson Center, Bergin Hall, Kenna Hall, Harrington Learning Commons & Orradre Library, Vari Hall and Sobrato Campus for Discovery and Innovation

5:30–6:30 p.m. **Project Demonstrations + Networking Hour**
Sordello Family Courtyard at Sobrato Campus for Discovery and Innovation

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

SENIOR DESIGN CONFERENCE MAP



1 Benson Memorial Center

- Mechanical Engineering Sessions 1, 2, 3

2 Harrington Learning Commons & Orradre Library

- Bioengineering Sessions 1, 2
- Electrical and Computer Engineering Sessions 1, 2
- Interdisciplinary Sessions 1

3 Heafey/Bergin Hall

- Computer Science and Engineering 1, 3, 4, 5
- Interdisciplinary Sessions 4

4 Kenna Hall

- Interdisciplinary Sessions 5

5 Sobrato Campus for Discovery and Innovation

- Civil, Environmental and Sustainable Engineering Sessions 1, 2
- Computer Science and Engineering 2, 6,
- Interdisciplinary Sessions 2, 3

6 SCDI Sordello Family Courtyard

Project Demonstrations + Networking Hour

7 Locatelli Activity Center

Judges' Check-in

Judges' Lunch & State of the School Address

Judges' Welcome and Orientation

BIOENGINEERING SESSION 1

Learning Commons 203

HEARTNet: High-resolution ECG-based Activation Reconstruction Transformer Network

2:15 - 2:40 p.m.

Riley Chafin, Lauren Kilfoy

Advisor: Hamed Akbari

HEARTNet is a deep learning–based framework designed for real-time MI detection and high-resolution cardiac activation reconstruction from surface ECG signals.

Automated Optimization of Membrane Bioreactor Performance Using Machine Learning

2:45-3:15 p.m.

Janessa Cayabyab, Isabella Lopez, Tomisin Opaleye, Jessica Stone

Advisors: Prashanth Asuri, Hamed Akbari

This project utilizes ML to optimize cleaning time in membrane bioreactors by analyzing transmembrane pressure trends. The system reduces downtime, energy use, and unnecessary cleaning, which enables more efficient membrane use and control.

Interpretable Protein Design of Thermostable Antibody Fragments

3:20-3:50 p.m.

Neel Mukkavilli, Konstantin Ivanov, Alex Giannopoulos, Luis Zamudio

Advisors: Hamed Akbari, David Anastasiu

We use novel methods to explain and change the outputs of ProteinMPNN, a popular protein design model. We use it to stabilize antibodies used to treat disease. Stable antibodies have a longer half-life in the body and are effective at lower doses.

Development of in vitro Hydrogels

4:00-4:30 p.m.

Xiomara Garcia, Jasmine Urbina, Sapna Wolf

Advisor: Prashanth Asuri

This project leverages hydrogels to develop a sustainable, ethical, and cost-effective alternative for the medical device industry, reducing dependence on animal blood in deep vein thrombosis research and testing.

AI Assisted Differentiation of IPSC Cells to Neural Organoids for Pre-Clinical Trials
4:35-5:05 p.m.

Karime Rivera, Alyson Low, Mikaela Cerda

Advisor: Jonathan Zhang

AI-guided system that optimizes stepwise differentiation protocols to guide iPSCs into neuronal organoids that enhance precision, diversity, reproducibility, and can replace the current method of preclinical trials.

BIOENGINEERING SESSION 2

Learning Commons 205

AMBER - Ambulatory Monitoring of Biomarkers for Enhanced Recovery
2:15-2:40 p.m.

Lucas Abrahamian, Gurman Dhami

Advisor: Ashley Kim

Our project develops a multilayer biosensor for continuous hydrogen peroxide monitoring in interstitial fluid as a marker of oxidative stress. Our work focuses on electrode optimization, benchtop electrochemical validation, and integration with microfluidic channels, microneedles, and prototype electronics for minimally invasive sensing.

Reverse Directed Evolution of Cre
2:45-3:15 p.m.

Giovanna Esposito, Katie Liu, Simran Sood

Advisor: Jonathan Zhang

Reverse directed evolution strategy to engineer a smaller, more specific Cre by systematically removing non-essential regions while preserving the catalytic domains required for DNA cleavage..

Engineering Exosome Delivery Systems for Targeted Cancer Therapeutics
3:20-3:50 p.m.

Gerardo Aguayo, Mahika Arya, Eduardo Noyola

Advisor: Bill Lu

Our project focuses on genetically engineering exosomes for glioblastoma-cell targeting. We are designing them to become a multi-gene system that targets three GBM biomarkers, making them an efficient and selective vehicle for cancer drug delivery.

PeriDevice
4:00-4:30 p.m.

Gurtej Singh, Jake Wood, Orion Cook, James Bell

Advisor: Maryam Mobed-Miremadi

PeriDevice is a custom SLA-printed packed-bed bioreactor that enhances peritoneal dialysis by regenerating dialysate through alginate-based microcapsules containing urease to shorten the number of cycles, addressing key engineering challenges, including the tradeoff between flow rate and pressure drop within the system and the stability and mechanical integrity of the capsules.

A Point-of-Care Hormone Monitoring Platform for Postpartum Health Assessment
4:35-5:05 p.m.

Ava McDonald, Avary Torres, Frances Warneke

Advisor: Emre Araci

This project develops an at-home, point-of-care device for postpartum depression screening. Using saliva-based hormone detection, paper microfluidics, and smartphone analysis, the system enables simple, low-cost, postpartum-focused health monitoring.

CIVIL, ENVIRONMENTAL AND SUSTAINABLE ENGINEERING SESSION 1

Sobrato Campus for Discovery and Innovation 3115

Designing an Advanced Water Purification System for the City of Palo Alto
2:15-2:40 p.m.

Kailee Oyama, Alex Marquez

Advisor: Aria Amirbahman

Water reuse is a crucial step in conserving water in California. Our team redesigned an advanced water purification system for the City of Palo Alto to treat effluent from the city's wastewater treatment plant and promote recycled water reuse.

Developing Connections for Bamboo Structures in Rural Mexico
2:45-3:15 p.m.

Mia McCaffrey, Claire Burnley, Mariah Montalvo

Advisors: Laura Doyle, Rocio Segura

Communities in rural Mexico are in need of improved housing structures that utilize a natural resource which is accessible and plentiful to them-- bamboo. The goal of this project is to design connections for these structures using both 3D printing and PVC materials.

Pajaro Levee Redesign for Climate Resiliency
3:20-3:50 p.m.

Allyson Bell, Hattie Higginbotham, Ranveer Saini, Harena Senai

Advisor: Ed Maurer

The community of Pajaro has been dealing with a serious risk of flooding, due to an undersized levee system along the Pajaro River. Our goal is to redesign their flood protection system for a 100-year storm, taking into account climate change.

SCDI x Mass Timber: Design Optimization
4:00-4:30 p.m.

Emily Leane, Ifran Mohamed, Jacey Niiya, Gabriela Valle

Advisors: Hisham Said, Reynaud Serrette, Yingqing Qiu

Can you imagine SCDI turned into wood? But not just any wood - huge engineered wood products, called Mass Timber - look it up! This project will redesign SCDI into Mass Timber and analyze the impact to sustainability, cost, and time.

Sustainable Design Build: Logistics Center
4:35-5:10 p.m.

Gage Urbach, Andrew Sabuda, Nicolae Vesca, Dylon Moala, Daryn Nguyen

Advisors: Hisham Said, Vito Francioso, Rachel He

Based on a proposed self-sufficient logistics center in Bakersfield, this project addresses the design and construction of the site in order to produce the most efficient and sustainable project while maximizing benefits to locals and site users.

CIVIL, ENVIRONMENTAL AND SUSTAINABLE ENGINEERING SESSION 2

Sobrato Campus for Discovery and Innovation 3116

Nanosilica Enhanced Concrete for Commercial Construction
2:45-3:15 p.m.

Pavlik Gribanovsky, Angel Lozano, Sebastian Rico

Advisor: Vito Francioso

Silica nanoparticles of various sizes and concentrations were fabricated and added to self-consolidating concrete to determine the effects on the concrete strength and environmental impact.

ASCE Concrete Canoe Competition
3:20-3:55 p.m.

Sara Namoos, Lauren Dahan, Ruben Parvaresh, Justin Wong, Joaquin Garcia

Advisors: Hisham Said, Vito Francioso

We will be competing in the 2026 ASCE Concrete Canoe Regional Competition (MidPac) taking place April 10-12 2026. We are creating a unique concrete mix and hull design in order to maximize both speed and bouyancy of this canoe.

Malley Redesign
4:00-4:30 p.m.

Wesley Kim, Noah Monterroza-Sanchez, Malachi Douyon

Advisors: Yingqing Qiu, Reynaud Serrette, Hisham Said

Redesigning Malley to have a larger area will help bring in more students. Modernizing the look and utilities can be used to make SCU's gym a selling point of the school instead of just a part of it.

ASCE/AISC 2026 Student Steel Bridge Competition
4:35 -5:10 p.m.

Wyatt Nipp, Robert Miller, Gabriel Barrantes, Matthew Beltran, Vance DeBrabander

Advisor: Hisham Said

This team designed and fabricated a steel bridge emphasizing structural efficiency and constructability. The team collaboratively handled analysis, scheduling, detailing, and erection planning while prioritizing competition rule compliance.

COMPUTER SCIENCE AND ENGINEERING SESSION 1

Bergin 214

ML Speech Diarization
2:15-2:40 p.m.

Kenneth Kang

Advisor: Sean Choi

Using existing machine learning models within the speech diarization realm, we plan on improving diarization between parent and child conversations. Current models work well with adult-to-adult speech but struggle for child-directed speech.

Comparing LLM Architectures in Street Fighter III
2:45-3:15 p.m.

Andrew Hinh, Hyemin Doo, Jack Wu

Advisor: Xiao Li

A high-performance, web-based version of Street Fighter III against trained AIs.

JSD: A Defense Apparatus for Synthetic Data
3:20-3:50 p.m.

Scott Wang, Jeffrey Lane, Bojun Zhang, Vincent Chang

Advisor: Yuhong Liu

JSD is a defense apparatus against privacy attacks using synthetic data, combining a state-of-the-art implicit-privacy detection model with a genetic algorithm dataset optimization pipeline.

EcoVisor - Visualizing Sustainability Data with AI
4:00-4:30 p.m.

Hayden Le, Emily Chen, Matthew Van Dyke, Dorothy Xu

Advisor: Sharon Hsiao

EcoVisor is a web-based AI tool that transforms complex sustainability articles into clear, data driven visuals. It bridges the gap between technical analysts and the general public, making environmental insights accessible and easy to understand.

NeuronNotes
4:35-5:05 p.m.

Max Blennemann, Ethan Diec, Araceli Franco, Shibo Cong

Advisor: Navid Shaghaghi

A note taking software that helps create and edit notes in a network (resembling a neural network) that ties ideas and notes together for better information indexing, retention, and retrieval

COMPUTER SCIENCE AND ENGINEERING SESSION 2

Sobrato Campus for Discovery and Innovation 3302

BroncosGo
2:15-2:40 p.m.

Katherine Carter, Ethan Sychangco

Advisor: Sharon Hsiao

Student portal for finding campus events, integrating with Google Calendar, and tailoring events by interest, while supporting a user-friendly moderator backend incorporating human-AI collaboration.

Biki
2:45-3:15 p.m.

Anna Aldrin, Caroline Tapia, Lillian Le

Advisor: Silvia Figueira

BiKi is an interactive, multilingual math learning app designed for bilingual kindergarteners. It uses visual and auditory aids in activities to bridge math vocabulary between English and students' native languages.

SleepFocus
3:20-3:50 p.m.

Erik Keifer, Austin Kim, Isaac Amedie

Advisor: Sean Choi

A wellness app focusing on sleep health for students and professionals through data-driven insights. Using wearable technologies, our app delivers smart alarms, sleep analysis, and AI-powered recommendations to support healthier daily productivity.

ThriveTogether – A Community-Driven Wellness Platform Powered by AI
4:00-4:30 p.m.

Ethan Nguyen, James Hunter, Isaac Soto, Nathan Shimada

Advisor: Yi Fang

An AI-powered wellness platform that helps users build personalized fitness and nutrition plans using community-shared routines and recipes. Designed for individuals at any starting point, including beginners and those with physical limitations, the platform combines real user experiences with personalized AI-generated options to make healthy living accessible, and sustainable.

Bouillean: AI Recipe Model
4:35-5:05 p.m.

George Mouratoff, Helen Wang, Hanol Yang, Sebastian Verbinski

Advisor: David Anastasiu

Bouillean is a text-to-text recipe generation model that mimics how chefs approach recipes by reducing recipes into standardized components and constructing dishes based on those components.

COMPUTER SCIENCE AND ENGINEERING SESSION 3

Heafey 129

Entity Resolution
2:15-2:40 p.m.

Alex Blackwell

Advisor: Yi Fang

Fast and intelligent entity linking and resolution for real, messy datasets

Student Organization Management Portal
2:45-3:15 p.m.

Lindsey Leong, Madeline Follosco, Noelle Evanich, Irene Chang

Advisor: Darren Atkinson

A web app for SCU student organizations and the Center for Student Involvement that centralizes resources such as club registration and financial management to improve the efficiency and visibility of student organizations for SCU students and staff.

Kaikei
3:20-3:50 p.m.

Zachariah Wang, Sola Kawahara, India Bell, Lydia Martin

Advisor: Sharon Hsiao

Kaikei centralizes club finance by unifying interactions and automating budget tracking. It streamlines treasury duties, ensuring fiscal clarity and reducing administrative overhead for student organizations.

IAJES Website Redesign
4:00-4:30 p.m.

Anisha Malani, Isabelle Hu, Nicolas Gibson, Justin Fan

Advisors: Silvia Figueira, Allan Baez-Morales

Redesigning the IAJES website into an interactive hub for discovering members and collaborating across Jesuit engineering schools worldwide. Built with React and Supabase, it's accessible, maintainable, and scalable.

SCU2U
4:35-5:10 p.m.

Sattvika Bhatt, Austin Nguyen, Dhruv Patel, Izzy Perez, Shaunak Sharma

Advisor: Krishna Ramamoorthy

A low-cost, autonomous delivery rover designed to deliver food between Santa Clara University's SCDI Cafe and Heafey Hall. The system uses ROS2, NAV2, and vision-based perception to safely navigate a fixed route on campus route.

COMPUTER SCIENCE AND ENGINEERING SESSION 4

Heafey 125

Triangle Sorting as a Real-time 3D Renderer
2:15-2:40 p.m.

Xinyi Wang, Alexander Green

Advisor: Michael Schimpf

Our project implements a triangle sorting based, real-time 3D rendering pipeline. We utilized this renderer to implement a game engine, featuring camera control, user input, audio feedback, etc.

Our Roots
2:45-3:15 p.m.

Kayla Mattson, Megha Thottam, Kayla Huffman, Shreeya Koritala

Advisors: Sharon Hsiao

An interactive game that transforms sustainability education into a collective community experience. It replaces passive learning with a simulation where users practice real-world sustainable decision-making.

Hemlock
3:20-3:50 p.m.

Ambrose Vellequette, Geno Meschi, Ephraim Esson

Advisors: Yi Fang, Michael Schimpf

Our project strives to enable musicians to protect their work from being stolen for use in GenAI training data.

BridgeIDE
4:00-4:30 p.m.

Will Zumbolo, Maya Srimal, Arnav Gupta, Jeshwin Prince

Advisor: Darren Atkinson

BridgeIDE is a cloud-based collaborative IDE built specifically for CS students and educators. It provides pre-configured, course-ready environments run entirely in the browser, allowing users to code, compile, and execute assignments instantly.

Debatrix
4:35-5:10 p.m.

Vivienne Lu, Huy Ngo, Luke Ponssen, Jonathan Preiss, Ryan Rani

Advisor: Sean Choi

The Interactive Debate Simulator is an AI-powered platform providing real-time voice debates and objective feedback to help learners master argumentation and public speaking at scale.

COMPUTER SCIENCE AND ENGINEERING SESSION 5

Heafey 122

Implementation of Mixed Precision Iterative Solver on AMD APU
2:15-2:40 p.m.

Henrik Evers, Saeyeon (Sally) Kim

Advisor: Younghyun Cho

We present an implementation of a mixed-precision iterative refinement solver leveraging collaborative execution between the CPU and a Neural Processing Unit (NPU) within an AMD Accelerated Processing Unit (APU).

Complexify!
2:45-3:10 p.m.

Joseph Yu

Advisor: Ahmed Amer

Declining literacy rates, sociopolitical turmoil, and rapidly evolving technologies threaten to uproot the foundations of human subjectivity and creativity as we know them. The need for such a design space to help people exercise more intellectual rigor towards general concepts and values has never been greater.

Limno Lock
3:20-3:55 p.m.

Arnav Bharadwaj, Joseph Bryson, Dewa Khushzad, Nina Mahdawe, Xavier Murphy, Luke Song

Advisor: Navid Shaghaghi

Creating a probe for early detection and neutralization of the invasive species Limnoperna Fortunei, aka the Golden Mussel. Also creating a dashboard for government officials that will live ping locations of Golden Mussel detections.

Inclement Weather Prediction
4:00-4:30 p.m.

Cole Mitchell, Julian Jackson, Curran McLaughlin

Advisor: David Anastasiu

We developed a high-resolution machine learning precipitation model for Santa Clara. By downscaling global forecasts (HRRR) using local terrain data, we aimed to deliver neighborhood-level accuracy superior to standard baselines.

Maya Roots: A Mobile App for the Agricultural Community of Yucatan, Mexico
4:35-5:00 p.m.

Megu Kanzawa, Erin Schmidt

Advisors: Angela Musurlian, Maia Dedrick

Low-resource mobile and web platform combining lightweight predictive analytics, GIS mapping, and LiDAR terrain models with community data. Designed for low connectivity and to integrate traditional farming knowledge for Yucatán farmers.

COMPUTER SCIENCE AND ENGINEERING SESSION 6

Sobrato Campus for Discovery and Innovation 1301

Fisheye Camera Object Detection
2:15-2:40 p.m.

Hugo Yang, Robert Luo

Advisor: David Anastasiu

Fisheye cameras are underutilized in traffic surveillance due to the scarcity of public annotated datasets. We reimplement the state-of-the-art model for fisheye traffic perception and explore improvements to detection accuracy and robustness.

Corridor Counting
2:45-3:15 p.m.

Erick Sun, Jayden Malhotra, Jacob Lin, Joseph Hissen

Advisor: David Anastasiu

Corridor counting is the process of determining the number of vehicles that traverse through a predetermined corridor. We create a real-time compatible system to accurately count vehicles utilizing deep learning methods on edge devices.

Wearable Hazard Detection System for the Visually Impaired
3:20-3:50 p.m.

Nolan Daly, Sergio Diaz, Brandon Ng

Advisor: Krishna Ramamoorthy

Aimed at assisting the visually impaired, our device pairs wide-angle camera vision with AI-based object detection to identify a range of potential obstacles, including rapidly approaching or elevated hazards. When a hazard is detected, haptic feedback alerts the wearer to its position.

Mimica
4:00-4:30 p.m.

Stephanie Campos, Gurprasaad Hora, Sean Lai

Advisors: Yuhong Liu, Benham Dezfouli

A compact, pocket-sized language translation device that features a variety of different language combinations, voice cloning, and fluid conversation support.

6-TiSCH Smart Agricultural Network
4:35-5:10 p.m.

Riley Heike, Rosalie Wessels, Justin Odo, Jalen Paige, Griffin Jones

Advisor: Yidi Wang

This project builds a low-power smart agriculture monitoring system using 6TiSCH networking. Wireless sensor nodes collect soil and environmental data and transmit it over a time-synchronized IPv6 mesh network to a cloud database with a dashboard.

ELECTRICAL AND COMPUTER ENGINEERING SESSION 1

Learning Commons 129, Viewing & Taping A

Reconfigurable RF Resonator Filters
2:15-2:40 p.m.

Jason Corn, Roman Junes

Advisor: Adham Naji

In this project, we design and validate a prototype reconfigurable RF filter, using microstrip geometric designs with electronically controlled tuning mechanisms. This component will allow for the real-time adjustment of filtering characteristics, enabling more dynamic wireless communication.

Mixed-Signal IC Design and Fabrication
2:45-3:15 p.m.

Jack DeMeulemeester, Aris Ozark, Alan Rieger

Advisor: Shoba Krishnan

To design, fabricate, and validate a Current Mode DAC with the help of Texas Instruments and Cadence Design Systems. To comprehensively document all steps taken throughout the project for a future tape-out course at Santa Clara University.

RF Target Detection Radar System
3:20-3:50 p.m.

Alfred Galindez, Austin Petersen, Francis Chau

Advisor: Kurt Schab

Our project recreates & enhances the MIT Coffee-Can radar to build a modern, modular sensing platform. The system produces a chirped signal, transmits it, & processes echoes to measure range & motion, supporting hands-on RF learning & experimentation

Radio Frequency Fingerprinting: Neural Networks for Device Identification
4:00-4:30 p.m.

Genevieve Patmore, Maxwell Gertner, Pranav Chainani

Advisor: Kurt Schab

This project classifies radio frequency devices by training a CNN to detect hardware-induced imperfections in RF signals. These imperfections form device-specific RF fingerprints that enable reliable device identification and classification.

Santa Clara Radio Astronomy Project (SCRAP) V
4:35-5:00 p.m.

Alejandro Hernandez, Agustin Garcia

Advisor: Kurt Schab

SCRAP V enhances SCU's radio telescope system by developing a robust MATLAB-based data processing and visualization infrastructure. Through this, it will enable accessible, real-time radio astronomy learning and research for students.

ELECTRICAL AND COMPUTER ENGINEERING SESSION 2

Learning Commons 133, Viewing & Taping B

Context-Aware Positioning Device
2:15-2:40 p.m.

Nadeem Alabed, Kai Hoshide

Advisor: Radhika Grover

This project involves developing a handheld real-time positioning system that combines IMU and RFID sensors with machine learning to accurately track device position in 3D space. The system utilizes low-cost sensors to provide spatial awareness in different indoor settings.

Educational Smart AI Multi-functional Robot
2:45-3:15p.m.

Chengxu Tang, Bill Zhang, Jiayan Wen

Advisor: Tokunbo Ogunfunmi

This project builds a ROS2-based AI smart robot car that integrates vision, speech interaction, and autonomous control, providing an educational platform to demonstrate the complete perception–decision–execution pipeline on real hardware.

Real-Time Basketball Video Detection using FPGA Hardware Acceleration
3:20-3:50 p.m.

Blessy Gnanamani, Armon Choudhry, Sreepriya Ganga

Advisor: Radhika Grover

This project builds a real-time basketball video detection system on an FPGA that accelerates a lightweight vision model to detect players and the ball, achieving lower latency and higher throughput than a software-only implementation.

ORA
4:00-4:30 p.m.

Isabella Murillo, Juan Pablo Fernandez Garza, Gabe Kotab, Catie Epstein

Advisor: Andrew Wolfe

A spherical robot with a magnetic head that rolls, climbs, and explores tight, hazardous spaces humans can't reach—ideal for inspection, construction, and search-and-rescue.

Open Source ARM Cortex-M0
4:35-5:00 p.m.

Bryce Kelly, Dylan Thornburg

Advisors: Andrew Wolfe, Younghyun Cho

This project aims to work on an open source implementation of the ARM Cortex-M0 processor in Verilog for research and experimentation.

INTERDISCIPLINARY SESSION 1 - BIOENGINEERING AND LIFE SYSTEMS

Learning Commons 316, St. Clare Room

SMART-BioSense: Specific Molecular Aptamer-based Recognition Technology for Ultra-Specific Whole-Cell Bacterial Detection

2:15-2:40 p.m.

Eashan Selvarajah

Advisor: Jonathan Zhang

This project involves the development of aptamer-based biosensors for the detection of E. coli and S. enterica via biochemical immobilization of aptamers on biochips for food safety & control purposes.

NeuroGen: Effects of Near-Infrared Light Stimulation on Cognition and EEG Biomarkers

2:45-3:15 p.m.

Damilola Gbadamosi, Cassie Hashemi, Taj Keny

Advisors: Andrew Wolfe, Julia Scott

Transcranial photobiomodulation (tPBM) is an experimental treatment for neurodegenerative disorders and neurological conditions. NeuroGen is a photobiomodulation device designed to optimize light-stimulation therapy based on electroencephalography (EEG) readings. We will use it to test the effects of tPBM on cognitive performance and the associated EEG biomarkers.

Bio-Payload

3:20-3:55 p.m.

Oliver Goodall, Connor Bishop, Marcus Kirk, Anish Shanmuganathan, Gabriella Robles

Advisors: Christopher Kitts, Michael Neumann, Ashley Kim

An autonomous platform capable of conducting cellular biology experiments in a well-plate within a CubeSat environment. Biopayload will initiate experiments, monitor them, and collect data without human intervention in microgravity.

AI in Precision Medicine: Redefining Blindness Treatment via Retinal Stem Cell Differentiation

4:00-4:25 p.m.

Calissa Leong, Tiffany Nguyen

Advisors: Jonathan Zhang, Michael Schimpf

We are utilizing AI to improve the differentiation efficiency of iPSCs into retinal pigment epithelium cells (RPE), which are critical to vision. The AI model is trained to predict the optimal amount of growth factors & timing to increase accuracy.

IRIS

4:35-5:10 p.m.

Cooper McCarthy, Elias Pedroza, Thatcher Steele-Maley, Zachary Henderson, Colin Friedel

Advisors: Christopher Kitts, Michael Neumann

IRIS is an autonomous marine telemetry system designed for near-real-time data transmission from subsea sensors. Using a winch the system periodically deploys a surface buoy to establish a communication link. This method replaces manual diver-based retrieval, allowing for persistent monitoring of benthic environments with minimal human intervention.

INTERDISCIPLINARY SESSION 2 - ENVIRONMENTAL & SUSTAINABILITY SYSTEMS

Sobrato Campus for Discovery and Innovation 1302

Multi-Outlet Water Delivery System - Oorja

2:15-2:40 p.m.

Paul Trudell, Yared Calderon

Advisors: Jes Kuczenski, Laura Doyle

This project partners with Oorja to design a low-cost, multi-outlet water delivery system for solar-powered irrigation. The system integrates modular piping, flow measurement, and simple controls to enable efficient and equitable water distribution, reduce labor demands, and improve productivity for smallholder farmers in rural Indian communities.

ThermoVision 3D
2:45-3:15 p.m.

Kieran Greeley, Iker Mendiburu Perez, Daniel Louie

Advisors: Michael Neumann, Christopher Kitts, Michael Schimpf

Design and implementation of a thermal imaging reconstruction system that generates three-dimensional building models from infrared imagery for energy efficiency diagnostics and building performance evaluation.

GUNK: eDNA Sampler
3:20-3:50 p.m.

Isaac Hernandez-Nguyen, Harumy Miura, Oscar Alvarado Flores, Kay Hall

Advisors: Michael Neumann, Christopher Kitts

A low cost multi-channel, portable sampling system for filtering environmental DNA from bodies of water. Analyzed samples can be used in impact assessments, biodiversity studies, and tracking invasive or endangered species.

Smart Waste Management System
4:00-4:30 p.m.

Clare Epolite, Mia Tippett, Will Mccarthy, Will Yancey

Advisor: Jes Kuczenski

The problem addressed is how SCU can implement a user-friendly smart waste management system that improves waste sorting accuracy, reduces contamination, and provides real-time data to support more efficient waste collection practices.

M.A.N.T.A R.A.Y. Profiler
4:35-5:10 p.m.

Ashika Balamurugan, Divya Bengali, Angelina Ekdawy, Gabriela Ruiz, Alexander Torres, Alondra Valencia, Ysidro Magaña

Advisors: Christopher Kitts, Michael Neumann, Sally Wood

To develop a low-cost, user-friendly Autonomous Underwater Vehicle (A.U.V) based ocean health monitoring system capable of collecting water column data at predetermined waypoints across a body of water.

INTERDISCIPLINARY SESSION 3 - HUMAN, HEALTH, BIOMECHANICS & ASSISTIVE TECHNOLOGY

Sobrato Campus for Discovery and Innovation 3301

HALoN (High Altitude LoRa Networking) for Crisis Communications
2:15-2:40 p.m.

Sahana Chandramohan, Vikram Jangid

Advisors: Kurt Schab, Krishna Ramamoorthy

HALoN strives to provide an accessible, crisis-aware emergency communication system to provide connection in times of disaster. It utilizes a LoRa mesh network, reconfigurable antennas and a light-weight machine learning scheduling algorithm.

Gesture-Controlled Reminder Device
2:45-3:15 p.m.

Ian Kennar, Ryan Kiniris, Veronica Saltanov

Advisors: Radhika Grover, Michael Schimpf

The Gesture-Controlled Reminder Device is a small, wearable device that manages reminders without screens. Hand gestures trigger haptic, light, and audio feedback, enabling hands-free, accessible task management for users who struggle with reminders.

Adaptive Neck Exoskeleton for Physical Strain
3:20-3:55 p.m.

Ayesha Ahmed, Parnia Ayoubi, Cesar Tellez, TaLiyah Borela, Srinidhi Vusirikala, Isabella Williams

Advisors: Michael Abbott, Ashley Kim

Our project aims to reduce occupational strain with an adaptive, lightweight neck exoskeleton. It preserves full mobility while using real-time sensing and feedback to reduce fatigue and prevent long-term neck injuries in dynamic work environments.

Smart Walker
4:00-4:30p.m.

Ayden Dauenhauer, Viet Ha, Harry Ying

Advisors: Maria Kyrarini, Micheal Schimpf

A walker with instruments that measure gait (characteristic of walking) for clinicians. This data will help clinicians monitor and modify their patients treatment plan over a long stretch of time.

PT Device
4:35-5:10 p.m.

Margaret Hughes, Avery Minter, Jarrett Powell-Odden, Mostafa Elshenawy, Shepard Dow, Cole Llana

Advisors: Michael Abbott, Ashley Kim, Salem Al Agtash

Our project is a dynamic resistance cable system that is designed to make physical therapy for the shoulder smarter and more responsive to real-time changes. It will use a motor and sensors which constantly adjust based on how much force is applied.

INTERDISCIPLINARY SESSION 4 - ROBOTICS & INTELLIGENT AUTONOMOUS SYSTEMS

Heafey 225

Developing an Integrated Computer Vision–Assisted Cobot Workcell for Automated PCB Defect Detection
2:15-2:40 p.m.

Paul (Shangyuan) Li, Elise Murugasu

Advisor: Fatemeh Davoudi

This project integrates computer vision, data collection, and robotics to build an intelligent PCB defect inspection system, enabling real-time defect classification and autonomous PCB retrieval and sorting using a UR3e robot.

Real-Time Multimodal Ergonomic Risk Assessment System Using Human & Robot Collaborations
2:45-3:15 p.m.

Andreas Wanebo, Sam Whistler, Claire Koch, Daniel Damico

Advisor: Fatemeh Davoudi

A multimodal ergonomic risk assessment system that integrates computer vision, wearable electromyography (EMG) and inertial measurement unit (IMU) sensors, and a collaborative robot (COBOT) to monitor and reduce musculoskeletal disorder risk in real-time occupational settings.

DESIGNING COST-EFFECTIVE QUADRUPEDAL SERVICE ROBOTS FOR DISABILITY AID
3:20-3:50 p.m.

Kieran Pazmino, Rose Toy, Cyrus Wong, Akira Zone

Advisors: Maria Kyrarini, Andrew Wolfe, Sthanu Mahadev

Design of a robot dog for the purpose of disability aid and assistance. This is the first year of a multi-year project, which focued on creating the design parameters based on consumer needs and the mechanical design and basic control of the legs.

Wheelless Snake-like Robot for Unknown Environment Exploration
4:00-4:30 p.m.

Gwyneth Anawalt, Eden Steinbeck, Anastasia Statcenko

Advisor: Burak Kurkcu, Angela Musurlian

Our project aims to develop a modular, snake-inspired robot capable of versatile movement. The system will use locomotion algorithms and camera based sensing to enable autonomous navigation.

INTERDISCIPLINARY SESSION 5 - SMART SYSTEMS, EMBEDDED & COMMUNICATION TECHNOLOGIES

Kenna 306

BlendMo: Blender Mocap Toolkit
2:45-3:15 p.m.

Kelly Lee, Dana Steinke, Angela Zhou

Advisors: Angela Musurlian, Danielle Heitmuller

The project is an extension within Blender that aims to clean markerless motion-captured data. It focuses on eliminating negligible key frames, cleaning jittery frames, locking down feet, and rescaling motion onto various proportioned models.

StudyScape
3:20-3:55 p.m.

Tiffany Doan, Sanaa Ahmed, Andrew Pritchard, Josh Colleran, Zach Anderson

Advisors: Farokh Eskafi, Jes Kuczenski, Sally Wood

StudyScape is an app designed to help Santa Clara University students make decisions about where they study across campus. Providing real-time information such as noise level, occupancy, and overall activity.

Image Processing in Autonomous Vehicles
4:00-4:30 p.m.

Seana Corners, Siddharth Kalidindi, Julia Lin, Anushri Selva

Advisors: Radhika Grover, Sean Choi

In this project, we implement image processing on a PYNQ-Z2–based autonomous system using a convolutional neural network, comparing a hardware-accelerated FPGA approach with a purely software-based solution.

Formation Control of a Multi-Agent System
4:35-5:05 p.m.

Benjamin Banh, Paul Lancaster, Daniel Sims

Advisors: Burak Kurkcu, Michael Schimpf

A ROS2-based distributed control system that enables coordinated multi-robot aggregation and formation control in shared environments. The project implements and translates a simulation-derived control algorithm into a real-time, deployable multi-agent system.

MECHANICAL ENGINEERING SESSION 1

Benson Center, Parlors B/C

Ping Pongers
2:45-3:15 p.m.

Derick Alvarado, Peter Sandberg, Andrew Wong

Advisors: Hannah Yang, Jun Wang

This machine will be a table tennis serving machine that costs around $250 and with a small and lightweight design for a backpack. Functions will include: shot location, speed, and spin. The balls will be launched by contact from three flywheels.

A.T.L.A.S.
3:20-3:55 p.m.

German Markaryan, Dean Schultz, Isabella Bravo, Lucas Matter, Quacy Moore, Robert Wang

Advisor: Peter Woytowitz

A.T.L.A.S. is a roof-mounted single-axis solar tracking platform with an automated sprinkler-based self-cleaning system. By following the sun and keeping panels debris-free, it targets 20-50% higher energy output than fixed residential installations.

Rehab Mechanics
4:00-4:35 p.m.

Joel Gonzalez, Sierra Spierling, Nicole Garcia, Mia Kwan, Diana Garcia-Becerra

Advisor: Michael Abbott

Our senior design project focuses on developing a grip-strengthening rehabilitation device for post-stroke patients with limited hand mobility and reduced grip function, allowing them to do their therapy from home.

MECHANICAL ENGINEERING SESSION 2

Benson Center, Williman Room

Inductive Train Transport System
2:45-3:15 p.m.

Ryan Cinarkaya, Devon Gibb, Davis Letsinger, Nicholas Root

Advisor: Godfrey Mungal

This project entails building a wirelessly-charged battery-powered light rail locomotive. The inductive charger will deliver a high power density to the train, enabling station stop times of one minute for a full scale light rail system.

SCU DBF Aerodynamics
3:20-3:55 p.m.

Unique Barnes, Gabriel Kern, Justin Mayer, Jack Quinn, Ben Randall, Mark Williams

Advisor: Drazen Fabris

The SCU DBF Aerodynamics Team will design, build, and fly a model aircraft for the AIAA Design/Build/Fly competition, using aerodynamic theory, CFD, and experimental validation to optimize, lift, drag, and stability.

DBF: Structures
4:00-4:35 p.m.

Kyle Greiner, Charles Olsen, Tate Schurman, Dante Black, Brendan Yarusso

Advisor: Drazen Fabris

Design, analyze, and manufacture all structural components of an RC aircraft, optimizing strength, weight, and payload capacity to meet mission requirements and maximize performance for international competition.

MECHANICAL ENGINEERING SESSION 3

Benson Center, CA Mission Room

Materials Testing Furnace
2:45-3:15 p.m.

Austin Gregson, Mekhi Hale, Lucas Lafayette

Advisor: Robert Marks

The objective of this project is to continue development of a compact and cost-effective vacuum heat furnace capable of achieving elevated temperatures for laboratory testing of material properties.

DBVF

3:20-3:55 p.m.

Malia Bennett, Jack Carpenter, Elisabeth Canjar, Xander Fruin, A'Zhae Turay, Steven Wu

Advisor: Mohammad Ayoubi

We are designing an autonomous eVTOL drone for wildfire response that provides rapid aerial situational awareness and payload delivery, improving early decision-making when ground access is limited.

Pool Pump Controls for Load Shifting

4:00-4:30 p.m.

Andrew Minocha, Angelo Piziali, Cade Benner, Brinley Chrzanowski

Advisor: Godfrey Mungal, Brian Woo-Shem

Designed a pool filtration lab test rig featuring adaptive pump control. The system leverages real-time sensor data to enable demand-response energy savings and predictive maintenance, optimizing both cost and grid support.

Camless Valve Engine

4:35-5:10 p.m.

Berkeley Burbank, Holden Kleiner, Thomas Daniel, Martin Raabe, Nicos Katigbak, Haydn Fischer

Advisor: Peter Woytowitz

Our project goal is to replace traditional camshaft valve actuation with variable pneumatic valve actuation to improve internal combustion engine power and efficiency.

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

Michael A Wang
Power Down Semiconductor Inc.

Robert Abatecola
AWS

Kishore Akshintala
Hewlett Packard Enterprise

Brad Allen
Retired

JP Allport
Supermicro

Mangesh Amdekar
Nvidia

Anthony Ashe
ZRG Partners

Catherine Avila
Avila And Associates

Ernesto Avila
Contra Costa Water District

Jui Banik
Elevaitlabs.ai

Evangelyn Bautista Reyes
San Francisco Department of Public Works

Dean Beaver
Sycomp

Pavitra Bhalla
Superserve Inc.

Nikita Bhatnagar
Vanqua Bio, Inc.

Kenneth Bigler
Intuit

Mike Bliss
Google, Inc.

Chris Brady
CP Brady Consulting

Martin Bringuel
Retired

Brooke Broszus
Cepheid

Michael Burke
Adobe Inc.

Sherwin Cabatic
NTT Devices America

Joseph Cepollina
Actuarial Advisors

Edmund Cheng
Intuit

Tony D'Antonio

Guru Das Srinagesh

Nayana Dawalbhakta
Criterion Networks

Tyson DeCastro
Advanced Energy Industries

Robert Decottignies
Applied Materials

Mark Dettle
Retired

Rahul Dhiman
LiveX AI

Hina Dixit
Decompute

Travis Duncan
Deca

Amber Eden Hensley
Strata Novate

JP Ertola
HPE

Susan Flierl
Silicon Valley Social Venture Fund

Nathan Garvey
Leitnium (Formerly YouSolar)

Samana Ghimire
Intuitive

Eric Golangco

Jim Haflinger
Zendure

Asheet Hakoo
AmpereComputing

Caroline Harieg

Karl Hennig
Intuit

Brent Hosoume
Lockheed Martin

Frank Hsu
Tiktok

Corina Hu
SWISSto12

Samuel Huang
Recently Retired

Trupti Joshi Satish
Microsoft

Naeem K Turner-Bandele
Latimer Enterprises

Shubham Kamdi
Meta

Chitti Keswani
Tumeryk

Amanda Khoo
Brown University

John King
UC Berkeley

William Kirkwood
TLR Inc

Nandini Kodipunzula
Salesforce

Jeff Krenek
Hewlett Packard

Pavan Kumar Srinivasulu
Asquare.ai

Ivan Kuo
Stanford University

Wilson Le
Cisco Systems

Billy Li
Google

Mike Liu

Louie Lombardo
Retired - Lockheed Martin

Matt Long
Lockheed Martin

Michael Loomis
4Leaf, Inc.

Avery Lu
Aventurine Capital Group

Mark Maagdenberg
Retired / Previous Peloton

Jim MacDonald
R.F.MacDonald Co.

Divya Mahajan
Amazon

Ruchir Mehta
Accenture

Payal Mehta
GEICO

Aniket Mirji
Google

Mirazun Mitu
SitelogIQ Inc.

Kevin Mo
Amazon

Amanda Moran
NVIDIA

Farhood Moraveji
Monolithic Silicon Power

Raja Nageswara Rao Gogineni
Amazon

Hesham Naja
Palisade Builders, Inc.

Allison Nason
Wisk Aero

Joe Nebolon
Expertise Engineering llc

Christine Nolan-Brady
Google

Athmane Nouiouat
Niandai

Matthew O'Connor
Mentor126.ai

Matt O'Connor
EPRI

Twinkle Pansuriya
Nvidia

Nartan Patel
IBM

Niharika Patil
Cigna Health Care

Sahil Patil
Lam Research Corp.

Armando Pereira
PVentures Consulting

Ognjen Petrovic
Venus Concept

Jay Prakash Thakur
Microsoft

Surya Rajasekaran
Apple

Atharva Rajiv Weginwar
Siemens

Sudhish Ramesh
MyTyTech Labs

Benita Rego
Oracle

Patricia Richards
Broadcom

Greg Richmond
Intuitive

Steven Rodriggs
Lockheed Martin

Greg Rodrigues
Hohbach-Lewin, Inc.

Peter Roguski
Meta

Jerard Roniel Madamba
Bayer

Kyle Roozen
Propeller Consulting

Amit Sandhu
THINK Surgical, Inc

Henry Schrader
LionfishLabs

Abhilasha Sharma
Uniphore

Richard Sherman
Retired

Manpreet Sokhi
Dell

Ladan Soroushian

Guillermo Surraco

Amit Syal
Vaxcyte, Inc

Noel Tamayo
Applied Materials

Michael Tamshen
Lockheed Martin

Stephen Tarantino
Retired/EKI Environment & Water

Don Toy
BKF Engineers

Jonathan Trinh
KLA

Ifiok Umoh
Intel

Donald Van Buren
Retired

Jenny Van Truong
NV5

Ursula Vaughan
Intuitive Surgical

Prajyoti Waghmare
Amazon

Jason Weaver
Apple

Ryan Wellman
Apple

Theresa Wellman
Homeowner Experience Real Estate

Claire Wemp
Qnity

Jose Ysaguirre
Waters