Santa Clara Engineering

55th Annual
School of Engineering

SENIOR DESIGN Conference

May 9, 2025
2:00 P.M.

ENGINEERING WITH A MISSION

WELCOME

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

Welcome to the 55th 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 first Senior Design Conference as the new 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.

This year's senior capstone projects offer innovative and practical solutions to real-world problems, including, designing a microgrid for Veggielution Community Farm that uses solar energy to manage water heating, ventilation, and lighting across three buildings, and redesigning the CalTrain Mountain View Station to enhance pedestrian and bicycle safety and efficiency through the addition of an overpass.

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 55 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

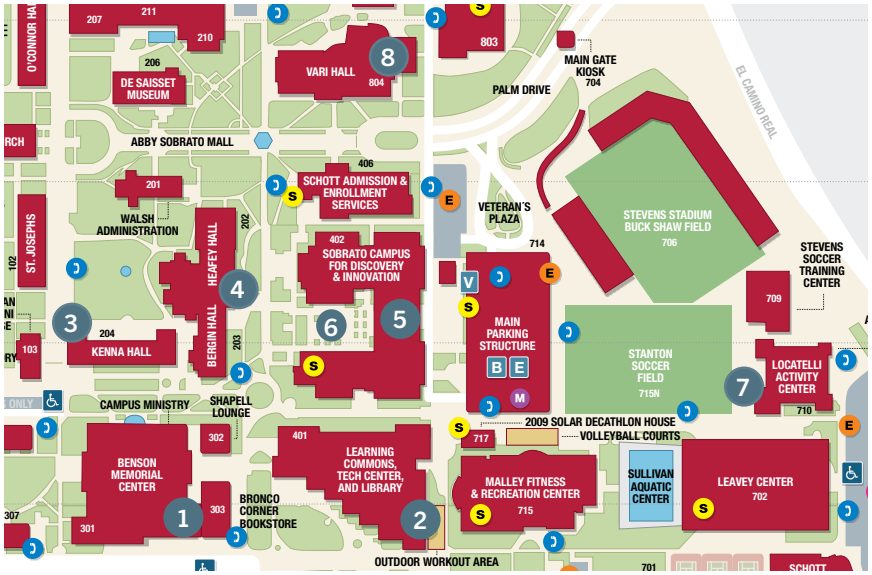
Locatelli Student Activity Center

2:10–5:00 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

5:00–6:00 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

Senior Design Presentations

- Computer Science and Engineering Session 1, 2, 3, 4

2 THE HARRINGTON LEARNING COMMONS & ORRADRE LIBRARY

Senior Design Presentations

- Computer Science and Engineering Sessions 5, 6
- Electrical and Computer Engineering Sessions 1, 2

3 KENNA HALL

Senior Design Presentations

- Bioengineering Sessions 1, 2

4 HEAFEY/BERGIN HALL

Senior Design Presentations

- Civil, Environmental and Sustainable Engineering Sessions 1, 2, 3

5 SOBRATO CAMPUS FOR DISCOVERY AND INNOVATION

Senior Design Presentations

- Interdisciplinary Sessions 1, 2, 3, 4, 5

6 SCDI SORDELLO FAMILY COURTYARD

Project Demonstrations + Networking Hour

7 LOCATELLI ACTIVITY CENTER

Judges' Check-in

Judges' Lunch and State of the School Address

Judges' Welcome and Orientation

8 VARI HALL

Senior Design Presentations

- Mechanical Engineering Sessions 1, 2, 3

BIOENGINEERING SESSION 1

Kenna Hall 306

Microplastic Eaters

2:15–2:40 p.m.

Alanna Boze, Kaya Chun

Advisor: Jonathan Zhang

Our goal is to prove that the desaturases ABO_2546 and ABO_2585 that degrade petroleum are able to degrade microplastics as well and to engineer two desaturases to have higher efficiency and selectivity towards microplastics.

Molecular Scaffolding and Cargo Loading in Engineering Nanomedicine

2:45–3:15 p.m.

Danielle Otero, Fernanda Mendoza, Ellie Wangard

Advisor: Bill Lu

Our project aims to determine which molecular scaffolds are the most efficient for exosomal drug delivery. This requires designing, testing, and imaging various anchoring scaffolds to compare them. Their membrane topology will be imaged and analyzed.

A Novel Nanoscale Exosome-based Suicide Gene Therapy for Brain Cancer Targeting

3:20–3:45 p.m.

Seth Madden, Grace Lenington

Advisor: Bill Lu

We are researching a novel therapy technique for brain cancer. Our research is to confirm that a prodrug-activating enzyme can be targeted to the surface of exosomes that are secreted and absorbed while maintaining its function to induce cell death.

Quantifying Protein Storage in Subcellular Compartments with a Genetic Sensor

3:50–4:20 p.m.

Haseeb Afzali, Keegan Kogl, Lissette Weaver

Advisor: Bill Lu

Our project develops genetic sensors to measure protein storage in cells. A dual reporter system with fluorescence and bioluminescence enables real-time tracking of protein localization, advancing disease research, drug development, and therapeutics.

AI Diagnostic Tool for COVID-19 Severity
4:25–5:00 p.m.

Ryan Lang, Hunter Lau, Aidan Furuhashi

Advisor: Hamed Akbari

This project examines lung imaging and patient heterogeneity in COVID-19 to develop an AI-driven diagnostic tool. AI techniques are employed to identify imaging patterns, evaluate disease progression and optimize personalized treatment strategies.

BIOENGINEERING SESSION 2

Kenna Hall 308

Microfluidic Intracranial Pressure Sensor
2:45–3:15 p.m.

Anthony Sukendro, Andrea Pader, Tripti Pandey

Advisor: Emre Araci

An implantable pressure sensor that uses microfluidic strain sensor techniques to create a less invasive solution for continual monitoring of intracranial pressure.

EEG-Based Machine Learning Framework for Schizophrenia Diagnosis and Predictive Modeling
3:20–3:45 p.m.

Ally Flinn

Advisor: Hamed Akbari

This project uses AI/ML to analyze EEG data for schizophrenia detection and diagnosis. This approach identifies neural patterns, models activity, and quantifies diagnostic heterogeneity, enabling objective, non-invasive, and precision psychiatry.

Ambulatory Monitoring of Biomarkers for Enhanced Recovery
3:50–4:20 p.m.

Guneet Grewal, Maggie Nostrand, Vismaya Panicker, Grace Kurilo

Advisor: Ashley Kim

This sensor aims to identify early detection of diseases associated with oxidative stress which can include certain types of cancer, neurodivergent diseases and cardiovascular diseases.

Continual Measurement of Protein Biomarkers for Early-stage Sepsis Management
4:25–5:00 p.m.

Brian Mostofi, Anders Kouhia, Aidan Burke, Jake Chansky

Advisor: Emre Araci

A system for continuous protein detection to provide real-time patient diagnostics. We designed a microfluidic chip interfaced with a functionalized optical probe that is proposed to solve this problem.

CIVIL, ENVIRONMENTAL AND SUSTAINABLE ENGINEERING SESSION 1

Bergin Hall 116

Bridging Deterministic and Probabilistic Methods for Dam Safety Evaluation
2:15–2:40 p.m.

Giselle Aviles

Advisor: Rocio Segura

This study evaluates a 326-ft Hardfill dam's resiliency under various loads using probabilistic analysis. It integrates Tornado Diagrams, CADAM 3D, and MATLAB to enhance stability assessment and improve efficiency in uncertainty analysis.

Pajaro Levee Remedial Design for Climate Resiliency
2:45–3:15 p.m.

Anna Krebs, Olivia Leonardis, Karina Martin

Advisor: Ed Maurer

Due to climate change, underrepresented residents in Pajaro, CA need a more resilient flood-protection solution. This project aims to design a climate-adaptable levee as current infrastructure has failed.

I-280/Wolfe Road Interchange Redesign
3:20–3:45 p.m.

Mitchell Wong, Zhuoxuan (Dave) Liang

Advisor: Rachel He

To support Vision Zero and Complete Streets goals, this project addresses collision history and anticipated growth near the I-280/Wolfe Road Interchange. Planned improvements include enhanced roadway expansion and separated bike lanes to improve safety and capacity for all users.

Sustainable Solutions for Managing Overcrowding at Pinecrest Lake
3:50–4:20 p.m.

Andre Brisk, John King, Kyle Ralston

Advisors: Laura Doyle, Rachel He, Aria Amirbahman

Proposal of sustainable solutions for managing overcrowding at Pinecrest Lake, focusing on infrastructure improvements, traffic management, and a water treatment retrofit that lowers operating costs while enhancing recreational access for visitors.

CIVIL, ENVIRONMENTAL AND SUSTAINABLE ENGINEERING SESSION 2

Heafey Hall 106

Alternative Shelter Initiative
2:15–2:40 p.m.

Christopher Rivas Castillo

Advisors: Rocio Segura, Hisham Said

This project explores using the Homeko structure, made from recycled Tetra Pak cardboard, in California to tackle seismic safety and homelessness. It compares materials, designs, and environmental impacts to find the best sustainable housing solution.

Cob Structure Optimization for Oaxacan Community Center
2:45–3:15 p.m.

Dana Johnson, Benjamin Lanzas, Alfonso Zepeda Perez

Advisor: Laura Doyle

Community Center for under-resourced communities in Oaxaca, Mexico. Constructed out of cob and wood optimizing bio-design with local materials. Structural, risk assessment, and life cycle cost analysis.

I-280 Wildlife Culvert
3:20–3:45 p.m.

Gunner Craig, Tate Reese

Advisors: Hisham Said, Tracy Abbott

This project aims to reduce wildlife-vehicle collisions (WVCs) along I-280, otherwise known as the 'roadkill capital' of California. We will provide the design for a support of excavation system and the construction of a cast-in-place concrete culvert to reduce WVCs.

Sustainable Water Solution for San Jose Urban Garden
3:50–4:20 p.m.

Isa Garcia, Katie Leisenring, Annie Tartell, Julia Cornejo

Advisor: Laura Doyle

Partnering with the Urban Growers Network (UGN), a group of environmental education organizations, this project designs a sustainable water supply to irrigate crops. Specifically, it will be an acre of crops in a new garden along the Guadalupe River.

CIVIL, ENVIRONMENTAL AND SUSTAINABLE ENGINEERING SESSION 3

Heafey Hall 129

Development of Sustainable Nano-Engineered Cementitious Composites Reinforced with Graphene Oxide from Invasive Seaweed
2:45–3:15 p.m.

Will Weber, Steven Garcia, Noah Chun

Advisors: Vito Francioso

Graphene from sargassum seaweed offers a sustainable way to enhance concrete. Once beneficial, its overgrowth now drives new applications. This project assesses the feasibility of using sargassum-based graphene in concrete.

Caltrain Redesign: Mountain View Station
3:20–3:45 p.m.

Itzel Vargas, Eugene Lim

Advisors: Hisham Said, Rachel He

Our project involves redesigning the CalTrain Mountain View Station to improve pedestrian and bicycle traffic efficiency and safety with an overpass.

Mixed Use Transit-Oriented Development
3:50–4:20 p.m.

Freddie Flanagan, Hugh Sutherland, Bryan Clagett, Maisie Lopez

Advisors: Hisham Said, Rachel He

Mixed Use Transit-Oriented Development with a structural concrete commercial first floor, second floor parking lot, and 3 floors of affordable residential housing using a modular construction method.

Complete Street Redesign of El Camino Real
4:25–4:55 p.m.

Ian Cosman, Healy O'Donnell, Kayla Zapata

Advisors: Rachel He

This project focuses on redesigning the El Camino Real Corridor around Santa Clara University to improve safety, traffic flow, and accessibility for all users. Guided by Vision Zero principles, we address critical safety concerns through community-focused design.

COMPUTER SCIENCE AND ENGINEERING SESSION 1

Benson Center, Parlor B

Universal LSTM Stock Predictor
2:15–2:40 p.m.

Zhirong Wang, Kelly Zhou

Advisor: David Anastasiu

Universal LSTM Stock Predictor uses an LSTM model to analyze multiple stock tickers simultaneously, identifying market patterns. It processes historical data to predict future closing prices.

SIDEQUE$T
2:45-3:15 p.m.

Lucas Jablon, Anusha Kankipati, Afra Mahammad, Akshay Nichani

Advisor: Shiva Jahangiri

SIDEQUE$T is a safe, user-friendly marketplace to connect job seekers of any experience level to opportunities. Through a tag and recommendation system, job seekers can display their skills on their profile and view jobs they are most qualified for.

An AI-Driven Microfinance Application to Improve the Profitability and Growth of Small Businesses in Developing Areas
3:20–3:45 p.m.

Abdullah Naveed, Yunzhou Wang

Advisor: Yi Fang

An application which is driven by artificial intelligence to help small businesses and lenders in all stages of a microfinance project.

Variable Natural Language Translator for Video Games
3:50–4:20 p.m.

Gabe Bernini, Cole Propach

Advisor: Oana Ignat

Our project is a game where players learn a fictional language using a natural language translator to guide learning. It uses Python libraries to interpret our invented language at variable translation levels, creating an immersive experience.

Bilingual Buddy
4:25–5 p.m.

Adian Alvarado, Farhaan Pishori, Luis Villalta, Andrea Ricci Yao, Ekam Singh

Advisor: Silvia Figueira

Bilingual Buddy is an educational app designed to help young students transition from Spanish to English. It combines interactive math exercises with foundational language-building activities to support their academic development.

COMPUTER SCIENCE AND ENGINEERING SESSION 2

Benson Center, Parlor C

NetGen: Network Traffic Generator
2:50–3:15 p.m.

Cole Fettkether, Johnathon Maschler, Arya Pefourque

Advisor: Sean Choi

NetGen uses a transformer-based model to convert natural language inputs into realistic packet streams. The model aims to generate configurable network traffic for research, ensuring accessibility, accuracy, and scalability across networking environments.

Documentation-Aware Code Generation via Retrieval-Augmented Generation
3:20–3:45 p.m.

Daniel Amirtharaj, Rahmin Norwood

Advisors: Yuhong Liu

Our product is designed to improve LLM-based code generation by integrating real-time, context-specific documentation retrieval. It generates more accurate and efficient code generation with relevant, up-to-date documentation enhancing code quality.

Deepfake Detection
3:50–4:20 p.m.

Timothy Tong, Abem Lucas

Advisor: David Anastasiu, Yuhong Liu

Exploring deep learning approaches to deepfake detection, from vision-language models to spatiotemporal methods.

Cross-Cultural Inspiration Coach
4:25–5 p.m.

Veronica Flores, Romeo Nickel, Rahul Rani, Andrew Yang

Advisors: Yi Fang, Oana Ignat

Cross-Cultural Inspiration Coach is a web app that uses a fine-tuned Llama LLM with LoRA PEFT to deliver personalized, culturally aware motivational content. Other features include goal-setting, journaling, and progress tracking to motivate and support personal growth.

COMPUTER SCIENCE AND ENGINEERING SESSION 3

Benson Center, Williman Room

Self Driving Robot Car
2:15–2:40 p.m.

Eric Hicks, Ruby Huynh

Advisor: Radhika Grover, David Anastasiu

We are creating a self driving robot car utilizing FPGA based hardware acceleration and comparing this to a software based approach. Metrics are based on responsiveness, CPU utilization, and course completion time.

Online Multi-Camera People Tracking
2:45–3:15 p.m.

Johan Kou, Connor Vallero

Advisor: David Anastasiu

We've leveraged state-of-the-art efforts in Machine Learning to track people across security camera networks, and experimented with a variety of methods for improving this process while maintaining real-time performance.

Road Object Detection in Fish-eye Cameras
3:20–3:45 p.m.

Isaac Orais, Kian Scola

Advisor: David Anastasiu

The objective in Road Object Detection in Fish-eye Cameras is to leverage the wide FoV provided for detecting different objects on the road. Our project approaches this problem using deep learning and has applications in intelligent traffic systems.

Limb Light - Interactive Lighting Design
3:50–4:20 p.m.

Matthew Tran, Joseph Joey Pandit

Advisors: Ahmed Amer, Andy Wolfe

A system for DMX512 lighting for performers to control lighting via MIDI devices or facial expressions for a more immersive and interactive audience experience.

TCRAS: Traffic Control Risk Analysis System
4:25–5:00 p.m.

Owen Matejka

Advisors: Yuhong Liu

An IOT computer vision system designed to analyze traffic intersection risk, provide data for roadway engineers, and update the traffic light controller behavior to reduce the chances of a collision.

COMPUTER SCIENCE AND ENGINEERING SESSION 4

Benson Center, CA Mission Room

Codelympics: An Educational Game
2:45–3:15 p.m.

Riley Guioguio, Shreyas Raghunath

Advisor: Sean Choi

This is a video game designed to teach young children how to code. We explore basic coding principles, such as variables, if statements, and loops.

Vintage Game Emulator
3:20–3:45 p.m.

Andrew Katchour, Ashwin Raman

Advisor: Michael Schimpf

Using a raspberry pi 5 we will be emulating a couple of old arcade titles. Each game has been updated for a more modern gameplay experience featuring AI to offer a specific kind of challenge for each player depending on their video game experience.

Litteracy
3:50–4:20 p.m.

Justin Chung, Aster Li, Andrew Nguyen

Advisor: Sharon Hsiao

An iOS app teaching waste sorting through interactive minigames and community leaderboards. Combines gamified learning with real-world impact, transforming daily eco-actions into a playful yet practical toolkit for advancing global sustainability.

Portuguese for Mozambican Mothers – A Language Empowerment App
4:25–5:00 p.m.

Joshua Kindarara, Alexandre Lopes, Gwendolyn Patwardhan, Riana Santos, Sara Wheeler

Advisor: Silvia Figueira

Designed as a learning supplement to be used with moderator support, this mobile app helps mothers in the DIFF EDUCATION program in Mozambique learn Portuguese through visuals and audio to improve their ability to communicate in urban settings.

COMPUTER SCIENCE AND ENGINEERING SESSION 5

Learning Commons 129, Viewing & Taping A

Middleware for Decentralized Content Moderation
2:15–2:40 p.m.

Vani Aggarwal, Mia Lassiter

Advisor: Ahmed Amer

We propose middleware for user-driven content moderation. The middleware provides mechanisms for verifiable content posting and authentication, and it is designed to complement and easily overlay upon existing platforms.

LeetQuest
2:45–3:15 p.m.

Sanvir Bal, Vladimir Ceban, Matty Herzig, Daryl Ho

Advisor: Yi Fang

LeetQuest is an engaging online tool that provides an organized roadmap for learning Data Structures and Algorithms. With our curated selection and order of topics and their respective problems, users will learn to succeed in technical assessments.

XMR: Extensible Model Representation
3:20–3:45 p.m.

Jason Cisneros, Lucas Van Der Heijden

Advisor: Darren Atkinson

A free and open source system that converts high level UML models into source code files to aid in model based design workflows. It is intuitive and enables users to tailor it to their needs via configurable parsers and code generators.

WeSearch
3:50–4:20 p.m.

Nicholas Cheung, Beatrice Hackman, Hilary Le, Meagan Vu

Advisor: Sharon Hsiao

Our team developed a centralized research hub for SCU's undergraduate research programs. Through the medium of a website - it aims to streamline access to research labs, promote interdisciplinary collaboration, and professional growth.

Student Organization Management Portal
4:25–5:00 p.m.

Leila Erhili, Cam Greene, Madison Nguyen, Walker Selby

Advisor: Darren Atkinson

A web application for SCU student organizations and the Center for Student Involvement that centralizes and automates processes such as club registration, event booking, and reimbursements, ultimately improving the student experience.

COMPUTER SCIENCE AND ENGINEERING SESSION 6

Learning Commons 133, Viewing & Taping B

Notewise: An Interactive AI Tool for Music Theory Education and Composition Analysis
2:15–2:40 p.m.

Darin Nilsson, Kyle Samonte

Advisor: Ahmed Amer

Notewise teaches music theory by identifying errors in context. As a VST plugin with MIDI input and output capabilities, it provides instant feedback, enhances creativity, and makes music theory accessible for all skill levels.

Educational Game Through Roblox
2:45–3:15 p.m.

Grant Goldman, Matthew Leonard, Aidan Walker

Advisor: Sean Choi

As coding becomes essential in careers, introducing basic skills early is crucial. We're teaching children via an educational video game in Roblox, popular among young users.

Autonomous Vehicular Blockchain: A Simulation Platform for Future Researchers
3:20–3:45 p.m.

Hudson Strauss

Advisor: Yuhong Liu

This project combines multiple open-source projects and software to enable the simulation of Autonomous Vehicles on blockchain. Its mission is to provide a workspace for future researchers to have an easy-to-set-up, modular, robust toolchain to support their work. As it currently stands, a lot of research is pouring into this field, but no open-source workspaces to validate this research.

BroncoNest
3:50–4:20 p.m.

Andrew Michael Collins, Jakob Esperson, Anish Katragadda

Advisor: Yi Fang

Many students choose dorms based on limited school info. Our mobile app can provide insights on social life, cleanliness, accessibility, and ratings while aiding off-campus housing and subletting for smoother transitions.

Beyond Campus
4:25–5:00 p.m.

Jenna Chinn, Dev Gupta, Sophia Miranda

Advisor: Angela Musurlian

Conducted through a match-making algorithm, Beyond Campus will suggest students to one another based on desired preference.

ELECTRICAL AND COMPUTER ENGINEERING SESSION 1

Learning Commons Training and Instruction 203

Delay and Attenuation Modules for Propagation Emulation and Response
2:15–2:40 p.m.

Matthew Guntz

Advisor: Kurt Schab

Delay and attenuation tool to simulate signal degradation for propagation emulation. They control timing and strength, aiding RF system testing. Applications include wireless networks, radar, and signal processing research.

Passive Radar in Metropolitan Environments (PRIME)
2:45–3:15 p.m.

Carson Crisafulli, Dylan Olson, Hannah Bajakian

Advisor: Kurt Schab

The PRIME project focuses on developing a cost-effective passive radar system for real-time object detection in metropolitan areas. By leveraging existing broadcast signals, PRIME significantly reduces the cost and complexity of traditional radar systems while enhancing redundancy for air traffic control applications.

Quarter 2 SCRAP Data Acquisition
3:20–3:45 p.m.

Peter Lattimer, Nicholas Alva

Advisor: Kurt Schab

This is an extension of a multiyear project in order to enable a stationary radio telescope to change it's inclination in real time to improve the image that it can generate for it's users.

BOOST EVX - Balancing Battery State of Charge for Extended EV Range
3:50–4:20 p.m.

Mack Atencia, Sal Martinez, Chris Bird

Advisor: Hoeseok Yang

EV Battery modules storage capacities differ from aging effects, lowering overall usable charge capacity and range. This project implements module active balancing via DC-DC converter technology to increase EV usable charge capacity and range.

ELECTRICAL AND COMPUTER ENGINEERING SESSION 2

Learning Commons Training and Instruction 205

Open Source ARM Cortex M0 Processor
2:15–2:40 p.m.

Zach Boyle

Advisors: Andy Wolfe

This project is a Verilog implementation of an ARM M0 processor on an FPGA.

Vector Extension
2:45–3:15 p.m.

Niels Holzmann, Khondakar Mujtaba, Muhammad Ibrahim Lawai

Advisor: Andy Wolfe

Design and implementation of a RISC-V vector extension in Verilog, enabling parallel processing of integer and fixed-point operations. The extension is simulated and tested on a Xilinx FPGA.

Ergonomic Human Robot Handovers Using sEMG Sensors
3:20–3:45 p.m.

Maya Murphy, Michael Mishkanian

Advisors: Fatameh Davoudi, Maria Kyrarini

We explore human-robot collaboration to reduce Musculoskeletal Diseases (MSDs) in industrial sectors via ergonomic handovers. Using a robot, sEMG sensors, and cameras, we study ergonomic vs. non-ergonomic handovers to enhance worker wellbeing.

Music Suggestion & Creation LLM Application
3:50–4:20 p.m.

Allan Yang, Thomas Liu, Curtis Robinson

Advisor: Hoeseok Yang

Our project develops an on-device LLM for music generation and recommendations, ensuring offline privacy, real-time interaction, and accessibility on a low-power microcontroller.

INTERDISCIPLINARY SESSION 1 - HEALTHCARE AND ACCESSIBILITY

Sobrato Campus for Discovery and Innovation 2301

Biome: Turning Food Inspiration Into Action
2:15–2:40 p.m.

Ryan McCaulley, Jerry Chen

Advisor: Jes Kuczenski, Ahmed Amer

Biome bridges the gap between social media recipes and grocery shopping, making healthy eating effortless

The GRD Companion
2:45–3:15 p.m.

Tro Hovasapian, Julius Gamboa, Muti Shuman

Advisors: Radhika Grover, Ahmed Amer

The GRD Companion is a user-friendly, gesture-controlled reminder device designed to help individuals with special needs stay organized and on track effortlessly throughout the day.

Empowering Tanzanian Education: Personalized and Accessible Test Preparation
3:20–3:45 p.m.

Brian Wiebe, Shiv Jhalani

Advisors: Michael Neumann, Chris Kitts

Pass rates for Form 2 students in Tanzania were as low as 18%. We built a testpreparation platform to improve the pass rate for these national exams by facilitating active recall, adapting question difficulty based on performance, and more.

MedPez: A Medical Adherence Device
3:50–4:20 p.m.

Liam Reese, Hannah Hoeptner, Brian Lee

Advisors: Jes Kuczenski, Farokh Eskafi

MedPez is a smart device that stores pills, notifies users of their medication schedule, and logs dosages, all facilitated with a mobile app to reduce reminder fatigue. MedPez is bettering user health and regime efficiency, one dose at a time.

EMG-Based Vocal Translations
4:25–5:00 p.m.

Lucas Amlicke, Raphael Kusuma, Monica Summer, Kayleigh Vu, Cole Heider

Advisors: Ahmed Amer, Maria Kyrarini

A Silent Speech Interface that accurately maps sEMG signals from facial and neck muscles in order to provide real-time vocal communication for non-speaking individuals.

INTERDISCIPLINARY SESSION 2 - SUSTAINABILITY AND AGRICULTURE

Sobrato Campus for Discovery and Innovation 2302

Plant Savers
2:15–2:40 p.m.

Michael Iwashima

Advisors: Jonathan Zhang, Fr. Dat T. Tran S. J.

Piezo electric crystal based sensor for Aspergillus niger and early pathogen detection in crop fields.

The GAEArden
2:45–3:15 p.m.

Arran Kooner, Samhita Rachapudi, Gwyn Anawalt

Advisor: Sharon Hsiao

Educational game creating pro-environmental behaviors and teaching about sustainability on both personal and community levels.

Veggielution Solar
3:20–3:45 p.m.

Zia Malangalila, Elizabeth Kluzak

Advisors: Shoba Krishnan, Jes Kuczenski

Propose a solar-powered microgrid design for Veggielution Community Farm that provides power and controls power distribution for water heating, ventilation, and lighting systems across three buildings.

Preserving Yucatán's Agricultural Heritage: A Mobile App for Agricultural Sustainability
3:50–4:20 p.m.

Fernando Rojas, Jason Serrano, Kavya Sharma

Advisor: Angela Musurlian

A bilingual mobile app for Yucatán's farmers, integrating GIS with traditional Mayan agricultural knowledge. This tool empowers farmers to make informed decisions, preserves cultural practices, and improves productivity.

SPROUT: Seedling Planting and Robotic Observation with Unsupervised Tracking
4:25–5:00 p.m.

Anshuman Sahu, Brayden Ristow, Elliot Clyde, Josh Spagnola, Katie Ott, Zen Yamao

Advisors: Michael Neumann, Chris Kitts

A low-cost autonomous seedling planting module that utilizes the pre-existing agricultural robot (Agbot). SPROUT is designed to assist local farmers during the planting season by automating a process that is traditionally labor-intensive, minimizing costs and needed operators.

INTERDISCIPLINARY SESSION 3 - ROBOTICS AND SECURITY

Sobrato Campus for Discovery and Innovation 3301

Sustainable Highway Design
2:15–2:40 p.m.

Evan Antonius, Matthew Graham

Advisors: Vito Francioso, Jes Kuczenski

Our project analyzes a small portion of California highway, and design a large-scale solution we apply to all of California's highway, implementing sustainability measures at all levels of highway, impacting environmental sustainability and safety.

Secure Your Hardware
2:45–3:15 p.m.

Joseph Khamisy, Sumeet Upadhya, Dennis Cao

Advisors: Hoeseok Yang, Younghyun Cho

Embedded systems drive modern tech but face attacks like clock glitching, which disrupts the clock signal, causing cryptographic errors in AES-128 and exposing data. Our project aims to counter these vulnerabilities and enhance hardware security.

SCRAP IV: Data Processing
3:20–3:45 p.m.

Noah Abe, Wesley Durbano

Advisors: Kurt Schab, Ahmed Amer

The Santa Clara Radio Astronomy Project (SCRAP) aims to equip Santa Clara University with radio astronomy capabilities. This project will open up new possibilities for learning, as well as for discoveries for the wider scientific community.

Lock and Roll
3:50–4:20 p.m.

Zachary Common, Varun Mangla, Gabriela Gamarro

Advisors: Krishna Ramamoorthy

Lock and Roll is an electronic bike wheel lock that advances modern bike security. With just a tap of a key or phone on a NFC reader and integrated GPS tracking and an alarm system, your bike wheels are safe from the ever rising threat of theft.

Piloted Autonomous Crisis Reconnaissance Robot 2.0
4:25–5 p.m.

Marissa Kuo, Urmika Ghosh, Awawu Alimi, Ethan Wyrick, Jonathan Santosa

Advisors: Maria Kyrarini, Andy Wolfe, Ahmed Amer

PACRR 2.0 (Piloted Autonomous Crisis Reconnaissance Robot) is an autonomous robot dog designed to aid disaster response teams. Equipped with advanced navigation algorithms and sensors, it enhances search and rescue in hazardous environments.

INTERDISCIPLINARY SESSION 4 - EMERGENCY AND MEDICAL RESPONSE

Sobrato Campus for Discovery and Innovation 3302

Confined Space Wire Tracing Robot
2:10 - 2:40 p.m.

Kevin Zhang, John Hoang, Kris Chon, Henry Fang

Advisors: Andy Wolfe, Jes Kuczenski

A robotic rover designed to operate in confined spaces such as a drop ceiling environment for wire tracing and inspection.

EMT Vision
2:45–3:15 p.m.

John Alvarado, Grant Johnson, Jack Landers, Logan Calder

Advisor: Krishna Ramamoorthy

EMT Vision is an AR (Augmented Reality) and AI (Artificial Intelligence)-based technology that analyzes conversations between paramedics and patients to automatically complete patient records and track progress on official county procedures.

Real-Time 3D Automated Spotlight Tracking System
3:20–3:45 p.m.

Francine Garcia, Mary Hemker

Advisors: Ahmed Amer, Andy Wolfe

Our project offers an alternative solution by developing a low-cost automated spotlight tracking system that leverages Ultra-WideBand (UWB) positioning technology to track actors wearing tags using anchors on the stage.

Integrating Vision and Language Models for Intelligent Robotic Mobile Manipulation
3:50–4:20 p.m.

Leo Chen, Lauren Hu, Ivan Kuo, Megan Choy

Advisors: Hoeseok Yang, Maria Kyrarini, Ahmed Amer

We aim to assist individuals with motor impairments by providing a robotic mobile manipulator enhanced with visual and language models. This system enables users to request and retrieve everyday objects through natural interaction, improving independence.

Bilateral Gait Trainer for Transtibial Amputees
4:25–5:00 p.m.

Odinachi Anene, Noah Hill, Andrew Wallace, Desmond Greer

Advisors: Michael Abbott, Prashanth Asuri, Ashley Kim

To develop a gait training device that gives amputees live physical feedback and provides simple quantitative progression metrics to allow unilateral and bilateral amputees more effective training at home.

INTERDISCIPLINARY SESSION 5 - SMART SYSTEMS AND AI

Sobrato Campus for Discovery and Innovation 3115

Revit WalaSee
2:10–2:40 p.m.

Andrew Kimball, Ally Delgado, Calianna Collins, Yi Qian Goh

Advisors: Ahmed Amer, Hisham Said

The Revit WalaSee is a software tool that generates a 3D model of existing wall interiors. It can be used to improve planning for renovation, retrofits, and repairs, and is aimed at helping minimize construction waste.

ChatGPT in Your Pocket
2:45–3:15 p.m.

Ethan Lin, Nathan Yu, Jeromy Chang

Advisors: Hoeseok Yang, Yi Fang

Leveraging activation sparsity across model layers for training-free optimization and runtime hyperparameter tuning of LLMs. This reduces computational costs, making powerful models practical for resource-constrained environments and edge devices.

Name IT! Automated WorkCell
3:35–4:10 p.m.

Pietra Curro, Hollene Cutay, Magdalena Murcko, Dalia Ramirez, Ivan Carrasco, David Thuita, Felix Fei

Advisors: Chris Kitts, Xiaoou Yang

The Automated Workcell (AWC) serves as a scaled-down manufacturing platform, enabling automated production of customizable and low-cost name tags and signage.

ALGAE - Benthic Rover
4:25–5:00 p.m.

William Torborg, Lucas Woodford, Mnason Chan, Jakob Lelong, Marley Willyoung

Advisors: Chris Kitts, Michael Neumann

The goal of ALGAE is to develop an autonomous rover capable of reducing the environmental devastation of algae blooms through the mitigation of invasive algae in Lake Tahoe's benthic zone.

MECHANICAL ENGINEERING SESSION 1

Vari Hall 129

Active Suspension System
2:10–2:40 p.m.

Jacky Quan, Jens Emil Clausen, Felix Derrouaz

Advisor: Drazen Fabris

To develop and prove a performance-enhancing active suspension system for a karting racing team.

THEO: Thermal Heat Excursion Observer
2:45–3:15 p.m.

Brody Johnson, Brandon Rosenberg, Aidan Wells

Advisor: Mahantesh Hiremath

A fully autonomous aerial drone designed to scan data center busways for heat excursions, preventing costly fires and downtime.

3D Printing Filament Machine
3:35–4:10 p.m.

Andrew Huynh, Jose Canez, John Gonzalez, Jaime Garcia, Jairo Gonzalez, Xiaotian (Stephen) Yan

Advisor: Robert Marks

This project aims to develop an innovative machine that recycles used 3D printed parts into new, usable spools of filament promoting sustainability within the 3D printing community.

Design, Build, Vertical Flight — "Bronco Air"
4:25–5:00 p.m.

Gus Gianotti, Jacob Finley, Lanie Pritchard, John Bowers, Luke Helwee, Caroline Barbar Askar

Advisor: Mohammad Ayoubi

Our team is developing a fully electric vertical take off and landing aircraft (eVTOL) for the annual VFS DBVF competition. The aircraft is equipped with a tilt-rotor system to allow for 6 degrees of freedom in both vertical and horizontal flight.

MECHANICAL ENGINEERING SESSION 2

Vari Hall 134

Trigger Buddy
2:10–2:40 p.m.

Alex Requadt, Alan Chen, Max Fernandez

Advisor: Robert Marks

Trigger Buddy is a convenient, durable, and ergonomic biometric handgun lock that enhances user safety by preventing unauthorized use.

Portable Stage
2:45–3:15 p.m.

Martin Decker, Theo Cabot, Liam Swanson

Advisors:Robert Marks, Sina Heydari

We propose to build a portable, modular stage with automated leveling and height adjustment.

High Temperature Testing Furnace - Team B
3:35–4:10 p.m.

Christoph Mahler, Joshua Wong, Cole Warnick, Lex Liang, Shanice Liu, Danielle Abenojar

Advisors: Robert Marks, Drazen Fabris

Designing a sealed furnace for a lab mechanical tester to reach 2000°C for high-temperature materials testing. Team B focuses on thermal, busbar, and fluid cooling design.

High-Temperature Testing Furnace - Team A
4:25–5:00 p.m.

Andrew Tan, James Masukawa, Kenneth Pan, Ryan Owens, Estefania Pesqueira, Alexander Norring

Advisors: Robert Marks, Drazen Fabris

Designing a sealed furnace for a lab mechanical tester to reach 2000°C for high-temperature materials testing. Team A focuses on structural analysis and fabrication, instrumentation, and electrical design.

MECHANICAL ENGINEERING SESSION 3

Vari Hall 135

Valve-Tec
2:10–2:40 p.m.

Ethan Lung, Leo Morris, Dan Pruin, Casey Lacuata

Advisor: Pete Woytowitz

The goal of the project was to provide a proof of concept for an electronically actuated engine valve. This removes the need for a camshaft and allows for greater control over valve timings.

Design Build Fly 2025: Aerodynamics

2:45–3:15 p.m.

Derek Nease, Jason Dionida, Mateo Jovicic, Michael Cavan

Advisor: Mohammad Ayoubi

A dual team effort to create and fly a high-speed, search and rescue radio-controlled airplane deploying an autonomous glider. The aerodynamics team develops aspects such as wing and tail design, flight dynamics, controls, CFD, and stability.

Design Build Fly 2025: Structures

3:35–4:10 p.m.

Tyler Choo, Cole Lourenco, Chris Campanile, Spencer Roberts, Zane Kempler

Advisor: Mohammad Ayoubi

A dual team effort to create and fly a high-speed, search and rescue radio-controlled airplane deploying an autonomous glider. The structures team develops aspects such as the fuselage, wing strength, landing gear, FEA, and mechanical components.

S.E.E.D.S. (Smart End Effector Docking System)

4:25–5:00 p.m.

Adam Shpolyansky, Julie Corey, Matthew Becker, Mia Gallarate, Rachel Lee

Advisors: Chris Kitts, Michael Neumann

Designed to increase autonomy of existing Agricultural Robots, S.E.E.D.S. permits dynamic charging from a stationary base and inter-robot fluid transfer. The automation seeks to reduce impacts from modern agricultural labor shortages while limiting human exposure to harmful substances and working conditions.

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.

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Erik Levine
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Genentech

Anand Gautam
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Jeff Krenek
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David Brude
General Dynamics

Eva Bouzos
Cepheid

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SolarEdge Technologies

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Intuitive Surgical

Brady Knowles
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OSI engineering

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Apple, Inc.

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Meta

Chris Brady
CP Brady Consulting

Karthick Phillip Nagarajan
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Teleo Inc

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Maher Fasheh
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Justin Lent
Self-employed

JP Allport
Supermicro

Ruchir Mehta
Accenture

Patricia Richards
Broadcom

Rani Rajurkar
Nutanix

Stephen Tarantino
EKI Environment & Water

Shreeraj Suryavanshi Patil
Juniper Networks

Andy Gonzales
Retired

Rushang Shah
Western Allied Mechanical

Robert Lathrop
Lathrop Product Development, LLC

Tom Wierzchon
Retired–BAE Systems

Asad Khamisy
Broadcom

Aayooshi Dharmadhikari
Dell Technologies

Pallavi Sharma
Imagination Technologies

Anthony Mei
US Army Corps of Engineers

Bradley Allen
Retired– Moog

Daniel Silverstein
Stellic

Katie Connelly
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Alec Nicholas
ARC Engineering Consultants, Inc.

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Mahesh Rao
Calyxo, Inc.

Bart Rupel
Lockheed Martin

Eric Steuben
Calyxo, Inc.

Lawrence Foster

Caroline Harieg

Gizem Incesu
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Actionspot

Andy Bredar
Radical Ventures

Ashutosh Shivakuman
Wright State University

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Bill Kirkwood
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Sarah Anjum