2024 MAY 9TH

SENIOR DESIGN PROJECT EXPO

College of Engineering
California State University, Long Beach

THE WALTER PYRAMID

DEPARTMENTS

- Biomedical Engineering
- Civil Engineering and Construction Engineering Management
- Chemical Engineering
- Computer Engineering and Computer Science
- Electrical Engineering
- Mechanical and Aerospace Engineering
MESSAGE FROM THE COE AFFILIATES PROGRAM CHAIR

Today, we are celebrating a year-long achievement of our students and faculty in sharing their Senior Design Projects with our community.

Our industry partners, incoming freshmen, and high-school students join us today for the 2nd Senior Design Expo of the College of Engineering!

With the strong support of the College of Engineering, we present to you a rich and exciting program, consisting of student exhibits and competition, industry talks, poster presentations, outreach activities, and a social event.

I am grateful to share this celebration with all of you, and would like to thank our Dean Dr. Jinny Rhee, our faculty and students, and the entire College of Engineering Team for their continued dedication and efforts. I wish everyone a great time during the full-day program of the Senior Design Expo 2024!

Dr. Emel Demircan
Chair, Engineering Corporate Affiliates

DEPARTMENT CHAIRS

- Shadnaz Asgari
  Biomedical Engineering

- Roger Lo
  Chemical Engineering

- Lisa Star
  Civil Engineering and Construction Engineering Management

- Mehrdad Aliasgari
  Computer Engineering and Computer Science

- Ebrahim Amiri
  Electrical Engineering

- Jalal Torabzadeh
  Mechanical and Aerospace Engineering
I am thrilled to welcome you to the second annual Senior Design Project Expo at the College of Engineering!

Building on the success of last year’s inaugural event, we have once again gathered to showcase the innovative projects of our senior engineering students. This expo, organized under the guidance of Dr. Emel Demircan and our dedicated department chairs and senior project instructors, represents a cornerstone of our commitment to fostering a dynamic relationship between our students and industry.

As you explore the projects on display, you will see how our students have risen to the challenges of engineering design, pushing technological boundaries and striving to make a meaningful impact on society. These projects not only reflect their hard work and creativity but also their readiness to contribute as future professionals as engineers and computer scientists.

Please engage with our students, share your expertise, and offer feedback that can help guide their ongoing development. Your participation is invaluable as we continue to nurture these future leaders.

Thank you for supporting our vision and efforts. I hope you find inspiration and insight throughout the expo today.

Go BEACH!

Dean Jinny Rhee
## EXPO SCHEDULE
### THURSDAY, MAY 9, 2024

<table>
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<tr>
<th>TIME</th>
<th>SESSION</th>
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| 8:00 - 8:45 AM    | Registration  
Breakfast (Ukleja Room)                                               |
| 8:45 AM           | Opening Remarks by the College of Engineering Dean Rhee                 |
| 9:00 - 10:00 AM   | **Electrical Engineering** (Session Chairs: Amiri, Hirunthanakorn)       |
|                  | **Civil Engineering** (Session Chairs: Star, Ko)                         |
| 10:00 - 10:15 AM  | Coffee Break  
Metaverse & Student Clubs Exhibits                                     |
| 10:15 - 11:30 AM  | **Chemical Engineering** (Session Chairs: Lo, Nazar)                     |
| 11:30 - 12:30 PM  | Lunch (Ukleja Room)                                                      |
| 12:30 - 2:45 PM   | **Biomedical Engineering** (Session Chairs: Asgari, Suh, Ahrar)          |
| 2:45 - 3:00 PM    | Coffee Break  
Metaverse & Student Clubs Exhibits                                     |
| 3:00 - 5:30 PM    | **Mechanical and Aerospace Engineering** (Session Chairs: Torabzadeh, Roy) |
| 5:30 - 6:30 PM    | VIP Reception (Ukleja Room)                                               |
| 6:30 - 9:00 PM    | **Computer Engineering and Computer Science** (Session Chairs: Aliasgari, Cregg) |
| 9:00 PM           | Closing Remarks by the College of Engineering Dean Rhee                 |
DISPLAY STATIONS MAP

■ The Walter Pyramid
## Table Locations + Project Titles

### MECHANICAL AND AEROSPACE ENGINEERING:

1. Refrigerated Street Vendor Cart  
2. Food Dispenser  
3. Stair-Climbing Robot with Leveling Platform  
4. Wave Energy Generator  
5. Small Scale Utensil Sorter for Tight Spaces  
6. Oil Filtration System  
7. Peripheral Vision Glasses  
8. Remote Control Palm Tree Trimmer  
9. Low Cost Adjustable Prosthetic Arm Base  
10. Car Lift System  
11. CNT Hair Sensors  
12. Underwater Oil Spill Detection System  
13. Self-drying Umbrella  
14. STEM Kit  
15. Tilt-in-Space All Terrain Wheelchair  
16. Zero Emission Mechanical Ferry  
17. Disposable Wildfire Recon UAV  
18. Wheelchair Modification for a Quadriplegic  
19. Solar Powered Hydrogen Generator  
20. Mechanical Prosthetic  
21. Suspension Dyno  
22. Foldable Bike  
23. Beachcomber  
24. Robotic Arm Manufacturing Attachment  
25. 3D Filament Recycler  
26. Cool Jacket  
27. Filming Dolly

### ELECTRICAL ENGINEERING:

28. Auto Leveling Control for Industrial Fluid Systems  
29. Smart Gardening System  
30. Design of a Handheld LoRa Device  
31. Improving Accuracy of Pulse Rate Detection on Various Skin Pigmentation  
32. Smart Solar Power Controller  
33. Beamforming and Modulation with Software Defined Radio Using NI USRP  
34. Spatial Modulation with Simulation and Software Defined Radio Implementation  
35. OFDM Subcarrier Index Modulation with Conventional and Machine-Learning Based Estimation  
36. Polarization Division Multiple Access and Machine-Learning Based Modulation Classification

### CIVIL ENGINEERING AND CONSTRUCTION ENGINEERING MANAGEMENT:

40. El Monte Community Youth Center  
41. North Hollywood Library  
42. Abbeywood Housing Community  
43. Evergreen Wellness Center Project

### CHEMICAL ENGINEERING:

44. Hydrogen Recovery  
45. Flare Gas Recovery  
46. Carbon Dioxide Recovery from Flue Gas  
47. Bio Diesel Production
## SENIOR DESIGN PROJECTS

### Table Locations + Project Titles

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<td>53 Physiologically Informed Microfluidics and Imaging Platform for Vertical Swimming of Microorganisms</td>
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<th>COMPUTER SCIENCE AND COMPUTER ENGINEERING:</th>
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54-55-56 Metaverse & Clubs
SENIOR DESIGN PROJECT IN THE METAVERSE

INTEGRATING METAVERSE IN THE COE CURRICULUM!

SEE THE WORK.
JOIN THE COMMUNITY.
FIND SUPPORT, EVENTS, AND RESOURCES.
The Engineering Corporate Affiliates program is a mutually beneficial collaboration between industry and the College of Engineering to support senior design (capstone) projects and co-curricular project-based learning. The Corporate Affiliates sponsor projects and can engage their employees as mentors to our talented students in areas of interest to the company. In addition, they have access to all senior design projects via the annual Senior Design Expo, and enjoy a suite of recognition, student engagement, and recruitment benefits. The faculty and students, in turn, gain knowledge of the insights, challenges, and priorities of industry. Corporate Affiliate membership fees support project costs, faculty mentoring, publication/presentation of projects, and the annual Senior Project Expo event.

Project-based learning is a cornerstone of engineering education at The Beach. We believe in the power of learning by doing, and the soft skills development that is fostered by project-based learning. Teamwork, communication, and leadership are practiced and honed, alongside application of theory, design, and implementation.

For further information about Engineering Corporate Affiliates membership, please contact Paras Shah at paras.shah@csulb.edu.

Additional support for project-based learning provided by WestLAND Group, ISEC, Inc, and Southern California Contractor's Association.