THE
UNIVERSITY
OF RHODE ISLAND
COLLEGE OF
ENGINEERING

E-Week

CAPSTONE DESIGN SHOWCASE

APRIL 25, 2025

THE UNIVERSITY OF RHODE ISLAND
COLLEGE OF ENGINEERING

E-Week 2025

WELCOME TO THE 2025 ENGINEERING WEEK CAPSTONE DESIGN SHOWCASE

The Capstone Design experience is a cornerstone of our engineering curriculum, where students bridge classroom learning with real-world application. Today's showcase marks the culmination of that experience.

Over the past year, **275** students across **67** teams have tackled complex design challenges – many in collaboraiton with industry sponsors, community organizations, practicing engineers, and faculty mentors. Their projects reflect not only their technical skill and creativity, but also a deep commitment to solving real-world problems.

As you explore the projects on display, we invite you to engage with the students, ask questions, and share in their excitement. Today's showcase is a testament to their hard work and a preview of the bright future ahead of them.

Biomedical Engineering	FCAE 040/045	1:00-4:00 PM
Chemical Engineering	FCAE 120	1:00-4:00 PM
Civil Engineering	FCAE 120	1:00-4:00 PM
Computer Engineering	FCAE 150	2:00-4:00 PM
Electrical Engineering	FCAE 150	2:00-4:00 PM
Industrial and Systems Engineering	FCAE 180/180A	1:00-4:00 PM
Mechanical Engineering	FCAE 010/025/155	12:00-3:00 PM
Ocean Engineering	Toray Commons	1:00-4:00 PM

THE UNIVERSITY OF RHODE ISLAND
COLLEGE OF ENGINEERING

E-Week 2025

BIOMEDICAL ENGINEERING

PROF. KUNAL MANKODIYA AND PROF. DHAVAL SOLANKI

1:00-2:00 Project Pitch | 2:00-3:30 Project Demos | 3:30-4:00 Award Ceremony in FCAE 040/045

Wearable Tech for Mothers
Designing a wearable sensor to detect the changes in a woman's pelvis throughout the pregnancy to predict labor complications.

Students: Jeremy Gervais, Kaitlyn Lum, Joshua Raposo
Mentor: Dr. Ryan Chapman, Kinesiology, URI

inSOLE: Smart Gait Tracking
Fully customizable 3D-printed insole with embedded sensors for real-time pressure mapping and gait analysis.

Students: James Cook, Brooke Costin, Bella Nealy, Jack Vieira
Mentor: Md Abdullah Al Rumon, Ph.D. Researcher, URI

CarePacer: Adaptive Treadmill for Stroke Rehabilitation
Smart treadmill to maintain target heart rate in gait rehabilitation of stroke patients.

Students: Eliane Chantre, Virtue Chike-Okeke, Allyson Doherty, Molly Phillips
Mentor: Dr. Susan D'Andrea, Kinesiology, URI

Telebot: Advanced Teleoperation System
TeleBot enables remote healthcare control via VR, using OptiTrack and StretchSense for telesurgery and rehab.

Students: Nate Claro, Joey Confessor, Julz DelliCompagni, Arianne Parvesh-Rizi.
Mentors: Dr. Reza Abiri and Anna Cetera, Biomedical Engineering, URI

MEDEMA: Peripheral Pitting Edema Monitoring
Sensor-based medical device for standardized edema (swollen foot) assessment, developed with nephrologist guidance and trainer samples.

Students: Caleb Bento, Harvey Dietz, Monithyda Hem, Hong Nguyen
Mentors: Dr. Ankur Shah, M.D., Brown Health and Dr. Nishtha Bhagat, Postdoctoral Scholar, URI

BalancR: Games for Rehabilitation
An integrated balance board gaming experience intended to help with balance strengthening and fall rehabilitation

Students: Isabella Contreras, Natalie DeVito, Megan Russo
Mentors: Isaac Gonzalez and Matthew Galipeau, Biomedical Engineering, URI

CHEMICAL ENGINEERING

PROF. LIQUN ZHANG

1:00-4:00 Project Presentations in FCAE 120

Chemical engineering seniors were trained to design chemical plants in order to efficiently convert raw materials into valuable products with high purity through chemical reactions, heat transfer control and components separation operations. In Design I last Fall, students designed a chemical plant to recycle waste polystyrene to generate styrene monomers to protect the environment, conserve petroleum resources and make profit. Continuing improving their skills in Design II, this Spring students applied catalytic cracking methods to generate ethylene, which is an important plant hormone and a key building block in the production of plastics and other industrial chemicals. The chemical plant location and capacity were decided through opportunity assessment in USA. Conducting both heat and material balances, the species allocation and process flow was simulated. Besides that, heat exchanger network was designed to minimize outside utility requirements and the profitability of the chemical plant was predicted based on economic analysis.

Student Groups:

Aaron Iwanski, Evan Takian, Devon Wakelin, Dan Meola

Charles Jouaneh, Jackie Coletta, David Amirsadri, Daniel Perez-Torres

Reilly Russo, Colby Constantine, Adam Sherman, Emily Principe

Kendrick Beaubrun, William Bourke, Marcus Orr, Jackson Buehler

Liz Ferrenti, Liam Earley, Jenni Landeros, Carlos Fragoso Uriarte

Nick Chowning, Natalia Oganesian, Abby Olson, Michaela Brady

James Maguire IV, Brian Morales, Owen Rothrock, Alex Tennent

CIVIL ENGINEERING

PROF. LEON THIEM, PROF. GEORGE TSIATAS,
CHRISTOPHER DUHAMEL, PE, PLS, PRINCIPAL AT DIPRETE ENGINEERING

1:00-4:00 Project Presentations in FCAE 120

This year's capstone project focuses on the redevelopment of URI's Narragansett Bay Campus including the design and siting of a wave tank building for the Ocean Engineering Department and a future dormitory at the entrance of the campus.

Hurizon Engineering
Nina Lazzareschi, Environmental
Rebecca Vertucci, Environmental
Tyler Tavares, Structural
Emily Stewart, Structural
Danny Collette, Structural
Anne Lamendola, Transportation
Jose Archila Moriega, Geotechnical
Chloe Blanchette, Civil Site
Andrew Martin, Geotechnical

Ocean State Engineering
Jay Bode, Project Manager, Geotechnical
Chris Tavarone, Environmental
Alexia Martin, Environmental
Owen Klusak, Structural
Jason Zimmitti, Structural
Campbell Challoner, Geotechnical
Tim Borden, Site Civil
Ethan Lakomy, Transportation

Northeastern Consulting Engineers
Franklin Cruz Jr., Project Manager, Transportation
John Jacques, Environmental
Danny Shea, Environmental
Jake Listwan, Geotechnical
Dylan Keefe, Site Civil, Structural
Mason Alway, Site Civil, Structural
Andy Prestegui, Site Civil, structural
Conor Murphy, Geotechnical

Motion Incorporated
Thomas Billings, Project manager, Env., Geotechnical
JT Kehoe, Site Civil
Vincent Genovesi, Site Civil
Scott Kiefer, Structural
Jack Heineman, Structural
Alex Cavanaugh, Geotechnical
Riley Franklin, Geotechnical, Environmental
David J. Capachietti, Transportation
Jorge Menacho, Transportation

ELECTRICAL AND COMPUTER (ELECOMP) ENGINEERING

PROF. HARISH SUNAK

2:00-4:00 Project Presentations and Demos in FCAE 150

The ELECOMP Capstone Design Program promotes a dynamic collaboration between senior engineering students and industry sponsors to design, build, program and test solutions to real-world problems. Students gain valuable experience as they apply theory to practice, while industry sponsors benefit from introductions to young talent and the innovative solutions presented. This experience is educational, exciting and productive for both the Student Teams and Industry Sponsors. Such collaboration prepares our students for positions with top companies, provides innovative solutions to our industry sponsors' most pressing problems. The students' abilities to introduce new technologies, tools, processes, designs and academic rigor should not be overlooked.

Market Gap Assessment Tool
Zachary Notarianni (CPE), Samuel Raheb (CPE)

Robotic Assembly, Inspection and Test Automation
Benjamin Maguire (CPE), Jack DeMarinis (CPE)

Developing the Hydroelectric Water Purification System
Michael Marsella (CPE), Aaron Phare (ELE)

GPIB Command Library and CBIT Expander Card
Liam Crisfield (CPE & ELE), Andrew Langille (ELE), Gianni Biondi (ELE)

On-Premises LLMs
Logan Richards (CPE), Damien Lee (CPE)

Project Greenfille – Ultra High Frequency (UHF) Radio Frequency Identification (RFID) Wristband Read Range
Remi Llyod (ELE), Ryan Hurley (ELE)

XMOS: Smart Amp
Ahmad Almuhtaseb (CPE), Sahil Chadha (CPE & ELE), Evan Murray (ELE)

XBOT: Motor Control o XCORE.ai
David Quevedo (CPE), Ean Newman (ELE), Noah Hawkins (ELE)

Using ML to Monitor Remote Connection Sessions
Noah Samuel Markus (CPE), Tyler Distefano (CPE)

High Reliability Dynamically Reconfigurable Optical Networks
Kylie Pasternak (ELE), Austin Noon (CPE), Alexander Gill (ELE)

Object Detection and Analysis
James Furtado (CPE), Ryan Steele (CPE), Korali Kouadio (CPE)

Project Emilia (Phase II) – Wireless Enablement of Green Power Technologies for Edge Devices
Ruben Germosen (CPE), Alex Lupo (CPE), Jake Nicynski (CPE), Joseph Kulik (ELE)

Safety Critical Applications for RISC-V Platforms
Jeshua Benzant (CPE), Adam Lubinsky (CPE), Nathan Kaye (ELE)

Innovative Design Automation Framework for Integrated Power Electronics Building Block (iPEBB)
Max Bongiovanni (ELE), Patrick Feliz (ELE), Gianni Smith (ELE), Justin Smith (CPE)

BLAST – Burst Learning Audio Spectrogram
Shuichi Kameda (CPE), Jakob Porto (CPE & CSC)

Underwater Camera
Ishan Chadha (CPE & ELE), Jake Javier (CPE), Noah Sarji (ELE)

URI ICRL Robotoy
Argha Goswami (CPE), Andrew Rae (CPE), Ryan Bolanos (ELE), Thomas May (ELE)

Sanctuari Echo Mike 2
Jack Russo (ELE), Ismail Muhammad (ELE), Barry Huang (ELE), Amani Hameed (CPE)

AI/MV for Wildlife Rehabilitation
James DeMello (CPE), Van Davey (CPE)

INDUSTRIAL AND SYSTEMS ENGINEERING

PROF. MANBIR SODHI

1:00-4:00 Project Presentations and Demos in FCAE 180 and 180A

The Industrial & Systems Engineering Capstone Design Showcase consists of five projects with a wide range of different focus areas. Teams of two to four students are tasked with investigating the problem and defining specific measurable deliverables to be achieved by the completion of the two-semester course sequence. Teams develop project plans, meet regularly, document their meetings with actions and deadlines, present the findings to both academic and outside audiences, and prepare intermediate and final reports. The emphasis is on teamwork and project management, intended to closely simulate the workplace environment. For projects linked to industry partners, the students are expected to work directly with corporate representatives and ensure the desired deliverables are achieved from the partner's perspective. Research-based project teams conduct literature reviews to identify the current state of the topic and explore future directions for investigation.

BigBrothers and Big Sisters
Evan Stabach, Brian Wilcox, Kate Denn

Battery Disassembly Station
Mike Conti, Nicholas Culver, Tyler Comeau

RFID Tracking
Jay-sun Rutledge, Sebastian Ruge

Swarm Robotics
Darien Kane, Andrew Muszynski

LabFab Robotic Manufacturing
Seun Filaoye, Carson Plaus, Cristian Varela

MECHANICAL ENGINEERING

PROF. BAHRAM NASSERSHARIF

12:00-3:00 Project Presentations and Demos in FCAE 010C, 025C, 155

Team 1: PPL - Coal to Nuclear for Decarbonization and Power Production
Owen Horiagon, James Russell, Thomas Scorpio, Nathan Segar

Team 2: GD-EB - Assessment and Design of Materials for Radiation Effects
Owen Hefferman, Lester Merida, Ian Sroka, Robert Viola

Team 3: NUWC - Composite Material Development for Floating Landing Pad
David Janczar, Jen Radulski, Colby Landry, David O'Connor, Zach Smith

Team 4: NUWC - UUV Internal Impeller Propulsion
Connor Marot, Max Mullen, James Roggero, Marcello Guider

Team 5: NUWC - Methodology for the Deployment of Encapsulated UAV Underwater Vehicle
Nick Ensign, Isaac Hernandez, Callum Melrose, Clayton Peel

Team 6: NUWC - Battery Thermal Runaway Pressurization Relief Mechanism
Enrique Echevarria, Larry Lambiase, Matthew Salisbury-Dowling, Ryan Tona, Madeline Macalister

Team 7: Raytheon - Unmanned Underwater Vehicle (UUV) Automatic Ballast Drop Mechanism
Jackson Beaudreau, Cam Cotter, Casey McQuesten, Alex Soucy, Victoria Rowe

Team 8: Raytheon - Thermal Materials
Justin Iorio, Colin Meunier, Sam Nendze, Justin Romaszka, Nicholas Scott

Team 9: Hooker+Foxhall - Soap Vending Machine - Redesign and Build - Reduce Single-Use Plastic
Klayton DaSilva, Betty Hasse, Nicholas O'Connor, Lizzie Vecchi, Kevin Perri

Team 10: Magseal - Automation and Control Improvements for the Carbon Seal Ring Assembly Process
Anthony Coppola, Nick Giorgi, Nate Mendoza, Sophia Harper, Ryan Tocco

Team 11: NASA - CNTR Gas Flow and Cooling Design
Ryan Elias, Sam Ingalls, Nick Kanaczet, Ryan Viveiros

Team 12: NASA - CNTR Gas Turbine Tube Driver and Control System
Lena Asprinio, Ace Ayotte, Peter Martin, Ivan Pantoja, Tom Shearing

Team 13: Toray - Design, Prototype, and Manufacture a Small-Format 4" Diverter Valve
Jake Carter, Tyler Ceseretti, Ryan McSweeney, Bryan Perez

Team 14: VATN - Hybrid Testing Platform for Autonomous Underwater Vehicles
Jordan Berry , Casey Egan, Evan Gordon, Logan James, Brendan Mathot, Oliver McMahon

Team 15: Mearthane - Inline Skate Wheels Cleaner
Billy Adamo, Jamal Baptista, Tristan Harrison, Mia Laine Mollicone, Nicholas Santovasi

Team 16: Dr. Marchese - Hybrid Rocket Motor Test Stand
Lilian Allory, Amelia Lambert, Ethan Leary, Chris Silveria, Matthew Zannini

Team 17: NASA - University Student Launch Initiative
James Collier, Chris Grivers, Ryan Hirsch, Alex Jedson, Jack Lague

Team 18: Hexagon - Automation of Air Bearing Machining Cell
Jonah Coppolelli, Justin Couto, Siena Robinson, Jessica Tingley

Team 19: NOSSA - Propane Fast Heating Test Design (Continuation)
Luke Heitkamp, Joey Hook, Dan O'Hara, Chris Phelan, Ethan Silverman

Team 20: NOSSA - Slow Heating Test Oven Design
Jason Albano, Andi Krasniqi, Nick McKeown, Sam Saleem, Connor Guerrero

Team 21: NIUVT/Dr. Nassersharif - Radiation Detector Remotely Operated Positioning
Josh Fielder, Ethan Maione, Drew Martin, Kaelyn McEvoy, Kevin Rush

Team 22: Dr. Nassersharif - Invent Something
Matt Beauregard, Alex Ciulla, Danny Fish, Tony Op

Team 23: Dr. Nassersharif - Underwater Jet Propulsion Module
Moustafa Amer, David Maciejuk, Max Morgado, Kevin Raczkowski, Patrick Raczkowski

OCEAN ENGINEERING

1:00-4:00 Project Presentations and Demos in Toray Commons

Evaluating the Feasibility of Using Reinforced Dunes to Mitigate Flooding and Erosion at Mackerel Cove in Jamestown, Rhode Island

Following severe winter storms in December 2022 and 2023, Jamestown, RI, faces the risk of splitting into three islands. With rising sea levels and erosion, Mackerel Cove urgently needs storm protection. This project evaluates the feasibility of using reinforced dunes to reduce flooding and erosion at Mackerel Cove. Land surveys were conducted to estimate the sand volume needed, which informed rough cost estimates for three scenarios: an unreinforced dune, a dune reinforced with coir envelopes, and one with geotextiles.

Students: Josette Audi, Logan Bukowski, Chris Ferretti, Israel Karubaba, Amanda Missing, Jonah Mroz-Roakes, Eva Davet
Mentors: Prof. Chris Baxter, Prof. Mehrshad Amini, Prof. Malcolm Spaulding

Extension and Improvements of the STORMTOOLS Design Elevation Maps (SDE) and Coastal Environmental Risk Index (CERI) Toolbox – Flood Modeling & Wind Damage Capability

This year's joint capstone project focused on enhancing STORMTOOLS and the Coastal Environmental Risk Index (CERI) to better assess both flood and wind damage. For flood modeling, students analyzed 100- and 500-year storm scenarios, incorporating sea level rise and validating results with real storm data and NACCS damage curves. They also proposed updates to STORMTOOLS maps to align with evolving ASCE 7-22 standards. To add wind damage capability, students applied a damage estimation method using ASCE Hazard Tool wind speeds for typical RI structures and surface conditions. They created wind damage maps for extreme wind events (115–125 MPH) and included a benefit-cost analysis of elevating properties to reduce future risk. These enhancements help make STORMTOOLS a more comprehensive tool for coastal resilience planning.

Students: Josette Audi, Logan Bukowski, Chris Ferretti, Israel Karubaba, Amanda Missing, Jonah Mroz-Roakes, Eva Davet
Mentors: Prof. Chris Baxter, Prof. Mehrshad Amini, Prof. Malcolm Spaulding

Sailing Spar Buoy

The purpose of our capstone project is to add value to an ongoing project between WHOI and URI called the Sailing Spar Buoy. The Sailing Spar Buoy is an observation platform which can sail to specific study areas and transform into a more traditional spar buoy for data collection. This removes the necessity for a ship and the buoy can stay in a vicinity on its own to prevent drifting. Our goal is to better predict and improve the Sailing Spar Buoy simulation dynamics through computational fluid dynamics and experimental characterization.

Students: Gavin Leeland, Jacob Connors, Taylor Fairchild, Marc Leonetti, Jane Lally
Mentors: Prof. Stephen Licht and Prof. Christopher Roman

The SAMBA: Sonar Array for Monitoring Biodiversity Acoustically

We have designed and developed a sonar array to enhance an existing biodiversity monitoring system. The SAMBA is designed to detect fish species and relative abundance, supporting more comprehensive assessments of biodiversity at offshore wind farm sites.

Students: Audrey Gravelle, Ryan Cassin, Blake Rottmann, Jakob werdell, Adrian Kohler
Mentors: Prof. Jim Miller and Prof. Lora Van Uffelen