SHILEY CAPSTONE SHOWCASE
APRIL 26TH, 2024

University
of Portland

SHILEY SCHOOL
OF ENGINEERING

Brochure design by
Katherine Gamblin, ME '24

WELCOME FROM THE DEAN

The 2024 Shiley Showcase displays the outstanding work done by our students in senior Capstone design. These projects are derived from challenges posed by industry partners, non-profit partners, students, faculty, and competition teams.

For many of the projects our students spent the academic year working in multidisciplinary teams. Our students gained invaluable project management skills as they balanced the need to coordinate with staff, faculty, and industry advisors, while staying on schedule and within budget. This work builds on the pedagogical model in the Shiley School of Engineering that emphasizes the hands-on practice of engineering and computer science throughout the curriculum.

I would like to thank our many corporate partners, non-profit partners, collaborators, and benefactors. Many of you have provided the financial resources that made it possible for us to execute these amazing projects. All of you have also provided your time as you mentored and guided our students on their journey to becoming engineering professionals. Thank you.
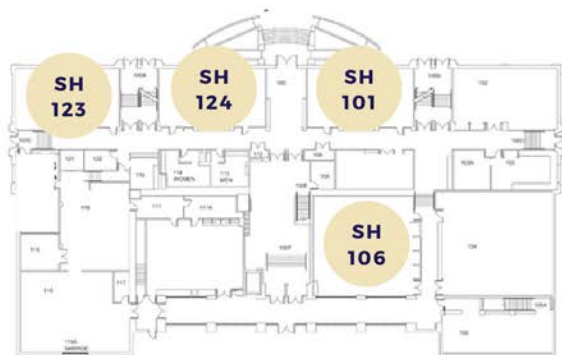
Congratulations to all our students, and as always, Shiley Proud!

Brian C. Fabien, PhD
Dean & Professor of Mechanical Engineering
Donald P. Shiley School of Engineering
University of Portland

SHILEY HALL

FIRST FLOOR

SH 123

SH 124

SH 101

SH 106

SECOND FLOOR

SH 249

SH 206

THIRD FLOOR

SH 319

SH 301

SHILEY SHOWCASE
SCHEDULE

3:45PM WELCOMING REMARKS   **SHILEY FIRST FLOOR LOBBY**
BRIAN FABIEN, PHD - DEAN, SHILEY SCHOOL OF ENGINEERING

SHILEY HALL 101 - ME
- 4:00 - HYDROGEN CONSUMPTION MEASUREMENT DEVICE
- 4:30 - HYDROGEN CONSUMPTION MEASUREMENT DEVICE-MECOP
- 5:00 - MEGA WATT CHARGING
- 5:30 - MEGA WATT CHARGING-MECOP

SHILEY HALL 123 - CE
- 4:00 - OUTFALL 85 STORMWATER PROJECT
- 4:30 - PERFORMANCE OF KEY INTERSECTIONS AT UP
- 5:00 - RELOCATING FLOW STRUCTURE
- 5:30 - MASS TIMBER STRUCTURES

SHILEY HALL 206 - EGR
- 4:00 - AR LEED STORIES AND BACNET DATA AGGREGATOR
- 4:30 - ELECTRIC TILT CONTROL
- 5:00 - ASHRAE NET ZERO DESIGN
- 5:30 - FOOTWEAR DURABILITY TEST MACHINE UPGRADES

SHILEY HALL 301 - EGR
- 4:00 - FORMULA SAE TEAM A-MECOP
- 4:30 - FORMULA SAE TEAM B
- 5:00 - FORMULA SAE TEAM C

SHILEY HALL 106 - EGR
- 4:00 - ENABLING VITALS MONITORING IN THE FIELD
- 4:30 - BIOWASTE BURNER
- 5:00 - IROBOT VISUALIZATION RIG
- 5:30 - TEAMLIFT

SHILEY HALL 124 - CS
- 4:00 - AR-BASED HEADS-UP SPECTRUM ANALYZER DISPLAY
- 4:30 - CROP MANAGEMENT SOFTWARE
- 5:00 - DATA VISUALIZATION
- 5:30 - NOMAD GAME DEVELOPMENT

SHILEY HALL 249 - EGR
- 4:00 - COMPACT HEAT EXCHANGERS
- 4:30 - ADHERENCE SENSOR
- 5:00 - ELECTRIC TILT PACKAGING
- 5:30 - RAIL CLIP INSTALLER SYSTEM

SHILEY HALL 319 - EGR
- 4:00 - SAE AERO-MECOP
- 4:30 - SAE AERO
- 5:00 - NASA LUNAR ROBOTICS
- 5:30 - NASA USLI

COLUMBIA SLOUGH OUTFALL 65 PROJECT - BUREAU OF ENVIRONMENTAL SERVICES

SPONSOR LIAISON: DANIEL JENKINS
FACULTY ADVISOR: JORDY WOLFAND, PHD
STUDENTS: MAYA STRUZAK, BELLA SMALL, GUS SHELLEY, JAYSON TAGALA

This project aims to design a stormwater treatment system to treat runoff from the City Right of Way (ROW) and decrease pollutant loading into the Columbia Slough, specifically Outfall Basin 65 in Portland, Oregon. Alongside cost and technical efficiency, other considerations include social equity, environmental impact, and landscape aesthetics.

MASS TIMBER STRUCTURE OPTIMIZATION - SKANSKA

SPONSOR LIAISON: MARIA ROZA
FACULTY ADVISOR: MATTHEW BARNER, PHD, PE
STUDENTS: MAILE BETZ, WILL BUSH, MATTHEW OGATA, JOE PILAWSKI, ANGELO RAMIREZ

We are researching alternative design systems for the Portland International Airport that incorporate mass timber. After selecting the materials for our preferred design system, we will propose our alternative design to SKANSA, along with a quantitative justification for the selected design.

CIVIL ENGINEERING PROJECTS

PERFORMANCE OF KEY INTERSECTIONS AT UP - KITTELSON & ASSOCIATES

SPONSOR LIAISONS: DESLY AMURAO, DIEGO ARGUEA, BECCA HOFFMAN
FACULTY ADVISOR: JORDY WOLFAND, PHD
STUDENTS: AUSTIN BOYLE, NEDIM CIMIC, SIMON DIRIENZO, ROBERT HALUPKA, MICHAEL TANG

The "UP Campus Traffic Improvements" team is working to solve UP's transportation infrastructure issues by collecting and analyzing data from several sources. The project will propose a data-driven redesign of multiple intersections on and off campus to prioritize pedestrian and biker safety and streamlining vehicular traffic.

RELOCATING FLOW STRUCTURE - MULTNOMAH COUNTRY DRAINAGE DISTRICT

SPONSOR LIAISON: BILL OWEN
FACULTY ADVISOR: KATE STAGL
STUDENTS: JULIANNA GALIAN, WYATT GRAU, KYLE HADFIELD, WARREN HENDERSON

We are designing a new flow structure to replace the existing flow structure that is non-operational and unsafe for maintenance on the Columbia Slough in Portland, Oregon. We are tasked with designing a new pipe in the levee, a new valve to regulate flow, and a structure to protect the valve inside the levee.

CIVIL ENGINEERING PROJECTS

CROP MANAGEMENT SOFTWARE - BACKUS AGRILABS

SPONSOR LIAISON: DENVER BACKUS
FACULTY ADVISOR: TAMMY VANDEGRIFT, PHD
STUDENTS: AUSTEN FURUTANI, PHI NGUYEN, TYLER SAKATA

The goal of this project is to increase the productivity of hydroponic systems by automating data collection and surveillance.

DATA VISUALIZATION - DAIMLER TRUCK NORTH AMERICA

SPONSOR LIAISON: NATHAN BULKLEY
FACULTY ADVISOR: TAMMY VANDEGRIFT, PHD
STUDENTS: EMILY DO, SELENA LI, JASON KATAYAMA CORY MARLEAU
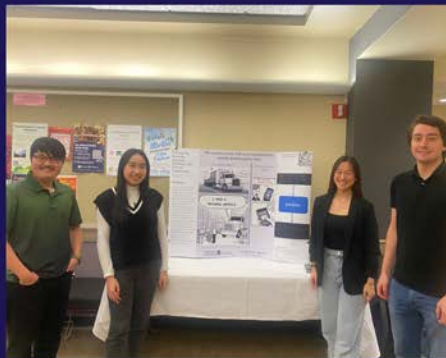
This team is developing a visualization tool to help them display data, files, and scripts. This web-app will be used by the electric control units (ECU) on trucks.
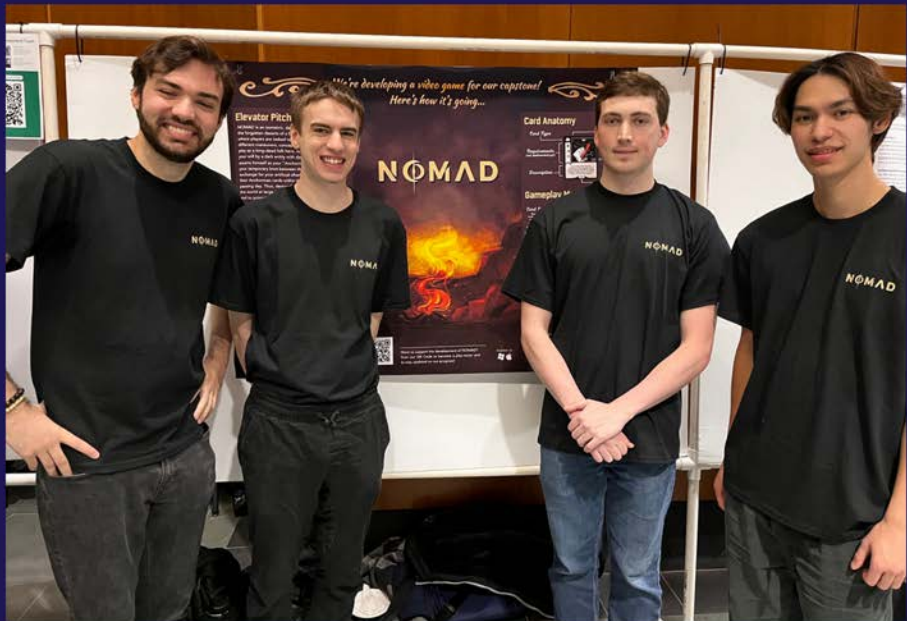
COMPUTER SCIENCE PROJECTS

NOMAD GAME DEVELOPMENT

**FACULTY ADVISOR: ANDREW NUXOLL, PHD
STUDENTS: BRUCE BAIRD, KAMALII SILVA,
JOHN NICHOLSON, CHASE OHMSTEDE**

We're developing a computer game: NOMAD, an isometric, deckbuilding RPG set in a western setting (think cowboys and train robberies). We anticipate a release sometime around mid/late 2024, but our capstone deliverable will be a fully playable beta version.


MAIN CHARACTER

COMPUTER SCIENCE PROJECTS

# AR LEED STORIES & BACNET DATA AGGREGATOR - OPSIS ARCHITECTURE

SPONSOR LIAISON: HEATHER DEGRELLA, SHEM HEIPLE
FACULTY ADVISOR: MATTHEW RUEBEN
STUDENTS: KEONI HAN, HENRY LEE, CIAN MURRAY, DYLAN PRICE

An AR data aggregator that gathers data from the Shiley Marcos building sensors and puts it on an AR dashboard. It also features LEED stories that show the background of the building.
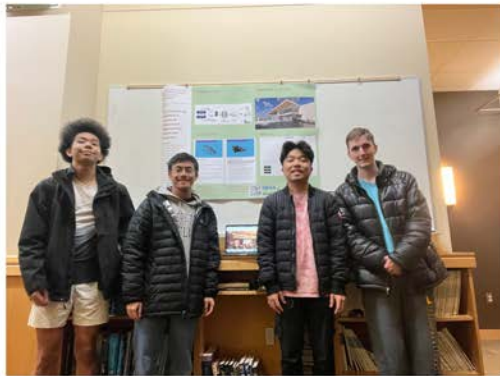
AR-BASED HEADS-UP SPECTRUM ANALYZER DISPLAY - TEKTRONIX

SPONSOR LIAISON: KEITH TENSLEY
FACULTY ADVISOR: MATTHEW RUEBEN
STUDENTS: DYLAN KRAMIS, AUGUSTINE PHAM, MATTHEW TRAN, JACK VOLONTE
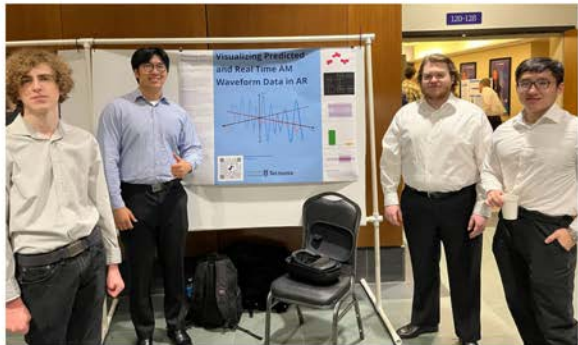
We are going to be predicting output of analog wave data using a machine learning algorithm. This output stream will be rendered and sent to a HoloLens AR device to view.
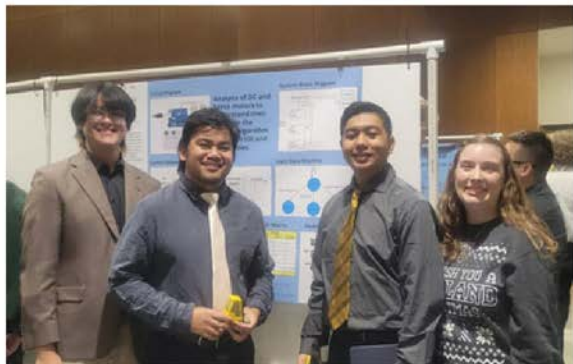
COMPUTER SCIENCE PROJECTS

ELECTRIC TILT CONTROLS - HYSTER YALE GROUP

SPONSOR LIAISON: JESSICA CHERRY
FACULTY ADVISOR: SHAZ VIJLEE, PHD
STUDENTS: CARSON AKAI, VANYEL SINLAO, BRENT TORRES

This project develops an electric control system that performs tilt and lift functions with a smooth lever-to-arm articulation on Hyster-Yale forklifts. The project also provides design insights on the real-time operation performance for driver feedback to increase safety during forklift use.

ADHERENCE SENSOR - GO BABY GO AND OHSU

SPONSOR LIAISON: BETHANY SLOANE
FACULTY ADVISOR: TAMMY VANDEGRIFT, PHD
STUDENTS: MARGO BROWN, KAYLEE MOCK, ANNA YRJANSON

The Adherence Sensor is a motion sensor that detects a child's movements in a mobility cart. The sensor also stores these data logs to be analyzed by pediatricians and pediatric physical therapists.

COMPUTER SCIENCE/ELECTRICAL ENGINEERING PROJECTS

ASHRAE NET ZERO DESIGN COMPETITION -SSOE

SPONSOR LIAISON: BRANDON SCHNEIDER
FACULTY ADVISOR: MEGAN TOSH, PE, JORDAN FARINA, PHD
STUDENTS: SYLVIA BROWN, NICO OCANA-LAVOIE, DEDRIC TOLENTINO

The ASHRAE Net Zero Design competition team will produce a schematic design of an energy efficient and sustainable library in Sao Paulo, Brazil. The focus of the project is minimizing energy demands for HVAC and all other technical systems and then offsetting any remaining energy needs with locally available or building-installed renewable energy sources.
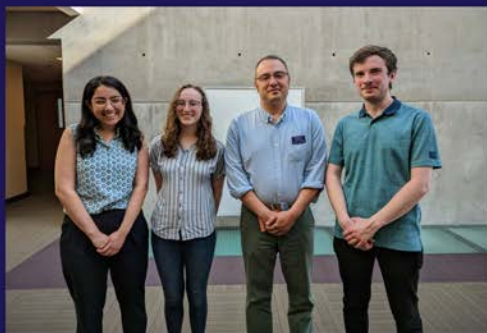

BIOWASTER BURNER

SPONSOR LIAISON: MOHAMMADHADI HAJILOU, PHD
FACULTY ADVISOR: KARSTEN ZUENDEL, PE
STUDENTS: MAIA TURBERVILLE, SUSANA RIVERA, NICHOLAS PERL

The team designed a reactor from more accessible materials than the study on which it was based and the final goal is to create a self-sustained smolder that will burn biowaste such as coffee grounds and food scraps.

MECHANICAL ENGINEERING PROJECTS

HYDROGEN CONSUMPTION MEASURMENT DEVICE - DAIMLER TRUCK NORTH AMERICA

SPONSOR LIAISON: JASON ROBERTS
FACULTY ADVISOR: CHRISTINA IVLER, PHD, JORDAN FARINA, PHD
STUDENTS: ALBERTO MUJICA, NATHANIAL PON, SHANE MATSUSHIMA, GUS STUCKI, STEVEN NGUYEN, SEBASTIAN ANDERSON, KYLE WICKLANDER

This project supports the research and development of alternative energy sources in the transportation industry. Our team is collaborating with a global industry leader to develop a device that can accurately and repeatably measure the consumption of hydrogen gas in a heavy-duty class 8 vehicle.

MECHANICAL ENGINEERING PROJECTS

MEGA WATT CHARGING - DAIMLER TRUCK NORTH AMERICA

SPONSOR LIAISON: RYAN MENZE, JEV MICHEAU-CUNNINGHAM
FACULTY ADVISOR: DEAN BRIAN FABIEN, PHD, TYLER KREIPKE, PHD
STUDENTS: BRYNN HARRINGTON, MELISSA TRAN, SEAN MURRAY, MARC RAFFAELI, TAIT ROWLEY, DELANEY SOUTHARDS, MICHELLE DORAIS, JULIAN HONG

The Mega Watt Charging project intends to create a high-amperage electric vehicle charger that can provide fast and easy charging for semi-trucks and passenger vehicles. The focus is on Electric Vehicle Supply Equipment (EVSE) connectors, specifically the Combined Charging System Combo 1 (CCS1) and Megawatt Charging System (MCS) connectors. This project uses ANSYS to iterate upon the current CCS1 connector handle design by considering changes to geometry, materials, and the use of non-liquid cooling techniques.

MECHANICAL ENGINEERING PROJECTS

COMPACT HEAT EXCHANGERS - FLEXFORGE

SPONSOR LIAISON: JEV MICHEAU-CUNNINGHAM
FACULTY ADVISOR: DEAN BRIAN FABIEN, PHD
STUDENTS: ULY BOREK, SEVERINO BULAGAY, MICHAEL LANG, DIEGO MADRIGAL

This team's goal is to optimize the cooling performance of electric vehicle (EV) charging handles. They are using finite element analysis to perform the project's thermal simulations.

ELECTRIC TILT PACKAGING -HYSTER YALE GROUP

SPONSOR LIAISON: JENNIFER LOUI
FACULTY ADVISOR: CHRISTINA IVLER, PHD
STUDENTS: LOGAN LAVETI, OWEN GENT, CULLEY JONES

Our team is helping to design the next generation of Hyster-Yale electric forklifts by developing an electric tilt mechanism using a mechanical screw jack system capable of replacing hydraulics.


MECHANICAL ENGINEERING PROJECTS

ENABLING VITALS MONITORING IN THE FIELD

INDUSTRY ADVISOR: JACOB KIMBALL, PHD
FACULTY ADVISOR: KARSTEN ZUENDEL, PHD
STUDENTS: ASHLEY HOFFMAN,
GABE RUSTIA, THOMAS BRIDGES,
KIAN PALMER

Biomedical engineering project focused on enhancing the detection of hypovolemia non-invasively. Improves upon existing solutions by enabling precise data collection during strenuous physical activity.

RAIL CLIP REMOVER SYSTEM - STANLEY
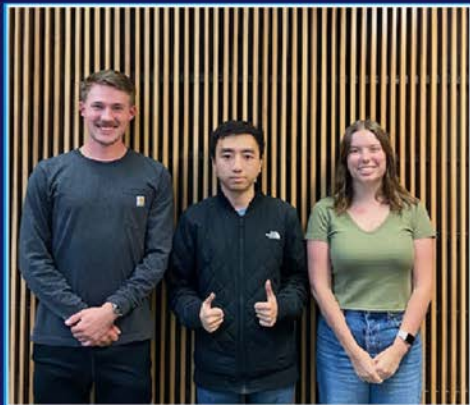
SPONSOR LIAISON:
TREVOR SCHECK, JACK CALDEN
FACULTY ADVISOR:
KENNETH LULAY, PHD
STUDENTS:
RHIANNA FITZGERALD, KHANG NGUYEN, KYLE SCHRANE

To improve the efficiency of rail clip removal and decrease the physical demand on maintenance workers, our team is designing and prototyping an electric rail clip remover.

MECHANICAL ENGINEERING PROJECTS

FOOTWEAR DURABILITY TEST MACHINE UPGRADE

SPONSOR LIAISON: KOHEI OKIMURA
FACULTY ADVISOR: BEN TRIBELHORN, PHD
STUDENTS: MEGAN LY, JORDAN CHUNG, LAM DUONG, TYLER UYENO, YOUSEF ALMUSALLAM

The Kinetic Impact Device (KIM) tester is a machine that tests various shoe soles to estimate its lifetime usage by applying a certain amount of force per cycle. The current goal is to integrate calibrating system, failure detection, and record data that can be easily accessed and shared.
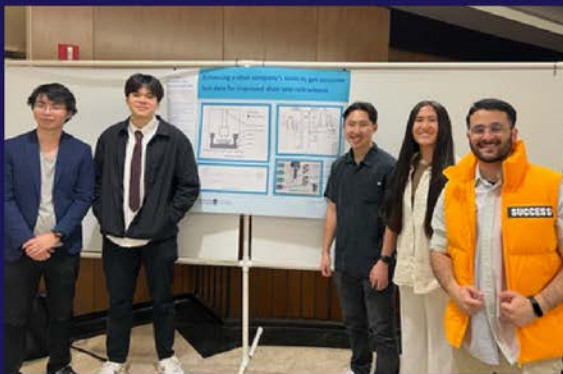
IROBOT VISUALIZATION RIG

FACULTY ADVISOR: KARSTEN ZUENDEL, PE
STUDENTS: SIERRA REPP, AUSTIN LAW, JUSTIN LEE, THEO ACLAN

In collaboration with Dr. Rueben's robot human interaction research, the capstone team is creating a sensor visualization rig to attach to an iRobot Create 3 which includes integrating a LED neopixel strip, camera, and diffused lasers to show real-time sensor information.

MULTIDISCIPLINARY ENGINEERING PROJECTS

NASA LUNAR ROBOTICS COMPETITION

**FACULTY ADVISOR:
BEN TRIBELHORN, PHD
STUDENTS: SHERIDAN MILESTONE,
LUKE WICHMANN, HEWLETT
DELARA, SEBASTIAN OLNEY**

We are designing and building a
robot to collect lunar soil and
use it to build a berm. This is for
the NASA Lunabotics Challenge.

NASA UNIVERSITY STUDENT LAUNCH INITIATIVE

**SPONSOR LIAISON:
JOHN E. THOMPSON
FACULTY ADVISOR:
JORDAN FARINA, PHD
STUDENTS:
AMANDA SCHIFF,
CAYMUS DUCHARME,
CAMERON NAKAKURA,
CONNOR SHANNON,
NICK WARREN**

LaunchUP team has entered the NASA University Student Launch Initiative
(USLI), a nation-wide competition that challenges students to design,
construct, test, and launch a high-powered rocket. This year, each team is
challenged to get their rocket to a target altitude between 4000-6000ft,
deploy a sensitive payload containing four astronaut stand-ins during
descent, and ensure it lands within a given time, velocity, and radius.

MULTIDISCIPLINARY
ENGINEERING PROJECTS

SAE AERONAUTICS COMPETITION

SPONSOR LIAISON: BERNARDO MALFITANO
FACULTY ADVISOR: CHRISTINA IVLER, PHD, C.J. HAINLEY, PE
STUDENTS: KAYLA MEDOF, CHASENA BRADY, MADI SCHALK, ALEX MAK, ADAM PUA, JP NEIGHBORS, BEAU BRUNDAGE, JONAH DOCTOLERO

SAE Aero consists of both MECOP and regular cycle students who are engaged in the design and fabrication of a 15-foot wingspan remote-controlled aircraft for the SAE Aero Design Regular Class Competition. In addition to the plane, the team is developing autonomous capabilities, including autonomous flight and landing zone detection using computer vision, for future Advanced Class Competition planes.


ST. MARY'S SECONDARY SCHOOL FORM 4 M-T MICROGRID DESIGN-BUILD - TEAMLIFT

INDUSTRY ADVISOR: JOE GABRIEL, PE
FACULTY ADVISOR: KARSTEN ZUENDEL, PE

STUDENTS: KATT GAMBLIN, CAMERON LEO, JUDE GABRIEL, ALEX NASTASE

Our team is partnering with TeamLIFT to provide a power generation and storage system with solar panels and lithium-phosphate batteries for St. Mary's Secondary School in Karonga, Malawi.
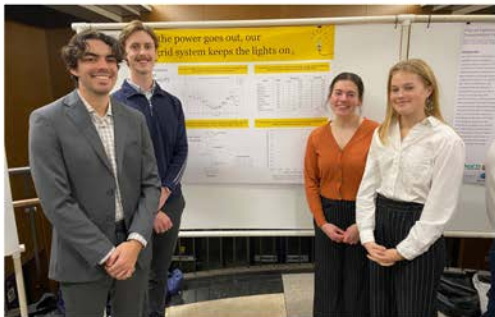
MULTIDISCIPLINARY ENGINEERING PROJECTS

FORMULA SAE ELECTRIC - TEAM A - MECOP

SPONSOR: BAEK MOTORSPORTS
SPONSOR LIAISON: SAMUEL REGIER
FACULTY ADVISOR: C.J. HAINLEY, PE
STUDENTS: TIM KING, SAM KOELLMANN,
PETER PHAM, KELE RIVERS, AARON
STOLL, CHRISTOPHER SENTENO,
RYAN SUGAI

The FSAE mechanical systems team is developing braking and suspension and fabricating the chassis of a formula-style electric racing vehicle.

MULTIDISCIPLINARY
ENGINEERING PROJECTS

FORMULA SAE ELECTRIC - TEAM B - CS/EE

SPONSOR: BAEK MOTORSPORTS
SPONSOR LIAISON: SAMUEL REGIER
FACULTY ADVISOR:
C.J. HAINLEY, PE
STUDENTS: DJ BACKUS, JONA BODIRSKY, JAMES LULAY, TRENT MATSUSHIMA, ALEX MELEMAI, EZEKIEL JOSHUA RAFANAN

The Formula SAE EV team is a capstone project that enables students to develop professional skills in the automotive industry with the development of a formula style electric vehicle.

FORMULA SAE ELECTRIC - TEAM C - ME

SPONSOR: BAEK MOTORSPORTS
SPONSOR LIAISON: SAMUEL REGIER
FACULTY ADVISOR: C.J. HAINLEY, PE
STUDENTS: CARISSA RICHTER, HAYDEN BAKER, HARRY HANNA, JULIETTE MORSE, THADDEUS NAZARENO, JAKE YOUNG
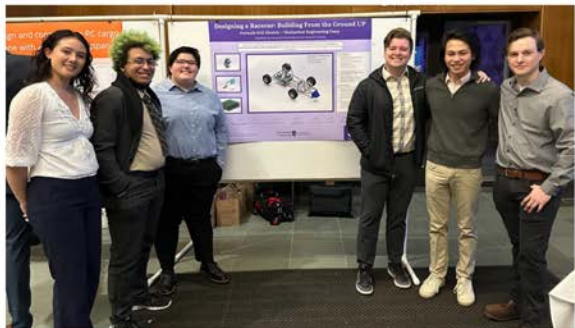
As the University of Portland's first Formula SAE EV team, we are developing a rules-compliant electric car that is centered on reliability, workability, and documentation by building off the successes of the Pilot Speed program.

MULTIDISCIPLINARY ENGINEERING PROJECTS

SHILEY SHOWCASE

BACKUS AGRILABS

BUREAU OF ENVIROMENTAL SEVICES

DAIMLER TRUCKS NORTH AMERICA

FLEXFORGE

GO BABY GO

HYSTER-YALE GROUP

KITTELSON & ASSOCIATES

MULTNOMAH COUNTY DRAINAGE DISTRICT

OPSIS ARCHITECTS

SKANSKA

SSOE GROUP

STANLEY

TEAMLIFT

TEKTRONIX

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