ENGINEERING, ARCHITECTURE AND TECHNOLOGY

CEAT SENIOR DESIGN EXPO

WELCOME!

It is my pleasure to welcome you to the spring 2026 Senior Design Expo. Today, we gather as a community to celebrate the ingenuity, collaboration and determination of our students as they bring their ideas to life.

The Senior Design Expo is one of the clearest expressions of our college's commitment to hands-on learning and meaningful industry engagement. Through close collaboration with our corporate partners and sponsors, our students are challenged to move beyond theory and develop solutions that respond directly to real-world needs. These partnerships are not only vital to the success of this program but also to preparing the next generation of engineers, architects and innovators.

This semester's projects highlight both technical excellence and industry relevance. Among them:

- Interdisciplinary students are advancing construction innovation with "The Rocket," a slipform concrete column fabrication system designed to eliminate traditional formwork. By improving efficiency, reducing labor demands and enhancing structural quality, this project has the potential to significantly impact large-scale construction practices.
- Civil engineering students are addressing infrastructure and environmental challenges through a conceptual rehabilitation plan for the Oklahoma City Bricktown Canal. Their work focuses on improving water quality, reducing algae growth and enhancing long-term system performance while maintaining safety and sustainability.
- Mechanical engineering students have partnered with Arcosa Wind Towers to develop an automated line-following system for submerged arc welding. Their solution improves precision and consistency in weld head operation, demonstrating the value of automation in modern manufacturing processes.

Each of these projects reflects the dedication of our faculty and staff, the perseverance of our students and the critical role of our industry collaborators. The support of our partners allows students to engage with authentic challenges, access professional mentorship and develop solutions with tangible impact.

We are deeply grateful for the continued investment of our industry sponsors, alumni and supporters. Your partnership strengthens this program and ensures that our students graduate with the experience, confidence and perspective needed to lead in their fields.

Please join me in celebrating the achievements of our graduating seniors. Their work represents not only the culmination of their academic journey, but also the beginning of their contributions to industry, academics and society.

GO POKES!

DEAN HANCHEN HUANG

Donald and Cathey Humphreys Endowed Chair
Professor of Engineering

OSU - DESIGN PROJECTS

FRIDAY, APRIL 24 | 9AM-4PM
ENDEAVOR LAB
OSU STILLWATER

MAE 3153 - ROBOT BATTLE - DESIGN COMPETITION

FIRST FLOOR OF ENDEAVOR, ROOM 160 | 10AM

THE AWARDS SHOW FOR ECE, ID AND MAE TEAMS

ENDEAVOR 160 | 4:30PM

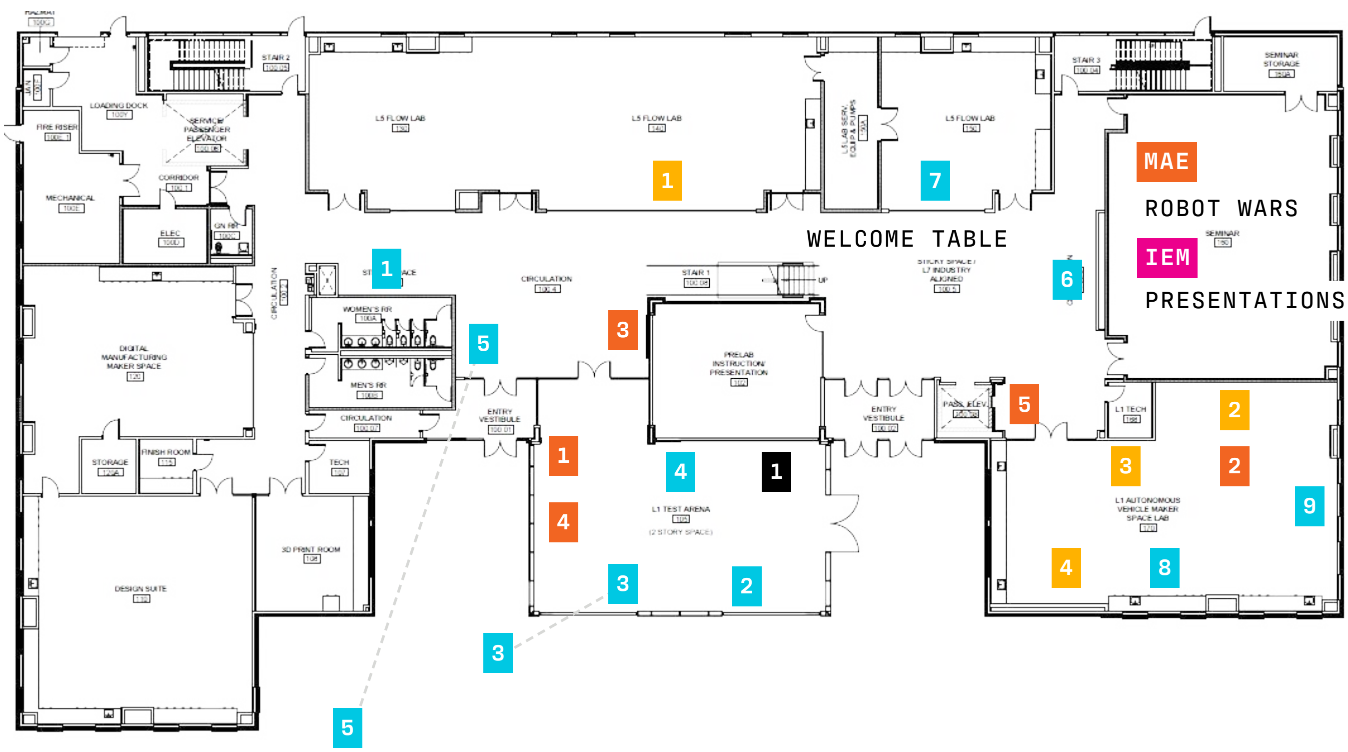
INTERDISCIPLINARY 35

(Projects located on the FIRST, SECOND & THIRD FLOOR of ENDEAVOR & ES LAWN)

INDUSTRIAL ENGINEERING & MANAGEMENT 48

(Projects located on the FIRST & SECOND FLOOR of ENDEAVOR)

FIRST FLOOR ENDEAVOR LAB



BAE

BAE 1
Erosion Erasers

ECE

ECE 1
BB8

ECE 2
Hand Gesture Music Sequencer

ECE 3
Semantic Compression

ECE 4
Athletic Mocap

ID

ID 1
Concrete Cowboys

ID 2
Litter Gitters

ID 3
Despool Dynamics

ID 4
Unsprung Aero - Current Racing

ID 5
Orbital Outfitters

ID 6
StarForce

ID 7
Unmanned Remote Energy Assessment

ID 8
OSU CENTAURS

ID 9
Eye in the Sky-Monitoring & Surveillance

MAE

MAE 1
ASHRAE

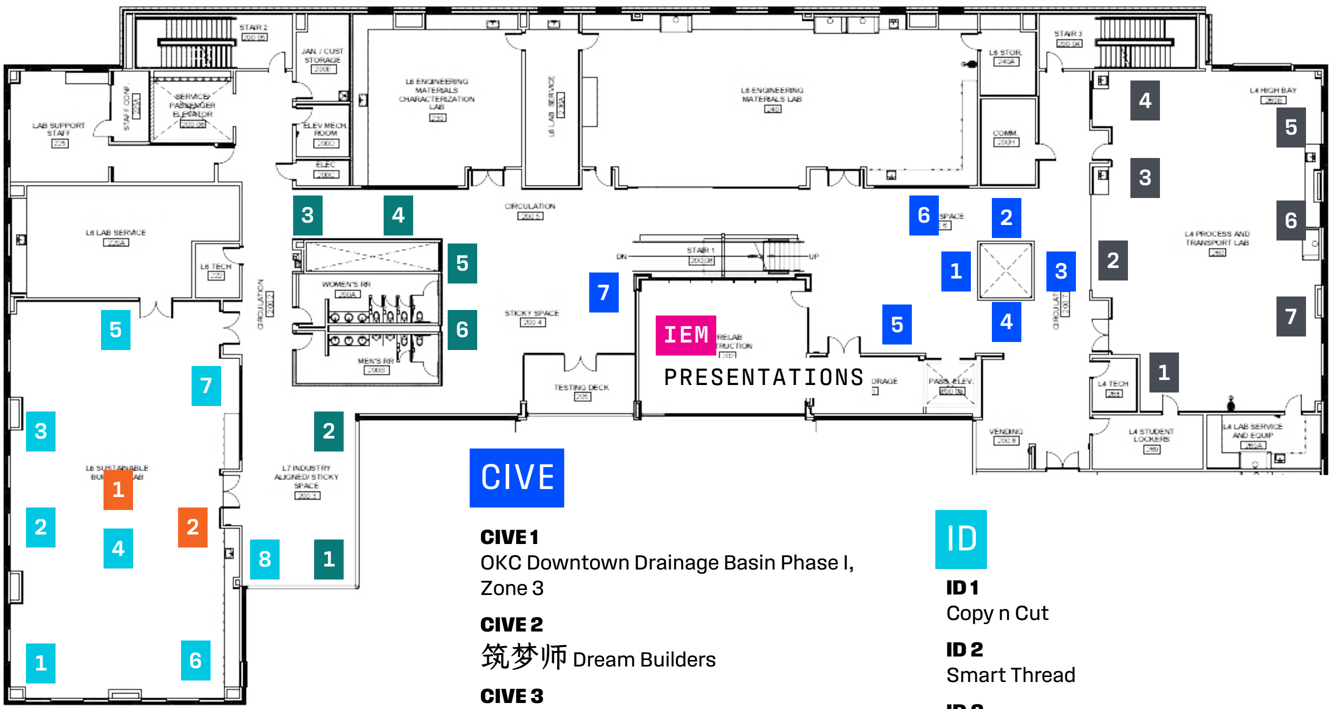
MAE 2
Droplet Size Detector

MAE 3
Home for the Mechanically Insane-CVD Engine

MAE 4
Icarus, Cowboy Space Program & RocketWorks

MAE 5
Dolphin Drone Phasm

SECOND FLOOR ENDEAVOR LAB



CHEM

CHEM 1
Dirty Money

CHEM 2
Manure Munchers

CHEM 3
Generating Renewable Natural Gas by Anaerobic Digestion of Cow Manure

CHEM 4
Project CERES - Moolecules

CHEM 5
Fuel of Crap

CHEM 6
Pasture Power

CHEM 7
CAT-alysts

CIVE

CIVE 1
OKC Downtown Drainage Basin Phase I, Zone 3

CIVE 2
筑梦师 Dream Builders

CIVE 3
The Uncivil Engineers

CIVE 4
Master-Planned Single-Family Subdivision

CIVE 5
Designing Bridge Replacement - The Beam Team

CIVE 6
Team 7

CIVE 7
Pawnee Multi-Use Sports Complex

FPSET

FPSET 1
Evaluating Fire Risk of Solar Panels Installed on Building's External Wall

FPSET 2
Life Safety Analysis of the 2025 Wang Fuk Court Fire

FPSET 3
Wildland Fire Safety Research Team

FPSET 4
Single Exit

FPSET 5
Bridging the Gap: Reducing Energy Demand in Low-Frequency Alarm Technology

FPSET 6
Stillwater WUI Fire Risk Assessment

ID

ID 1
Copy n Cut

ID 2
Smart Thread

ID 3
Orange Crest

ID 4
Origami Soft Robot

ID 5
OKSat - Oklahoma CubeSat Initiative

ID 6
RearGear in a Chair

ID 7
Cyclone Cowboys

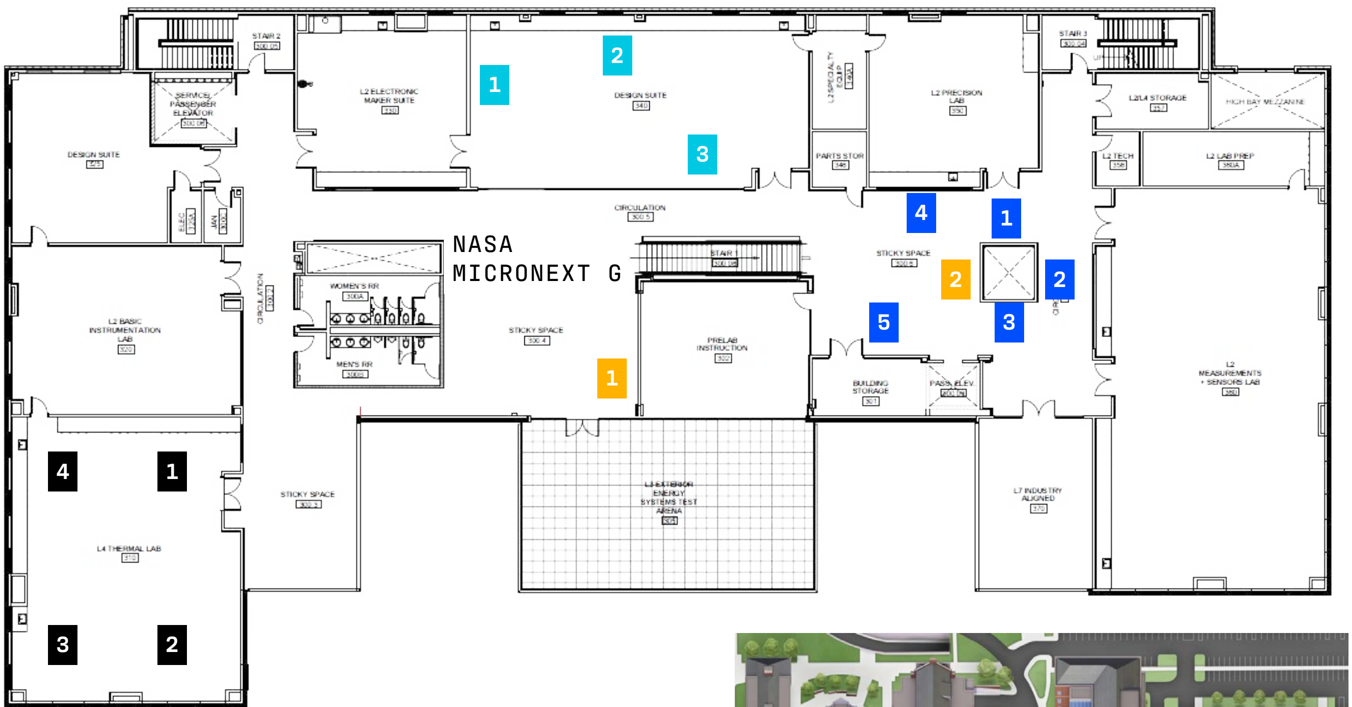
ID 8
Dust Explosion Chamber

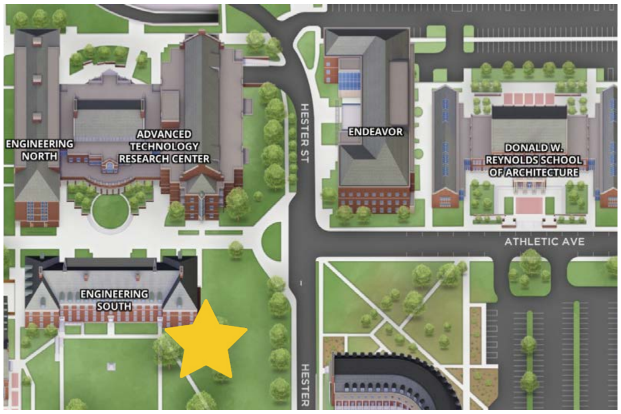
MAE

MAE 1
ArcRiders - Arcosa Line Following

MAE 2
OSU Valves

THIRD FLOOR ENDEAVOR LAB





BAE

BAE 1
Hedge Fund

BAE 2
DJR Implements

BAE 3
Cashew Crew

BAE 4
Sustainalight

CIVE

CIVE 1
PNHA Site 2 Elder Village Design

CIVE 2
Swisher Park Masterplan Design Project

CIVE 3
Martin Nature Park Flood Mitigation

CIVE 4
Pnha Site 3 - "Shotgun Style" Infill 11 Housing

CIVE 5
Five Star Foundation

ECE

ECE 1
AFV

ECE 2
PowerFire Lab

ID

ID 1
Space Cowboys

ID 2
AI Foosball

ID 3
Bio-inspired Guitarist

ENGINEERING SOUTH LAWN TEAMS

ECE

Horizontal HF System Design
UAV based cost effective RADAR implementation

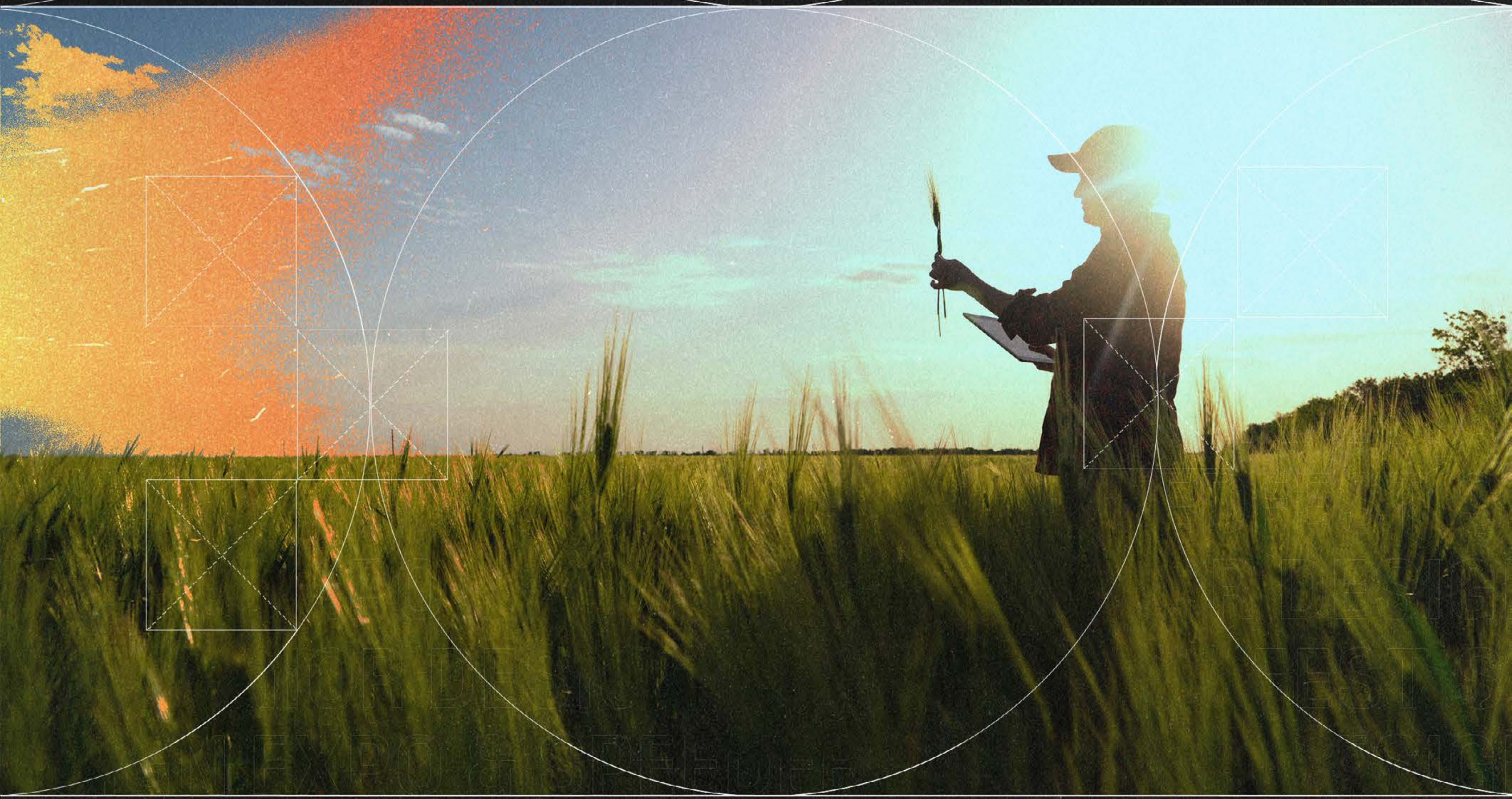
COMP

Pistol Pete's Propulsion Posse - Black Team
Pistol Pete's Propulsion Posse - Orange Team

ID

Advanced Manufacturing Micro-Turbojet Design
Design of a Modular Rotating Detonation Rocket Test Stand
Rocket Assisted Take Off Launch Kit
Subscale Ag Drone for Spray Applications

BIOSYSTEMS & AGRICULTURAL ENGINEERING



BAE

(Left to Right) Eli Reynolds, Eric Renner, Sarah Spring

(Left to Right) Jacksen Ketner, Doug Harshbarger, Harrison Frazier

PROJECT TITLE

CASHEW CREW | CASHEW ROASTING AND COATING PROCESS

Padiano's Kitchen, a seasoning and hot sauce manufacturer in Broken Arrow, Oklahoma, requested assistance in increasing the production scale and quality of their recently developed seasoned cashew product, Crackshews. Padiano's wanted to reduce the number of manual processing steps, improve the texture of their final product and address supply-chain issues for some of their ingredients, while maintaining a clean-label product. New binding agents for the seasoning were considered and optimized to address challenges in accessing avocado oil. Textural properties were improved by switching to a convection oven for roasting. Several designs were evaluated for a new, higher-capacity roasting and seasoning coating process, and an economic analysis was performed. Further sensory analysis was conducted to ensure the quality of the reformulated Crackshews, and the process was improved based on the recommendations.

STUDENTS

Eli Reynolds, Eric Renner, Sarah Spring

ADVISOR(S)

Dr. Timothy Bowser

SPONSOR(S)

Padiano's Kitchen

PROJECT TITLE

DJR IMPLEMENTS | CUSTOMIZED HOPPER AND SEED METERING SYSTEM FOR A VARIABLE NO-TILL DRILL

Small-scale farmers using walk-behind tractors often lack access to affordable precision planting equipment capable of handling a wide range of seed sizes. Existing commercial systems are typically designed for larger tractors, making them cost-prohibitive and incompatible with compact no-till drills. LL Implement, an Oklahoma-based agricultural equipment company, asked our team to design a hopper and seed metering system that can be easily mounted to the company's prototype no-till drill that is compatible with walk-behind two-wheel tractors. Fluted roller and seed plate designs were developed and tested to evaluate performance in planting a wide variety of seed types.

STUDENTS

Jacksen Ketner, Doug Harshbarger, Harrison Frazier

ADVISOR(S)

Dr. John Long

SPONSOR(S)

LL Implement

(Left to Right) Kami Blythe, Jaycee Greening, Tatumn Kennedy, Eli Wood

PROJECT TITLE

EROSION ERASERS | STILLWATER CREEK STREAMBANK STABILIZATION

This project addresses streambank instability along Stillwater Creek in Stillwater, Oklahoma, with a focus on severe erosion near the Country Club Road bridge crossing. The team surveyed the project site and combined this information with satellite data to generate accurate elevations and channel geometry. The processed geometry was implemented into the Hydrologic Engineering Center's River Analysis System software for hydraulic modeling. Based on modeled conditions representative of observed hydropeaking events, the model was used to analyze flow depth, velocity, shear stress and potential sediment transport. This provided a practical approach for evaluating stabilization alternatives under plausible high-flow conditions. Potential solutions, including riprap reinforcement, enhancement of riparian vegetation and combined stabilization approaches, were assessed for effectiveness in reducing erosion and improving channel resilience. An educational outreach component was also developed to communicate the proposed restoration strategies to the community. This utilized a stream trailer and 3D-printed models to replicate the Stillwater Creek study area and demonstrate stream processes, erosion impacts and the effectiveness of engineered restoration solutions.

STUDENTS

Kami Blythe, Jaycee Greening, Tatumn Kennedy, Eli Wood

ADVISOR(S)

Dr. Ali Mirchi, Dr. Sara Alian

(Left to Right) Brady Holzapfel, Cara McWilliams, Garrison Green

PROJECT TITLE

THE HEDGE FUND | PNEUMATIC PRESS TO EVALUATE HEDGE APPLE PROCESSING

The hedge apple (Maclura pomifera), is a widely distributed but underutilized fruit native to the south-central United States. It contains bioactive compounds such as pomiferin and osajin that exhibit antioxidant and antimicrobial properties with potential applications in human and veterinary topical formulations. Despite its promising chemical profile, commercial utilization remains limited due to insufficient processing data and a lack of standardized extraction methods capable of preserving these bioactive compounds while producing consistent juice yields. This project focuses on the design, fabrication and evaluation of a small-scale pneumatic pressing system to support continued testing of hedge apple material properties and juice extraction performance. The pneumatic press is designed to provide controlled and repeatable compressive forces, enabling systematic evaluation of pressure, time and yield efficiency.

STUDENTS

Brady Holzapfel, Cara McWilliams, Garrison Green

ADVISOR(S)

Dr. Timothy Bowser

SPONSOR(S)

Mr. Jim Curl

(Left to Right) Gillian Hahn, Jayden Barbere, Dulce Gallardo-Owens, Kylie Daum

PROJECT TITLE

SUSTAINALIGHT | SUSTAINABLE LIGHTING SOLUTION

The construction of the Central Marketplace at Oklahoma State University caused lighting challenges in areas adjacent to the construction site. When on-grid power was removed from the area to allow for safe deconstruction of pre-existing infrastructure and subsequent construction of the new building, the area became extremely underlit. This case prompted consideration of other low-lit areas on the OSU campus. Insufficiently illuminated areas on campus pose potential safety concerns for students, staff and faculty. OSU Facilities Management and the Office of Sustainability partnered with Sustainalight to investigate methods to resolve areas of insufficient lighting on campus using renewable energy. A solar-based solution was designed, prototyped and tested to assess lighting intensity, coverage area and duration under a wide range of conditions.

STUDENTS

Gillian Hahn, Jayden Barbere, Dulce Gallardo-Owens, Kylie Daum

ADVISOR(S)

Dr. Robert 'Scott' Frazier

UP NEXT

CHE

CHEMICAL ENGINEERING

CHE

(Left to Right) Madison Gustovic, Giovani Sanchez, Adam Meringolo, Taryn McIntosh

PROJECT TITLE

CAT-ALYSTS

The team designed a renewable natural gas facility from cow manure.

STUDENTS

Madison Gustovic, Giovani Sanchez, Adam Meringolo, Taryn McIntosh

ADVISOR(S)

Dr. Clint Aichele, Dr. Praveen Meduri

LINK

(Left to Right) Kurt Sharon, Olivia McNichol, Jared Meeks, Roman Bersche

PROJECT TITLE

DIRTY MONEY

Project CERES (Cow Excrement for Renewable Energy Supplies) aims to design and evaluate a renewable natural gas facility in central Wisconsin. This facility aims to convert dairy cow manure from a variety of local dairy farms into energy grid-quality natural gas. The project focuses on optimizing anaerobic digestion, biogas processing and byproduct repurposing to produce RNG eligible for renewable fuel incentives and fertilizer. By transforming agricultural waste into a valuable energy resource, Project CERES seeks to deliver environmental benefits while producing quality renewable fuel.

STUDENTS

Kurt Sharon, Olivia McNichol, Jared Meeks, Roman Bersche

ADVISOR(S)

Dr. Clint Aichele, Dr. Praveen Meduri

LINK

[Left to Right] Mason Park, Nathan Huskins, Kaden Renfroe, Connor Pascual

PROJECT TITLE

FUEL OF CRAP

We are converting cow manure to a clean natural gas stream.

STUDENTS

Mason Park, Nathan Huskins, Kaden Renfroe, Connor Pascual

ADVISOR(S)

Dr. Clint Aichele, Dr. Praveen Meduri

LINK

[Left to Right] Amelia Cherry, Macey Fletcher, Naomi Stevens, Isabel West

PROJECT TITLE

GENERATING RENEWABLE NATURAL GAS BY ANAEROBIC DIGESTION OF COW MANURE

The team was tasked with completing the preliminary design of a facility to generate renewable natural gas and industrial-grade carbon dioxide from the anaerobic digestion of cow manure. Gas flows from the farm to the facility, is digested by anaerobic bacteria and is subsequently purified into methane, carbon dioxide, filtrate and nutrient-rich centrate. The methane stream is cleaned with iron sponge adsorption, amine scrubbing and triethyl glycol desiccation before injection in a local natural gas header.

STUDENTS

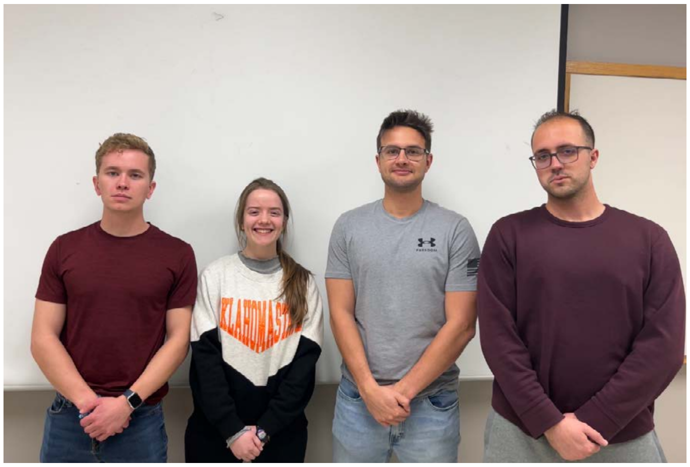
Amelia Cherry, Macey Fletcher, Naomi Stevens, Isabel West

ADVISOR(S)

Dr. Clint Aichele, Dr. Praveen Meduri

LINK

(Left to Right) Sarah Douglas, Maddox Wilfong, Joe Gibbs



(Left to Right) Daniel Van Dam, Ariel Santos, Cole Elder, Austin Lynch

PROJECT TITLE

MANURE MUNCHERS

AIChE National Student Design Competition is the project assigned to CHE seniors in the spring semester. Our aim is to look at the recovery of renewable natural gas via cow manure.

STUDENTS

Sarah Douglas, Maddox Wilfong, Joe Gibbs

ADVISOR(S)

Dr. Clint Aichele, Dr. Praveen Meduri

LINK

PROJECT TITLE

PASTURE POWER

The team designed an anaerobic digester and associated gas processing system to produce renewable natural gas from dairy manure.

STUDENTS

Daniel Van Dam, Ariel Santos, Cole Elder, Austin Lynch

ADVISOR(S)

Dr. Clint Aichele, Dr. Praveen Meduri

LINK

(Left to Right) Trenton Neiderer, Victoria Sanchez, Kylyn Swatsenbarg, Zach Seay

PROJECT TITLE

PROJECT CERES - MOOLECULES

Project CERES (Cow Excrement for Renewable Energy Supplies) evaluates the feasibility of producing renewable natural gas from dairy manure sourced from a cooperative of 12 farms in central Wisconsin. The objective of the project is to design an optimized process that converts manure into pipeline-quality RNG through anaerobic digestion and biogas upgrading while addressing digestate management and utility integration. The proposed facility aggregates manure from 6,000 cows and processes the resulting biogas to meet natural gas pipeline specifications by removing impurities such as hydrogen sulfide, water and carbon dioxide. In addition to RNG production, the process considers potential revenue streams from carbon credits, Renewable Identification Numbers and optional CO_2 recovery. Economic and process safety analyses were performed to evaluate capital investment, operating costs and project viability. This project aims to provide an environmentally sustainable solution for manure management while producing renewable energy and reducing methane emissions from dairy operations.

STUDENTS

Trenton Neiderer, Victoria Sanchez, Kylyn Swatsenbarg, Zach Seay

ADVISOR(S)

Dr. Clint Aichele, Dr. Praveen Meduri

LINK

UP NEXT

CIVE

CIVIL & ENVIRONMENTAL ENGINEERING

CIVE

(Left to Right, Front to Back) Lea Hency, Cameron Glen, Tongyang Liu, Yingzhu Li, Yiyang Zhao

PROJECT TITLE

DESIGNING BRIDGE REPLACEMENT - THE BEAM TEAM

Our project is a bridge replacement, located in Luther, Oklahoma. The structure is currently a 44-ft single span I-beam bridge built in the 1940s. The location is in a regulatory flood zone, making hydraulics the governing factor in design. The goal is to design a new structure that can handle water flow, maintain the current structure elevation, widen the road for future expansion and provide long-term functionality.

STUDENTS

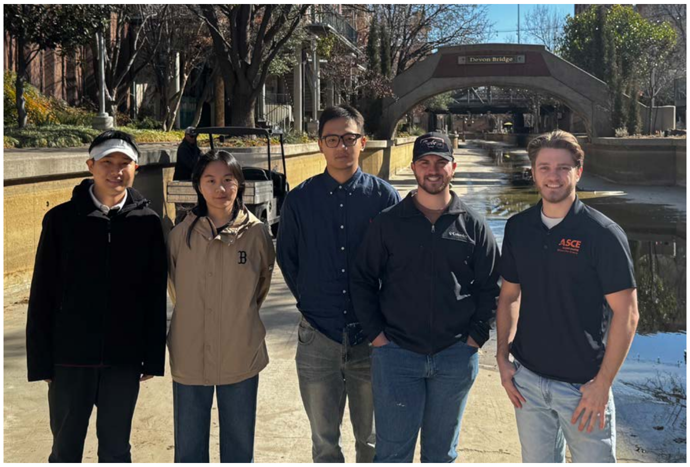
Lea Hency, Cameron Glen, Tongyang Liu, Yingzhu Li, Yiyang Zhao

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber, Leslie Lewis

SPONSOR(S)

The City of OKLAHOMA CITY



(Left to Right) Ruiqi Yin, Lesley Xia, Yili Yang, Brady Chenoweth, Jair Simon

PROJECT TITLE

筑梦师 DREAM BUILDERS

The Oklahoma City Bricktown Canal is an urban infrastructure system that supports stormwater conveyance, water circulation, recreation and tourism within the Bricktown district. Over time, the canal has experienced minor structural deterioration and water quality challenges, particularly algae growth associated with stormwater runoff, nutrient loading and limited hydraulic circulation. This project develops a conceptual rehabilitation plan to improve hydraulic performance and reduce algae formation while maintaining public safety and compliance with municipal and environmental standards. Through site investigations, watershed, storm sewer mapping and evaluation of multiple treatment alternatives, the project seeks to identify practical, cost-effective strategies that sustainably enhance long-term canal functionality.

STUDENTS

Ruiqi Yin, Lesley Xia, Yili Yang, Brady Chenoweth, Jair Simon

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber

(Left to Right) Huqi Fan, Jingran Cheng, Zhiqi Cheng, Kolby Atkins, Madelyn Blodgett

PROJECT TITLE

FIVE STAR FOUNDATION

The team is modeling the Aquatic Center in the Will Rogers Gardens. For the park, they are redesigning the parking lots and walking trails to provide better accessibility. Additionally, they are improving the amenities and signage throughout the park to enhance visitor experience and wayfinding.

STUDENTS

Huqi Fan, Jingran Cheng, Zhiqi Cheng, Kolby Atkins, Madelyn Blodgett

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber

SPONSOR(S)

(Left to Right) Mingyu Ouyang, Yifan Liu, Xinran Pang, Annie Grace Irlbeck,Emma Hernandez

PROJECT TITLE

MARTIN NATURE PARK FLOOD MITIGATION

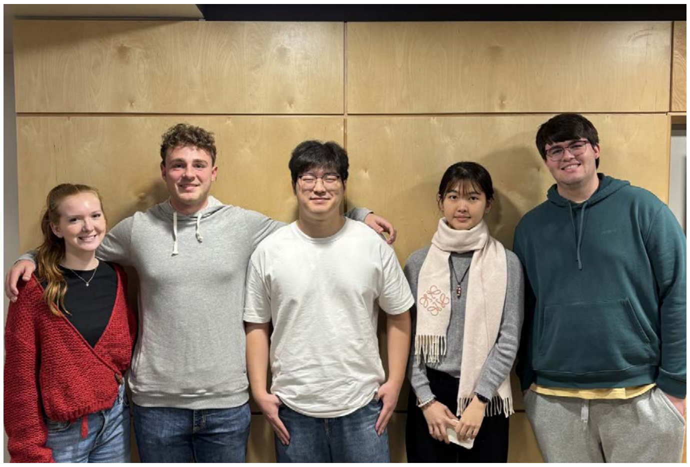
Martin Nature Park Pond in Oklahoma City, Oklahoma, is supplied by a tributary of Bluff Creek and supports a diverse ecosystem, including fish and turtles. Flow enters the pond through an existing low-head dam, with outflow controlled by a 30-inch pipe culvert. The surrounding area experiences recurring flooding, especially along West Memorial Road near the Kilpatrick Turnpike. This project focuses on mitigating flood impacts through the integration of smart stormwater technology, green infrastructure solutions and targeted improvements to the existing low-head dam.

STUDENTS

Mingyu Ouyang, Yifan Liu, Xinran Pang, Annie Grace Irlbeck, and Emma Hernandez

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber, Dr. Jaime Schussler



(Left to Right) Kaylin Hall, Will Harrison, Yixuan Zhu, Jessie Zhang, Trey Smith

(Left to Right) Courtney Perry Mardis, Ziwen Wu, Lingli Fang, Zirong Wang, Sophia Bertelli

PROJECT TITLE

MASTER-PLANNED SINGLE-FAMILY SUBDIVISION

The Pawnee Nation Housing Authority has requested the development of a new subdivision to be used for low-income housing. The 14-acre property is mostly untouched land with an existing shed that needs to be removed. It is a flat terrain with existing vegetation and a pond that requires filling. House designs are primarily meant for family housing, with an emphasis on three- and four-bedroom houses. The idea is that the houses aren't all cookie cutter layouts and have a more modern feel, while still being affordable. A park with sports courts and a walking trail is required, and there needs to be sufficient street lighting to improve nighttime safety. This project requires the engineering design of multiple branches of civil engineering. Roadway design is necessary for the layout of the neighborhood and required for access to the neighborhood. Structurally, it must be determined how the houses will stand and with what materials the structural system needs to be built. The introduction of sidewalks and roads leads to a major increase in runoff, so a drainage plan needs to be developed, as well as green infrastructure to help prevent ponding and flooding. A geotechnical report is also essential to the project, as the entire 14-acre property needs to be properly consolidated before construction can begin. The water systems, including water lines and sewage pipes, need to be introduced to the site and connected to the existing lines in the area.

STUDENTS

Kaylin Hall, Will Harrison, Yixuan Zhu, Jessie Zhang, Trey Smith

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber, Cynthia Butler, Linda Jestes

PROJECT TITLE

OKC DOWNTOWN DRAINAGE BASIN PHASE I, ZONE 3

The Oklahoma City Drainage Basin Phase I - Zone 3 Project evaluates and advances conceptual drainage improvements to reduce recurring surface flooding in the downtown watershed caused by aging, capacity-limited early 20th-century storm sewer infrastructure. Using hydrologic and hydraulic modeling tools, including Civil 3D and PCSWMM, the project assesses existing system performance under 10- and 100-year storm events and develops feasible alternatives such as upsized conveyance and detention solutions. Alternatives are screened based on flood reduction effectiveness, constructability within a dense urban corridor, utility constraints, long-term maintenance and cost-effectiveness to identify a preferred alternative. The project is being undertaken to mitigate repetitive flooding, protect public safety and property, preserve critical downtown infrastructure and improve long-term system resilience in accordance with modern design standards.

STUDENTS

Courtney Perry Mardis, Ziwen Wu, Lingli Fang, Zirong Wang, Sophia Bertelli

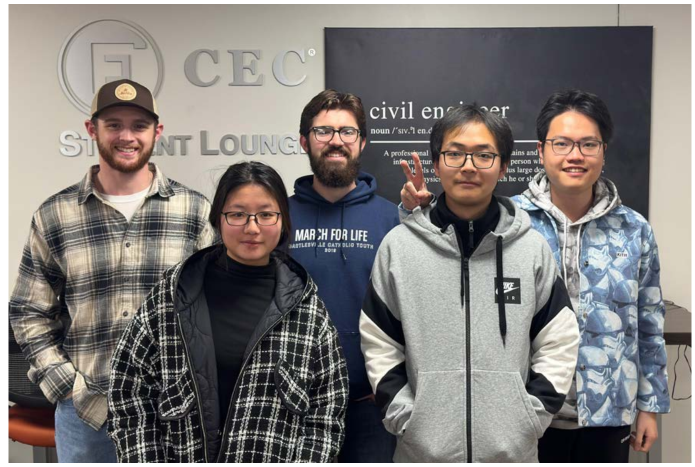
ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber

SPONSOR(S)

SEAL OF THE CITY OF OKLAHOMA CITY

(Left to Right) Junye Zhang, Felix Lan, Daisy Rosas, Austin Snipes, Aidan Saucedo



(Left to Right) Charlie Gilbreath, Chutong Jin, Matt Fries, Yuhan Lai, Yansong He

PROJECT TITLE

PAWNEE MULTI-USE SPORTS COMPLEX

The Pawnee Sports Complex project aims to transform approximately 40 acres at the former Pawnee Municipal Airport into a multi-use recreational hub for the City of Pawnee, Oklahoma, a rural community of approximately 2,500 residents. The proposed facility will include multi-purpose athletic fields for baseball, softball and soccer; walking and jogging trails; playground areas; concession stands; shaded seating; and a potential indoor facility for year-round use. The City of Pawnee initiated this project to address the critical lack of recreational facilities for youth and adults in the area while simultaneously stimulating local economic development and attracting regional tourism. The vision is to create a self-sustaining community asset that promotes health, wellness and social connection for residents of all ages. Our team is conducting this feasibility study to provide the City of Pawnee with the essential technical foundation needed for informed decision making. This includes evaluating site suitability, designing grading and drainage systems, assessing utility infrastructure capacity, analyzing traffic and parking demands, reviewing environmental impacts and developing cost estimates and phased construction concepts. By delivering a data-driven roadmap, our work will help ensure the Pawnee Sports Complex is built on a feasible, sustainable foundation that serves the community for generations to come.

STUDENTS

Junye Zhang, Felix Lan, Daisy Rosas, Austin Snipes, Aidan Saucedo

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber

SPONSOR(S)

City of PAWNEE

PROJECT TITLE

PNHA SITE 2 ELDER VILLAGE DESIGN

The Pawnee Nation Housing Authority seeks to develop Site 2 on Hawthorn Street in Pawnee, Oklahoma, into a compact and secure Elder Village that provides safe, accessible and socially connected housing for up to six residents. Currently consisting of two raw infill parcels within an established urban area, the site requires parcel consolidation, thoughtful site planning and coordinated utility connections to support development. Although existing electric, water and sewer infrastructure are adequate, the project presents challenges related to creating an inward-focused community layout, ensuring full ADA accessibility, integrating emergency response systems and balancing limited parking with pedestrian-friendly circulation. In addition, the design must incorporate shared amenities such as a commercial kitchen, dining space and common laundry while promoting safety, energy efficiency and quality of life through landscaped outdoor areas, secure fencing and natural lighting. The overall challenge is to transform an undeveloped urban site into a functional, sustainable elder housing environment that supports independence, safety and social interaction.

STUDENTS

Charlie Gilbreath, Chutong Jin, Matt Fries, Yuhan Lai, Yansong He

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber, Cynthia Butler, Linda Jestes

(Left to Right) John Montemayor, Andrew Young, Qixuan Feng, Chaohan Zhong

(Left to Right) Jackson Crum, Adrianna Cheverie, Tianfeng Han, Ziyu Guo (Not Pictured) Keyao He

PROJECT TITLE

PNHA SITE 3 - "SHOTGUN STYLE" INFILL HOUSING

Site 3, located at the intersection of 2nd and Cleveland streets in Pawnee, Oklahoma, is a small infill housing project under the jurisdiction of the City of Pawnee and owned by the Pawnee Nation Housing Authority. The project encompasses approximately three city parcels within an established residential neighborhood. Existing site conditions include raw, undeveloped lots with generally flat grades near 2nd Street and a noticeable slope toward the rear of the property. The site is accessible from both 2nd Street and Cleveland Street, supporting flexible circulation and frontage opportunities. Utility capacity for electric, water and sewer is reported by the City of Pawnee as adequate, with anticipated design considerations driven by site topography, particularly the rear-of-site slope. Only minimal roadway improvements are expected, such as curb and gutter installation and standard access upgrades as required.
The development vision for Site 3 is a compact residential infill community featuring "shotgun-style" one-bedroom units optimized for the narrow lot configuration. The housing program is designed to serve singles, couples, college students and older adults who are not yet ready for an elder village setting. Units will include full in-unit kitchens and laundry, with parking primarily located at the front of the homes. Overall, the project prioritizes efficient use of space, compatible neighborhood integration and safe, clear pedestrian and vehicular access from both adjoining streets.

STUDENTS

John Montemayor, Andrew Young, Qixuan Feng, Chaohan Zhong

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber

SPONSOR(S)

PAWNEE Nation Housing Authority

PROJECT TITLE

SWISHER PARK MASTERPLAN DESIGN PROJECT

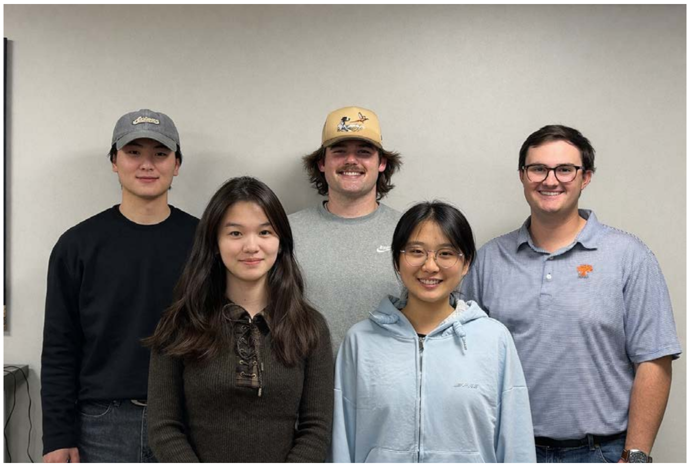
We are creating a masterplan design of Swisher Park located in Oklahoma City, Oklahoma. It is a part of the OKC GO Bond program and aims to add a mixed-use park complex for southwest Oklahoma City. This design will include plans to support phased construction.

STUDENTS

Jackson Crum, Adrianna Cheverie, Tianfeng Han, Ziyu Guo, Keyao He

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber



(Left to Right) Eddie Quan, Yunxi Tao, Caleb Nealis, Qiuchun Wang, Zander Leffel

PROJECT TITLE

TEAM 7

Designing drainage improvements for the Sun Valley Acres neighborhood in east-central Oklahoma City.

STUDENTS

Eddie Quan, Yunxi Tao, Caleb Nealis, Qiuchun Wang, Zander Leffel

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber, Blaine Sheffield

SPONSOR(S)

(Left to Right) Noah Campbell, Angel Carrillo, Sizhe Fan, Kechen Wu, Guangyi Zhang

PROJECT TITLE

THE UNCIVIL ENGINEERS

We are reworking Wheeler Park in Oklahoma City. This park has a very spread out and unorganized layout. Our plan is to reorganize and implement multiple athletic-related amenities and refurbish outdated pavement surfaces within the park.

STUDENTS

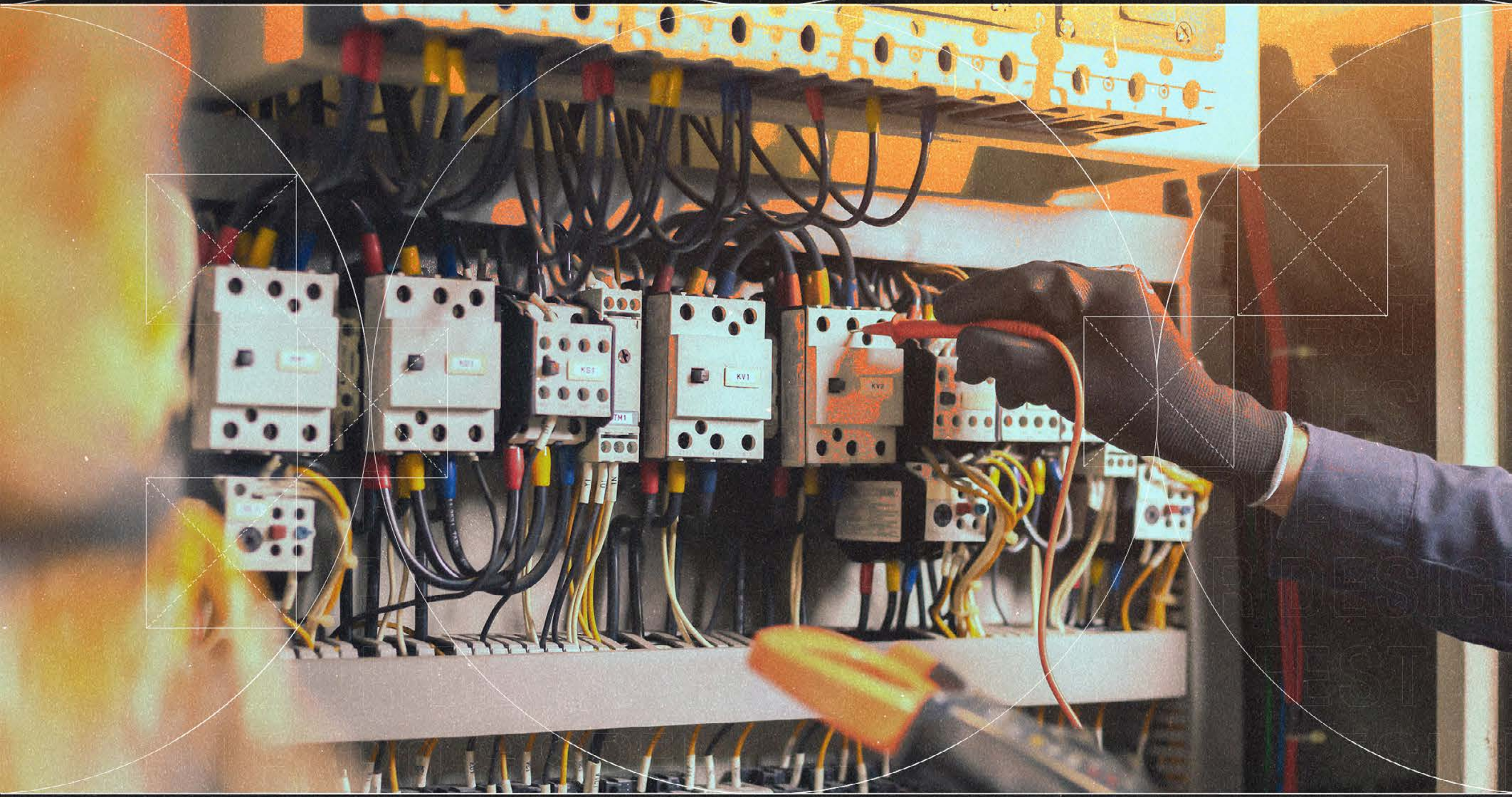
Noah Campbell, Angel Carrillo, Sizhe Fan, Kechen Wu, Guangyi Zhang

ADVISOR(S)

Dr. Norb Delatte, Dr. Greg Wilber

SPONSOR(S)

ELECTRICAL & COMPUTER ENGINEERING



ECE

(Left to Right) Abdullah Khaja, Jermaine Kelley, Ben Rector

(Left to Right) Ethan Jiang, Julia Dickerson, Kala Hernandez, Quentin Koeninger, Luke Cardiel

PROJECT TITLE

AFV

The goal of our project is to implement a fire detection AI model onto the AFV for fire detection and attack. We will also be responsible for building algorithms that utilize the output data of all vision sensors for autonomous repositioning and attack.

STUDENTS

Abdullah Khaja, Jermaine Kelley, Ben Rector

ADVISOR(S)

Dr. Joe Conner, Dr. Hritom Das, Dr. Nate Lannan

PROJECT TITLE

ATHLETIC MOCAP TRAINING

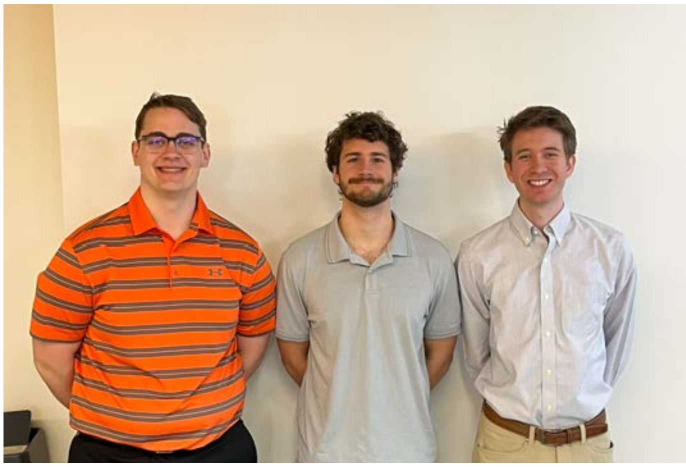
Our project is to create a camera setup and processing pipeline that allows for the motion capture of athletic movements. The camera setup includes a handheld, 3D-printed mount with cameras and microcontrollers attached, used for video capture. During capture, several tags will be in frame to offer a basis for camera calibration. The video is then offloaded to a server for processing that performs the motion capture, allowing for deeper analysis of the original video.

STUDENTS

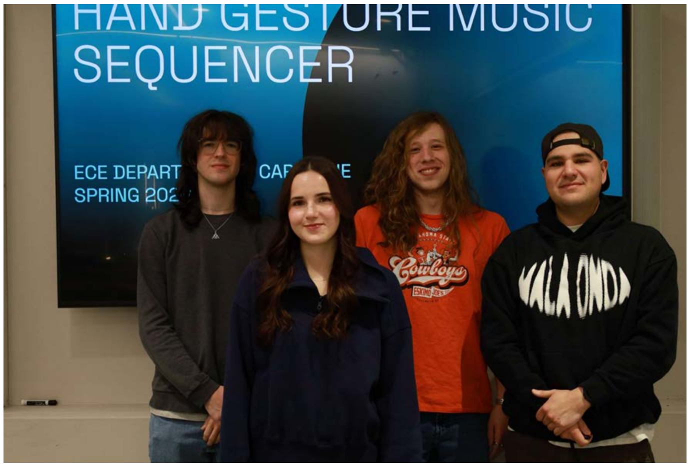
Ethan Jiang, Julia Dickerson, Kala Hernandez, Quentin Koeninger, Luke Cardiel

ADVISOR(S)

Dr. Scott Mattison



(Left to Right) Matthew Brue, Sawyer Hutchison, Holland Carter



(Left to Right) Evan Acree, Abbie Schlatter, Nikolas Brouwer, Ricardo Landeros Aranda

PROJECT TITLE

BB-8

Our project transforms a BB-8-inspired robot from a simple remote-controlled robot into a semi-autonomous service droid. While previous versions relied entirely on manual control, our team integrated computer vision, localization and closed-loop stability control to give the robot environmental awareness and improved balance. This project demonstrates the integration of mechanical design, embedded systems and artificial intelligence to create an engaging robot that promotes engineering and human-robot interaction to current and incoming students.

STUDENTS

Matthew Brue, Sawyer Hutchison, Holland Carter

ADVISOR(S)

Dr. Nate Lannan, Dr. Joe Conner, Daniel Albrecht

PROJECT TITLE

HAND GESTURE MUSIC SEQUENCER

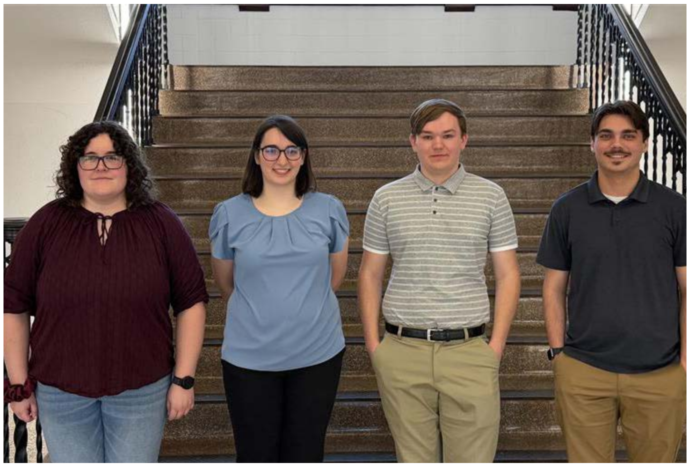
This project is a music sequencer that can be controlled through hand or body gestures. This involves the use of a sequencer and synthesized sound, an audio system to play the music and a computer vision system to interpret hand or body motions and pass commands to the sequencer. This involves a hand or body pose library that is associated with various sounds. It could be useful for music production without traditional control methods, providing a more kinematic experience.

STUDENTS

Evan Acree, Abbie Schlatter, Nikolas Brouwer, Ricardo Landeros Aranda

ADVISOR(S)

Dr. Nate Lannan



(Left to Right) Railey Prentice, Elizabeth White, Landren Martin, Braden White

PROJECT TITLE

HORIZONTAL HF SYSTEM DESIGN

Naval vessels rely on shipboard electronics that must operate safely in strong HF communication fields. The Naval Surface Warfare Center Dahlgren Division evaluates these systems' electromagnetic compatibility before deployment. Current testing procedures (HERO, EMV) use a vertical whip antenna with missiles suspended vertically; however, this setup is impractical for large missiles due to crane limitations and handling difficulties. This project aims to develop a horizontal, broadband HF antenna capable of producing a uniform electromagnetic field for HERO and EMV testing. The antenna will feature a reasonable VSWR across the HF band and scalable design for high-power operation. To demonstrate feasibility, the team has assembled a large LPDA antenna for proof-of-concept horizontal testing.

STUDENTS

Railey Prentice, Elizabeth White, Landren Martin, Braden White

ADVISOR(S)

Dr. Chuck Bunting, Dr. Pavithrakrishnan Radhakrishnan

SPONSOR(S)

NAVSEA WARFARE CENTERS DAHLGREN

(Left to Right) Lenna Abouzahr, Cade Seay, Daniel Dubon

PROJECT TITLE

POWERFIRE LAB

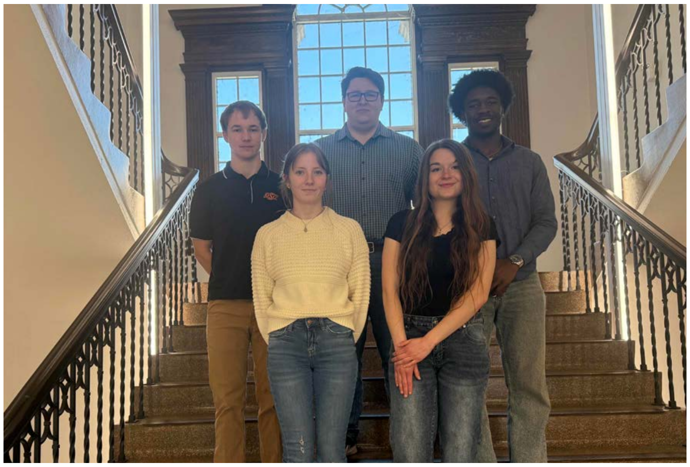
The goal of this project is to design and prototype a software-based human machine interface and safety logic platform for Dr. Nazaripouya's PowerFire Lab. The system must allow operators to monitor, control and coordinate medium voltage electrical experiments in conjunction with fire-related testing. Future researchers in the PowerFire Lab will conduct experiments on transmission line-caused fires, specifically when they come into contact with tree branches and other vegetation.

STUDENTS

Lenna Abouzahr, Cade Seay, Daniel Dubon

ADVISOR(S)

Dr. Hamid Nazaripouya



[Left to Right] Makayla Burks, Aramaea Sewell, Caleb Seabolt, Ryan Kerns, Joel Nnaji

PROJECT TITLE

SEMANTIC COMPRESSION

The aim of this project is to investigate the feasibility of compressing image data by learning a compact semantic representation using a neural network-based encoder, followed by image reconstruction using a corresponding decoder network. Rather than relying on traditional hand-engineered compression techniques, this project explores whether deep learning models can extract and transmit only the most fundamental semantic information required to accurately reproduce an image.

STUDENTS

Makayla Burks, Aramaea Sewell, Caleb Seabolt, Ryan Kerns, Joel Nnaji

ADVISOR(S)

Dr. Shahriar Shahabuddin

[Left to Right] Collin McQueen, Curtis McCormick, Matthew Kuzbel, Aidan Knight

PROJECT TITLE

UAV BASED COST EFFECTIVE RADAR IMPLEMENTATION

This project develops and tests a drone-mounted ground penetrating radar system using stepped-frequency continuous-wave radar techniques. Our goal is to create a lightweight, low-cost sensing platform that can detect and localize buried or obscured objects while keeping operators at a safe distance. We are using a DJI S1000+ UAV as the carrier platform, a bladeRF 2.0 micro as the software-defined radio, a Raspberry Pi 5 for onboard control/data logging and Vivaldi antennas for wideband transmission and reception.

STUDENTS

Collin McQueen, Curtis McCormick, Matthew Kuzbel, Aidan Knight

ADVISOR(S)

Dr. Syed Jehangir

FIRE PROTECTION & SAFETY ENGINEERING TECHNOLOGY

FPSET

(Left to Right, Front to Back) Boyi Wang, Kunpeng Lin, Yuhang Chen, Madhav Suresh, Qingyang Deng

PROJECT TITLE

BRIDGING THE GAP: REDUCING ENERGY DEMAND IN LOW-FREQUENCY ALARM TECHNOLOGY

Since 2010, NFPA 72 has stipulated that many building and fire safety regulations require low-frequency audible alarms in sleeping areas due to their demonstrated superiority in awakening occupants, particularly among at-risk populations such as children, the elderly and people affected by drugs, alcohol or sleeping aids. However, the increased power demand associated with low-frequency alarm signals presents challenges for battery-operated smoke alarms and raises concerns regarding the practicality and flexibility of current code requirements. This study conducts a comprehensive literature review of waking effectiveness research and existing code provisions related to low-frequency audible alarms. The approach involves determining the minimum power requirements that are consistent with experimental waking studies, code requirements and technical reports that have been done. Emphasis is placed on evaluating differences in waking performance between normal and at-risk. Findings from the literature are compared against current regulatory requirements to identify inconsistencies and areas where code provisions may not fully reflect available scientific evidence. Based on this analysis, the study explored potential strategies for achieving the required alarm performance while reducing electrical energy consumption, including optmizing signal characteristics and alternative compliance approaches. The results aim to support the development of a more comprehensive, specific and evidence-based framework for low-frequency alarm requirements and provide recommendations for improving energy efficiency and future fire alarm code development.

STUDENTS

Yuhang Chen, Madhav Suresh, Qingyang Deng, Boyi Wang, Kunpeng Lin

ADVISOR(S)

Dr. Bryan Hoskins, Dr. Virginia Charter, Dr. Leslie Stockel

(Left to Right) Tianbo Wang, Xiaoyao Lu, Jackson Moats, Xinyi Wang

PROJECT TITLE

EVALUATING FIRE RISK OF SOLAR PANELS INSTALLED ON BUILDING'S EXTERNAL WALL

Building-integrated photovoltaics (solar panels integrated into building facades) are increasingly being used in facades to improve building energy performance and achieve sustainable development goals. However, BIPV facade components present new fire safety hazards due to the following reasons: (1) the multi-layered facade assembly incorporates polymeric panel components and foam insulation behind the cladding that are inherently combustible. Once ignited, these materials sustain vertical flame spread along the facade surface and cannot be easily suppressed from the exterior, directly worsening the overall fire spread risk; (2) ventilation cavities may create a chimney effect; (3) the tilt angle of photovoltaic panels affects the geometry of the air gap between the panel and the wall, altering airflow patterns and radiative heat flux distribution, which can accelerate upward flame propagation along the facade. These factors may accelerate the vertical spread of fire along the building's exterior walls, increase heat transfer to upper floors and substantially impede firefighting operations, post-fire structural damage assessment, hazardous residue management and building re-occupancy procedures. This study primarily assesses the impact of BIPV facade tilt angle on fire spread risk, as tilt angle is a design variable that can be directly controlled by engineers – unlike material properties or cavity dimensions that are often fixed by product specifications. Through a structured literature review of relevant fire safety standards (including NFPA 285, BS 8414, and ISO 13785), key parameters affecting fire spread, such as cavity depth, building size, fire source and material flammability, are identified in addition to facade tilt angle. A simplified facade model is developed using Pyrosim, and computer simulations are conducted using Fire Dynamics Simulator to compare HRR, temperature and flame spread pattern across two BIPV facade tilt angle configurations (60° and 90°). The findings are expected to provide evidence-based tilt angle recommendations that balance solar energy performance with reduced fire spread risk, supporting safer BIPV facade design practice.

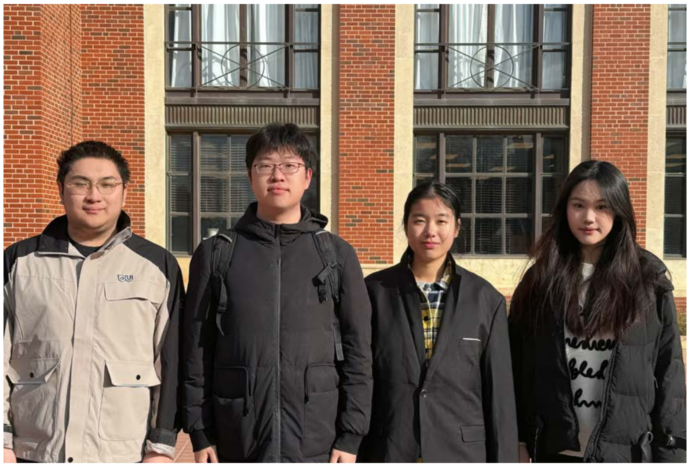
STUDENTS

Tianbo Wang, Xiaoyao Lu, Jackson Moats, Xinyi Wang

ADVISOR(S)

Dr. Chen Chen, Dr. Diana Rodriguez Coca

(Left to Right) Jiaxin Yin, Haolun Zhong, Jingbo Zhang, Zijian Yan



(Left to Right) Jingran Zhang, Junhao Zhong, Huiting Jiang, Zihan Liu

PROJECT TITLE

LIFE SAFETY ANALYSIS OF THE 2025 WANG FUK COURT FIRE

On November 26, 2025, a serious fire broke out in the Wang Fuk Court residential complex in Tai Po District, Hong Kong. This fire, which lasted around 43 hours and 27 minutes, resulted in 168 fatalities (including one firefighter) and 79 injuries. The incident highlighted significant challenges associated with occupant evacuation in densely populated residential buildings, especially high-rise buildings. Reports from the incident underscored concerns about alarm failure, stair availability and occupant movement speed under fire and smoke conditions. These challenges are particularly critical in buildings with a high proportion of elderly residents, who often experience reduced mobility, delayed alarm response and increased need for assistance during descent. Although performance-based egress analysis and elderly mobility have been widely studied, limited research has examined these interacting factors in a real-world scenario involving multiple evacuation constraints simultaneously. This gap highlights the importance of developing a scenario-based approach to evaluate how interacting evacuation factors influence the performance of elderly occupants under realistic high-rise fire conditions. In Wang Fuk Court, where older adults constitute approximately 36.6% of residents, evacuation delays can significantly reduce survivability, making the evaluation of Required Safe Egress Time essential for risk-informed fire safety design and emergency planning. In this project, a case-based, performance-oriented approach was adopted to evaluate RSET under a structured scenario matrix. Also, Pathfinder was used to simulate occupant evacuation performance within a simplified building geometry. The study systematically varied alarm and pre-movement delays, stair interface conditions (crowding and smoke-related speed reduction) and elderly mobility categories represented by different speed distributions. Smoke effects were represented using speed reduction factors, and congestion was modeled using density-speed relationships. Additionally, scenarios simulated a midday rest period with occupants initially located in bedrooms. The analysis is designed to evaluate how pre-movement delay, stair availability conditions and occupant mobility impact the total evacuation time. Furthermore, the findings are intended to support strategy-oriented recommendations to improve evacuation efficiency and enhance life safety for vulnerable populations in high-rise residential fires.

STUDENTS

Jiaxin Yin, Haolun Zhong, Jingbo Zhang, Zijian Yan

ADVISOR(S)

Dr. Bryan Hoskins, Dr. Muhammad Jujuly

PROJECT TITLE

SINGLE EXIT

U.S. building codes impose strict height limits on single-exit stairs, with NFPA 101 generally allowing up to four stories and the International Building Code limiting them to three. Housing advocates argue that these restrictions hinder multifamily housing development and that modest height increases could reduce housing costs and ease shortages affecting low-income populations. In contrast, fire service organizations—including NFPA, IAFF and IAFC—view single-exit stairs as a significant reduction in life-safety redundancy and emphasize preventing failures like the 2017 Grenfell Tower fire.

Against this backdrop, this study evaluates the feasibility of modifying U.S. height limits for single-exit stairs through a systematic literature review, regulatory analysis and international comparison. Safety data, accident reports, and codes from the U.S. and six other countries (the U.K., Canada, Australia, Japan, China and Brazil) are analyzed. The study examines key parameters such as height limits, unit counts, egress distances, fire separation and sprinkler requirements, tracing the evolution and safety rationale of U.S. provisions while comparing them with international practices. Based on this analysis, the study identifies critical safety factors and proposes a single-exit stair standard that balances economic benefits with acceptable life-safety performance.

STUDENTS

Jingran Zhang, Junhao Zhong, Huiting Jiang, Zihan Liu

ADVISOR(S)

Dr. Bryan Hoskins, Dr. Virginia Charter

(Left to Right, Front to Back) Keying Wang, Tong Yang, Xinrui Liu, Yu Ji, Kody Kroth, Jonathan Ma, Shiya Zhang, Martin Xia, Jake Spokely

PROJECT TITLE

STILLWATER WUI FIRE RISK ASSESSMENT

Wildland Urban Interface communities are facing increasing wildfire risk as development expands into fire-prone environments. This was seen in Stillwater, Oklahoma, during the 2025 wildfire that destroyed approximately 96 homes before it was contained. Currently, there is not a risk assessment method that is uniformly used in the fire protection industry to consistently assess WUI fire risk. To accurately assess WUI fire risk, the risk assessment tool needs to be both quantitative and qualitative, repeatable and sensitive to local conditions within the community that are being assessed. This project tests a structured risk assessment framework to compare wildfire risk among three selected Stillwater WUI communities. The assessment uses a hierarchical investigation map that was provided to our team by our advisors. This map organizes risk into leaf-level factors and aggregates them upward to a community-level score. The structured risk assessment is based on three main points for analysis: community protection, life safety and structural protection. These three focuses are products of the relationships between a vast amount of leaf factors, such as water source fire resilience and public water supply. Conducting field surveys is a crucial component for evaluating WUI fire risk and completing our statistical analysis, while also increasing our holistic understanding of WUI fire phenomena. All group members will conduct a physical survey of the three selected WUI communities in Stillwater to assess community conditions and assign performance values for each bottom-level attribute. Each leaf factor receives a performance value describing observed conditions in the community and a weighting factor describing relative importance. These performance value scores, along with the weighting factors per attribute, will provide a structure that will aid our team in conducting a statistical analysis of the results that were retrieved from the three WUI communities.
This study conducts a quantitative comparative analysis of wildfire risks across the three Stillwater WUI communities and provides practical references for the refinement of the definitions of risk impact factors, the scientific setting of their weightings and the standardized development of field assessment criteria. This thereby underpins more accurate community-level wildfire risk assessment work and offers a scientific foundation and practical support for formulating wildfire risk prevention, control and mitigation plans as well as enhancing the capacity of community fire prevention and disaster reduction in various regions. The study provides a clear and repeatable way to assess community-level wildfire risk. The results help identify key risk factors and support better wildfire prevention and mitigation planning at the community level.

STUDENTS

Keying Wang, Tong Yang, Xinrui Liu, Yu Ji, Kody Kroth, Jonathan Ma, Shiya Zhang, Martin Xia, Jake Spokely

ADVISOR(S)

Dr. Haejun Park, Dr. Diana Rodriguez Coca

(Left to Right) Ling Jiayun, Liu Peini, Ma Sara, Essa Asiri

PROJECT TITLE

WILDLAND FIRE SAFETY RESEARCH TEAM

Wildfires are becoming more frequent, increasing the risk of fire damage to buildings in the wildland-urban interface . The objective of this project is to examine the strengths, limitations and gaps of existing fire test methods, codes and standards for exterior building components and assemblies under realistic wildfire exposure conditions. The method includes systematic reviews, analysis and comparisons of real-world conditions with literature materials, such as American Society for Testing and Materials standards, California Building Code and International Organization for Standardization standards. The project is organized into three phases that examine wildfire exposure pathways and the performance of exterior building components. Phase 1 analyzed four wildfire exposure pathways: ember, direct flame, radiant heat and structure-to-structure fire spread. In Phase 1, existing test methods and codes were compared with real wildfire conditions. Finally, gaps were identified where current test methods failed to represent real wildfire conditions. These limitations included overlooked exposure conditions, insufficient wind effects and combined exposure scenarios such as ember and radiant heat acting simultaneously. Phase 2 focused on four building components: roof system, exterior wall system, projections and openings such as windows, doors and vents, to assess how current wildfire test methods align with real wildfire conditions. Phase 2 used the same method to identify gaps between the actual burning conditions experienced by these building components during wildfires and the test methods used to evaluate them, including discrepancies in heat flux levels, flame exposure duration and ember-accumulation scenarios. In addition, some components lacking corresponding testing methods were also identified. To connect the two phases, the four exposure pathways established in Phase 1 were applied to each building component identified in Phase 2. Phase 3 systematically combined the exposure pathways and building components to evaluate different wildfire scenarios. Finally, the analyses from the three phases were combined to produce a comprehensive gap analysis. The study found that current test methods do not fully represent key wildfire conditions, such as failing to capture realistic wind effects and varying heat flux levels. These results can be used to guide improvements in fire test methods and code requirements for exterior building components in the wildland-urban interface.

STUDENTS

Ling Jiayun, Liu Peini, Ma Sara, Essa Asiri

ADVISOR(S)

Dr. Muhammad Jujuly, Dr.Haejun Park, Dr. Ryan Shen

INTERDISCIPLINARY

ID

(Left to Right, Front to Back) Aiden Martin-Teakell, Aiden Fritts, Olivia McKeever, Luke Cooper, Wyatt Curry, Nick Taraszewski, Braxton Aylor, Landon Mitchel Weer, Zachary Eminger, Bruce Lamoreaux, Austin Ashley, Drew Shafer (Not Pictured) Memphis Keyes, Cooper Tuley

PROJECT TITLE

ADVANCED MANUFACTURING MICRO-TURBOJET DESIGN

Micro-turbojets are becoming increasingly important as unmanned aircraft systems demand grows, with the global micro-turbine market rising sharply due to the need for compact, high-thrust propulsion systems. However, current engines are difficult to service with large lead times for repair and are not designed for field-level maintenance. We have been tasked to design a 100 N thrust class micro-turbojet that may be manufactured rapidly, with readily available materials and a field-maintainable architecture.

DISCIPLINES

MET | AERO

STUDENTS

Aiden Martin-Teakell, Aiden Fritts, Olivia McKeever, Luke Cooper, Wyatt Curry, Nick Taraszewski, Braxton Aylor, Landon Mitchel Weer, Zachary Eminger, Bruce Lamoreaux, Austin Ashley, Drew Shafer, Memphis Keyes, Cooper Tuley

ADVISOR(S)

Dr. Kurt Rouser, Jared Henderson, Zach Wattenbarger

(Left to Right) Axel Espinosa, Tyler Lee, Brady McCutchen, Rigo Romero, Jake Pinell, Mishary Alfouzan

PROJECT TITLE

AI FOOSBOTS

The AI Foosbots project focuses on developing an intelligent foosball table that enables competitive gameplay between a human player and an automated robotic opponent. Building upon the groundwork established by previous teams, our objective is to advance the system into a fully functional and reliable platform. The project integrates mechanical design, sensing and artificial intelligence to detect ball movement and control the robotic rods in real time. Our primary goal is to create a foosball system that operates smoothly with minimal errors while delivering a responsive and engaging player-versus-robot experience.

DISCIPLINES

CS | ME | ECE

STUDENTS

Axel Espinosa, Tyler Lee, Brady McCutchen, Rigo Romero, Jake Pinell, Mishary Alfouzan

ADVISOR(S)

Dr. Joe Conner, Dr. Nate Lannan

LINK

(Left to Right, Front to Back) Zel Tan, Blake Miller, Wyatt Probst, William Freeman, Aydan Erwin, Emma Fulkerson, Jesse Dobelbower, Connor Hill

PROJECT TITLE

BIO-INSPIRED GUITARIST

Our project's end goal seeks to create a low-weight, low-cost, highly precise bionic prosthetic hand and forearm capable of playing a guitar. This semester, our team developed a prosthetic armature based on the design from the previous groups' work and introduced a neural network designed to train the hand to play the guitar.

DISCIPLINES

ECE | MAE | MERO | CS

STUDENTS

Zel Tan, Blake Miller, Wyatt Probst, William Freeman, Aydan Erwin, Emma Fulkerson, Jesse Dobelbower, Connor Hill

ADVISOR(S)

Dr. Joe Conner, Dr. Scott Mattison, Dr. Brian Norton, Dr. Yafeng Wang

LINK

(Left to Right) Colton Rhodes, Eastyn Becker, Tyler Ley, Brian Pinto, Jack Mitchell

PROJECT TITLE

CONCRETE COWBOYS

Our project focuses on developing a slipform concrete column fabrication system called "The Rocket." The goal of the project is to create a device capable of producing reinforced concrete columns without the need for traditional formwork. In typical construction, forms must be transported, assembled, filled with concrete and then removed once the material cures. This process requires significant labor, time and cost, and it can also introduce defects such as honeycombing that may not be visible until the forms are removed.

The Rocket is designed to act as a vertically moving slipform nozzle that shapes and consolidates concrete as it is lifted. By filling the nozzle with concrete and gradually raising it, the material can be consolidated and allowed to gain strength while forming the column. This approach has the potential to eliminate formwork entirely, reduce labor requirements and improve efficiency in column construction.

This semester, our team expanded on previous work by redesigning the system to produce larger columns measuring approximately 36 inches by 36 inches. We focused on improving the nozzle geometry, developing a reliable vibration system for proper consolidation and designing an alignment and lifting system that allows the nozzle to move vertically while maintaining the correct spacing around the reinforcement cage. Our work also included testing vibration propagation, evaluating reinforcement spacing and refining subsystem components such as the cleaver doors and gantry alignment system.

We are working on this project because improving efficiency in concrete construction has significant real-world impact. Large construction projects often require hundreds of columns, and reducing the time and cost associated with formwork could provide meaningful benefits to the industry. Additionally, the Rocket serves as a research platform that future teams can continue to improve as slipform concrete fabrication technologies develop.

DISCIPLINES

MAE | MET

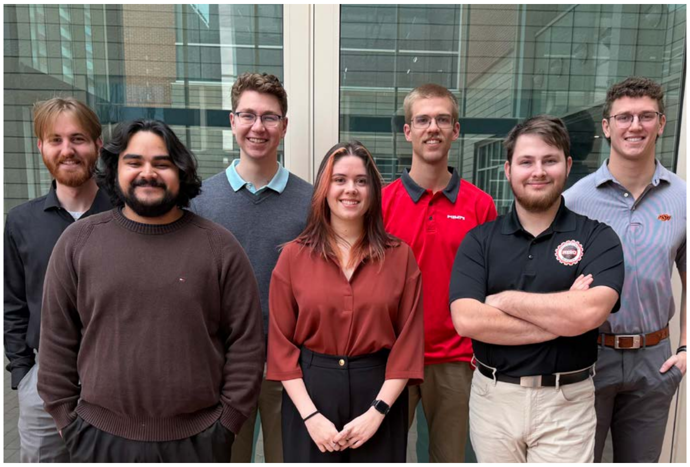
STUDENTS

Colton Rhodes, Eastyn Becker, Brian Pinto, Jack Mitchell

ADVISOR(S)

Dr. Tyler Ley

LINK



(Left to Right) Isaiah Hajabolhassan, Nathan Rago, Charles Bruce, Kierstyn Schroeder, Nathaniel Veld, Joshua Simmons, Preston Solomon

PROJECT TITLE

COPY N' CUT

Reproducing physical objects through CNC machining traditionally requires significant CAD expertise, manual toolpath programming and experienced calibration of machining parameters – creating a high barrier to entry and a time-intensive workflow. The Scan to Mill project aims to address these challenges by developing an integrated system that automates the full pipeline from physical object to finished milled part. The system uses acoustic-based 3D scanning to capture object geometry, processes the resulting point cloud into a usable mesh and automatically generates G-code toolpaths for a CNC mill. By combining embedded systems, computer vision and automated control, this project demonstrates a practical, low-cost approach to reverse engineering and part reproduction that lowers the skill barrier for complex manufacturing tasks.

DISCIPLINES

ECE | MAE | MET

STUDENTS

Isaiah Hajabolhassan, Nathan Rago, Charles Bruce, Kierstyn Schroeder, Nathaniel Veld, Joshua Simmons, Preston Solomon

ADVISOR(S)

Dr. Daqing (Daching) Piao

LINK

(Left to Right, Front to Back) Will Capron, Beau Newell, Jacob Pippin, Hope Hinshaw, David Barton, Danny Stearman, Sophie Hawkins, Luke Heimonen, Kaden Cook (Not Pictured) Julian Fields, Andres Benavides, Gabriel Reed

PROJECT TITLE

CYCLONE COWBOYS

The Cyclone Cowboys is an interdisciplinary team formed to compete at the Collegiate Wind Competition hosted by the U.S. Department of Energy. Our goals include designing and building a successful wind turbine per CWC regulations and creating a realistic and thorough site design proposal for the project development portion of the competition.

DISCIPLINES

ECE | MAE | MET

STUDENTS

Will Capron, Beau Newell, Jacob Pippin, Hope Hinshaw, David Barton, Danny Stearman, Sophie Hawkins, Luke Heimonen, Kaden Cook, Julian Fields, Andres Benavides, Gabriel Reed

ADVISOR(S)

Dr. Nate Lannan, Evan Burk, Adrian Toquothty

SPONSOR(S)

enel | HO | NEXTera ENERGY RESOURCES

LINK

(Left to Right) Carter Sanders, Moksh Mohan, Gabriel Noland

(Left to Right) Manuel Lopez, Jackson Adkins, Brady Harman, Brandon Bergman, Kade Fiegener, Kaitlin Jolliff

PROJECT TITLE

DESIGN OF A MODULAR ROTATING DETONATION ROCKET TEST STAND

This paper presents the design and implementation of a modular rotating detonation rocket engine test stand intended for experimental study of detonation combustion. The system was developed to enable flexible investigation of detonation behavior through interchangeable injector, chamber length and channel width configurations. The combustor consists of four primary components: an outer wall, inner wall, injector plate and propellant manifold, all manufactured from 316 stainless steel. A hydrogen-oxygen pre-detonator initiates the detonation wave within an annular chamber supplied with propane and oxygen propellants. Instrumentation integrates valve actuation, ionization sensing and high-speed data acquisition. Spark-plug ionization probes positioned around the annulus detect the passage of the detonation front, while a Teensy 4.1 microcontroller records time-resolved voltage spikes to determine wave velocity using time-of-arrival differences. The modular architecture reduces testing costs and allows for rapid iteration of combustion configurations. This platform enables experimental characterization of detonation wave stability, velocity and operational limits in rotating detonation combustors.

DISCIPLINES

MET | AERO

STUDENTS

Carter Sanders, Moksh Mohan, Gabriel Noland

ADVISOR(S)

Dr. Kurt Rouser

PROJECT TITLE

DESPOOL DYNAMICS

The goal of this project, completed on behalf of National Standard, is to provide an engineered solution that can eliminate safety hazards and reduce the manual labor required during manipulation. The existing machine must be hand-loaded causing back, shoulder and knee injuries. This project aims to replace the current loading process, improve the factors contributing to operator risk and define performance requirements for a safer and more efficient system. The objective is to establish a clear understanding of the operational challenges and safety concerns that will guide the development of an improved design.

DISCIPLINES

MAE | MET

STUDENTS

Kaitlin Jolliff, Manuel lopez, Brady Harman, Jackson Adkins, Kade Fiegener, Brandon Bergman

ADVISOR(S)

Dr. Joe Conner

SPONSOR(S)

NS NATIONAL STANDARD

LINK

[Left to Right] Trey Golden, Joseph Reed, Jason Todhunter, Matthew Hickerson, Charlie Poet, Zhongyao Jiang, Truckee Torres

[Left to Right, Front to Back] Benjamin Ashrafi, Logan Leding, Benjamin Mower, Joshua Wyckoff, Conlan Chesser, Mark Siguenza Cambi, Dylan Stone, Cassie Coffman, Madison Anderson, Kaylee Buchanan

PROJECT TITLE

DUST EXPLOSION CHAMBER PROJECT

Combustible dust is a serious industrial hazard created when materials such as metals, plastics, wood and lubricants are reduced to fine particles with high combustibility. These dusts can readily satisfy the conditions for a dust explosion—fuel, oxygen, ignition, dispersion and confinement—posing significant risks to worker safety. The danger is illustrated by the 2017 Didion Milling explosion, which killed five employees and injured 14 others. This project aims to demonstrate the explosibility of lubricant dust at a local industrial facility and the risk of secondary explosions caused by pressure-wave-induced dust dispersion. A dual-chamber apparatus will be constructed to generate a primary dust explosion, with the resulting pressure wave dispersing and igniting dust in a second chamber. The lubricant dust will be evaluated through physical and chemical analysis, controlled combustion testing and measurement of deflagration behavior using pressure sensors, thermocouples and high-speed video. Project outcomes include a visual training demonstration highlighting combustible dust hazards and the design of a robust dual-chamber explosion apparatus adaptable for industrial safety education and risk awareness.

DISCIPLINES

MAE | FPSET

STUDENTS

Trey Golden, Joseph Reed, Jason Todhunter, Matthew Hickerson, Charlie Poet, Zhongyao Jiang, Truckee Torres

ADVISOR(S)

Dr. Ryan Shen, Dr. Leslie Stockel

SPONSOR(S)

NS NATIONAL STANDARD

PROJECT TITLE

EYE IN THE SKY

Factories and industrial facilities often require inspections to identify gaps in energy efficiency. However, many inspection points are located in difficult-to-access areas such as rooftops, HVAC systems and large machinery. Reaching these locations frequently requires inspectors to use lifts, ladders or enter confined spaces, which introduces safety risks. Additionally, these inspections can disrupt normal operations by requiring equipment slowdowns or temporary shutdowns. Traditional data collection methods also present challenges with consistency, as photographs and measurements may not always be properly documented or georeferenced, making long-term tracking and analysis difficult.

To address these challenges, our team is developing an aerial inspection platform in the form of a hexacopter drone. This platform is designed to collect multiple data sources needed for energy gap analysis, including thermal imaging, 360-degree visual capture and 3D LiDAR mapping. The system is being developed from the ground up and incorporates integrated GPS, onboard power monitoring and multiple communication interfaces for reliable operation.

The goal of this project is to produce a lightweight drone system weighing under 3 kg that is capable of maintaining a hover time of approximately 30 minutes while carrying the required sensing payload. Ultimately, this platform aims to provide a safe, efficient and reliable solution for conducting energy efficiency inspections in industrial environments, with the capability to operate both autonomously and under direct operator control.

DISCIPLINES

MERO | ME | CS | EE | ECE

STUDENTS

Benjamin Ashrafi, Logan Leding, Benjamin Mower, Joshua Wyckoff, Conlan Chesser, Mark Siguenza Cambi, Dylan Stone, Cassie Coffman, Madison Anderson, Kaylee Buchanan

ADVISOR(S)

Dr. Atanu Halder, Dr. Shahriaar Shahabuddin, Dr. Hitesh Vora, Dr. Yafeng Wang

LINK

[Left to Right, Front to Back] Sam Green, Griffin Plank, Craig Bourlon, Josh Wilson, Rider Rodriguez, Drew Taylor, Kaleb Barnes, Justin Bachert, Barrett Schneider, Audrey Rasmussen, Orin Phillips, Hamad Albaloul

[Left to Right] Tyler Clayton, Jacob Hood, Sean Anderson, Noah Dyer, Alex Seda, Alex Malakar, Alexander Turner Camacho

PROJECT TITLE

LITTER GITTERS

We are working on building a boat that can identify and collect trash on a lake and automatically return home to dump what was collected. This semester, we have focused on camera recognition and the trash removing routine.

DISCIPLINES

EET | MAE | ECE | MET

STUDENTS

Sam Green, Griffin Plank, Craig Bourlon, Josh Wilson, Rider Rodriguez, Drew Taylor, Kaleb Barnes, Justin Bachert, Barrett Schneider, Audrey Rasmussen, Orin Phillips, Hamad Albaloul

ADVISOR(S)

Dr. Jdiobe Muwanika

SPONSOR(S)

BOB MOORE®

LINK

PROJECT TITLE

OKSAT - OKLAHOMA CUBESAT INITIATIVE

The Oklahoma CubeSat Initiative (OKSat) is a student-led effort to design, develop and deploy a 3U CubeSat capable of collecting experimental data on small-debris flux in low-Earth orbit. The project spans multiple disciplines of engineering, including orbit analysis, ADS design, power systems, wireless communications and operating system design/embedded programming. Our primary objective is to help validate existing NASA models that describe the distribution of small orbital debris, with the aim of improving future launch confidence.

DISCIPLINES

ECE | MAE | CS

STUDENTS

Tyler Clayton, Jacob Hood, Sean Anderson, Noah Dyer, Alex Seda, Alex Malakar, Alexander Turner Camacho

ADVISOR(S)

Dr. Imraan Faruque, Dr. John O'Hara

LINK

(Left to Right) Toby Richards, Jacob McCoy, Zach Fees, Izmir John, Saah Sicarr, Dae Stuber

(Left to Right) Trent Thomas, Caleb Arthaud, Wyatt Showalter, Aaron Maloney, Kade Moorman, Quetz Lu

PROJECT TITLE

ORANGE CREST ENERGY

There is an urgent need to transition toward renewable energy sources to support a growing population and escalating energy consumption. Hydrogen is a leading clean energy candidate because it offers high energy density and produces only water as a by-product. Current hydrogen generation methods remain heavily reliant on carbon-based fossil fuel processes.

The Solution: Ocean waves offer a constant, predictable and highly promising supply of renewable mechanical power. Harnessing this wave energy and converting it into electricity can power electrolysis, resulting in a completely carbon-neutral system for producing green hydrogen.

The Project Scope: The primary objective is to evaluate the energy conversion efficiency of a sponsor-provided “Alpha” wave energy converter. The project utilizes a controlled, land-based simulation approach rather than deploying the system in a live marine environment. A custom mechanical platform uses dual vertical linear actuators to physically simulate the dynamic, low-frequency oscillatory motions characteristic of ocean waves. A specialized Data Acquisition system continuously monitors the mechanical input power from the actuators against the electrical output power produced by the generator. By actively tracking this input-versus-output relationship, the system will establish a performance baseline to optimize the generator’s viability for sustainable, wave-powered hydrogen generation.

DISCIPLINES

ECE | MAE

STUDENTS

Toby Richards, Jacob McCoy, Zach Fees, Izmir John, Saah Sicarr, Dae Stuber

ADVISOR(S)

Dr. Joe Conner, Dr. Mike Gard, Dr. Nate Lannan

LINK

PROJECT TITLE

ORBITAL OUTFITTERS

We were tasked with designing and fabricating a mobile rocket launch trailer for the rocketry team. This will help limit the amount of site setup and setup time that it currently takes the rocketry team to launch.

DISCIPLINES

MAE | MET

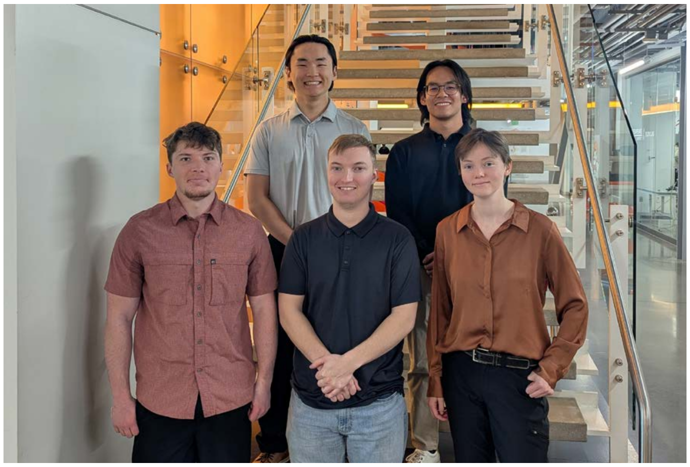
STUDENTS

Trent Thomas, Caleb Arthaud, Wyatt Showalter, Aaron Maloney, Kade Moorman, Quetz Lujan

ADVISOR(S)

Ray Lucas

LINK



(Left to Right) Timothy Steinke, Quinton Hannemann, Logan Young, Vincent Le, Bailey Chave

PROJECT TITLE

ORIGAMI SOFT ROBOTS TEAM - CREASE CONTROL

The field of soft robotics is a new and quickly expanding discipline. There are many types of soft robots, with applications in many situations in which a rigid-body robot would function poorly, such as on rough terrain, in healthcare or in the body, and in natural environments.

This semester, our team is tasked with a similar goal: to create a robot which uses a soft type of actuator called a dielectric elastomer actuator. DEAs are flexible surfaces that attach to creases in the robot's body and expand when powered to create motion. These actuators are very new and haven't yet been used in many applications. The intended goal is to travel 50cm in a line using these DEAs as our force of motion.

DISCIPLINES

ECE | MAE

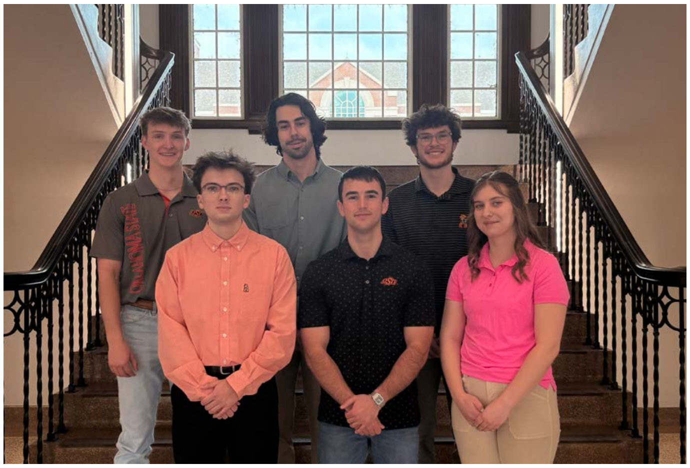
STUDENTS

Timothy Steinke, Quinton Hannemann, Logan Young, Vincent Le, Bailey Chave

ADVISOR(S)

Dr. Aurelie Azoug

LINK



(Left to Right, Front to Back) Caden Lasyone, Ian Martin, McKenzie Keedy, Iain Sharp, Ethan Graffagnino, Spencer Epperly

PROJECT TITLE

OSU CENTAURS

The CENTAURS UAV was originally designed as a general-purpose unmanned aerial vehicle that allows for modular modifications for various missions, including agricultural monitoring and security applications. The airframe was 3D-printed in multiple sections with removable panels for accessibility. The team designed the propellers, and the motor was a slotted through-hole brushless DC design.

The new project focuses on redesigning the airframe for easier manufacturability while maintaining or improving performance metrics such as lift, efficiency and weight. The UAV's structural and thermal design is also optimized to meet mass-manufacturing requirements and ensure cost-effectiveness. Design constraints include weight, budget, in-house fabrication capabilities and power output limitations.

DISCIPLINES

MAE| MET | ME

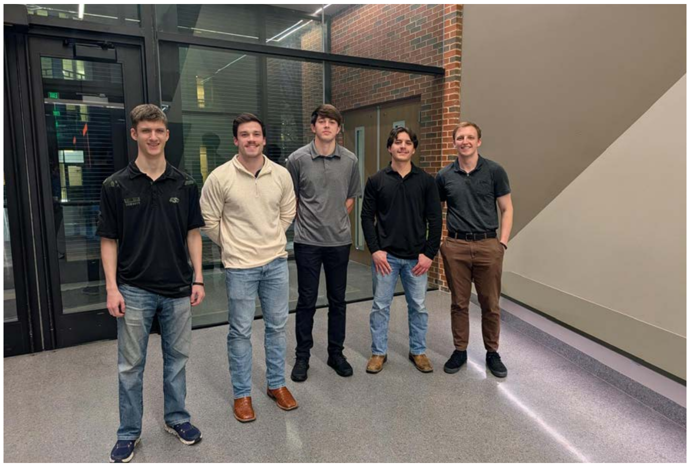
STUDENTS

Caden Lasyone, Ian Martin, McKenzie Keedy, Iain Sharp, Ethan Graffagnino, Spencer Epperly

ADVISOR(S)

Dr. Imraan Faruque

LINK



(Left to Right) Bruce Smith, Mason Snyder, Ian Craft, Tony Baldeon, Michael Bunch

PROJECT TITLE

REARGEAR IN A CHAIR

REARGEAR in a Chair is a rehabilitation and strength-training device designed to improve lower-body muscular strength through controlled sit-to-stand contrast training. Contrast training involves applying greater resistance during the eccentric phase of movement (sitting down) than during the concentric phase (standing up), which has been shown to significantly enhance strength and muscle development. Currently, no rehabilitation devices on the market provide both assistive and resistive forces for the sit-to-stand motion in a single system.

The goal of this project is to design and build a pneumatic-powered system capable of delivering up to 200 pounds of adjustable force to assist or resist the user during sit-to-stand exercises. The system integrates a dual 2:1 cable-pulley configuration, pneumatic pistons, electronic controls and a height-adjustable chair to accommodate users of different sizes while maintaining ADA accessibility. Engineering principles, including statics, fluid dynamics, mechanical advantage and control systems, were applied to ensure safe and reliable operation.

REARGEAR in a Chair is intended for use in rehabilitation and physical therapy settings to help individuals with motor deficits develop greater lower-body strength and improved control during everyday movements. By enabling adjustable assistance and resistance within the same device, the system offers a versatile training tool that can support both rehabilitation and performance training applications.

DISCIPLINES

MET | MAE

STUDENTS

Bruce Smith, Mason Snyder, Ian Craft, Tony Baldeon, Michael Bunch

ADVISOR(S)

Dr. Singh Harshvardhan, Dr. Jerome Hausselle, Dr. Jason Miller

LINK

(Left to Right) Jackson Moss, Ethan Clark, Alexander Bennett, Daniel Toll, Lucas de La Sayette

PROJECT TITLE

ROCKET ASSISTED TAKE OFF LAUNCH KIT

This project involves the design, analysis and testing of a portable rocket-assisted launch system for small, high-speed unmanned aircraft. The system is intended to meet demand for a lightweight, low-cost solution that enables aircraft to take off without the need for a runway, making it suitable for operation in varied and constrained environments.

DISCIPLINES

MET | AERO

STUDENTS

Jackson Moss, Ethan Clark, Alexander Bennett, Daniel Toll, Lucas de La Sayette

ADVISOR(S)

Dr. Kurt Rouser

(Left to Right) Maikol Escudero, Avery Nield, Cecil Henderson, Daniel White

PROJECT TITLE

SMART THREAD

The Smart Thread project addresses a critical gap in advanced textile research: the absence of a reliable, small-scale method for producing continuous thin-diameter fibers from high-performance polymers such as polyether block amide (PEBA) and thermoplastic polyurethane (TPU). These materials have significant potential in smart fabrics and athletic performance textiles – PEBA offers exceptional energy return properties that make it highly desirable for next-generation footwear and apparel applications. However, researchers at OSU's Human Performance and Merchandising departments currently lack the means of producing the fine, continuous fiber required to knit and evaluate these materials at a research scale. To solve this, the Smart Thread team is designing and building a custom polymer fiber extrusion and spooling system capable of taking commercially available 1.75 mm PEBA filament as input and producing a continuous fiber of approximately 100 micrometers in diameter – fine enough to be compatible with standard knitting machinery. The system integrates a direct-drive hot end for precise melt extrusion, a camera-based sag detection system for closed-loop winding speed control and an automated traverse spooling mechanism to produce uniform, knitting-ready fiber spools. The team will also characterize the mechanical properties of the produced fiber and document all processing parameters in standard operating procedures, giving the client a repeatable and well-understood production process they can continue to use and build upon after the project concludes.

DISCIPLINES

MAE | ECE

STUDENTS

Maikol Escudero, Avery Nield, Cecil Henderson, Daniel White

ADVISOR(S)

Dr. Jerome Hausselle

LINK

(Left to Right, Back to Front) Kahleen Dabbs, Alex Carter, Brenden Hardy, Dr. Streker, Danny Johnson, Skylar Araujo, Dr. Connor

PROJECT TITLE

SPACE COWBOYS

Our team is tasked with designing, manufacturing and programming a robot to compete and represent OSU in the annual IEEE Region 5 Conference. The robot must be designed to effectively and strategically collect points to advance in the competition.

DISCIPLINES

MAE | ECE

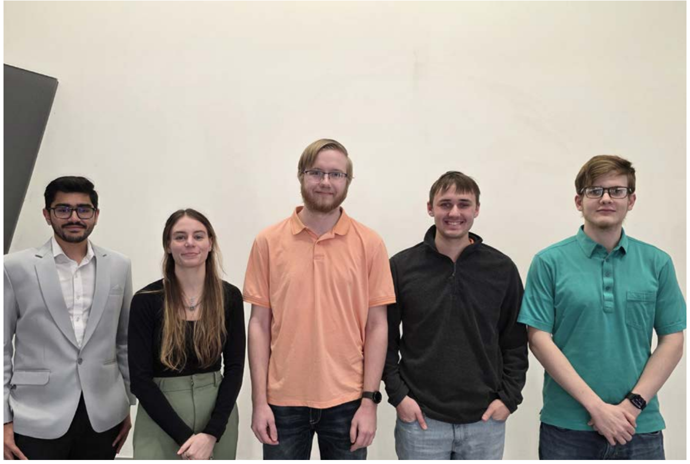
STUDENTS

Kahleen Dabbs, Brenden Hardy, Alex Carter, Danny Johnson, Skylar Araujo

ADVISOR(S)

Dr. Joe Conner, Dr. Karl Strecker

LINK



(Left to Right) Harshil Mistry, Brianna Kindley, Christian Landrum, Sam Shankle, Brandon Isaac

PROJECT TITLE

STARFORCE

This project aims to design a small, low-cost control loading system used for fixed-wing flight that provides realistic force feedback during on-ground training in addition to a two-axis CLS that provides pitch and roll force feedback. The CLS should emulate control-force characteristics for different classes of aircraft, including force-deflection plots to perform static control tests. We are working on this project to provide an optimal cost effective, solution that can be reproduced and available to a more diverse group of pilots in training.

DISCIPLINES

MAE | ECE

STUDENTS

Brianna Kindley, Harshill Mistry, Christian Landrum, Brandon Issac, Sam Shankle

ADVISOR(S)

Dr. Tim Brown, Dr. Joe Conner

SPONSOR(S)

CymSTAR

LINK

(Left to Right) Cameron Hostetler, Sam Houck. Noah Lawyer, Brayde Mennem, Jake Young

PROJECT TITLE

SUBSCALE AG DRONE FOR SPRAY APPLICATIONS

Farmers in rural Oklahoma often apply herbicides directly, which exposes them to spray and fine droplets that can drift in windy conditions. In a preliminary OSU survey of 16 Oklahoma farmers and ranchers, 100% said they would consider using a drone if it reduced chemical exposure, and about 75% cited cost or reliability as the main barriers. A low-cost, Oklahoma-built spraying drone that removes the farmer from the spray cloud and is designed to be built or serviced in the community can address both the health risk and economic gap.

This project challenges students to develop a subscale spray ag drone, including the drone itself (electronics, propulsion, and structure) and the spraying mechanism (tank, spray hoses, and spray nozzles). The drone should carry a one-gallon spray container and be electrically powered with a minimum flight time of 15 minutes. The drone flight control system and mission design are not directly within the scope of the project—the core focus is on the design of the drone itself. By the end of the semester, students should aim to have a prototype ready to flight test, and tests should demonstrate successful spray of water in flight. The spray need not be automated—a pilot should be able to engage and disengage the spray remotely. The drone should minimize metal and carbon fiber components—instead opting for additive manufactured (3D-printed) components wherever possible.

DISCIPLINES

MAE | AERO

STUDENTS

Cameron Hostetler, Sam Houck. Noah Lawyer, Brayde Mennem, Jake Young

ADVISOR(S)

Dr. Anthony Comer, Prof. Laura Southard

(Left to Right) Ryan Wally, Ethan Willis, Charlie Olsen, Jillian Jones, Carlee Fugate, Carter Fuser

PROJECT TITLE

UNMANNED REMOTE ENERGY ASSESSMENT

Our project is to create a device to aid in energy audits and assessments. Our device is a kit that attaches to different robotic platforms to allow for flexibility, availability and cost efficiency. Our kit contains a Lidar sensor, a thermal sensor, a 360-degree camera and its own onboard computer and power source. This kit will provide a safe option to reduce time, money and manpower dedicated to energy audits.

DISCIPLINES

MMME | MAE

STUDENTS

Ryan Wally, Ethan Willis, Charlie Olsen, Jillian Jones, Carlee Fugate, Carter Fuser

ADVISOR(S)

Dr. Hitesh Vora

SPONSOR(S)

Industrial Training and Assessment Centers
U.S. DEPARTMENT OF ENERGY

(Left to Right, Front to Back) Ethan Mote, Zach Covington, Jordan Wegele, Malcolm Keenan, Kaeleb Lund, Johnathon Westhusing, Nick Napoliello, Garret Johnson, Ian Walsh, Austin Thurman, Cole Happ

PROJECT TITLE

UNSPRUNG AERO - CURRENT RACING

Formula SAE challenges students to conceive, design, fabricate and compete with small formula-style racing cars. Teams spend 8-12 months designing, building and preparing their vehicles for a competition. These cars are judged in a series of static and dynamic events, including technical inspection, cost, presentation, engineering design, solo performance trials and high-performance endurance. Current Racing, OSU's Electric Formula SAE team, has an existing suspension setup that is outdated and restricted to an internal-combustion car frame from an old ruleset. The aero package is subject to limitations under heave and roll scenarios that limit its ability to produce downforce.

The goal of this semester's project is to design, validate and build a modern suspension system that is lighter than the existing system and is designed around the average weight of a competitive EV FSAE car. This system will be integrated with an un-sprung aero system that is lighter than the current system and overcomes the limitations of a traditional aero package. The WindShape facility in Tulsa will be used to validate the CFD and kinematic simulations. Additionally, this system will ideally set the competition team up for a top-20 finish.

DISCIPLINES

MET | MAE

STUDENTS

Ethan Mote, Zach Covington, Jordan Wegele, Malcolm Keenan, Kaeleb Lund, Johnathon Westhusing, Nick Napoliello, Garret Johnson, Ian Walsh, Austin Thurman, Cole Happ

ADVISOR(S)

Ray Lucas

LINK

INDUSTRIAL ENGINEERING & MANAGEMENT

IEM

(Left to Right) Samantha Antaya, Abdullah Alkandari, Jonathan Blatt, Noah Ropp

PROJECT TITLE

BOKF CAPSTONE TEAM

This project focuses on analyzing and improving drive-thru operations at BOK Financial branches. Many branches currently use different drive-thru lane configurations, and decisions about the number of lanes or layout are often based on past experience rather than standardized performance analysis. The goal of this project is to evaluate current drive-thru performance using key performance indicators such as wait times, queue length and lane utilization.

By analyzing operational data and studying traffic flow patterns, the project aims to identify opportunities to improve efficiency and customer experience. The team will develop recommendations and decision-support guidelines that BOK Financial can use when planning new branches or remodeling existing locations. These recommendations will help the company make more consistent, data-driven decisions about drive-thru capacity and configuration while improving service efficiency.

STUDENTS

Samantha Antaya, Abdullah Alkandari, Jonathan Blatt, Noah Ropp

ADVISOR(S)

Dr. Manjunath Kamath

SPONSOR(S)

BOK FINANCIAL

(Left to Right) Brett Hall, Kylie Chutek, Abbey MacDougall

PROJECT TITLE

EVALUATING DISTRIBUTION NETWORK REDESIGN OPTIONS FOR LOVE'S

The overall objective of this project is to reduce Love's inventory holding costs by investigating if a percentage of the slower-moving SKUs should be strategically consolidated at regional DCs (located at selected stores within its current distribution network), rather than stocked at each store. It is important to maintain Love's 95% in-stock service level and ensure product availability while exploring opportunities to reduce excessive inventory levels. The analysis will utilize data-driven assessment of SKU demand patterns and usage rates to come to informed decisions regarding the locations and quantities of SKUs in the network. The scope of this project is focused on optimizing the inventory levels of the slow-moving SKUs at the regional DCs, supplied by the regional DC located in El Reno, Oklahoma, to ensure feasibility for thorough completion of the project within the semester timeframe. This scope outline aims to generate more comprehensive and detailed results that can later be scaled and applied across other Love's distribution centers in the network. We also intend to look at only the most impactful SKUs, rather than all. The project aims to deliver practical distribution network recommendations that support Love's operational and performance goals. We are working on this project because we all have a shared interest in supply chain and optimization.

STUDENTS

Brett Hall, Kylie Chutek, Abbey MacDougall

ADVISOR(S)

Dr. Tieming Liu, Nick Halpern

SPONSOR(S)

Love's

(Left to Right) Connor Meissner, Landri Moydell, Jenny Schmidt, Mohammad Aldossary

(Left to Right) Kaegan Reynolds, Will Clements, Jake Tarrant, Zack Dankenbring

PROJECT TITLE

HUMAN FACTORS ENGINEERING ANALYSIS OF SPANISH COVE'S INDEPENDENT LIVING NEEDS

Increased life expectancy in the United State has led to an influx of retirement aged individuals. This presents a new challenge to retirement communities: how can senior communities accommodate the needs of residents when the population growth has outpaced the infrastructure growth? Spanish Cove Retirement Village is a continuing care retirement community in Yukon, Oklahoma, that is taking proactive measures to ensure their system continues to provide quality services to residents despite mounting demand.

The objective of this project was to apply human factors engineering and systems thinking approaches to residential living in Spanish Cove's retirement community setting. Progress towards this objective was made through two aims: identifying factors impacting quality of life and identifying factors impacting independence longevity. The overall goal was to provide a data-driven analysis that identifies the areas of highest impact to independence longevity and quality of life to better inform decision making at Spanish Cove.

STUDENTS

Connor Meissner, Landri Moydell, Jenny Schmidt, Mohammad Aldossary

ADVISOR(S)

Dr. Katie Jurewicz, Dallas Rehberg

SPONSOR(S)

Spanish Cove Retirement Village

PROJECT TITLE

IMPROVING INVENTORY ACCURACY FOR T.D. WILLIAMSON

This project addresses the inventory system inaccuracies at T.D. Williamson's Tulsa facility. Specifically, the team will look at their raw material plates that are used to manufacture one of their more important products, STOPPLE Fittings. Over the past few years, the company has experienced miscommunication between their departments involving their inventory levels and inventory locations for these plates. This results in production delays, stockouts and costly write-offs. The miscommunication involving T.D. Williamson's inventory stems from inconsistent material handling practices, disorganized outdoor storage allocation and a lack of standardized and documented operating procedures.

After identifying and validating the root causes of this problem and developing solutions, the proposed benefits include improved inventory process and traceability of inventory, enhanced labor efficiency, lower write-off and expedited shipping costs, and increased compliance with quality management standards. Ultimately, the project aims to create a sustainable system that improves operational reliability and reduces production delays.

STUDENTS

Kaegan Reynolds, Will Clements, Jake Tarrant, Zack Dankenbring

ADVISOR(S)

Dr. Austin Buchanan

SPONSOR(S)

TDW T.D. Williamson

(Left to Right) Erin Lowe, Adam Hartman, Felipe Castro, Sam Boozer

(Left to Right) Mohammed AlAbandi, Byron Knight, Nate Peak

PROJECT TITLE

PREDICTIVE MODELING FOR SCRAP FORECASTING AT TEXTRON AVIATION

This project partners with Textron Aviation to address rising scrap quantity and scrap-related costs at an aircraft assembly facility in Independence, Kansas. The team is developing a predictive analytics tool that uses historical production and scrap data to identify where scrap is most likely to occur before it happens. The project aims to shift scrap management from a reactive process based on past reports to a proactive strategy that highlights higher-risk departments, work centers and production conditions. The final deliverable will support decision-making through a dashboard that helps Textron prioritize scrap investigation and improvement efforts.

STUDENTS

Erin Lowe, Adam Hartman, Felipe Castro, Sam Boozer

ADVISOR(S)

Allen Glenn

SPONSOR(S)

Cessna Beechcraft BY TEXTRON AVIATION

PROJECT TITLE

WORKLOAD PLANNING ANALYTICS FOR CORRECTIVE MAINTENANCE FOR FEDERAL AVIATION ADMINISTRATION

The Federal Aviation Administration maintains and operates a large network of equipment that supports aviation safety and airport operations across the United States. Because equipment failures occur unpredictably, corrective maintenance is difficult to plan and can lead to challenges in assigning the appropriate number of technicians to maintenance tasks. This senior design project focuses on analyzing historical corrective maintenance data to better understand maintenance workload and support workforce planning. The objective of the project is to develop a structured framework that can estimate corrective maintenance demand and translate that demand into technician staffing needs, helping the FAA make more informed scheduling and staffing decisions.

STUDENTS

Mohammed AlAbandi, Byron Knight, Nate Peak

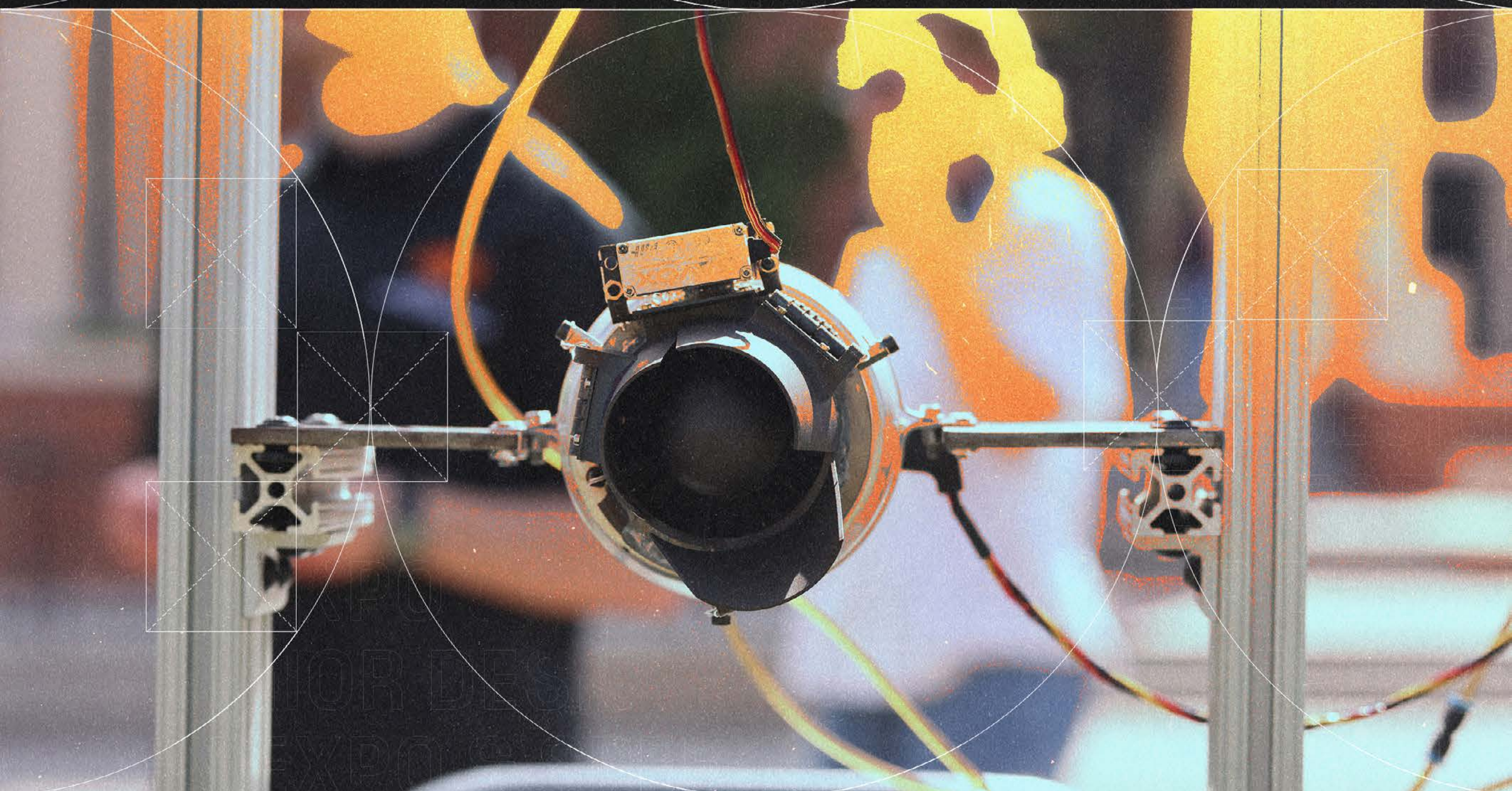
ADVISOR(S)

Dr. Chenang Liu, Kaci Miller

SPONSOR(S)

FEDERAL AVIATION ADMINISTRATION

MECHANICAL & AEROSPACE ENGINEERING



MAE

(Left to Right) Zach Morgan, Ivana Mora, Emma Saxe, Justin Boyd

PROJECT TITLE

ARCRIDERS - ARCOSA LINE FOLLOWING

We are developing a proof-of-concept system to automate the side-to-side motion of the remotely operated weld heads used by Arcosa Wind Towers in the company's submerged arc welding process. Currently, this process is controlled manually by an operator viewing the weld through a camera. Our system includes an edge-following system to apply a mark onto the metal plate at a constant offset from its edge and a line-following system to keep the weld head aligned with this mark, thus keeping the weld seam at the plate's edge while welding.

STUDENTS

Zach Morgan, Ivana Mora, Emma Saxe, Justin Boyd

ADVISOR(S)

Dr. Joe Conner, Truman Giesen, Charley Walton

SPONSOR(S)

ARCOSA

LINK

(Left to Right) Bishop Proctor, Gavin Peery, Matt McAdams, Josh Collier, Brice Pfrehm

PROJECT TITLE

ASHRAE DESIGN

This project presents a comprehensive cooling and heating load analysis developed for the 2026 ASHRAE HVAC Design Competition Load Calculation category. The objective of the project was to determine accurate building thermal loads that support efficient HVAC system design while maintaining occupant comfort and meeting applicable industry standards, ASHRAE 55, ASHRAE 62.1, ASHRAE 90.1 and many others. In addition to the ASHRAE competition, the team had the opportunity to work on a ground source heat pump to show the methods used on real equipment.

STUDENTS

Bishop Proctor, Gavin Peery, Matt McAdams, Josh Collier, Brice Pfrehm

ADVISOR(S)

Dr. Dan Fisher

SPONSOR(S)

FEDERAL AVIATION ADMINISTRATION

LINK

[Left to Right] Simon Eddins, Mike Booker, Hannelore Copland, Maile DiPaula

PROJECT TITLE

DROPLET SIZE DETECTOR

We have been given the opportunity to test and prove the concept and ability to create a small-scale droplet size detector. This type of equipment already exists, but is very expensive and is required to be attached to a manned aircraft or to a sturdy stationary object. Our goal is to be able to recreate the same kind of sensor on a smaller scale for eventual use on unmanned aerial systems.

STUDENTS

Simon Eddins, Mike Booker, Hannelore Copland, Maile DiPaula

ADVISOR(S)

Dr. Alyssa Avery, Dr. Brian Elbing

LINK

[Left to Right] Jacob Bearer, Hunter Morris, Carlos Reyes, Charlie Cutts

PROJECT TITLE

HOME FOR THE MECHANICALLY INSANE-CVD ENGINE

The continuously variable displacement engine is a revolutionary engine concept conceived by Dr. Robert A. Knezek and Mike Pastusek of Ameriband LLC. This engine features continuously variable displacement at constant compression, promising a massive leap forward in gasoline engine efficiency. Our goal this semester was to improve the reliability of the valvetrain and implement hydraulic variable valve timing to bring the prototype closer to being production-ready. This was accomplished by re-engineering the valvetrain gear system to implement stabilizing bearings, switching from flat tappet to roller lifters and designing a piston-based VVT actuator that operates on engine oil pressure. These changes aim to create a more reliable and adaptable prototype that future semesters can build upon to finalize the engine's design and advance the concept toward a production-ready engine.

STUDENTS

Jacob Bearer, Hunter Morris, Carlos Reyes, Charlie Cutts

ADVISOR(S)

Ray Lucas

SPONSOR(S)

AmeriBand LLC

LINK

(Left to Right) Gavin Smith, Baxter Cornelius, Jackson Benton, Dr. Paul Elliot, Trent Upshaw, Paxton Bradford, Gavin Stearman, Wyatt Voth, Ilya Dzialendzik, Kinslee Harper, Avery Cherrington, Katie Wavering, (Not Pictured) Samuel Hiltz

PROJECT TITLE

ICARUS, COWBOY SPACE PROGRAM

Icarus is the Cowboy Space Program's half scale rocket, designed as a stepping stone towards a full 100km launch to space. Icarus will fly to 50 km (180k ft) and reach Mach 4.4, testing the airframe design, avionics and in-house manufactured motors to ensure they are ready for the full-scale flight. Cowboy Space Program's goal is to make OSU the first state school in space, and the first university to be GPS verified in space.

STUDENTS

Gavin Smith, Baxter Cornelius, Jackson Benton, Dr. Paul Elliot, Trent Upshaw, Paxton Bradford, Gavin Stearman, Wyatt Voth, Ilya Dzialendzik, Kinslee Harper, Avery Cherrington, Katie Wavering, Samuel Hiltz

ADVISOR(S)

Dr. Paul Elliot, Ray Lucas, Will Fehring (Mentor)

(Left to Right) Riley Hix, Stephen Whiting, David Hull, Davis Needham, Logan Raymer

PROJECT TITLE

OSU VALVES

The primary objective of this project is to test whether ensemble control can reduce the number of required actuators while still providing valid flow distribution and load matching. Ensemble control uses the pressure-flow characteristics of passive valves arranged in parallel branches to redistribute flow without relying on multiple feedback-controlled devices. In the proposed system, a single conventional proportional control valve regulates the overall system flow and pressure difference across the valves. Flow distribution between zones is achieved using a combination of positive and negatively passively acting valves – one valve whose flow coefficient increases with pressure drop and another whose flow coefficient decreases with pressure drop. This behavior allows the system to shift flow between hydronic circuits as system pressure changes. This reduces the complexity, cost and overall maintenance seen in conventional HVAC systems today.

STUDENTS

Riley Hix, Stephen Whiting, David Hull, Davis Needham, Logan Raymer

ADVISOR(S)

Dr. Christian Bach, Dr. Haotian Lui

SPONSOR(S)

ASHRAE

LINK

[Left to Right] Chase Allensworth, Libbi Thompson, Carter Whitfield, Sydney Davis, Ryan Richards, Molly Dolan, Daniel Gassen

PROJECT TITLE

PHASM DOLPHIN DRONE

OAIRE, Dolphin Quest, Stephen F. Austin State University

Anthropogenic stressors on marine fauna are increasing, and there is not a method to measure how marine mammals respond to these stressors. To solve this, a noninvasive collection device that collects mucus from the dolphin's chuff has been developed. The mucus sample must be viable for the health assessment to be done, as well as adequate size with minimal contamination.

STUDENTS

Chase Allensworth, Libbi Thompson, Carter Whitfield, Sydney Davis, Ryan Richards, Molly Dolan, Daniel Gassen

ADVISOR(S)

Dr. Jamey Jacob, Daniel Gassen

[Left to Right] Samuel Kasuni, Jamin Kreighbaum

PROJECT TITLE

SALINE SOLUTION

We are designing a steam ejector for a water desalination system. Our ejector will replace the turbine and compressor in a mechanical vapor compression system, making it a thermal (and completely solar-powered) vapor compression system.

STUDENTS

Samuel Kasuni, Jamin Kreighbaum

ADVISOR(S)

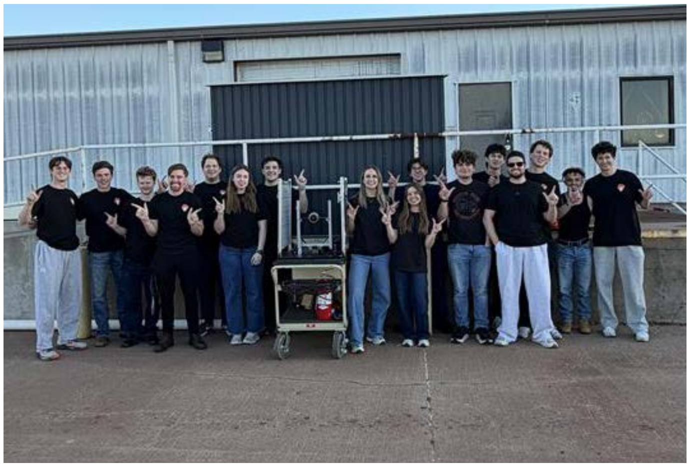
Dr. Khaled Sallam, Lihui Cai, Steven Wilson

SPONSOR(S)

Nitro-Lift Technologies LLC

COMPETITION TEAMS

COMP



(Left to Right) Evan Bohannon, Jacob Thomas, Robert Wood, Nolan Jones, Luke Sims, Jenna Jones, Henry Haslam, Kaitlyn Brafford,Jaycie Jester, Sam Morris, Paul Aldridge, Liam Schupbach, Jay Gunn, Slade Spears, Kaden Thompson, Brody Richardson (Not Pictured) Armaan Madahar, Camden Macdonald

PROJECT TITLE

PISTOL PETE'S PROPULSION POSSE - BLACK TEAM

This paper presents an evaluation in which micro-turbojets can be modified and used for integrated thermal system purposes. A concentric tubing configuration was selected due to its high heat transfer capability. This concentric tubing design allows the core flow to extract bleed air and not be reintroduced. An analysis was performed that estimated pressure loss, heat transfer rates and overall system efficiency at 80 percent turbine speed. From this analysis, it was determined that a concentric tubing configuration surrounding the combustor section provides the most effective balance between heat transfer performance while maintaining a reasonable radial distance. The final design consists of concentric tubing wrapped around a hollow outer casing that routes bleed air through an inner tube and external shop air through an outer tube, allowing heat transfer from both the casing and bleed flow. A half-circle tube with a radius of 0.4 inches is used to increase surface contact with the engine casing and enhance thermal conduction through the Aluminum 6061 casing. The final design will satisfy a growing market demand for thermal management systems utilizing micro-turbojets as UAS platforms continue to grow in usage. The results of this study demonstrate that a conformal concentric tube heat exchanger can effectively provide the required thermal output while maintaining engine performance and its structural integrity.

STUDENTS

Evan Bohannon, Jacob Thomas, Robert Wood, Nolan Jones, Luke Sims, Jenna Jones, Henry Haslam, Kaitlyn Brafford,Jaycie Jester, Sam Morris, Paul Aldridge Liam Schupbach, Jay Gunn, Slade Spears, Kaden Thompson, Brody Richardson, Armaan Madahar, Camden Macdonald

ADVISOR(S)

Dr. Kurt Rouser

SPONSOR(S)

U.S. AIR FORCE

(Left to Right) Maggie Sapp, Jacob Thomas, Emerson Morton, Daniel Cuellar, Fox Mattox, Joshua Varon, Isaac Williams, Isaac Hilbun, Riley Barker, Colton Smith, Nathan Revor, Daniel Adeleye, Brody Richardson

PROJECT TITLE

PISTOL PETE'S PROPULSION POSSE - ORANGE TEAM

This project presents the design, manufacturing and experimental validation of a conformal spiral plate heat exchanger. The system is designed around the parameters of a micro-turbojet engine and utilizes up to 5% compressor bleed air to provide thermal management while maintaining acceptable engine performance. The heat exchanger is integrated onto a manufactured casing that fits over the combustion liner without affecting core mass flow. A parametric cycle analysis was performed to determine an appropriate bleed air percentage and to quantify the resulting impact on thrust performance. Experimental validation consisted of cold-flow simulation, comprehensive thermal and pressure testing, and vibration testing under representative operating conditions. Instrumentation was calibrated prior to testing to ensure accuracy of measurements and repeatability, then used to record temperature and pressure. Several qualifications were tracked to measure efficiency of the design such as pressure retention, pressure drop, heat exchanger structural integrity and heat transfer performance by means of flow modeling, computational fluid dynamics and finite element analysis. The heat exchanger was tested for pressure retention while operating an external heat load. Results demonstrate the feasibility of integrating a compact, conformal heat exchanger that utilizes a fraction of compressor bleed air to provide heat transfer in a small-scale turbojet engine while balancing thermal capability, weight and performance penalties.

STUDENTS

Maggie Sapp, Jacob Thomas, Emerson Morton, Daniel Cuellar, Fox Mattox, Joshua Varon, Isaac Williams, Isaac Hilbun, Riley Barker, Colton Smith, Nathan Revor, Daniel Adeleye, Brody Richardson

ADVISOR(S)

Dr. Kurt Rouser

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