



EXPO

engineering ▲ design

2025 Capstone Projects



EXPO is the longest-running student engineering and technological innovation showcase in the Pacific Northwest. The event welcomes K-12 and community college students, industry partners and community members to explore industry-sponsored projects designed by current U of I students in the college's Interdisciplinary Capstone Design Program, ranked top seven in the nation for infusing real-world experiences into engineering education.

Engineering students work in interdisciplinary teams on creative projects sponsored by industry partners, private individuals or U of I departments.

Courses in the program emphasize the design process and the creation of a thoughtfully engineered, tested and validated outcome or prototype.

Biological Engineering

BENCH SCALE YEAST FERMENTATION BIOREACTOR FOR TEACHING CONTROL SYSTEMS

Bioreactors enable controlled microbial growth and biofuel production by optimizing temperature, pH, and nutrients. The Continuous Stirred-Tank Reactor (CSTR) is ideal for uniform mixing and biochemical reactions. Developing small-scale bioreactors for teaching will provide hands-on learning of heat transfer, mass/energy balance, and instrumentation, bridging theoretical concepts with practical applications.

Team Members

Olivia Nielson - Biological Engineering
Joshua Werner - Electrical Engineering
Pascal Deuel - Biological Engineering
Philip Boettcher - Mechanical Engineering
Ethan Miller - Mechanical Engineering

Client/Sponsor

Dev Shrestha – U of I Department of Chemical and Biological Engineering

Faculty Advisor

Russell Qualls - U of I Department of Chemical and Biological Engineering

LOW-COST SHEAR STRESS BIOREACTOR TO ENABLE TISSUE ENGINEERING RESEARCH

Tendons transfer forces from muscle to bone and are vital for movement. However, they are commonly injured and current treatments fail to restore them to their prior strength. Functional tendon repairs using stem cells are being explored, but the mechanisms of tendon development are not fully understood and commercial bioreactors for this research can be expensive. We are developing a low-cost bioreactor system to increase accessibility in researching novel solutions for chronic tendon injuries.

Team Members

Dillon West - Biological Engineering
Gibson Moseley - Computer Science

Client/Sponsor

Nathan Schiele – U of I Department of Chemical and Biological Engineering
Joe Stanley - Stanley Solutions NW

Faculty Advisor

Russell Qualls – U of I Department of Chemical and Biological Engineering



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Chemical Engineering

LIFE SUPPORT SYSTEMS: MITIGATING DUST IN LUNAR HABITATS

Since the Apollo missions, lunar dust has posed significant challenges. This project aims to mitigate dust contamination through two key approaches: developing an anti-adhesive coating for spacesuits, and designing a brush to remove dust particles. A bench-scale prototype will be used to evaluate the effectiveness of the proposed solutions by measuring dust adhesion and removal efficiency. Testing will be conducted using simulated lunar dust. This research contributes to the ongoing development of effective dust mitigation strategies for future lunar habitats and operations.

Team Members

Caeley Hodges - Chemical Engineering
John Arterburn - Chemical Engineering
Quinn Dodge - Chemical Engineering
Matt Womelduff - Chemical Engineering

Client/Sponsor

New Mexico Space Grant Consortium

Faculty Advisor

Matthew Bernards – U of I Department of Chemical and Biological Engineering

BIOCOMPATIBLE CROSSLINKER SCALE-UP

This project focuses on synthesizing a cross-linker species for medical applications. The cross-linker can be incorporated into polymer materials to create 3D structures with wide ranging biomedical applications. The goal is to determine the cost of producing this species at a scale large enough to sell it commercially.

Team Members

Hayden Zumwalt - Chemical Engineering
Ethan Collingwood - Chemical Engineering
Gavin Baker - Chemical Engineering

Client/Sponsor

Matthew Bernards - U of I Department of Chemical and Biological Engineering
Kristopher Waynant - U of I Department of Chemistry

Faculty Advisor

Matthew Bernards - U of I Department of Chemical and Biological Engineering

MEMBRANE SEPARATION OF TRITIUM AND HELIUM EXTRACTED FROM EXIT SIGNS

Tritium is a radioactive isotope of hydrogen that is found with its decay product, helium, in self-luminating exit signs. Tritium is a highly valuable gas used in fusion reactors and medical systems. Helium is a valuable gas used in medical devices and manufacturing. In this project a bench scale model using a palladium silver alloy membrane was designed to separate hydrogen from helium. A full-scale facility to recycle exit signs was designed based on the bench scale model results.

Team Members

Taylor Folta - Chemical Engineering
Katelyn Shadley - Chemical Engineering
Joshua Tooley - Chemical Engineering

Client/Sponsor

U of I Department of Chemical and Biological Engineering

Faculty Advisor

Matthew Bernards – U of I Department of Chemical & Biological Engineering

MAXIMIZING VALUE CAPTURED FROM PRODUCED WATER

Our project focuses on recovering valuable constituents from Permian Basin produced water and transforming them into sellable products to offset the costs of treating this byproduct for reuse. This work addresses challenges in the oil and gas industry by reducing waste, enhancing resource recovery, and supporting efforts to move toward a Net Zero economy. By treating and reusing produced water, our project also contributes to mitigating water scarcity in drought-prone regions.

Team Members

Kate Bouse - Chemical Engineering
Maren Mackey - Chemical Engineering
Sarah Pecha - Chemical Engineering
Leiden Huber - Chemical Engineering

Client/Sponsor

Matthew Bernards - U of I Department of Chemical and Biological Engineering

Faculty Advisor

Matthew Bernards – U of I Department of Chemical and Biological Engineering

Civil Engineering

ZINK DAM RECREATIONAL WHITEWATER FEATURE

The City of Tulsa is rehabilitating Zink Dam, and a portion of that project is to create a whitewater flume for recreational use. The focus of our project is the creation of whitewater opportunities using the storage and available head upstream of the dam. The waves will accommodate a combination of inner tubes, kayaks, river surfers, and other enthusiasts.

Team Members

Amber Graves - Civil Engineering
Calvin Connelly - Civil Engineering
Matt Montrose - Civil Engineering

Client/Sponsor

Lars Ostervold Jr. - Black and Veatch

Faculty Advisor

Fritz Fiedler – U of I Department of Civil & Environmental Engineering

WESTON-FAIRVIEW ROAD BRIDGE REPLACEMENT

The City of Fairview, Idaho, has requested the replacement of the Weston-Fairview Road Bridge given that the 1955 bridge has been rated as being in a serious state of disrepair along with an intolerable structure rating. The design for the new bridge will improve traffic flow, reduce environmental impacts on the surrounding wetlands, and uphold the safety, health, and welfare of the public.

Team Members

Angelica Vazquez Martinez - Civil Engineering
Kassidey Brownlee - Civil Engineering
Alexander Sanford - Civil Engineering

Client/Sponsor

Katherine Wisdom – HDR, Inc.
Nicholas McDowell – HDR, Inc.

Faculty Advisor

Fritz Fiedler – U of I Department of Civil and Environmental Engineering



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KOKANEE COVE

Kokanee Cove located within Ponderosa State Park in McCall, Idaho, is undergoing some redevelopment. The project is designed to upgrade the site's layout, functionality, and infrastructure while maintaining its natural and historical integrity as a Nazarene camp.

Team Members

Mattias Cornwall - Civil Engineering
Vy Tran - Civil Engineering
Hailey Holloway - Civil Engineering

Client/Sponsor

Alyssa Yensen - KM Engineering
Jeff Doersch - KM Engineering

Faculty Advisor

Fritz Fiedler – U of I Department of Civil and Environmental Engineering

GRANGEVILLE WATER TANK

This project aims to design a high zone water tank for the City of Grangeville in order to meet storage requirements, as they currently have a storage deficit.

Team Members

Awson Wheeler - Civil Engineering
Cali Shipman - Civil Engineering
Nick Caracciolo - Civil Engineering

Client/Sponsor

Braxton Klas - J-U-B Engineers, Inc.

Faculty Advisor

Fritz Fiedler – U of I Department of Civil and Environmental Engineering

KUNA NEIGHBORHOOD IMPROVEMENTS

This project aims to improve a roadway corridor in Kuna, Idaho, in order to provide connectivity and safety for pedestrians.

Team Members

Josh Moerer - Civil Engineering
Ryland Hoit - Civil Engineering
Sage Smith - Civil Engineering

Client/Sponsor

Taylor Schwerts – Consor Engineers

Faculty Advisor

Fritz Fiedler – U of I Department of Civil and Environmental Engineering

CITYWIDE PEDESTRIAN CROSSING IMPROVEMENTS IN PULLMAN WASHINGTON

The City of Pullman has determined four intersections are a high priority for pedestrian improvements. These intersections are in residential areas or high traffic areas and need improvement for public safety. The main purpose of this project is to design reconstructed curbs, pedestrian ramps, add rectangular rapid flashing beacons, and review the preliminary stormwater system. Our project will improve daily life and travel for the citizens of Pullman.

Team Members

Aiden McCarthy - Civil Engineering
Joe Sparano - Civil Engineering
Daniel Champlin - Civil Engineering

Client/Sponsor

Fred Wismer - Kittelson & Associates
Anthony Davies - Kittelson & Associates

Faculty Advisor

Fritz Fiedler – U of I Department of Civil and Environmental Engineering

LIVINGSTON STONE NATION FISH HATCHERY SUPPLY PIPELINE

This project aims to design a new supply pipeline for the Livingston Stone National Fish Hatchery off of the Shasta Dam.

Team Members

Collin Morgan - Civil Engineering
Lane Hanson - Civil Engineering
Korvin Jones - Civil Engineering

Client/Sponsor

Kelby Sommer - Schnabel Engineering
Luke Rutherford - Schnabel Engineering

Faculty Advisor

Fritz Fiedler - U of I Department of Civil and Environmental Engineering

DOWNTOWN LEWISTON MAIN STREET IMPROVEMENTS

This project is located in downtown Lewiston, Idaho. Lewiston's Main Street currently forms a couplet with D Street, the parallel street to the north. This means that traffic only flows in one direction on each road. The City of Lewiston wants to convert Main Street into two-way traffic because the couplet layout limits downtown Lewiston's ability to grow. This project will involve redesigning the layout of Main Street, redesigning adjoining intersections, and updating utilities.

Team Members

Adrian Sanford - Civil Engineering
Paul Surbeck - Civil Engineering
Carlos Jaquez - Civil Engineering

Client/Sponsor

Melissa Cleveland - Welch Comer
Cody Hodgson - Welch Comer

Faculty Advisor

Fritz Fiedler - U of I Department of Civil and Environmental Engineering

BULL RUN FILTRATION - ACTIVE TREATMENT SYSTEM DESIGN

This project aims to assist in the design of a temporary test-water treatment and reuse system to treat all test-water created during testing and startup of the Bull Run Filtration Facility. MWH Constructors estimates the total volume of test water could exceed two hundred million gallons if reuse is not implemented. The goal of this project is to design a treatment system that will maximize reuse and limit the volume of water required to test the new filtration facility.

Team Members

McKinley Fulk - Civil Engineering
Isabel Huggins - Civil Engineering
Sterling Beasley - Civil Engineering

Client/Sponsor

Kiersten Lee - MWH Constructors
Em Minner - MWH Constructors

Faculty Advisor

Fritz Fiedler - U of I Department of Civil and Environmental Engineering



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NEW PATH 2 PROJECT

The purpose of the New Path development is to provide affordable housing for people without homes, and cut down on the large homeless population while stimulating the economy of downtown Boise, Idaho. It will include counseling, rehabilitation and employment resources for residents.

Team Members

Nathan Salzer - Civil Engineering
Paul Gillespie - Civil Engineering
Candace Jones - Civil Engineering

Client/Sponsor

Madelynn Gregoire – KPFF Consulting Engineers
Chaney Wood – KPFF Consulting Engineers

Faculty Advisor

Fritz Fiedler – U of I Department of Civil and Environmental Engineering

SOUTH CEMETERY ROAD CONSTRUCTION

The City of Middleton, Idaho, has proposed a new roadway segment, South Cemetery Road, which would connect State Highway 44 and Sawtooth Lake Drive. This project will be designed in partnership with Idaho Transportation Department District 3 and the Federal Highway Administration. The purpose of this connection is to provide an alternate route around the downtown corridor and provide the community of Sawtooth Lake Drive access to Middleton Middle School.

Team Members

Taylor Beauchene - Civil Engineering
Jason Hankin - Civil Engineering
Ryan Mack - Civil Engineering
Samual O'Reilly - Civil Engineering

Client/Sponsor

Nick Saras - Horrocks Engineers

Faculty Advisor

Fritz Fiedler – U of I Department of Civil and Environmental Engineering

Computer Science

IMAGE BASED FIBRE TRACKING

Our project focuses on developing an automated tool to extract and reconstruct tendon fascicles from micro-CT cross-sections of rat tails. This work addresses the challenge of understanding tendon structure by overcoming limitations in manual modeling methods, improving both accuracy and efficiency. By enhancing knowledge of tendon structure and formation, our research contributes to advancements in tendon injury repair and regenerative medicine.

Team Members

Gavin Haynes - Computer Science
Jishnuvardhan Karpuram - Computer Science
Tang Zheng - Computer Science

Client/Sponsor

Boyu Zhang – U of I Department of Computer Science
Nathan Schiele – U of I Department of Chemical and Biological Engineering

Faculty Advisor

Bruce Bolden – U of I Department of Computer Science

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BAND ROBOT

The University of Idaho Vandal Marching Band is on a mission to elevate its performances with more creative and unique elements. Led by Band Director Spencer Martin, the initiative aims to deepen collaboration with engineering students, inviting them to contribute innovative ideas and designs. The goal is to develop a robust, remote-controlled robot that can make regular appearances during performances, enhancing the overall experience for both the band and its audience.

Team Members

Lacey Hunt - Computer Science
Mikayla Winant - Computer Science
Connor McElroy - Computer Science
Matthew Kurtz - Computer Science
Michael Knutson - Computer Science
Kevin Wing - Computer Science

Client/Sponsor

Spencer Martin – U of I Vandal Marching Band
Robert Rinker – U of I Department of Computer Science

Faculty Advisor

Bruce Bolden – U of I Department of Computer Science

PURPLEFRAME: VULNERABILITY AND SECURITY TESTING FRAMEWORK

Modern power systems rely on digital products but face cyber risks exploiting their complexity. Purpleframe helps to address and manage these threats by standardizing testing, integrating tools, and identifying vulnerabilities through a user-friendly, extendable framework.

Team Members

Claire Westby - Cybersecurity
Rebecca Smith - Cybersecurity
Nathan Hampton - Computer Science
Meghan Nulf - Computer Science

Client/Sponsor

Joe Ferguson - Schweitzer Engineering Laboratories
Tracy Young - Schweitzer Engineering Laboratories

Faculty Advisor

Bruce Bolden – U of I Department of Computer Science

CLOUD CONTROL AND SUPPORT OF REMOTE AMD PRO PCS

This project solves the problem of performing remote analysis of IT equipment with people that speak other languages and/or are less familiar with advanced computer operations. Our prototype can remotely control the device having issues even while booting and running the operating system, so software issues can be fixed, rebooted, updated and more.

Team Members

Rory Arnone-Wheat - Computer Science
Ben Murray - Computer Science
Upal Kundu - Computer Science
Yue Yu - Computer Science
Sambhav Karki - Computer Science

Client/Sponsor

Philip Wright - Hewlett-Packard

Faculty Advisor

Bruce Bolden – U of I Department of Computer Science

CLOUD TOOLS FOR DATA MODELING

As data analysis and modeling have advanced, so have the computation and storage required to handle the increased complexity and scale of modern datasets. Current infrastructure can be prone to inefficiency, large storage requirements and data loss. With a cloud-based application, analysis can both be more efficient and scalable with easier access to datasets, reliable backups of models, and a lower storage requirement on individual machines.

Team Members

Caleb Mouat - Computer Science
Ian King - Computer Science
Andrew Plum - Computer Science
Shashwot Niraula - Computer Science
Bibek Sharma - Computer Science

Client/Sponsor

Brendan Geidl - Lightcast

Faculty Advisor

Bruce Bolden – U of I Department of Computer Science

AUTOMATED YEAST IMAGE ANALYSIS

The process of identifying new toxins and yeast strains is slow and labor-intensive, requiring large quantities of samples to be analyzed individually. This project leverages machine learning and machine vision to analyze agar plate images by classifying samples based on visual traits, and flagging anomalies objects/features for further review. By automating sample analysis, we accelerate the identification of valuable yeast strains and their toxins.

Team Members

Sebastian Fedane - Computer Science
Owen Knight - Computer Science
Naga Kadarla - Computer Science

Client/Sponsor

Paul Rowley – U of I Department of Biological Sciences
Boyu Zhang – U of I Department of Computer Science

Faculty Advisor

Bruce Bolden - U of I Department of Computer Science

VIRTUAL PROFESSOR

The virtual professor project creates an AI-powered version of Dr. Terry Soule to help the students. It enhances education by offering accessible and scalable learning experiences. This project adds value by personalizing instruction and reducing educators' workload.

Team Members

Ankit Paudel - Computer Science
Sohan Lama - Computer Science
Shubham Gupta - Computer Science

Client/Sponsor

Terry Soule - U of I Department of Computer Science

Faculty Advisor

Bruce Bolden - U of I Department of Computer Science

DRONE INTEGRATION WITH A THERMAL CAMERA

Our goal is to capture thermal infra-red images with accompanying geolocation data using a drone, which will be stored and processed to produce temperature maps over a large area, using an Optris PI 640i thermal sensor. These detailed maps will be analyzed to visualize temperature variations, which allow for estimations to be made regarding various environmental challenges and give scientists a favorable position to find solutions on several issues.

Team Members

Nikolas Erickson - Computer Science
Alyannah Daguro - Electrical Engineering
Maverick March - Cybersecurity

Client/Sponsor

Jason Karl – U of I College of Natural Resources

Faculty Advisor

Bruce Bolden – U of I Department of Computer Science

MICROCHIP CLEAN ROOM VIRTUAL REALITY SIMULATION

This is a simulation to emulate the procedures in microchip clean rooms. It is meant to be a cost effective and time efficient alternative to regular training methods, which can cause a loss in product if done incorrectly.

Team Members

Tryston Jimenez - Computer Science
Ibrahim Mansour - Computer Science
Tracy Rountree - Computer Science

Client/Sponsor

Terry Soule – U of I Department of Computer Science

Faculty Advisor

Bruce Bolden – U of I Department of Computer Science

Electrical and Computer Engineering

RISC V CONTROL FLOW INTEGRITY VERIFICATION SUITE

This project involves developing a verification test suite suitable for RISC V processors following the emerging control flow integrity specification. This specification was published on July 3, 2024, opening the market for a verification suite. This will lay the groundwork for RISC V CFI verification on FPGAs. This solution enhances system reliability and reduces vulnerabilities meeting the requirements of the aerospace and defense industry.

Team Members

James Hagman - Electrical Engineering
Kellen West - Electrical Engineering
Andrew Bonilla - Cybersecurity
Brandon Vetter - Computer Engineering
Zhexi Lu - Computer Science
Siwen Xu - Computer Science

Client/Sponsor

Andrew Weiler - Idaho Scientific

Faculty Advisor

Kip Sikes – U of I Department of Electrical and Computer Engineering

A group of students in a workshop setting are focused on working on a motorcycle. In the foreground, a young woman with brown hair in a striped shirt is using a screwdriver on the handlebars. To her right, another student is also working on the bike. In the background, other students are visible, some looking at a device. The scene is brightly lit, suggesting an indoor workshop or classroom environment.

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HIGH EFFICIENCY SOLAR CELLS

Our project aims to address the growing demand of undergraduate semiconductor training in design, process development, fabrication, testing, and clean room procedures. Focusing on solar cell fabrication, we aim to document the entire process and create a practical framework that enhances students' skills while enabling future advancements in efficiency and performance. This project lays the foundation for continuous improvement and innovation in the University of Idaho's semiconductor education.

Team Members

Connor Denson - Electrical Engineering
Junhua Gu - Electrical Engineering
Julienne Sophia Pacquing - Computer Engineering
Jennie Tafoya - Computer Science

Client/Sponsor

Micron Technology, Inc.
Idaho Workforce Development Council (IWDC)

Faculty Advisor

Kip Sikes - U of I Department of Electrical and Computer Engineering

INCOMING RADIO SIGNAL DIRECTION FINDING USING AN ANTENNA ARRAY

Current livestock tracking methods are expensive, time-consuming, and require frequent maintenance, posing significant challenges for ranchers. Our project aims to develop an innovative antenna array system that detects the angle of incoming radio signals from a beacon, offering a cost-effective, low-maintenance solution. This system will save time and reduce costs while supporting safer and more efficient herd management practices.

Team Members

Emery Baker - Electrical Engineering
Jayden Sherman - Electrical Engineering
Victor Vargas - Computer Science
Shreeya Pradhan - Computer Science
Zaiden Espe - Computer Science

Client/Sponsor

Dev Shrestha - U of I Department of Chemical and Biological Engineering
Karen Launchbaugh - U of I College of Natural Resources

Faculty Advisor

Kip Sikes - U of I Department of Electrical and Computer Engineering

PORTABLE CHAIR LIFE ASSIST

This project aims to enhance the lives of individuals with mobility challenges by designing a safe, user-friendly, and affordable device to assist with sitting and standing. Current solutions rely on caregivers or bulky equipment, which can be costly and restrictive. This project addresses these issues by creating a portable, lightweight device, offering a secure, adjustable solution that promotes independence and improves quality of life.

Team Members

Joshua Planting - Mechanical Engineering
Gavin Wickens - Electrical Engineering
Samuel Mbah - Mechanical Engineering
Jonathan Stark - Electrical Engineering

Client/Sponsor

Kip Sikes - U of I Department of Electrical and Computer Engineering

Faculty Advisor

Kip Sikes - U of I Department of Electrical and Computer Engineering



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INCREASING STEM INTEREST ONE ROBOT AT A TIME.

This project aims to inspire high school students and incoming college freshman to consider studying an engineering discipline and pursuing a career in STEM. We combine knowledge from various engineering disciplines, including electrical, mechanical, computer science, and computer engineering, to create robots that show off the knowledge we have gained in our four years as engineering students at the University of Idaho.

Team Members

Sebastian Diaz Murillo - Electrical Engineering
Brock Anderson - Electrical Engineering
Jo Rodzinka - Mechanical Engineering
Shaun Martin - Computer Engineering
Aayushi Gupta - Computer Science
Ava Raney - Mechanical Engineering
Yichen Liu - Electrical Engineering
Cody Gilson - Mechanical Engineering

Client/Sponsor

Korbin Reichardt - U of I Strategic Enrollment Management

Faculty Advisor

Kip Sikes - U of I Department of Electrical and Computer Engineering

SCALE MODEL POWER SYSTEM

The goal of our project is to create a scale model of the power grid, aimed at educating an audience on the operation, transmission, and protection of the grid. The project showcases a practical representation of a real-world power system, including how external events affect it.

Team Members

Colton Royals - Electrical Engineering
Bryson Threlkeld - Electrical Engineering

Jedidiah Jones - Electrical Engineering
Ryan Nearing - Computer Engineering
Jon Watkins - Computer Engineering
Isaac Harrison - Mechanical Engineering

Client/Sponsor

John Cassleman - Schweitzer Engineering Laboratories

Faculty Advisor

Kip Sikes - U of I Department of Electrical and Computer Engineering

CUBE SATELLITE: A MODULAR APPROACH TO SPACE RESEARCH

Miniaturization of technology has enabled highly compact and efficient cube satellites able to perform tasks exclusive to much larger and more expensive spacecraft. Our project aims to design a space ready cube satellite module with three payloads: 1) Sun sensor that will determine orientation relative to the sun, 2) Star tracker that will determine the position based on measurements of the stars, 3) Boom arm designed to extend with a variable size payload attached

Team Members

Kay Atkinson - Cybersecurity
Owen Wooster - Mechanical Engineering
Liam Gigray - Mechanical Engineering
Andrea Cernuda Herraiz - Biological Engineering
Andrew Carefoot - Computer Engineering
Mauricio Rodriguez - Computer Science
Ryan Stephenson - Electrical Engineering
Suhail Singh - Electrical Engineering

Client/Sponsor

Avery Brock - NASA - Ames Research Center
Malachi Mooney - NASA - Ames Research Center

Faculty Advisor

Kip Sikes - U of I Department of Electrical and Computer Engineering



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For more information visit
stem.inl.gov



Idaho National Laboratory

Mechanical Engineering

AUTOMATED RING/MOUNT CROSSBOLT PRESS

Nightforce currently assembles riflescope rings and mounts using a labor-intensive process that requires technicians to manually install each component. Our project focuses on the development of a machine that automates the alignment and pressing of crossbolts, the first step in the assembly process. By eliminating human input, we improve manufacturing speed and precision, benefiting Nightforce and its customers.

Team Members

Cole Bailey - Mechanical Engineering
Preston Bielenberg - Mechanical Engineering
Jacob Flick - Mechanical Engineering
Mason DeCola - Mechanical Engineering
John Dorr - Electrical Engineering

Client/Sponsor

Daniel Revard - Nightforce Optics
Grant Minor - Nightforce Optics

Faculty Advisor

Christopher Bitikofer – U of I Department of Mechanical Engineering

FORKLIFT OVERHEAD GUARD VIBRATION REDUCTION

According to the CDC, 12% of forklift drivers are at risk of noise induced permeant hearing loss. We are trying to mitigate this through modifying the design of the overhead guard used to protect forklift

operators from falling objects. The overhead guard vibrates during operation, causing noise. Using analysis software and physical testing, we aim to pinpoint areas of concern and shift frequencies through design.

Team Members

Ryder Fleming - Mechanical Engineering
Koji Becker - Mechanical Engineering
Cruz Flores - Mechanical Engineering
Hylton Reber - Mechanical Engineering

Client/Sponsor

Gregory Gaglione - Hyster-Yale Materials Handling

Faculty Advisor

Matthew Swenson – U of I Department of Mechanical Engineering

LEVER DRAG SINGLE ACTION OFFSHORE FISHING REEL

The goal of this project is to combine the feel of a traditional fly-fishing reel and the capabilities of modern offshore reels, allowing the fisherman the sensations and aesthetics of a fly reel with the robust nature and control of high-performance reels on the market today. Our product is a fishing reel that puts the fisherman back into the equation and demands skill and technique to land large fish.

Team Members

Cade Christensen - Mechanical Engineering
Logan McCallie - Mechanical Engineering
Stuart Trimble – Mechanical Engineering

Client/Sponsor

Andre Corpus - Hard Chargin' Adventure Co.

Faculty Advisor

Michael Maughan – U of I Department of Mechanical Engineering

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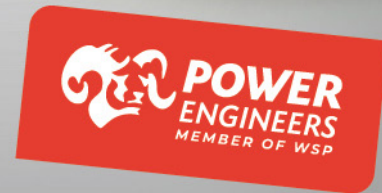
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FORKLIFT FLOOR PLATE IMPROVEMENTS FOR A QUIETER DESIGN

The forklift industry is essential for the global movement of goods. Our project focuses on reducing noise from the engine and transmission through improved floorplate design. By minimizing noise, we enhance operator comfort and concentration, leading to increased work efficiency and cost savings for the company. Furthermore, a quieter environment promotes the long-term health of forklift operators, addressing safety concerns and fostering a better workplace.

Team Members

Wesley Rebeck - Mechanical Engineering
Alan Kyaw - Mechanical Engineering
Evan Henkel - Mechanical Engineering
Brock Golightly - Mechanical Engineering

Client/Sponsor

Jacob Wilson - Hyster-Yale Materials Handling

Faculty Advisor

Matthew Swenson - U of I Department of Mechanical Engineering

TONER CARTRIDGE SUSTAINABLE HOUSING REDESIGN

Non-renewable packaging makes up the majority of plastic waste in the modern world. Existing sustainable alternatives struggle to replace injection-molded parts with complex geometry. Compostable plastics and pulp injection molding are potential solutions, offering fine detailing capabilities with only a slight reduction in strength.

The objective is to determine and implement the most cost-effective solution for single-use toner cartridge covers.

Team Members

Skylar Dawe - Mechanical Engineering
Colin Haugseth - Mechanical Engineering
Isaac Looney - Biological Engineering
James Setters - Mechanical Engineering

Client/Sponsor

Doug Richards - Hewlett-Packard
Andie Weyant - Hewlett-Packard

Faculty Advisor

Matthew Swenson - U of I Department of Mechanical Engineering

SEL: MODULAR HARNESS FORMBOARD SYSTEM

The problem presented involves the lack of updated formboards for workers as well as the need for a different formboard for each wiring harness. This causes downtime for assemblers at the SEL facility. Our solution is a modular formboard that can be altered to meet the requirements of each wiring harness through modular components.

Team Members

Curtis Johnson - Mechanical Engineering
Alexander Fahey - Mechanical Engineering
Alex Peterson - Mechanical Engineering
Kewei Zhu - Electrical Engineering

Client/Sponsor

Nathan Stout - Schweitzer Engineering Laboratories
Kyle Fickenworth - Schweitzer Engineering Laboratories

Faculty Advisor

Matthew Swenson - U of I Department of Mechanical Engineering

ELECTRONIC THROTTLE CONTROLLED SNOWMOBILE TRANSMISSION SYSTEM

Modern snowmobile transmissions are mechanically driven and difficult to optimize. With an electronic actuation system, we are able to decrease sound and tail pipe emissions while improving fuel economy and performance

Team Members

Christian Halter - Mechanical Engineering
Henry Newman - Mechanical Engineering
Joseph Cicanese - Mechanical Engineering
Slade Stephens - Mechanical Engineering
William Huntsman - Mechanical Engineering

Client/Sponsor

Cooper Hancock – U of I Clean Snowmobile Challenge Team
Taylor Hancock – U of I Clean Snowmobile Challenge Team

Faculty Advisor

Dan Cordon – U of I Department of Mechanical Engineering

SPRAYER DRONE FOR PRECISION AGRICULTURE

Food insecurity is a growing problem, especially in developing countries where farming is largely manual. An affordable, AI-powered precision agriculture drone that autonomously detects and accurately sprays weeds in a field will help farmers weed a larger area while using less herbicide and improving crop yields.

Team Members

Andrew VanCorbach - Computer Science
Evan Schweifler - Electrical Engineering
Andrew Schafer - Mechanical Engineering
Joseph Schlegel - Computer Science

Client/Sponsor

Jae Ryu – U of I College of Agricultural and Life Sciences

Faculty Advisor

Matthew Swenson – U of I Department of Mechanical Engineering

PRECISION OVERLAY INSTALLATION TOOL

Our project is to create a precision overlay installation tool to assist in the application of overlays to panels of electrical equipment. This device will reduce the number of misplaced overlays, saving our sponsor time, money, and reducing the ergonomic hazard currently present.

Team Members

Anthony Black - Mechanical Engineering
Kobe Bake - Mechanical Engineering
Tate Garrett - Mechanical Engineering
Nicholas Woodman - Mechanical Engineering

Client/Sponsor

Taylor Spence - Schweitzer Engineering Laboratories
Tyler Marines - Schweitzer Engineering Laboratories

Faculty Advisor

Christopher Bitikofer – U of I Department of Mechanical Engineering

VIABILITY OF HIGH EFFICIENCY TAILLESS AIRCRAFT

Our team is designing and building a RC aircraft and an autonomous glider using the NASA patented Prandtl-D wing design to compete in the American Institute of Aeronautics and Astronautics Design/Build/Fly competition. This wing design allows for the absence of a tail wing that is typical for other aircraft, but has never taken off and landed under its own propulsion. Our project will serve as a proof of concept to demonstrate the viability of this design.

Team Members

Aiden Shepard - Computer Science
Jake Miller - Electrical Engineering
Kyren Mesenbrink - Mechanical Engineering
Shay Albrecht - Mechanical Engineering
Warren Smith - Mechanical Engineering
Zhenwen Luo - Electrical Engineering
Brian Renzelman - Computer Science

Client/Sponsor

NASA Idaho Space Grant Consortium

Faculty Advisor

Matthew Swenson – U of I Department of Mechanical Engineering
Vibhav Durgesh – U of I Department of Mechanical Engineering

ACOUSTICS IN SOIL: IMAGING PLANT ROOTS & THE RHIZOSPHERE

Agricultural sustainability is critical to feeding growing populations, producing biomass and improving crop yield and quality. Root depth and dispersion inform plant health, but there's no reliable way to monitor plant root health without uprooting and damaging the plant. Our in-soil acoustic system aims to provide instantaneous information about root depth and dispersion. This ultimately inspires research that can prevent the spread of disease, therefore increasing food and biomass production.

Team Members

Lydia Beardsley - Mechanical Engineering
Erik Caballero - Mechanical Engineering
Benjamin Miller - Biological Engineering
Laura Moler - Computer Engineering
Trenton Redman - Electrical Engineering

Client/Sponsor

Richard Anglin - Precision Ag Sensors
Keith Taggart - Precision Ag Sensors

Faculty Advisor

Christopher Bitikofer – U of I Department of Mechanical Engineering

SHEET METAL FATIGUE TESTING FRAME FOR TARGETED LOCATION RESEARCH

This project aims to create a platform for research on fatigue life for sheet metals. There are limited known material properties for sheet metal. This machine collects data about fatigue life to acquire an accurate prediction of material lifespans. The platform facilitates research on advanced joining techniques furthering the research in this field.

Team Members

Logan Ellis - Mechanical Engineering
Jasmeen Manshahia - Mechanical Engineering
Cade Stenzel - Mechanical Engineering

Client/Sponsor

Jonathan Richards - Schweitzer Engineering Laboratories
Matthew Swenson – U of I Department of Mechanical Engineering

Faculty Advisor

Ryan Sundburg – U of I Department of Mechanical Engineering

SILENT & SMOOTH SINGLE-USE SPECULUM

Cervical exams are essential for women's health but often cause discomfort and anxiety, primarily due to the speculum used. The most common single-use speculum contributes to this with its noisy operation and jolting movements. The goal of our project is to design a new speculum, specifically the opening mechanism, to provide a quieter, smoother experience for both patients and healthcare providers.

Team Members

Isabelle Dingel - Biological Engineering
Christina Mai - Biological Engineering
Oaklee Woolstenhulme - Mechanical Engineering
Natalie Zender - Mechanical Engineering

Client/Sponsor

Dr. Rayme Geidl – Idaho WWAMI

Faculty Advisor

Dr. Michael Maughan – U of I Department of Mechanical Engineering

COLOR-CODED AMMUNITION COMPONENTS

In order to easily distinguish between duty and practice ammunition, our team is developing a more cost effective method to create a color coating process for common handgun caliber projectiles. Our main projectile focus is duty ammunition, otherwise known as hollow points, and practice ammunition, or plain roundnose ball ammo. Two different colors of coatings will be applied, purple for practice ammunition and black for duty ammunition.

Team Members

Dakota Livingston - Mechanical Engineering
Benjamin Salcido - Mechanical Engineering
Jordan Gallegos - Mechanical Engineering
Sullivan Weibert - Mechanical Engineering
Sam Grant - Cybersecurity

Client/Sponsor

Jeff Williams - CCI/Speer

Faculty Advisor

Michael Maughan – U of I Department of Mechanical Engineering

REUSABLE MOLD FOR NUCLEAR FUEL ROD CASTING

The current process for producing cast nuclear fuel rods is inefficient, because molds must be destroyed for each production. To address this issue, we are designing a process that uses a reusable mold. We will simulate the model with FLOW-3D Cast software to demonstrate its advantages over the existing method, and simulations will be validated with a quarter-scale design, using safe alternative materials.

Team Members

Trenton Flansburg - Mechanical Engineering
Ashton Herrick - Mechanical Engineering
Joshua McKenna - Mechanical Engineering
Alexander Pare - Mechanical Engineering

Client/Sponsor

Randall Fielding - Idaho National Laboratory

Faculty Advisor

Michael Maughan – U of I Department of Mechanical Engineering

IN-FIELD AGRICULTURE IOT SENSING NETWORK

Our project revolutionizes agriculture with fully subterranean sensors that monitor six key soil parameters in real-time. Operating underground, these sensors eliminate the need for removal during machinery use, reducing labor, costs, and disruptions. Collected data is processed automatically by the receiving device and is accessible online. This innovation empowers farmers with uninterrupted, actionable data, paving the way for more sustainable and efficient agricultural practices.

Team Members

David Trail - Cybersecurity
Zhonghan Wang - Computer Science
Alex Von Bruck - Electrical Engineering
Maxfield Nadler - Mechanical Engineering

Client/Sponsor

Johnny Li – U of I College of Agricultural and Life Sciences

Faculty Advisor

Christopher Bitikofer – U of I Department of Mechanical Engineering



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MEET OUR JUDGES

Judges are a critical part of the Engineering Design EXPO experience for University of Idaho College of Engineering students. Interaction between students and judges creates opportunities for students to gain new insight and learn about engineering career paths and the profession in general.

Thank You for Joining Us!

Ahmad Abu Abdo

Carmen Achabal, Micron Technology

Jon Adams, Engineered Solar Systems

Muhammad Akram, Youngdev intern

Rich Allen, Retired

Tim Arnold, Barr Engineering

John Barrutia, DC Engineering

Amanda Battles, Clearwater Paper

Cory Baune, J-U-B Engineers, Inc.

Steve Beyerlein, University of Idaho

Jeff Binford, Micron Technology

Pat Blount, Moscow High School

Walid Bouras, Sonatrach

Gabe Brandt, HDR

Ben Bunce, Avista Utilities

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Jules Clemens, J-U-B Engineers, Inc.

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Kaushal Darokar, Rivian Automotive LLC

Manish Dawadi, Compass group

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Luke Fuess, TechHelp & University of Idaho

Bidisha Goswami, The Pokemon Company International

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Alyssa Hansten, Washington State University

Gary Hermann, CH2M HILL (now Jacobs) & Velsicol Chemical Corp

Dawson Hill, Schweitzer Engineering Laboratories

David Hollenback, HDY Global

Fred Jessup, Schweitzer Engineering Laboratories

Hatim Kapadia, American Express

Jesse Kappmeyer, Idaho National Lab / Battelle Energy Alliance

Joseph Keegan, The Boeing Company

Doug kippes, Glanbia Nutritionals

Braxton Klas, J-U-B Engineers, Inc.

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Manon MacAllister, Clearwater Paper

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Manan Hitendra Mehta, Schweitzer Engineering Laboratories

Sally Mei, Schweitzer Engineering Laboratories

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Todd Swanstrom, Western Trailer Co.

Thornton Waite, Retired

Richard Wall, Retired, University of Idaho

Melissa Warner, Idaho National Laboratory

David Watkins, J-U-B Engineers, Inc.

Ian Wettlaufer, University of Idaho

Jeff Williams, The Kinetic Group

Ashley Williams, Welch Comer Engineers

Zac Woodall, Amazon

Min Xian, University of Idaho

Sodiq Yusuf, University of Idaho

***Judges registered by publishing deadline.**