

Engineering Design EXPO Student Projects

3D PRINTER POLYMER FILAMENT EXTRUDER

The polymer filament necessary to operate a 3D printer is costly to purchase for regular use. To reduce costs, a shredding and extruding process was devised to recycle flawed or unused prints as well as other plastic sources to use as filament.

Sponsor: Instrument Shop

Sponsor Organization: University of Idaho, Chemical and Materials Engineering Department

Team Members:

Khaled Abdel-Rahim – Chemical & Materials Engineering

Mitchell Flynn – Chemical & Materials Engineering

Richard Munn – Chemical & Materials Engineering

Kirk Riedner – Chemical & Materials Engineering

Faculty Adviser(s): David Drown

Mentor(s): David MacPherson, Charles Cornwall

ADVANCED MANUFACTURING SPECIAL OPS

This booth displays locally produced prototypes and innovative design/manufacturing processes explored in the ME Machine Shop as part of a graduate elective course. Projects on display include a generative design synthesizer, 125 anniversary UI seal, Stirling engine, rehabilitation delta robot, Alboka Basque wind instrument.

Sponsor Organization: University of Idaho, Department of Mechanical Engineering

Team Members:

David Eld – Mechanical Engineering

Stephen Goodwin – Mechanical Engineering

Dan Keane – Mechanical Engineering

Matt Kologi – Mechanical Engineering

Rory Lilley – Mechanical Engineering

Luke Nelson – Mechanical Engineering

Phillip Petersen – Mechanical Engineering

Jeffrey Reznicek – Mechanical Engineering

Jon Teske – Mechanical Engineering

Faculty Adviser(s): Edwin Odom, Steve Beyerlein

ALLISON CREEK HYDROELECTRIC PROJECT

The University of Idaho's Design Team will design portions of a run-of-river hydroelectric plant located on the south side of Port Valdez for the Trans-Alaska Pipeline. The objectives of this project are to design the diversion structure, the penstock, and access roads to connect Allison Creek to a powerhouse.

Sponsor: Mort McMillen

Sponsor Organization: Mort McMillen LLC

Team Members:
Bryant Charlo – Civil Engineering

Ryan Cook – Civil Engineering

Brett Khoring – Civil Engineering

John Swidecki – Civil Engineering

Faculty Adviser(s): Fritz Fiedler

AMPS COMMUNICATION

The current Analog Model Power System (AMPS) uses equipment which is becoming obsolete. The purpose of our project is to upgrade the protection equipment to more modern, Ethernet based technology, and to document the system to make it a user friendly and modern teaching tool.

Sponsor: Normann Fischer

Sponsor Organization: Schweitzer Engineering Laboratories

Team Members:
Fahad Alhajeri – Electrical & Computer Engineering

Jorge Rios – Electrical & Computer Engineering

Garrett Stauffer – Electrical & Computer Engineering

Corneliu Turturica – Electrical & Computer Engineering

Faculty Adviser(s): Amrit Dahal, Touraj Assefi

Mentor(s): Brian Johnson

ASME MICRO BAJA

The goal of this project is to design and manufacture a fully functional remote controlled car to compete in the ASME Micro Baja Regional Competition. Key features include an isolated gear box, slipper differential, carbon fiber chassis, double wishbone suspension, and Ackerman steering.

Team Members:

Corbin Basler – Mechanical Engineering

Kris Davis – Mechanical Engineering

Zane Jesser – Mechanical Engineering

Jake Johnson – Mechanical Engineering

Darren Mabe – Mechanical Engineering

Zach Maryon – Mechanical Engineering

Alan McMurray – Mechanical Engineering

Jonathan Paul – Mechanical Engineering

Dillon Turnbull – Mechanical Engineering

Jon Wheless – Mechanical Engineering

Faculty Adviser(s): Steve Beyerlein

Mentor(s): David Eld



AUTONOMOUS COTS BOTS

The goal of this project is to use the Commercial-Off-The-Shelf (COTS) Bots platform and add inter-robot communication and autonomy to perform cooperative tasks.

Sponsor: Terrance Soule

Sponsor Organization: University of Idaho, Department of Computer Science

Team Members:

Robert Meine – Computer Science

Chris Waltrip – Computer Science

Faculty Adviser(s): Bruce Bolden

Mentor(s): Robert Heckendorn

Engineering Design EXPO Student Projects

AUTONOMOUS UNDERWATER VEHICLE (AUV) DEVELOPMENT

This project, a collaboration between the University of Idaho and Washington State University Mechanical, Electrical, and Computer Engineers and Computer Scientists, consisted of designing, fabricating, and testing the mechanical and electrical components of an autonomous submarine. This submarine includes the ability to maneuver, launch torpedoes, drop markers, and grasp objects.

Sponsor: Mike Kapus

Sponsor Organization: NAVSEA

Team Members:

Ingrid Kooda – Mechanical Engineering

Kyle Newell – Mechanical Engineering

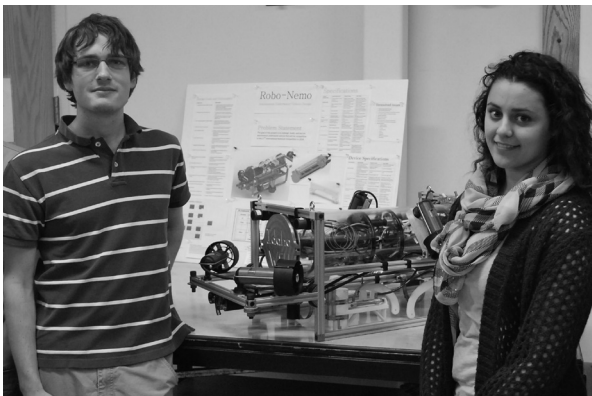
Christopher Pratt – Mechanical Engineering

Alexander Rowson – Electrical & Computer Engineering

Michelle Spear – Mechanical Engineering

Faculty Adviser(s): Matthew Riley

Mentor(s): Matt Kologi



BASSOON FINGERING FINDER

A web application that will allow bassoonists to quickly and easily look up a variety of approved fingerings.

Sponsor: Susan Hess

Sponsor Organization: Lionel Hampton School of Music

Team Members:

Eric Doman – Computer Science

Charles Miller – Computer Science

Faculty Adviser(s): Bruce Bolden

Mentor(s): Luke Bakken

BOLSTER RIVET PRESS

Our project goal is to create a test fixture and calibration methods in order to measure the force required to compress and seat rivets in the production of knives. These tools are intended to aid designers and machine operators; improving product quality and consistency across a spectrum of knife families.

Sponsor: Kenneth Fisher

Sponsor Organization: Buck Knives

Team Members:

Ryan Borth – Mechanical Engineering

David Erickson – Mechanical Engineering

Luke Nelson – Mechanical Engineering

Mitch Miller – Mechanical Engineering

Faculty Adviser(s): Steven Beyerlein

Mentor(s): Rory Lilley

CLEAN SNOWMOBILE TEAM

The University of Idaho Clean Snowmobile Competition (UICSC) team develops a clean, quiet, and powerful snowmobile to compete in the clean snowmobile competition. It is primarily undergraduate work and design. The UICSC team has been competing since 2001.

Sponsor Organization: National Institute for Advanced Transportation Technology

Team Members:

Amos Bartlow – Electrical & Computer Engineering

Marc Compton – Mechanical Engineering

Chris Fraser – Mechanical Engineering

Joey Gibson – Mechanical Engineering

Crystal Green – Mechanical Engineering

Megh Hester – Mechanical Engineering

Parker Hill – Mechanical Engineering

Tony Keys – Mechanical Engineering

Trevor Lutz – Mechanical Engineering

Dillon Quenzer – Mechanical Engineering

Justin Ruehl – Mechanical Engineering

Dillon Savage – Mechanical Engineering

Chase Smith – Mechanical Engineering

Tygh Weyand – Mechanical Engineering

Mark Woodland – Mechanical Engineering

Alex Wright – Mechanical Engineering

Faculty Adviser(s): Dan Cordon, Karen Den Braven

CLEANROOM CLEANING ROBOT

Design and construct a system that can be used autonomously to spray sanitization solutions on the floor of a cleanroom used in the production of clinical drug products.

Sponsor: Chad Schrader

Sponsor Organization: Revalerio Corporation

Team Members:

Gregory Atkinson – Mechanical Engineering

Justin Herrick – Mechanical Engineering

Nathan Pueschel – Mechanical Engineering

Nicholas Rodriguez – Electrical & Computer Engineering

Faculty Adviser(s): Dan Cordon

Mentor(s): Jeremy Cuddihy

COGENERATION TURBINE

The design goal for the UI Cogeneration Turbine team was to conduct a feasibility analysis for utilizing the campus steam plant to generate power in addition to supplying campus heat. The second semester goal was to perform an economic analysis of the project.

Sponsor: Scott Smith

Sponsor Organization: University of Idaho Steam Plant

Team Members:

Chris Anderson – Biological & Agricultural Engineering

Chad Dunkel – Biological & Agricultural Engineering

Donald Haines – Electrical & Computer Engineering

Ryan Oliver – Electrical & Computer Engineering

Faculty Adviser(s): Tao Xing, Steve Beyerlein, Herb Hess

Mentor(s): Amrit Dahal

Engineering Design EXPO Student Projects

DUAL-MODE PROPULSION SYSTEM FOR CUBESATS

We're promoting development of an affordable, low-mass, off-the-shelf propulsion system for CubeSats. With development of a low cost, low-mass propulsion system; these satellites are capable of expulsion from low earth orbit to various destinations in the outer solar system – making outer planet based research more affordable and readily available.

Sponsor: Stephen Howe

Sponsor Organization: Center for Space Nuclear Research

Team Members:

Artemio Ambriz – Virtual Technology & Design

Christopher Chesnut – Virtual Technology & Design

Samuel Horton – Virtual Technology & Design

Dylan Johnson – Virtual Technology & Design

Matt Ziegler – Virtual Technology & Design

Faculty Adviser(s): John Anderson

DYNAMIC COMMERCIAL FISHERY CLEANING SYSTEM

Fine particulate in the raceway is easily re-suspended during cleaning operations. Our objective is to design an automated cleaning system with little maintenance to reduce fine particulate from accumulating in raceways without sacrificing flow rates to maintain fish health through computational and experimental analyses.

Sponsor Organization: Clear Springs Inc.

Team Members:

Levi Dawes – Biological & Agricultural Engineering

Matt Francis – Biological & Agricultural Engineering

Jeremiah Schroeder – Mechanical Engineering

Kate Wicher – Biological & Agricultural Engineering

Faculty Adviser(s): Tao Xing

Mentor(s): Jeremy Cuddihy

ENGINEERING SCHOLARS STUDENT DESIGN PROJECTS

Engineering Scholars Undergraduate Design Projects include four STEM-based projects designed and developed by Mechanical Engineering DeVlieg Scholars and two multi-disciplinary team-based projects. Projects range from hands-on experiments for K-12 students, to demonstration tools for undergraduates in engineering, to proof of concept designs for manufacturing.

Sponsor Organization: College of Engineering, Engineering Scholars

Team Members:

Mark Garber – Mechanical Engineering

Jonathan Hanson – Mechanical Engineering

Chris Jurue – Mechanical Engineering

Jesse Jutson – Civil Engineering

Harrison Pugeseck – Mechanical Engineering

Eric Silk – Electrical & Computer Engineering

James Tigue – Mechanical Engineering

Tygh Weyand – Mechanical Engineering

Jonathan Wheless – Mechanical Engineering

Amanda White – Mechanical Engineering

Kevin Woodruff – Mechanical Engineering

Faculty Adviser(s): Bob Stephens

FORMULA ELECTRIC VEHICLE POWERTRAIN

This project is continuing the progress of last year's FEV (Formula Electric Vehicle) power-train team. The project has two goals: 1) Integrate our new battery system with the existing battery management and regeneration systems. 2) Create a test stand for our next generation in-hub motor.

Sponsor Organization: National Institute for Advanced Transportation Technology

Team Members:

Tate Bischoff – Mechanical Engineering

Jay Nair – Mechanical Engineering

Chinmay Subhedar – Electrical & Computer Engineering

Micah Wilson – Mechanical Engineering

Victor Zarate – Electrical & Computer Engineering

Faculty Adviser(s): Herbert Hess, Steve Beyerlein, Dan Cordon

Mentor(s): Jaz Veach, Jon Teske

FROM FREEWAY TO FRAGRANCE: RECOVERING LIMONENE FROM RECYCLED TIRES

Every year millions of tires reach the end of their usable life. To reduce the number of tires that end up in landfills, Reclaim Inc., has developed a way to convert used tires into carbon black, a chemical product in high demand. Currently, Reclaim's process has two byproducts: a gas used to fuel the plant and an oil rich in hydrocarbons. Our goal was to economically design a process to separate the oil into the most profitable commodities based on Reclaim's process and financial workup.

Sponsor Organization: Capstone Technology Corporation

Team Members:

Tianna Drew – Chemical & Materials Engineering

Amanda Eagle – Chemical & Materials Engineering

Brice Sumner – Chemical & Materials Engineering

Sara Sumner – Chemical & Materials Engineering

Faculty Adviser(s): Mark Roll, David Drown

Mentor(s): David MacPherson

GEOTHERMAL HEAT PUMP

Design and optimization of a geothermal heat pump system using computer models and simulations.

Sponsor: Sue Tacke

Sponsor Organization: Saint Gertrude's Monastery

Team Members:

Mitchel Gogert – Mechanical Engineering

Samuel Qualls – Mechanical Engineering

Desiree Reed – Mechanical Engineering

Colin Ryan – Mechanical Engineering

Faculty Adviser(s): Tao Xing

GRAPHENE FOR A BETTER BATTERY

Graphene from University of Idaho Thermalized Asphalt Reaction (GUITAR) produces a carbon compound similar to graphene, but with more useful conductive properties. Our goal was to produce enough high quality GUITAR coated additives for testing a battery and design a full-scale production plant to meet possible demand.

Sponsor: Dean Edwards

Sponsor Organization: Advanced Hybrid Power Systems LLC

Team Members:

Aimen Alamoudi – Chemical & Materials Engineering

Matthew Chapin – Chemical & Materials Engineering

Joshua Payne – Chemical & Materials Engineering

Landon Sturgeon – Chemical & Materials Engineering

Faculty Adviser(s): Dean Edwards, David Drown

Engineering Design EXPO Student Projects

GREENSFERRY ROAD OVERPASS

Geotechnical and structural design of an overpass spanning Interstate 90 and connecting the north and south arterials of Greensferry Road in Post Falls, ID.

Sponsor: Jay Hassel

Sponsor Organization: JUB Engineering

Team Members:

Jesse Clark – Civil Engineering

Nathan Eddy – Civil Engineering

Stephanie Fischer – Civil Engineering

Kyle Staab – Civil Engineering

Faculty Adviser(s): Fritz Fiedler

Mentor(s): Sunil Sharma

HIGH TUNNEL GREENHOUSE

The University of Idaho's high tunnel greenhouse team, Stand Your Ground, is tasked with designing a greenhouse for harsh environmental conditions. Current greenhouses have failed due to high wind load. The goal of this project is to design a greenhouse to prevent such damage.

Sponsor: Tony McCammon

Sponsor Organization: University of Idaho Extension

Team Members:

Faisal Alahmadi – Mechanical Engineering

Christopher Kreps – Mechanical Engineering

Kyle MacLean – Mechanical Engineering

Stephen VanPatten – Mechanical Engineering

Faculty Adviser(s): Thomas Hess

Mentor(s): Jeremy Cuddihy

HILL ROAD/ 36TH STREET / CAPTALPA DRIVE ROUNABOUT DESIGN

The 5-way intersection of Hill Road, 36th Street and Catalpa Drive in Boise, Idaho has been functioning near capacity for several years. The Ada County Highway District and City of Boise are looking at the possibility of a modern roundabout design to solve this problem.

Sponsor: John Ringert

Sponsor Organization: Kittelson & Associates

Team Members:

Charles Linja – Civil Engineering

Harvey McHugh – Civil Engineering

Spencer Payne – Civil Engineering

Faculty Adviser(s): Fritz Fiedler

Mentor(s): Fritz Fiedler

IMAGE-BASED REAL-TIME TRAFFIC DETECTION

In response to the need for real-time traffic control, less intersection congestion, and reduced emissions, Team New Perspective has developed a unique vehicle speed detection system using a revolutionary low-power image sensor. The design is realized in hardware for future single-chip implementations.

Sponsor: Suat Ay

Sponsor Organization: National Institute for Advanced Transportation Technology, VSRG

Team Members:

Paul Bailey – Computer Science

Mitch Bodmer – Electrical & Computer Engineering

Jacob Grinestaff – Electrical & Computer Engineering

Carson Stauffer – Computer Science

Francis Sziebert – Electrical & Computer Engineering

Faculty Adviser(s): Touraj Assefi

Mentor(s): Kyle Swenson, Ismail Cevik

IMPROVED DRINKING WATER TREATMENT FOR SMALL COMMUNITIES USING ELECTROCOAGULATION

Electrocoagulation treats water by creating flocculent with contaminants which allows for easy separation. The goal of this project is to demonstrate the economic value of this technology and its ability to treat multiple contaminants simultaneously. In particular, this will benefit small communities which have difficulty in providing adequate water treatment.

Sponsor: WERC

Sponsor Organization: New Mexico State University

Team Members:

Ben Carleton – Chemical & Materials Engineering

Arnold Pelayo – Chemical & Materials Engineering

Kelli Quist – Chemical & Materials Engineering

Sidney Suggs – Chemical & Materials Engineering

Faculty Adviser(s): David Drown

Mentor(s): David MacPherson

KIBBIE DOME LIGHT SHOW

The goal of this project is to provide a prototype design for a Kibbie Dome ceiling LED-display. This project aims to utilize the Raspberry Pi as a controller to operate high-powered LEDs to create images and patterns on the ceiling panels in the Kibbie Dome, a successor of Tower Lights.

Sponsor: Bob Rinker

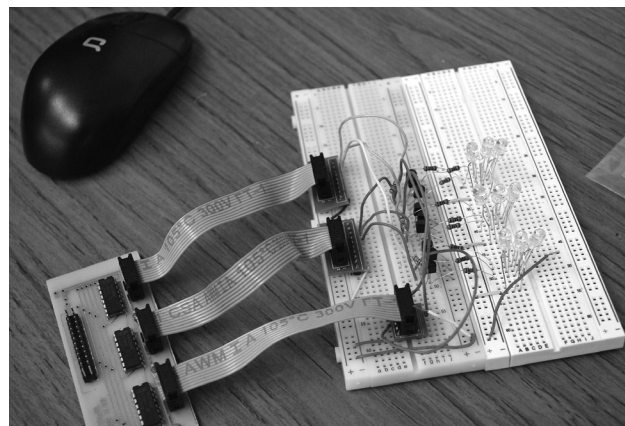
Sponsor Organization: Computer Science Department

Team Members:

Michael Crawl – Electrical & Computer Engineering

Heather Tallman – Electrical & Computer Engineering

Faculty Adviser(s): Touraj Assefi



KICKSHOT FOR ANDROID

KickShot for Android is a mobile application developed to bring KickShot, the board game, to the Android platform.

Sponsor: Aziz Akhani

Sponsor Organization: KickShot

Team Members:

Jordan Leithart – Computer Science

Robert Kleffner – Computer Science

Tao Zhang – Computer Science

Faculty Adviser(s): Bruce Bolden

Engineering Design EXPO Student Projects

LED VIDEO PLAYER

This project allows the user to play videos on an array of 32x32 pixel LED panels.

Sponsor: Robert Rinker

Sponsor Organization: Computer Science Department

Team Members:

Alex Eklund – Computer Science

Tell O’Neal – Computer Science

Faculty Adviser(s): Bruce Bolden, Robert Rinker

LUCKY FRIDAY MINE BORROW PIT DESIGN FOR TAILINGS IMPOUNDMENT

Hecla Mining has developed a borrow pit on company property to support the second stage of expansion on its active tailings pond at its Lucky Friday Mine in Mullan, Idaho. This project will evaluate borrow pit reactivation, stormwater & environmental controls, and a pit design for the current borrow pit.

Sponsor: Craig Shiner

Sponsor Organization: Hecla Mining Company

Team Members:

Matt Klepfer – Civil Engineering

Molly McGee – Civil Engineering

Garrett Rodgers – Civil Engineering

Faculty Adviser(s): Fritz Fielder

MARCHING BAND ENGINEERING

The goal of this project is to construct a human-powered mobile drum set for the UI Vandal Marching Band to use in halftime performances. We have also worked on various side projects, including wood turning mallets, modifying drum attachments and creating video tools to generate support for future musical performances.

Sponsor: Spencer Martin

Sponsor Organization: University of Idaho, Vandal Marching Band

Team Members:

Scott Blee – Mechanical Engineering

Jack Housley – Mechanical Engineering

Nadine Morasci – Mechanical Engineering

Theo White – Mechanical Engineering

Faculty Adviser(s): Edwin Odom, Steve Beyerlein

Mentor(s): Rory Lilley



MEASUREMENT OF OCEAN PH USING A NON-CONVENTIONAL QUINHYDRONE ELECTRODE

Accurate, durable pH sensors are needed to measure acidifying ocean pH due to rising atmospheric CO₂. Conventional pH meters cannot adequately meet these needs. A quinhydrone electrode with no platinum wire, a solid graphite composite interface, and a rugged encasement may. Adaption of this simple design could help spur the development of a more complete prototype design.

Sponsor: Wendy Schmidt

Sponsor Organization: Ocean Health XPrize

Team Members:

Moyd Alamri – Chemical & Materials Engineering

Reid Hattaway – Chemical & Materials Engineering

Alexander Schoenfelder – Chemical & Materials Engineering

Faculty Adviser(s): David Drown, Mark Roll

Mentor(s): Dennis Macpherson

MENAN INTERSECTION REDESIGN

The Menan Lorenzo Highway and State Highway 48 (SH 48) intersection will be redesigned to accommodate the increased traffic flow going east on the Menan Lorenzo Highway and the reduced flow heading south on SH 48.

Sponsor: Ben Burke

Sponsor Organization: Idaho Transportation Department

Team Members:

Greg Elmore – Civil Engineering

Riannon Heighes – Civil Engineering

Breanna Logerwell – Civil Engineering

Faculty Adviser(s): Fritz Fiedler

MODEL POWER SYSTEM

Create a digital model of an industrial plant that will be simulated in real time on the specialized Real Time Digital Simulation (RTDS) computer. Design and implement power system controls in real time automation controller (RTAC) donated by SEL. Interface the RTAC to the RTDS and test the controls scheme.

Sponsor: Scott Manson

Sponsor Organization: Schweitzer Electric Laboratories

Team Members:

Adel Al Mater – Electrical & Computer Engineering

David Eldredge – Mechanical Engineering

Chris Foiles – Electrical & Computer Engineering

Ann McConnell – Electrical & Computer Engineering

Faculty Adviser(s): Amrit Dahal

Mentor(s): Mahi Appannagari, Brian Johnson

MULTI LIPO BATTERY CHARGER

The University of Idaho Marching Band has been incorporating multimedia displays into their performances, including synchronized light emitting diodes powered by Lithium-Polymer battery packs. There is a need for a charging system capable of charging approximately 200 packs safely and efficiently within a one week time frame.

Sponsor: Robert Rinker

Sponsor Organization: ACM (Association for Computing Machinery), University of Idaho, Department of Computer Science

Team Members:

Ryler Adams – Electrical & Computer Engineering

Pankaj Dhyani – Electrical & Computer Engineering

Abraham Martinez – Electrical & Computer Engineering

Faculty Adviser(s): James Frenzel

Engineering Design EXPO Student Projects

NASA TOPPS (TENSEGRITY OPTIMIZED PAYLOAD PROTECTION SYSTEM)

Building and testing a physical prototype of a tensegrity structure to validate a computational model. The validated model will be used to design tensegrity based payload protection systems for interplanetary exploration.

Sponsor: Vytas SunSpiral

Sponsor Organization: NASA Ames Research Center, Intelligent Robotics Group

Team Members:

Alex Ackerman – Mechanical Engineering

Nick Clyde – Mechanical Engineering

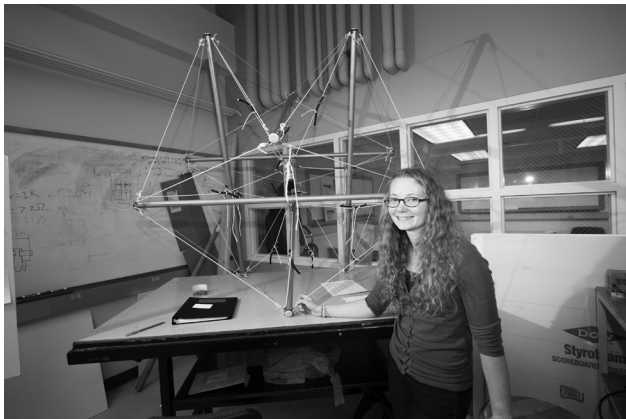
Will Hoffman – Mechanical Engineering

Brenden Kaschmitter – Mechanical Engineering

Mary Yovanoff – Mechanical Engineering

Faculty Adviser(s): Matthew Riley

Mentor(s): Sophie Milam, Kyle Morse



ORCHARD PICKER POSITIONING PLATFORM

We are designing a prototype that will aid orchard workers in picking and pruning apple and pear trees. Our goal is to speed up the picking and pruning process by using a leveling platform that moves up and down. The platform will make picking safer by removing the ladder hazard.

Sponsor: Joe Rumble

Sponsor Organization: Rumble Orchards

Team Members:

Cole Lewis – Mechanical Engineering

Spencer Marquis – Mechanical Engineering

Sydney Osterloh – Mechanical Engineering

Jordan Schwes – Biological & Agricultural Engineering

Faculty Adviser(s): Steve Beyerlein, Edwin Odom

Mentor(s): David Eld

OWSLEY CANAL BRIDGE

This project will select a culvert to replace the Owsley Canal Bridge near Mud Lake, Idaho. The design will involve traffic re-routing during construction, hydrologic analysis of the water in the canal, hydraulic analysis for culvert selection, pavement analysis and highway design of the new roadway above the culvert.

Sponsor: Michael McKee

Sponsor Organization: Idaho Transportation Department

Team Members:

John Cozens – Civil Engineering

Derek Probst – Civil Engineering

Mitch Skiles – Civil Engineering

Arthur Thomas – Civil Engineering

Faculty Adviser(s): Fritz Fiedler

POTABLE WATER FOR CHIWRAPI, BOLIVIA

Chiwirapi, Bolivia is a 250 person community in the Andes mountains. We are designing a clean drinking water and irrigation distribution system. The first step will be shallow wells with hand pumps and surveying for irrigation in the future.

Sponsor Organization: University of Idaho Chapter, Engineers Without Borders

Team Members:

Megan Dempsy – Civil Engineering

Riannon Heighes – Civil Engineering

Nate Hill – Civil Engineering

Rachel Hill – Civil Engineering

Meg Licht – Civil Engineering

William Parker – Electrical & Computer Engineering

Kelby Sommers – Civil Engineering

Nate Suhr – Civil Engineering

Faculty Adviser(s): Fritz Fiedler

PROSTHETIC LINER DONNING DEVICE

Our project is to design a device to aid lower limb amputees in donning their prosthetic liner. The device will ensure that the liner sits flush against the limb, properly aligns the pin, and enables those with low hand dexterity, vision, or flexibility to don their liner independently.

Sponsor: Lisa Huffman

Sponsor Organization: Biological & Agricultural Engineering Department

Team Members:

Matthew Guthrie – Mechanical Engineering

Allyson Labrum – Mechanical Engineering

Jennifer Rainey – Biological & Agricultural Engineering

Jordan Simonson – Biological & Agricultural Engineering

Samantha Sutherland – Biological & Agricultural Engineering

Faculty Adviser(s): Thomas Hess

Mentor(s): Matt Kologi, Chris Ohlinger



Engineering Design EXPO Student Projects

RAPID BIOEX ETHANOL FERMENTER

MuPor Industries has patented a rapid fermentation system for ethanol production using yeast encapsulated in bio-beads. Our project designed a scale up of bench-top reactors, using these BioEx beads, to proof-of-concept production scale. The reactors are designed to ferment sugars to ethanol within hours instead of days.

Sponsor: Ryan Meek

Sponsor Organization: Fostail BioSystems

Team Members:

Daniel Kang – Mechanical Engineering

Kevin Kruger – Biological & Agricultural Engineering

Kalven Metz – Biological & Agricultural Engineering

Matt Williams – Biological & Agricultural Engineering

Isaac Wilson – Mechanical Engineering

Faculty Adviser(s): Thomas Hess

Mentor(s): Jeremy Cuddihy

ROBOTIC WORKSTATION

Team RoboShow was tasked with the design and fabrication of a robotic workstation and safety enclosure to house the 6-Axis robots recently donated to the College of Engineering by the Boeing Company. The workstation will be used by the college as a platform for hands-on coursework and exciting new research.

Sponsor: Eric Wolbrecht

Sponsor Organization: University of Idaho, Mechanical Engineering Department

Team Members:

Will Edwards – Mechanical Engineering

Jacob Herrington – Electrical & Computer Engineering

Stephen Goodwin – Mechanical Engineering

Andrew Gregory – Mechanical Engineering

Kyle Kausen – Electrical & Computer Engineering

Kevin Witkoe – Mechanical Engineering

Faculty Adviser(s): David Alexander, Michael Santora

Mentor(s): David Eld

SMALL SATELLITE TECHNOLOGY

Demonstrate proof of concept for measuring planetary winds using Doppler shift. Provide end to end manufacturing and testing of system, including a capsule. Testing includes an in flight test working with Idaho VAST to perform in air flight.

Sponsor: David Atkinson

Sponsor Organization: Idaho Space Grant Consortium

Team Members:

Aaron Kitchen – Mechanical Engineering

Rhys Perry – Electrical & Computer Engineering

Philip Petersen – Mechanical Engineering

Jessica Slater – Electrical & Computer Engineering

Faculty Adviser(s): Touraj Assefi, Amrit Dahal

Mentor(s): David Eld, Stephan Wayne, Jason Bjur

SOLAR BRINE CONCENTRATOR

The brine solution from a solar water distillation is concentrated with a spray dryer and heat pump process powered by solar energy. The process is accomplished by preheating the air and the brine solution, raising the temperature so the water evaporates out of the solution when atomized leaving behind salt crystals. The exhaust is then condensed to produce clean water. The separation produces agricultural grade salts. The brackish solution is used at a rate of one gallon per hour.

Team Members:

Kirsten Hillyer – Chemical & Materials Engineering

Frank Ramirez – Chemical & Materials Engineering

Jared Reynolds – Chemical & Materials Engineering

Brennett Rodseth – Chemical & Materials Engineering

Faculty Adviser(s): David Drown

Mentor(s): David MacPherson, Charles Cornwall

SOLAR POWERED WATER FILTRATION

Developed in collaboration with Orphans to Ambassadors, our design project is a solar powered water filtration unit designed to be implemented in rainwater catchment systems. The design will provide clean, safe, pathogen-free water to remote orphanages that are without readily available power sources.

Sponsor: Jake Gentry

Sponsor Organization: Orphans to Ambassadors

Team Members:

Amy Cox – Biological & Agricultural Engineering

Tyler Marines – Mechanical Engineering

Kyle Rainer – Biological & Agricultural Engineering

Sharon Strom – Biological & Agricultural Engineering

Nick Stroud – Mechanical Engineering

Faculty Adviser(s): Thomas Hess

SOLDER JOINT RELIABILITY

Thermal expansion and impact stress is a concern to manufacturers dealing with solder joint reliability. The Solder Joint Reliability capstone project produced a finite element analysis model, validated with experimentation data, capable of predicting the failure rate of an electronic component's solder ball array caused by repeated thermal cycling.

Sponsor: Owen Fay

Sponsor Organization: Micron Technology, Inc.

Team Members:

Chadd Bergland – Mechanical Engineering

Josh Carlson – Mechanical Engineering

Trevor MacLean – Mechanical Engineering

Faculty Adviser(s): Fred Barlow, Gabriel Potirniche, David Alexander

Mentor(s): Victor Wolemiwa, Dominic Nwoke, Jose Ramirez Ruiz

SOLID MODELING WITH SOLIDWORKS AND CATIA

Students in ME 301 (Introduction to Solid Modeling w/Solidworks) and ME 421 (Advanced CAD w/CATIA) engage in challenging end of semester projects that bring them into close contact with classic mechanisms, design of new learning spaces, integration of CAD with metrology, and exploration new software toolkits. Their work products leave a valuable legacy to future students in these courses.

Sponsor Organization: University of Idaho, Mechanical Engineering Department

Team Members:

ME 301 Students

ME 421 Students

Faculty Adviser(s): Edwin Odom, Steve Beyerlein, Dan Cordon

Mentor(s): Chris Jerue, Luke Nelson, Ingrid Kooda, Matt Guthrie, Nadine Morasci, Amanda White, Matt Kologi, Jeff Reznicek, Bryce Gill

Engineering Design EXPO Student Projects

SPRINGFIELD SOCKEYE SALMON HATCHERY

Springfield Hatchery is a Sockeye Salmon hatchery in southern Idaho that will be designed to produce 1 million Sockeye smolts to feed the Salmon River run to Redfish Lake. This project involved the design of the main hatchery facility including the structural, geotechnical and hydraulic analyses.

Sponsor: Morton McMillen

Sponsor Organization: McMillen LLC

Team Members:

Beau Donaldson – Civil Engineering

Eric Holmberg – Civil Engineering

Vance Leavitt – Civil Engineering

Kelby Sommer – Civil Engineering

Ben Sonnen – Civil Engineering

Faculty Adviser(s): Fritz Fiedler

Mentor(s): Olivia Weick

STROKE REHABILITATION ROBOT – ROBOTIC ARM ASSIST

Assisting TECNALIA's venture in designing a rehabilitation robot to aid in stroke victim's recovery. The mission is to design and build a gripping, wrist rotation, and arm elevation mechanism and a computer interface to depict the state of these mechanisms to extend the functionality of the existing rehabilitation robot.

Sponsor: Joel Perry

Sponsor Organization: TECNALIA

Team Members:

Joe Osborn – Mechanical Engineering

Roman Pacheco – Electrical & Computer Engineering

Brenden Staab – Biological & Agricultural Engineering

Kadrie Swanson – Biological & Agricultural Engineering

Steven Witkoe – Mechanical Engineering

Faculty Adviser(s): Matthew Riley

Mentor(s): Jon Teske

SUNSHINE ISLAND: A FLOATING SOLAR CELL

A floating solar cell unit has been developed to generate power for a mining site. The unit will be placed on a tailings pond and have single axis solar tracking for better efficiency. The bench scale model will consist of a single unit that will create a fraction of what the full scale model will demand.

Sponsor Organization: WERC

Team Members:

Michael Cron – Chemical & Materials Engineering

St. John Richardson – Chemical & Materials Engineering

Kelsey VanderWaal – Chemical & Materials Engineering

Breanna Wong – Chemical & Materials Engineering

Faculty Adviser(s): David Drown

Mentor(s): David MacPherson, Charles Cornwall

SYNTHESIS AND CHARACTERIZATION OF PERFLUORINATED CALIXARENES

Calixarenes like resorcinol[4]arene and pyrogallol[4]arene have been studied for decades. Their functionalized counterparts, however, have received markedly less attention despite presenting with potential applications in separation science (Chu, O'Neal and Osipov) and biphasic reaction chemistry. The standard reaction method to generate these macrocycles was involved reflux under argon for upwards of 72 hours, a time and material intensive process. Using green chemistry microwave technology, however, the reaction time is reduced from 72 hours to 15-20 minutes. In addition, the volume of solvent needed is

greatly diminished, as is the input power required to drive the reaction.

Team Members:

Sara Sumner – Chemical & Materials Engineering

Faculty Adviser(s): Mark Roll, David Drown

Mentor(s): Mark Roll

UNIVERSITY OF IDAHO'S INDUSTRIAL ASSESSMENT CENTER

The purpose of the University of Idaho's Industrial Assessment Center is to train a generation of energy engineers and provide local industries with energy and process efficiency improvements.

Sponsor: Dev Shrestha

Sponsor Organization: U.S. Department of Energy

Team Members:

Chris Anderson – Biological & Agricultural Engineering

Chad Dunkel – Biological & Agricultural Engineering

Ibrahim Ibrahim – Civil Engineering

Andrew Lake – Mechanical Engineering

Luke Nelson – Mechanical Engineering

Vignesh Jayaraman Muralidharan – Biological & Agricultural Engineering

Ryan Oliver – Electrical & Computer Engineering

Vince Schwartz – Mechanical Engineering

Chance Sundquist – Mechanical Engineering

Faculty Adviser(s): Dev Shrestha, Steve Beyerlein

WIND RESOURCE ASSESSMENT

The project is an assessment of the wind resource on the U of I campus. The assessment is accomplished by placing four instrument packages, consisting of an anemometer, a wind direction vane, and a data logger, at four sites and collecting wind data. The sites are on top of the water tower at the UI golf course, on top of Theophilus Tower, on top of the Anderson grain elevators down town, and on top of 20 meter tower at the UI farm on 6th street. This project is funded by a grant from the University of Idaho Sustainability Center

Sponsor Organization: University of Idaho Sustainability Center

Team Members:

Kelly Moore – Mechanical Engineering

Jordan Scott – Electrical & Computer Engineering

Faculty Adviser(s): Tao Xing

#YOCO (YOU-ONLY-COAT-ONCE)

Magnesium alloys have a lower density than aluminum but are more susceptible to corrosion. In order to increase feasibility the magnesium alloys were anodized with NH₄F. The effectiveness of the coating was tested using electrochemistry/weight loss to determine its effect on corrosion resistance.

Sponsor: Krishnan Raja

Sponsor Organization: University of Idaho Materials Engineering Department

Team Members:

Zach Campbell – Chemical & Materials Engineering

Diane Edwards – Chemical & Materials Engineering

Adam Grebil – Chemical & Materials Engineering

Quinn MacPherson – Chemical & Materials Engineering

Faculty Adviser(s): David Drown, Krishnan Raja
