

2017 EXPO AWARD WINNERS

People's Choice Award

Hoofbath Copper Recovery

Five to ten percent copper sulfate solutions are implemented to prevent their cattle from infectious hoof diseases. After every 150-200 cattle, the solution becomes inactivate due to biosolids, urine, and soil particles. Currently waste solutions are sent to the wastewater lagoons, reducing soil fertility. Recovering copper from used copper-sulfate hoof baths can be recycled to restore the capital loss on copper. This process is not only economically sound, but environmentally friendly. Our team has been tasked to create an economical process of separating copper from the inactivated copper sulfate solution while doing a biological treatment process of the biosolids.

Sponsor Organization: NMSU Institute for Energy and the Environment

Team Members:

- Zachary Beaman — Chemical & Materials Engineering
- Jacob Bonwell — Chemical & Materials Engineering
- Emily Tesnohlidek — Chemical & Materials Engineering
- Elli Tindall — Chemical & Materials Engineering
- Sam Wolfe — Chemical & Materials Engineering

Faculty Advisers: James Moberly, David Drown, Matthew Bernards

Mentor: David MacPherson, Charles Cornwall

Booth Award Winners

3D Metal Printer

We are creating a prototype 3D metal printer using MIG welding technology in order to bring the cost of 3D printing metal down and deliver access to academia and the home user.

Sponsor: Mike Maughan

Sponsor Organization: Department of Mechanical Engineering

Team Members:

- Matthew Buchanan — Mechanical Engineering
- Maxwell Emerson — Mechanical Engineering
- Peter Haley — Mechanical Engineering
- Kyle Krieg — Electrical & Computer Engineering
- Jay Van Gerpen — Electrical & Computer Engineering
- Nathan Wagner — Mechanical Engineering

Faculty Adviser: Mike Maughan

Clean Snowmobile Muffler Team

Working as a sub-team on this year's competition sled, we designed, manufactured, and validated a muffler that is quieter than stock without imposing power losses.

Sponsor: Clean Snowmobile Challenge Team

Sponsor Organization: Society of Automotive Engineers

Team Members:

- Marcelino Arteaga — Mechanical Engineering
- Aaron Eliason — Mechanical Engineering
- Adam Sedgewick — Mechanical Engineering
- Mark Woodland — Mechanical Engineering

Faculty Adviser: Dan Cordon

Mentor: Dillon Savage

Lunar Flywheel Controls

Develop code and hardware configuration for the safe acceleration and stabilization of the Low Speed Lunar Flywheel Energy Storage System.

Sponsor Organization: NASA

Team Members:

- Brian Cartwright — Computer Science
- Andrew Jones — Electrical & Computer Engineering
- Ian Tanimoto — Computer Science

Faculty Advisers: Herb Hess, Christine Berven

Mentor: David Arnett

Micro Capacitive Sensor

The goal of this project is to develop a printed circuit board (PCB) that utilizes capacitive sensors and an off-the-shelf capacitance-to-digital-converter (CDC) to detect and monitor micro entities. The monitoring process is an autonomous process that displays a plot of real-time capacitance values.

Sponsor: Suat Ay

Sponsor Organization: U of I VLSI Sensor Research Group

Team Members:

- Jennifer Hunt — Electrical & Computer Engineering
- Nathan Totorica — Electrical & Computer Engineering
- Jordan Vilcapoma — Electrical & Computer Engineering

Faculty Adviser: Feng Li

Mentors: Bingxing Wu, Ezekiel Adekanmbi

Neurotouch

The NeuroTouch is a hand-held device that measures the elastic modulus of biological tissues with the slightest touch to the tissue surface. It is designed to be used as a diagnostic tool for surgeons; giving real time feedback to aid in determining the severity of different health ailments.

Sponsor: Bryn Martin & Mike Maughan

Sponsor Organization: University of Idaho

Team Members:

- Mazen Aljawi — Biological Engineering
- Brooke Deans — Mechanical Engineering
- Christina Gibbs — Biological Engineering
- Mathew Harlow — Mechanical Engineering
- Brendan Souvenir — Electrical & Computer Engineering

Faculty Adviser: Dev Shrestha

Mentor: Richard Leathers

RF Energy Harvesting

Only a small amount of RF energy is captured by the intended receiver. The objective of this research is to make a device that captures the remaining ambient energy and converts it back into electricity for low power applications such as powering a sensor module.

Sponsor Organization: U of I Sustainability Center

Team Members:

- Alexa Aguilar — Electrical & Computer Engineering
- Andrew Davies — Electrical & Computer Engineering
- Tyler Larson — Electrical & Computer Engineering

Faculty Advisers: Herb Hess, Ata Zadehgo, Feng Li

Sight Impaired Mobility Assistance

This product is designed to enable sight-impaired people to navigate by sound. A headset carrying video cameras produces a software model of the surroundings, and translates this description to sounds, allowing the user orient him/herself and perform tasks like navigating around a room and pick up objects. This phase of the project focuses on constructing a videogame-like “virtual world”, and mapping a 3D scene into sound, serving as a testbed of techniques.

Sponsor: Daniel Schneider

Sponsor Organization: Schweitzer Engineering Laboratories, Inc.

Team Members:

- Matt Daniel — Computer Science
- Mason Fabel — Computer Science
- Eric Marsh — Computer Science
- Colin Pate — Electrical & Computer Engineering
- John Snevily — Computer Science

Faculty Adviser: Greg Donohoe

The Internet of Things: Watering the Future

In the US 355 **billion** gallons of water is used every day, water conservation is essential for reducing such use. This design utilizes a user friendly application to instruct sensors to gather atmospheric and soil readings. This data is used to control irrigation in real-time to minimize overwatering, thereby conserving water.

Sponsor Organization: NMSU Institute for Energy and the Environment

Team Members:

- Taylor Davis — Chemical & Materials Engineering
- Kyle Hubbell — Chemical & Materials Engineering
- Brett McKinnon — Chemical & Materials Engineering
- Tyler Songstad — Computer Science

Faculty Advisers: David Drown, Matthew Bernards

Titanium Fitting Sorting

We have created a material handling system to properly orient titanium fittings for a subsequent cleaning operation in accordance with needs of Boeing's Tube Duct and Reservoir Center.

Sponsor Organization: The Boeing Company

Team Members:

- Evan Bonar — Mechanical Engineering
- John Hansen — Mechanical Engineering
- Joshua Howard — Mechanical Engineering
- Cody Smisek — Mechanical Engineering
- Juvy Jane Tongco — Mechanical Engineering

Faculty Adviser: Steven Beyerlein

Mentor: Alex Olson

Vandal Atmospheric Science Team

The Vandal Atmospheric Science Team (VAST) aims to design, build, test, fly and recover aerospace technology and science instrumentation via High-Altitude Balloon launches, develop critical-thinking creators and leaders, and foster partnerships between the University of Idaho and the aerospace industry.

Sponsor: Joe Law

Sponsor Organization: NASA Idaho Space Grant Consortium

Team Members:

- Cooper Atkinson — Mechanical Engineering
- Byron Bowles — Mechanical Engineering
- Bill Duncan — Mechanical Engineering
- Zach Hacker — Mechanical Engineering
- David Handy — Electrical & Computer Engineering
- Jonathan Hanson — Electrical & Computer Engineering
- Kyle Petersen — Mechanical Engineering

- Caleb Smith — Mechanical Engineering
- Nathan Wagner — Mechanical Engineering

Faculty Adviser: Ata Zadehgol

Wearable Mobile Arm Support

To design a mobile, wearable, arm movement assistance device from the existing design that is effective at providing support to the shoulder and elbow and comfortable to the user.

Sponsor: Joel Perry

Sponsor Organization: Department of Mechanical Engineering

Team Members:

- Anthony Branz — Mechanical Engineering
- Jace Courtright — Mechanical Engineering
- Carter Drake — Mechanical Engineering
- Parker Hill — Mechanical Engineering
- Kylo Murray-Gann — Mechanical Engineering

Faculty Adviser: Joel Perry

Mentor: James Founds

Technical Presentation Award Winners

Clean Snowmobile Challenge Team

The University of Idaho Clean Snowmobile Team is comprised of both undergraduate and graduate students. We design, build, and test a snowmobile then compete with it at the SAE Clean Snowmobile Challenge. The object of the challenge is to reduce emissions and quiet the snowmobile while maintaining reliability and performance.

Sponsor Organization: Department of Mechanical Engineering & NIATT

Team Members:

- Zac Avelar — Mechanical Engineering
- Ben DeRuwe — Mechanical Engineering
- Phoenix Duncan — Mechanical Engineering
- Aaron Eliason — Mechanical Engineering
- Brian Gift — Computer Engineering
- Hayden Hulse — Mechanical Engineering
- Alex Kiss — Mechanical Engineering
- Zach Lipple — Mechanical Engineering
- Jason Maas — Mechanical Engineering
- Leland Maris — Agricultural Systems Management
- Patrick Paulus — Mechanical Engineering
- Adam Sedgwick — Mechanical Engineering
- Cade Smith — Mechanical Engineering
- Ian Sullivan — Mechanical Engineering
- Joseph Tucker — Mechanical Engineering
- Adam Thurgood — Mechanical Engineering
- Mark Woodland — Mechanical Engineering

Faculty Adviser: Dan Cordon

Mentor: Dillon Savage

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- Mark Woodland — Mechanical Engineering

Faculty Adviser: Dan Cordon

Mentor: Dillon Savage

High Speed Stator Design for Flywheel Energy Storage System

U of I-FESS research team is designing and modeling flywheel energy storage systems to evaluate their associated science and technologies. FESSs enable the storage of energy from renewable, intermittent sources such as wind, solar, and nuclear. The high speed model is being developed to be able to store 30,000 RPMs.

Sponsor Organization: NASA

Team Members:

- Cooper Atkinson — Mechanical Engineering
- Nicholas Bachus — Mechanical Engineering
- Shea Morrison — Electrical & Computer Engineering
- Kyle Peterson — Mechanical Engineering
- Matt Phillips — Electrical & Computer Engineering

Faculty Advisers: Herbert Hess, Christine Berven

Mentors: David Arnett, Justin Pettingill

Page Wastewater Treatment Plant Upgrade

The Page wastewater treatment plant is located in Smelterville, Idaho. It currently is unable to meet its NPDES effluent requirements for ammonia. Additionally, it is likely that the EPA will impose stricter effluent ammonia requirements in the future along with nitrate and phosphorus. The purpose of the project is to design a biological treatment and solids separation system to maximize the use of existing infrastructure.

Sponsor: Sharon Strom

Sponsor Organization: J-U-B Engineers

Team Members:

- Casey Bryant — Civil Engineering
- Kade Dustin — Civil Engineering

- Erin Poor — Civil Engineering
- Austin Quinn — Civil Engineering

Faculty Advisers: Fritz Fiedler, Erik Coats

Passive Solar Distillation of Acid Rock Drainage Water

Acid rock drainage (ARD) waters impact local waterways due to their heavy metal content and acidity. Many affected sites are remote and effective treatment requires low-maintenance and self-sustaining processes. Our team has developed a passive solar distillation system to treat ARD waters, operating solely on gravity and solar power.

Sponsor Organization: NMSU Institute for Energy and the Environment

Team Members:

- Alyssa Ertel — Chemical & Materials Engineering
- Talal Hamadah — Chemical & Materials Engineering
- Jesse Hinshaw — Chemical & Materials Engineering
- Erin Johnson — Chemical & Materials Engineering
- Nathan Myers — Chemical & Materials Engineering

Faculty Advisers: David Drown, Matthew Bernards

Mentors: Charles Cornwall, John Failla

Seed Storage Tube

Our prototype is intended for usage in third world countries to help increase agricultural yield. Our solution is an airtight and watertight container inside which seeds collected during harvest can be stored for up to two years. The container is vacuum sealed to kill insects present in the seed.

Sponsor: Don Tolmie

Sponsor Organization: Idaho Bean Commission

Team Members:

- Joshua Begay — Biological Engineering
- Peter Handel — Mechanical Engineering
- David Smith — Mechanical Engineering
- Joel Wilson — Biological Engineering

Faculty Advisers: Dev Shrestha, Steven Beyerlein

Mentor: Alex Olson

Snare Drum Notator

This project will take real-time measurements of a soloist playing on the snare drum, and convert them into music notation, which can be displayed using publicly available applications, or printed. The system will gather signals from accelerometers and gyroscopic sensors mounted to a wristband. The goal is to capture nuances of the performance not available in commercial notation software, such as type of stroke, and location, attack, and intensity of a hit.

Sponsor: Spencer Martin

Sponsor Organization: U of I School of Music

Team Members:

- Scott Dennis — Computer Science
- Nathan Groggett — Electrical & Computer Engineering
- Phil Kearns — Electrical & Computer Engineering
- Hue Purkett — Computer Science
- Domn Werner — Computer Science

Faculty Adviser: Greg Donohoe

The Internet of Things: Watering the Future

In the U.S., 355 **billion** gallons of water is used EVERY DAY, water conservation is essential for reducing such use. This design utilizes a user friendly application to instruct sensors to gather atmospheric and soil readings. This data is used to control irrigation in real-time to minimize overwatering, thereby conserving water.

Sponsor Organization: NMSU Institute for Energy and the Environment

Team Members:

- Taylor Davis — Chemical & Materials Engineering
- Kyle Hubbell — Chemical & Materials Engineering
- Brett McKinnon — Chemical & Materials Engineering
- Tyler Songstad — Computer Science

Faculty Adviser: David Drown, Matthew Bernards

The Point at Post Falls

Land development in Post Falls, Idaho that includes roadway design, stormwater collection and treatment, and design of wastewater facilities.

Sponsor: Ben Weymouth

Sponsor Organization: T-O Engineers

Team Members:

- Kyle Allen — Civil Engineering
- Ry Butler — Civil Engineering
- Taylor Hart — Civil Engineering
- Shane Warmbrodt — Civil Engineering

Faculty Adviser: Fritz Fiedler, Erik Coats, C.P. Liou