

THE NORTHWEST'S LONGEST-RUNNING STUDENT ENGINEERING SHOWCASE

XXII
TwentySecond
Annual

engineering • design
expo 2015

EXPLORE ENGINEERING

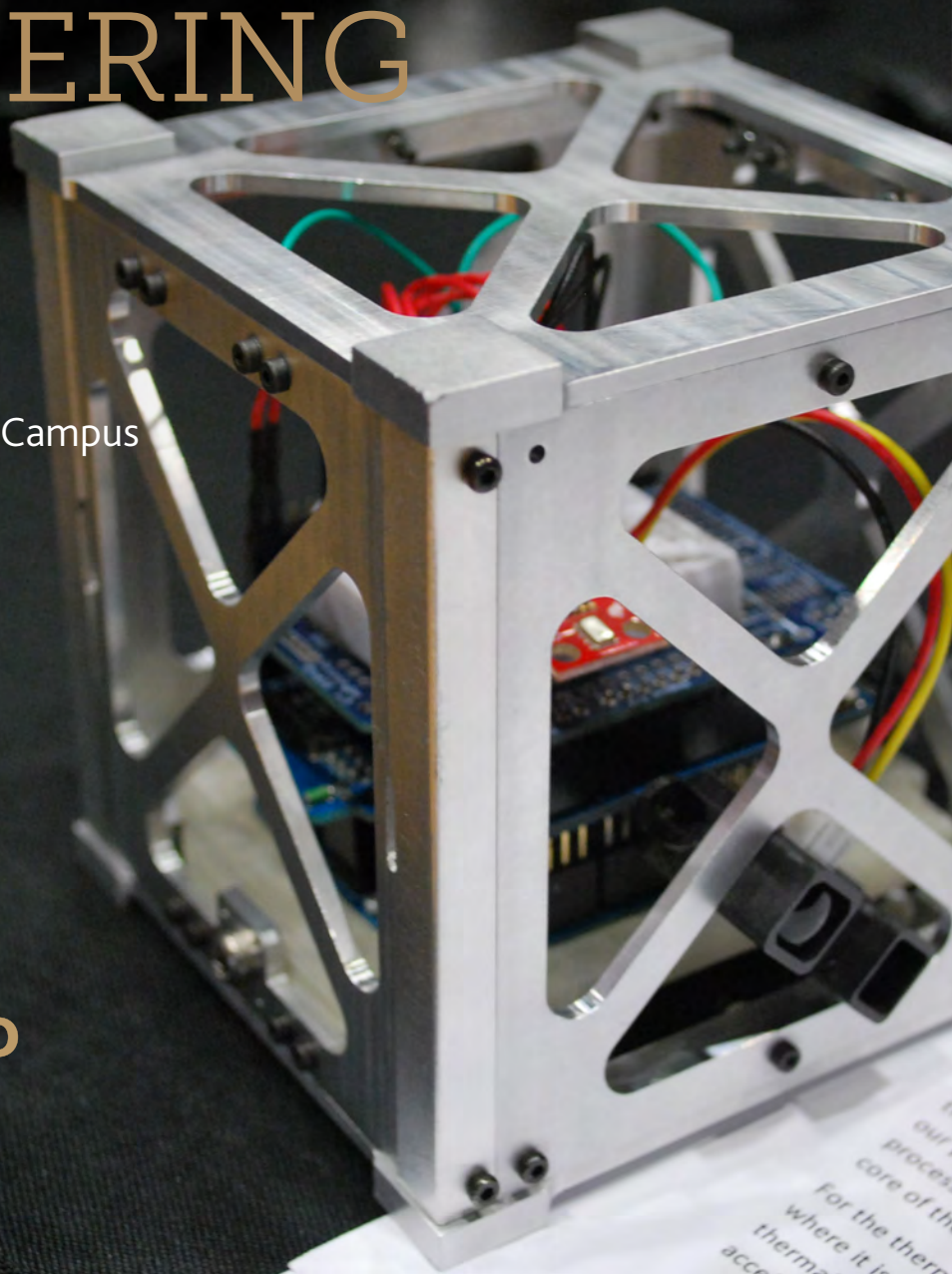
May 1, 2015

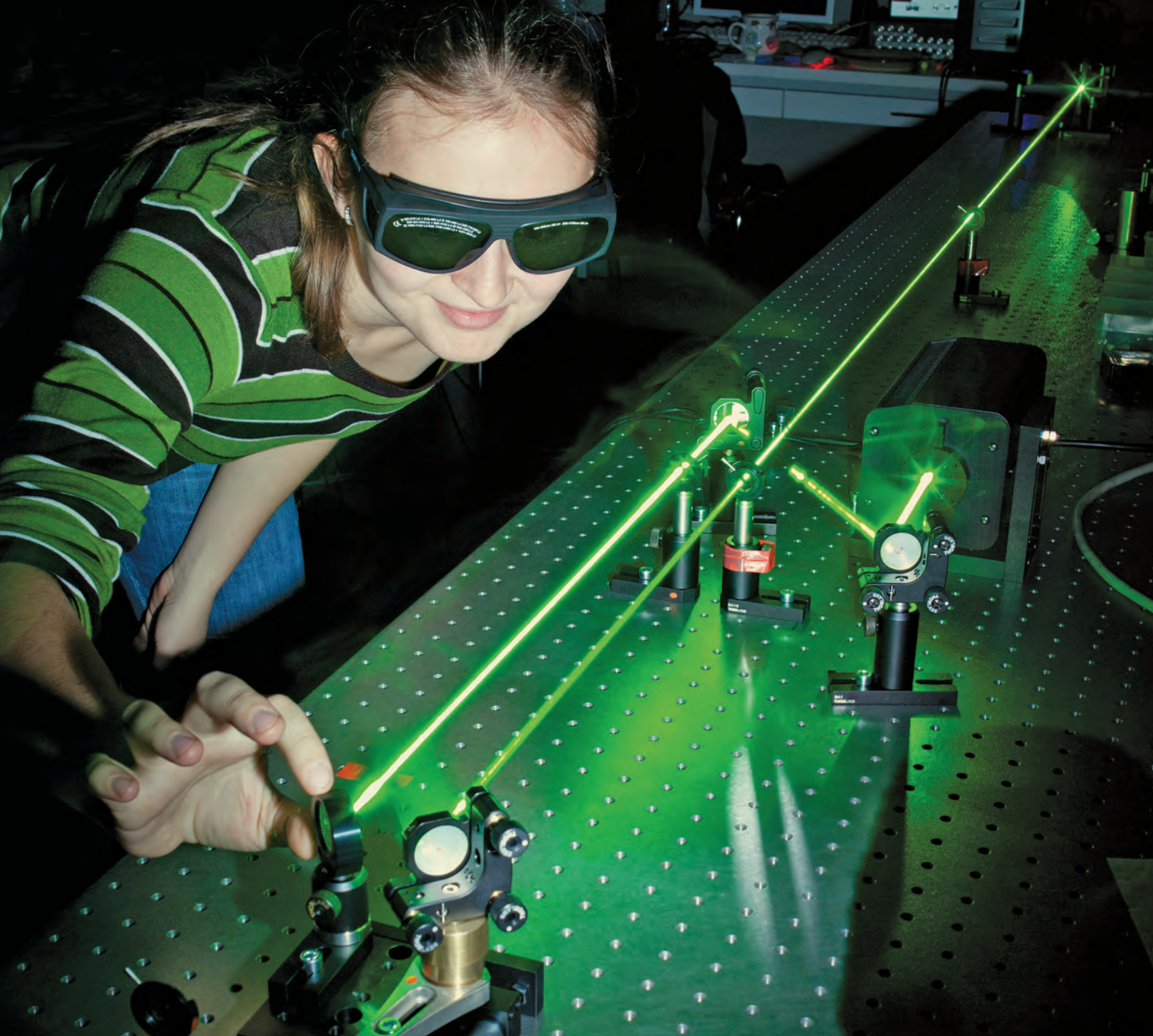
Bruce M. Pitman Center (SUB)
University of Idaho | Moscow Campus

Presented by:



University of Idaho
College of Engineering





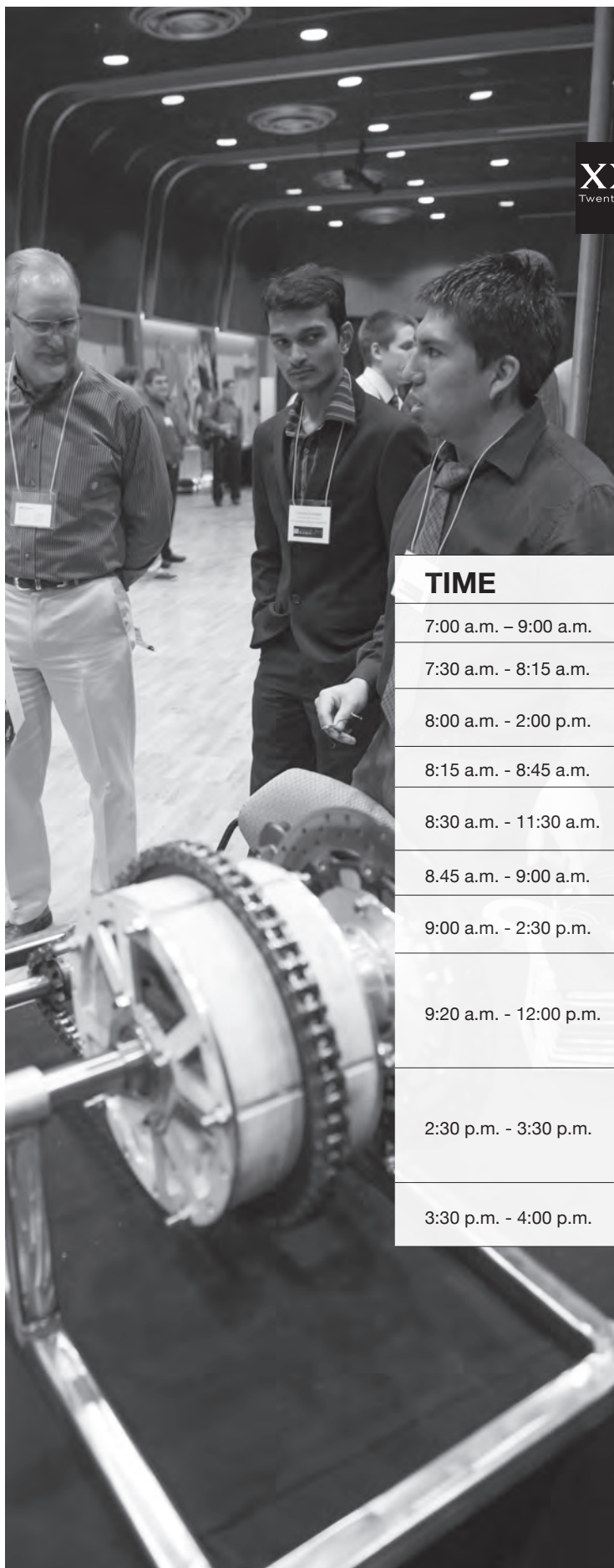
Official sponsors of tomorrow's tech



The Micron Foundation strives to build a strong community and promote robust education in the areas of science, technology, engineering and mathematics (STEM). Through our support of local non-profits, K-12 schools and universities, we support the communities where our employees live, work and volunteer.

We are proud to support students at the 2015 Engineering Design EXPO and the University of Idaho College of Engineering.





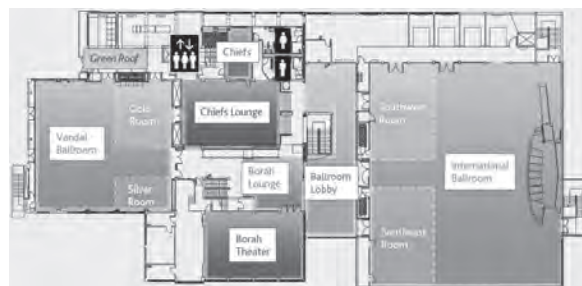
XXII
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engineering • design expo2015

May 1

University of Idaho
BRUCE PITMAN CENTER 2nd FLOOR
(Student Union Building)

TIME	EVENT	PLACE
7:00 a.m. – 9:00 a.m.	Student Registration	Ballroom Lobby (2nd Floor)
7:30 a.m. - 8:15 a.m.	Judges Breakfast	Vandal Ballroom (2nd Floor)
8:00 a.m. - 2:00 p.m.	EXPO Information	Bruce Pitman Center (1st Floor)
8:15 a.m. - 8:45 a.m.	Judge Orientation	Vandal Ballroom (2nd Floor)
8:30 a.m. - 11:30 a.m.	K-12 Visitor Registration	Bruce Pitman Center (1st Floor)
8.45 a.m. - 9:00 a.m.	Opening Ceremonies	Chief's Lounge (2nd Floor)
9:00 a.m. - 2:30 p.m.	EXPO Hall Open	International Ballroom (2nd Floor)
9:20 a.m. - 12:00 p.m.	Technical Sessions	Borah Theater (2nd Floor) Cataldo Room (Basement) Gold Room (2nd Floor) Silver Room (2nd Floor) Vandal Ballroom (2nd Floor)
2:30 p.m. - 3:30 p.m.	Karen Higgins, Honorary Chair Keynote Address: Preventing Interstellar: Millennials' Role in Shaping the Future	International Ballroom (2nd Floor)
3:30 p.m. - 4:00 p.m.	EXPO Awards Ceremony	International Ballroom (2nd Floor)



THANK YOU

2015 Engineering Design EXPO Sponsors

The University of Idaho, College of Engineering thanks all of our corporate and educational sponsors for their generous support of the 22nd annual Engineering Design EXPO. We value and appreciate our sponsors' participation and continued commitment to engineering education and EXPO.



Sponsorship Opportunities

Planning Engineering Design EXPO is a yearlong activity. To explore future opportunities to support the University of Idaho's Engineering Design EXPO contact the College of Engineering Development office at 208-885-5201 or email us at expo@uidaho.edu. We look forward to talking with you about how you can help us engage young learners to *explore engineering*.

Welcome to Engineering Design EXPO



It is my pleasure to welcome you to the 22nd Annual Engineering Design EXPO, the longest-running exposition in the Pacific Northwest, showcasing senior engineering capstone projects. For more than 100 years, the College of Engineering has been providing highly talented engineers to Idaho and the world. Our capstone design experience is the highlight of our engineering program. University of Idaho engineering students tackle real-world issues with the help of industry partners. Companies provide a technical problem and we provide our students with a hands-on opportunity to solve it. It's a perfect match! In this program, students work in teams, learn about the design process, and are provided an opportunity to apply their entire college education towards an industry sponsored project.

We have been hosting an exposition of our capstone projects for twenty-two years. This is a long time for any event. Over the years EXPO has grown in significance towards our educational process and our students' development. Thank you to all faculty, staff, students and industry partners who have helped shape EXPO these past two decades. Our capstone program which provides the content for EXPO has been recognized by the National Academy of Engineering as one of the best in the nation, highlighting it as one of seven capstone programs that infuses real-world experiences into engineering education. This recognition is impressive considering every engineering college has a capstone program. This recognition by the National Academy of Engineering is a testament to the hard work and talents of our faculty, staff, students and industry partners. EXPO is recognized by those in industry eager to hire our students for the skills and knowledge they demonstrate through the projects you will learn about today.

I also want to thank our judges who are industry partners and friends of the College of Engineering. They give of their time and expertise each year to make this a rich experience for our students. In addition, EXPO receives sponsorships from industry partners who help us engage young learners to explore engineering. We depend on generous sponsorships from our partners including the Micron Foundation, University of Idaho Engineering Outreach, BP, Schweitzer Engineering Laboratories, Avista, Power Engineers, Boeing, Lochsa Engineering, Idaho National Laboratories, the Center for Advanced Energy Studies, Hewlett-Packard, Wagstaff and Itron that enable us to provide these opportunities.

We are proud of the education and experiences that we provide to our students in the College of Engineering. I invite you to ask our students questions about their projects and engineering designs, and to explore the world of engineering today at our Engineering Design EXPO.

Thank you for attending this exciting event and your interest in our students' engineering excellence.

Sincerely,

Larry Stauffer, Dean
University of Idaho, College of Engineering

2015 EXPO Honorary Chair and Keynote Speaker

Dr. Karen Higgins

Dr. Karen Higgins earned her B.S. in mathematics and master's degree in electrical engineering in 1972 and 1973 respectively from the University of Idaho. She continued her education at Claremont Graduate University, Claremont, California, where she received a M.B.A and Ph.D. in Executive Management. After an exceptional 32-year career in the U.S. Naval Air Warfare Center Weapons Division she retired in 2005. In 2012 Dr. Higgins was inducted into the University of Idaho, Academy of Engineers. She is currently an Adjunct Professor at the Peter F. Drucker and Masatoshi Ito Graduate School of Management at Claremont Graduate University where she teaches project management, systems thinking and ethical leadership. She is author of two books, *Financial Whirlpools* (2013) and *Economic Growth and Sustainability* (2015). Her EXPO Keynote talk is derived from her third and forthcoming book *The Seven Colors of Leadership*.



Preventing Interstellar: Millennials' Role in Shaping the Future

In the movie *Interstellar* when the Earth was ravaged by blight and civilization was threatened, scientists devised two plans to rescue humanity. Both involved exploring the universe for habitable planets to begin human civilization anew or to relocate. Although our situation is not quite as grave as that portrayed in this science fiction movie, great challenges lie ahead.

Predictions suggest that by 2040, Earth will support nine billion souls; water and fossil fuels will have dwindled; infrastructures will be in disarray; and pollution will have created an environmental predicament. To tackle the challenges brought on by this new world order, pioneering industries and novel products will be crucial; out-of-the box thinking will be vital; global perspective will be necessary and technical innovation will be more critical than at any time in history.

Unlike the society in *Interstellar*, we are earth-bound for the foreseeable future. Rather than escaping, we must resolve our issues - and prevent an *Interstellar* scenario. We must protect and preserve as we rely on our human ability to adapt, on our ingenuity, and particularly on our greatest asset: the Millennial Generation.

Unlike previous generations, these young adults have grown up in a world of flux where communication is instant, collaboration is a way of life and differences are embraced. They view the world through fresh eyes and frame its problems in a different context. Unafraid to explore and equipped with technical acuity, scientists and engineers in this generation will be able to reframe our issues and generate solutions - as many have already demonstrated. This generation will transform hope into solutions.

Whether we are millennials or 'pre'-millennials, we all have a part in this journey of transformation. Millennials must build their skills and develop a spectrum of qualities to address contemporary issues. Previous generations must facilitate their path ahead. Together, we can shape a future that prevents an *Interstellar* outcome.

THANK YOU

2015 Engineering Design EXPO Judges



A special thank you to all of the individuals who have taken time to lend their expertise as 2015 Engineering Design EXPO judges. Judges serve an essential role in the EXPO experience. Our senior design students gain invaluable insights through their interaction with EXPO judges. Together we recognize and congratulate our senior capstone students on their hard work, and welcome them as colleagues into the dynamic world of engineering. Thank you for joining us today, your participation is greatly appreciated.

Brad Acker - University of Idaho
Ralph Barker - Hecla Mining Company
Amanda Battles - Clearwater Paper
Pat Blount - Moscow School District
Bruce Bouton - The Boeing Company
Pietro Boyd - Nightforce Optics
Myles Brown - The Boeing Company
Mike Bryson - Schweitzer Engineering Laboratories
Martin Buehler - Decagon Devices
Christopher Byrne - POWER Engineers, Inc.
John Crockett - Crockett Consulting
Amrit Dahal - University of Idaho
Finia Dinh - Idaho Department of Labor
Raymond Dixon - University of Idaho
Byron Flynn - General Electric
Shannon Fuchs - Idaho Forest Group
Jennifer Halvorson - Schweitzer Engineering Labs
Gene Hamacher - University of Idaho TechHelp
Blake Hansen - Alturas Capital
Marjorie Hatter - Retired
Chad Heimbigner - Coffman Engineers
Kenneth Hengen - U.S. Army Corps of Engineers
Scott Hodge - Schweitzer Engineering Laboratories
David Hollenback - K&N Industrial Equipment
Chris Horgan - J-U-B ENGINEERS, Inc.
Paul Huber - The Boeing Company
Christopher Hyde - University of Idaho

Richard Jacobsen - Idaho State University
Valerie Jensen - The Boeing Company
Fred Jessup - Schweitzer Engineering Labs
James Jonakin - Celestica
Kurran Kelly - BP Alaska
Ellie Key - Washington State Department of Ecology
Krista Kinsey - Idaho Power
Jay Larsen - Idaho Technology Council
Katie Leichter - University of Idaho
Bradley Loeding - BD Biosciences
Kenneth Mays - Sonnet Software
William McDougall - Retired
Tom Moore - Consultant
Doug Overholtzer - Wagstaff, Inc.
Lyle Parks - Retired
Marc Patterson - Idaho Power
Gerry Queener - Retired
Pete Robichaud - USDA Forest Service
Steve Silkworth - Avista Corporation
Charles Simon - Boeing Commercial Airplane
Tom Stalick - Kapstone Kraft Paper Corporation
Eric Stubbs - Micron Technology
Todd Swanstrom - Western Trailer Co.
Cody Tews - Schweitzer Engineering Laboratories
Ed Whitehead - Retired
Calvin Williams - The Boeing Company
Tom Zysk - Boeing Commercial Airplanes

College of Engineering Advisory Board

TOM BOURQUE

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Engineer
Director of Engineering -
Board Chair*

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*POWER Engineers
Operations Consultant*

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*Idaho Forest Group
Plant Manager*

**STEVE R. GARSKE**

*Kootenai Health
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**VALERIE JENSEN**

*Boeing
Senior Manager,
Engineering*

**BRENT KEETH**

*Micron Technology, Inc.
Senior Fellow-Advanced
DRAM Architectures*

**ROD LINJA**

*Keller Associates, Inc.
President*

**KEN MAYS**

*Sonnet Software Inc.
Director of Business
Development*

**BOB MORRIS**

*Schweitzer Engineering
Laboratories
Vice President, National
Operations*

**DAVID NELSON**

*Soteica Visual MESA,
LLC
Chief Technology Officer*

**REMY NEWCOMBE**

*Rainier Patents
Patent Agent*

**JEFF OSTERMAN**

*CH2M HILL
Business Development
Manager*

**TOM M. PFEIFFER**

*Idaho National
Laboratory
Engineering Manager,
Materials and Fuels
Complex Research Division*

**TERRY PRECHT**

*Vergent Products, Inc.
President & CEO*

**TRACY ROLSTAD**

*Avista
Senior Power System
Consultant*

**MIKE SIMON**

*Creation Logic LLC
Chief Technical Scientist*

**RYNE C. STOKER**

*PE-GeoTek, Inc.
Principal Engineering &
President*



2015 EXPO Organizing Committee

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Dean

SANDY SPEAR

Alumni and Donor Relations
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MARY YOVANOFF

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Associate Dean for Undergraduates

CHRISTINA RANDAL

Director of Development

STEPHANIE BUNNEY

Civil Engineering Administrative
Assistant

STEVE BEYERLEIN

Mechanical Engineering Faculty

MARIA PREGITZER

Director of Student Services

ROB PATTON

Marketing Communications Manager

Special thanks to the University of Idaho, Communication and Marketing, Creative Services unit and the UI Video Production Center for their invaluable assistance with creating Engineering Design EXPO promotional content and event materials.



2015

ACADEMY OF ENGINEERS

Please join Dean Larry Stauffer, the college advisory board, faculty, staff and students in congratulating this year's College of Engineering, Academy of Engineers inductees.

The University of Idaho recognizes these individuals for their personal contributions to engineering achievement, leadership, engineering education, and service to the profession and society. We salute these leaders for their lifetime of commitment to advancing the quality of life through engineering innovation.



DON KOPCZYNSKI

*M.B.A., Whitworth University, 2011
M.A., Organizational Leadership, Gonzaga University, 2004
M.S., Engineering, Washington State University, 1993
B.S., Electrical Engineering, University of Idaho, 1979*



CHARLES C. MITCHELL

*Ph.D., Engineering Science, Arizona State University, 1968
M.S., Engineering, Arizona State University, 1966
B.S., Electrical Engineering, University of Idaho, 1959*



BURCH ROARK

B.S., Mechanical Engineering, University of Idaho, 1955



GEORGE SIMMONS

*Ph.D., Chemical Engineering, Stanford University, 1970
M.S., Chemical Engineering, University of Idaho, 1966
B.S., Chemical Engineering, University of Idaho, 1965*



ALLEN STUBBERUD

*Ph.D., Engineering, University of California, Los Angeles, 1962
M.S., Engineering, University of California, Los Angeles, 1958
B.S., Electrical Engineering, University of Idaho, 1956*



KEITH VAN SCOTTER

*M.S., Chemical Engineering, University of Idaho, 1979
B.S., Chemical Engineering, University of Idaho, 1977*

2015 College Awards Recipients

Each year the college recognizes faculty, staff and students for achievements in job & academic performance, service, and promoting excellence within the College and the University. Congratulations to our 2015 award recipients!



OUTSTANDING FACULTY AWARD

*Steve Penoncello, Professor,
Mechanical Engineering*



OUTSTANDING YOUNG FACULTY AWARD

*Tao Xing, Assistant Professor,
Mechanical Engineering*



OUTSTANDING STAFF AWARDS

*Ray Anderson
IT Resource Manager, Dean's Office*



*Beth Cree,
Compliance Consultant,
Dean's Office*



*Terri Gaffney
Associate Director,
Engineering Outreach*



OUTSTANDING GRADUATE STUDENT

Glenn Roth, Mechanical Engineering



OUTSTANDING GRADUATE STUDENT PUBLICATION

*Kalyan Chitrada, Chemical and
Materials Engineering*

OUTSTANDING SENIOR AWARDS



Biological and Agricultural Engineering

Braden Comstock



Chemical and Materials Engineering

Breanna Wong



Civil Engineering

Taylor Romenesko



Computer Engineering

Amy Wohlschlegel



Computer Science

Shea Newton



Electrical Engineering

Brandon Arawkawa



Industrial Technology

Michael Joe Kelso



Mechanical Engineering

James Tighe



Amanda White



CONGRATULATIONS

"THE FIRST VANDAL ON MARS"

UI Graduate Sophie Milam
Chief Engineer, HO-SEAS
2015 Forbes 30 Under 30, Science

Congratulations to University of Idaho graduate Sophie Milam who was recognized in the 2015 Forbes 30 Under 30. Milam is currently in Hawaii assisting NASA on an eight month stimulated mission to Mars where they are studying group cohesion in isolated and confined environments.

www.uidaho.edu/meet-sophie | A LEGACY OF LEADING

University of Idaho
College of Engineering

About the College of Engineering Senior Capstone Program

The University of Idaho's College of Engineering interdisciplinary senior capstone program is the foundation of our annual Engineering Design EXPO event. The program has evolved over its long history to become a catalyst for local and regional engineering design development. Our capstone program evolution has occurred as the result of a continuous stream of projects from regional industry, equipment donations from alumni and industry supporters, graduate student support, and educational research grants. As a result Engineering Design EXPO has become the Pacific Northwest's longest running engineering showcase and a signature event for the University of Idaho. Engineering Design EXPO is a unique opportunity for senior students to share the results of their team projects with the public, elementary and high school students, alumni, and industry partners.

THE SIX CORE VALUES OF OUR SENIOR CAPSTONE PROGRAM:

PROFESSIONAL INTEGRITY: day-to-day and long-term actions, aligned with professional codes of ethics in ways that are relevant and meaningful, responding to the needs of clients and society at large.

GROWTH ORIENTED: awareness of current knowledge, skills, and learning styles, informing self, peer, and mentor actions that elevate performance expectations while providing needed support for measurable change in professional behaviors and attitudes.

TECHNICALLY COMPETENT: enlightened use of engineering principles, early prototyping, modeling, experimentation, application of appropriate software tools, selection of state-of-the-art components, problem formulation & decomposition, and specification of manufacturing methods.

COLLABORATIVE: respectful, supportive, empowered community of practitioners promoting mutual understanding of diverse motivations and complementary skills while working towards a shared vision.

RESOURCE RICH: inspiring work environment providing ready access to prior work products, catalogs, instructional videos, software tutorials, and expert consultation as well as multiple opportunities to learn and use state-of-the art tools for computation and manufacturing.

VALUE ADDED: significant return on investment by developing compelling project goals that respond to stakeholder needs, innovating, measuring progress through systematic collection and analysis of data, assuming responsibilities needed for efficient and effective results, and compiling documentation that allows others to adopt solutions.

2015 EXPO Project Advisors

BIOLOGICAL AND AGRICULTURAL ENGINEERING

- Dev Shrestha

CHEMICAL AND MATERIALS ENGINEERING

- Indrajit Charit
- David Drown
- Dean Edwards
- James Moberly
- Mark Roll

CIVIL ENGINEERING

- Ahmed Abdel-Rahim
- Erik Coats
- Fritz Fiedler
- Richard Nielsen
- Sunil Sharma

COMPUTER SCIENCE

- Bruce Bolden
- Robert Heckendorn
- Robert Rinker

ELECTRICAL AND COMPUTER ENGINEERING

- David Atkinson
- James Frenzel
- Herbert Hess
- Feng Li
- Brian Johnson
- Michael Santora

MECHANICAL ENGINEERING

- Steve Beyerlein
- Dan Cordon
- John Crepeau
- Edwin Odom
- Joel Perry
- Russ Porter
- Matthew Riley
- Bob Stephens
- Eric Wolbrecht
- Tao Xing

Engineering Design EXPO Student Projects

AICHE CHEM-E-CAR

Design a shoe box sized car that is powered by a chemical reaction to compete in the American Institute of Chemical Engineers (AIChE) Chem Car Competition. The goal of the competition is to control the chemical reaction in order to go a given distance carrying a specific load, both announced one hour prior to the first run.

Sponsor Organization: American Institute of Chemical Engineers (AIChE) UI Student Chapter

Team Members:

Jonathan Adamson - Chemical & Materials Engineering
Quenton Heath - Chemical & Materials Engineering
Kylo Murray-Gann - Mechanical Engineering
Austin Porter - Chemical & Materials Engineering
John Bulow - Chemical & Materials Engineering

Faculty Advisor(s): David Drown

Mentor(s): Charles Cornwall, Dave MacPherson

AIRPORT BATTERY CHARGER

The goal of this project is to create a device that can gather enough energy in two minutes to charge a cell phone. This product is intended for travelers who are in between flights and need to charge their cell phone quickly. This device should be portable and user-friendly.

Sponsor: Herbert Hess

Sponsor Organization: UI Department of Electrical & Computer Engineering

Team Members:

Darion Marlin - Electrical & Computer Engineering
Brooks Prather - Electrical & Computer Engineering
Brian Patterson - Electrical & Computer Engineering

Faculty Advisor(s): Herbert Hess, Feng Li

ALTERNATIVE DRAIN PAN DEFROST

Design, evaluate, and test electrical heating systems for evaporator drainpans, providing the necessary temperature requirements while accounting for manufacturing, operation, and maintenance costs.

Sponsor: Trever Pope

Sponsor Organization: Colmac Coil Manufacturing Inc.

Team Members:

Jonathan Paul - Mechanical Engineering
Andrew Lake - Mechanical Engineering
Anthony Gatlin - Mechanical Engineering
Jamie Walker - Mechanical Engineering

Faculty Advisor(s): Tao Xing, Steve Beyerlein

Mentor(s): Theo White

ANIMAL LAIR IMAGING AND CARTOGRAPHIC EXPLORATION (ALICE)

The ALICE (Animal Lair Imaging and Cartographic Exploration) project is aimed at the development a small robotic device designed explicitly to explore the burrows of pygmy rabbits. The vehicle uses data from an array of sensors and cameras to provide the user with first person video, 3D mapping abilities and volumetric burrow measurements.

Sponsor: Janet Rachlow

Sponsor Organization: UI College of Natural Resources

Team Members:

Daniel Schneider - Mechanical Engineering
Brandon Bitseff - Electrical & Computer Engineering
Donald Bellevue - Biological & Agricultural Engineering
Alexius Pinkham - Mechanical Engineering
Nicholas Stocks - Mechanical Engineering

Faculty Advisor(s): Joel Perry

ARMASIST ARM REHABILITATION TRAINING SOFTWARE

Team Kaixo developed a training game to engage stroke patients while they perform rehabilitative exercises to improve the use of their arms. The game was implemented for use with the ArmAssist device developed by Tecnalia.

Sponsor: Cristina Rodríguez de Pablo

Sponsor Organization: Tecnalia Research & Innovation

Team Members:

Ben Hofferber - Computer Science
Charlie Miller - Computer Science
Gleudson Mendes Costa - Computer Science
Sean Harris - Computer Science

Faculty Advisor(s): Bruce Bolden

Mentor(s): Joel Perry

ASME MICROBAJA RC VEHICLE

A team of sophomores and juniors have created a RC vehicle for competition in a regional ASME event. Special features include: Custom 3D printed gearbox, light-weight suspension design, true Ackermann-steering, and vacuum-formed carbon fiber chassis.

Sponsor Organization: UI Department of Mechanical Engineering

Team Members:

Murilo Amaral - Mechanical Engineering
Alexx Jensen - Mechanical Engineering
James White - Mechanical Engineering
Jacquelin Remaley - Mechanical Engineering
Coye Johnson - Mechanical Engineering
Roger Oliveria - Electrical & Computer Engineering
Lucas Albuquerque - Chemical & Materials Engineering
Bruno Ramlow - Electrical & Computer Engineering

Faculty Advisor(s): Steve Beyerlein

Mentor(s): Samuel Qualls

AUTOMATED UNDERWATER VEHICLE SENSOR PROCESSING

To improve the analog/digital sensor processing system aboard the Automated Underwater Vehicles being developed by the Center for Intelligent System Research at the University of Idaho for the Office of Naval Research.

Sponsor Organization: Office of Naval Research

Team Members:

Kevin Blosser - Electrical & Computer Engineering
Chris Leblanc - Electrical & Computer Engineering

Faculty Advisor(s): Michael Santora

BAND-BEESTEN: THE LEGACY CONTINUES

The Band-Beesten lives on as the Department of Mechanical Engineering and the Vandal Marching Band collaborate to create the ultimate drum machine. This year's Band-Beesten is fully powered and with a redesigned frame, control system, and wheels it can traverse astroturf and hardwood with a 400 pound load.

Sponsor: Spencer Martin

Sponsor Organization: Vandal Marching Band

Team Members:

Amanda White - Mechanical Engineering
Christian O'Bryan - Mechanical Engineering
Maddie Brennan - Electrical & Computer Engineering
Tyler Comstock - Mechanical Engineering
Robyn Vowell - Mechanical Engineering

Faculty Advisor(s): Edwin Odom, Steve Beyerlein, Robert Rinker

Mentor(s): Matt Kologi, Theo White

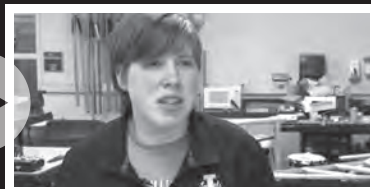


EXPLORE ENGINEERING

Designing the Ultimate Drum Machine

*"We really wanted our design to be as cool and amazing as the marching band but as functional and safe as engineering requirements."
-Madeleine Brennan, Electrical & Computer Engineering*

learn more at: uidaho.edu/explore-engineering



Engineering Design EXPO Student Projects

CIVIL ENGINEERING AND THE FOCUS ON RESOURCE RECOVERY FROM WASTEWATER

A graduate student team highlights the exciting activities on wastewater treatment and resource recovery in the Civil Engineering department.

Sponsor: Erik Coats

Sponsor Organization: UI Department of Civil Engineering

Team Members:

Derek Probst - Civil Engineering

Sharon Strom - Civil Engineering

Eric Hughes - Civil Engineering

Ben Carleton - Chemical & Materials Engineering

Faculty Advisor(s): Erik Coats

CNC LASER CUTTER

Building a 60W CO2 CNC laser cutter that will be used in research and project development for the physics and engineering department.

Sponsor: Jacob Turner

Sponsor Organization: UI Department of Physics

Team Members:

Brian Hanson - Biological & Agricultural Engineering

Robert Iler - Physics

Hayden Smotherman - Physics

Rebecca Winzer - Physics

Faculty Advisor(s): Jacob Turner

DESIGN OF AN IMPACT - ABSORBING CONCRETE STORAGE PAD FOR HEAVY OBJECTS

The overall goal of this project is to design a road and a reinforced concrete slab. The slab will support 18 storage containers that are 20-feet tall, 11 feet in diameter and weigh 205 tons. A unpaved gravel roadway is used to access the storage pad.

Sponsor: Scott Black

Sponsor Organization: Energy Northwest

Team Members:

Kaylynn Oaks - Civil Engineering

Reuben Germain - Civil Engineering

Chad Crow - Civil Engineering

Camden Robinson - Civil Engineering

Faculty Advisor(s): Fritz Fiedler

DEVELOPMENT OF PROTOTYPE MINIATURIZED SPECTROMETER FOR DECAGON DEVICES

A miniature spectrometer characterizing Polydextrose was designed, using an Arduino Due micro-controller, with an integrated camera for viewing physical changes such as glass transition temperature and other physical changes. Testing of the manufactured design was done for proof of concept and suggesting improvements.

Sponsor: Martin Buehler

Sponsor Organization: Decagon Devices Inc

Team Members:

Brandon Cisco - Chemical & Materials Engineering

Cody Dawes - Chemical & Materials Engineering

Robert Blair - Chemical & Materials Engineering

Daniel Roach - Chemical & Materials Engineering

Faculty Advisor(s): David Drown

DEVLIEG INNOVATION DESIGN PROJECT - ENGINEERING SCHOLARS HEAT EXCHANGER

The goal of this project is to develop a physical heat exchanger with sensor systems to monitor and record the conditions of fluids flowing through the exchanger. Once developed, ME 435 students will be able to use this heat exchanger to test computer models of the heat exchanger.

Sponsor Organization: DeVlieg Foundation

Team Members:

Dustin Mallet - Electrical & Computer Engineering

Lorraine Mottishaw - Chemical & Materials Engineering

Patrick Paulus - Mechanical Engineering

Nicholas Shaber - Mechanical Engineering

Kathryn Simpson - Chemical & Materials Engineering

Faculty Advisor(s): Bob Stephens

Mentor(s): Andrew Engel

DEVLIEG INNOVATION DESIGN PROJECT - HORIZONTALLY OPPOSED STIRLING (H.O.P.S) ENGINES

A group of the Engineering Scholars working with the DeVlieg Foundation to develop educational projects for undergrads. This projects involves developing horizontally opposed Stirling (H.Op.S) engines.

Sponsor Organization: DeVlieg Foundation

Team Members:

Mark Woodland - Mechanical Engineering

Cooper Atkinson - Mechanical Engineering

Kevin Miklos - Mechanical Engineering

Faculty Advisor(s): Bob Stephens

Mentor(s): Dillon Savage

DEVLIEG INNOVATION DESIGN PROJECT - REHABILITATION ROBOT END-EFFECTOR

As a sophomore design project with the goal of developing a robot end-effector to support robotic rehabilitation research.

Sponsor Organization: DeVlieg Foundation

Team Members:

Aaron Eliason - Mechanical Engineering

Autumn Pratt - Mechanical Engineering

Brendan Souvenir - Electrical & Computer Engineering

David Mortin - Electrical & Computer Engineering

Faculty Advisor(s): Eric Wolbrecht

Mentor(s): James Tigue

DEVLIEG INNOVATION DESIGN PROJECT - SUSTAINABILITY AT HOME

Humans only have one world on which to live. It is our responsibility to secure a safe and healthy environment for generations to come. This project focuses on sustainable practices that can be implemented into a residential home to help reduce environmental impact.

Sponsor Organization: DeVlieg Foundation

Team Members:

Tyler Hutten - Mechanical Engineering

Cody Barrick - Civil Engineering

Jessica Hunter - Chemical & Materials Engineering

Amanda Vu - Chemical & Materials Engineering

Christopher Steinmetz - Civil Engineering

Faculty Advisor(s): Bob Stephens



EXPLORE ENGINEERING

Assisting the Rehabilitation of Stroke Patients

"Seeing how this work can help a patient do everyday tasks again is really motivating to me."
-Ronnie Ross, Mechanical Engineering

learn more at: uidaho.edu/explore-engineering





U-Idaho Clean Snowmobile Challenge Team Winning Tradition

The Vandal engineering team has been competing in the SAE International Clean Snowmobile Challenge (CSC) for the past 15 years. In nine of those years, the Vandal team has placed in the top three overall positions, winning over 50 awards in total, and taking first place three times in 2002, 2003 and 2007.

This year UI accomplished what no other school has done in the 15-year history of the competition. For the third time the Vandal team was awarded the Bill Paddleford Memorial Award for Most Sportsmanlike Conduct, also known as the “Founder’s Trophy” or “Paddle.” The sportsmanlike trophy winner is based on votes by other CSC teams. UI also won the “Paddle” in 2007 and 2011.

“The ‘Paddle’ has been a white whale of sorts for my tenure here at UI,” said Dillon Savage, CSC team member and senior mechanical engineering major. “To understand what it means to get this award you have to understand the culture that the CSC has developed and the culture of our Idaho team. Every team wants to beat you at their best. This award is one of the accomplishments I am most proud to put on my resume. It is a true team accomplishment.”

The Vandal team’s high standard of sportsmanship exemplifies the winning tradition the team has nurtured and established over the past fifteen years.

“We know that many teams have problems during competition,” said Crystal Green, CSC team member and senior mechanical engineering major. “Anything we can do to help them fix that, the better. We don’t want to watch another team fail over something we could have done to help them. There are a bunch of great teams at competition doing all they can for other teams. It is a value our former advisor, (UI emerita faculty member) Karen Den Braven instilled in us about the competition. She always said, ‘If you only come home with one award, make sure it’s the Paddleford.’”

Due to disqualifying emissions scores, the Vandal CSC team placed fifth overall at this year’s weeklong challenge in Houghton, Michigan. Despite this, in addition to the Founder’s Trophy, the team also won the Polaris Best Handling Award, and the Mahle Award for Best Engine Design, which was accompanied with a \$500 prize.



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Engineering Design EXPO Student Projects

DFIG WIND TURBINE MODELING AND FAULT PROTECTION

The fault behavior of modern wind turbines is not well understood. Our team plans to finish a controls system for a DFIG to simulate a Type III Wind Turbine for fault simulations. An RSCAD software model will be finished and used to validate the physical controls system and also run simulations.

Sponsor: Normann Fischer

Sponsor Organization: Schweitzer Engineering Laboratories

Team Members:

Drew McKinnon - Electrical & Computer Engineering
Andrew Miles - Electrical & Computer Engineering
Cody Swisher - Electrical & Computer Engineering
Tiras Newman - Electrical & Computer Engineering

Faculty Advisor(s): Herbert Hess, Brian Johnson

Mentor(s): Mike Beacham

DYNAMIC FISH MANURE EXTRACTOR

Cleanliness in fish hatchery raceways is of the utmost importance when it comes to healthy fish. As an engineering team, our purpose is to design a system that can effectively reduce the build-up of fish manure on the bottom of the raceways without causing re-suspension of the manure in the water.

Sponsor: Scott Williams

Sponsor Organization: UI Service Learning Center

Team Members:

Steven Sainsbury - Mechanical Engineering
Craig Woodruff - Biological & Agricultural Engineering
Braden Comstock - Biological & Agricultural Engineering
Cole Schierman - Mechanical Engineering
Clint Hartz - Biological & Agricultural Engineering

Faculty Advisor(s): Tao Xing

Mentor(s): Kevin Kruger

EAST ALAMEDA ROAD AND YELLOWSTONE AVENUE INTERSECTION REDESIGN IN POCATELLO IDAHO

We are redesigning the East Alameda Road and Yellowstone Avenue intersection in Pocatello, ID due to increases in traffic volume resulting in numerous crashes. The current intersection is a large four-way intersection, with commercial businesses and parking lots on each corner, making it difficult to expand.

Sponsor: Greydon Wright

Sponsor Organization: Idaho Transportation Department

Team Members:

Ethan Salove - Civil Engineering
Saud Alrashdi - Civil Engineering
Scott Patterson - Civil Engineering
Kevin McGarry - Civil Engineering

Faculty Advisor(s): Fritz Fiedler

Mentor(s): Michael Kyte, Fouad Bayomy

ELECTRONIC FUEL CONTROL FOR GE-T58 GAS TURBINE

Take a mechanical fuel controller for a gas turbine engine and develop an electronically controlled fuel controller that will measure EGT, turbine speeds, TPS, and thermocouple readings. Develop a programmed controller that will respond to these readings and output fuel to nozzles and stator vane actuator. The fuel to nozzles and stator vane actuator will be controlled via 2 and 4 way valves, respectively. The valves will be packed within an aluminum manifold and be able to bolt into the proper location on the engine.

Sponsor: Ross Schlotthauer

Sponsor Organization: Burly Products

Team Members:

Joseph Gibson - Mechanical Engineering
Dillon Quenzer - Mechanical Engineering
Andrew Sedgwick - Mechanical Engineering

Faculty Advisor(s): Dan Cordon

Mentor(s): Rory Lilley

ETHTOOL SUPPORT FOR MICROSOFT HYPER-V

Ethtool Support for Microsoft Hyper-V is a programming project to implement support of the Linux command-line application "ethtool" on virtual machine guests of the Microsoft Hyper-V hypervisor. Ethtool is used to query and control network driver and hardware settings. Enabling support requires patching the virtual network driver in the Linux kernel.

Sponsor: K. Y. Srinivasan

Team Members:

Andrew Schwartzmeyer - Computer Science
Justin Hall - Computer Science
Keith Drew - Computer Science
Eric Doman - Computer Science
Chris Waltrip - Computer Science

Faculty Advisor(s): Bruce Bolden

Mentor(s): Haiyang Zhang

EXCITATION CONTROL FOR A SYNCHRONOUS MACHINE

The goal of the project is to specify, purchase, install, and commission a static exciter for the synchronous generator in the UI Model Power System Lab, including user documentation and a verified RTDS system model.

Sponsor: Normann Fischer

Sponsor Organization: Schweitzer Engineering Laboratories

Team Members:

Jacob Nelson - Electrical & Computer Engineering
Carlos Valdez - Electrical & Computer Engineering
Kerri McGinty - Electrical & Computer Engineering
Chien-Kai Wang - Electrical & Computer Engineering

Faculty Advisor(s): Feng Li, Brian Johnson

FUEL ROD DEFECT DETECTION

The goal of this project is to create a test bench that facilitates the inspection of irradiated nuclear fuel rods, identifying and characterizing external as well as internal defects. The two primary methods to be used for this inspection are thermal imaging and optical profilometry.

Sponsor: Daniel Wachs

Sponsor Organization: Idaho National Laboratory

Team Members:

Cristofer Farnetti - Mechanical Engineering
Iain Fisher - Mechanical Engineering
Trevor Lutz - Mechanical Engineering
Kaleb Trotter - Mechanical Engineering

Faculty Advisor(s): Steven Beyerlein

Mentor(s): Theo White

FUELED BY TRASH: USING PLASTIC WASTE IN A SELF-SUSTAINING RECYCLING PROCESS

Waste reclamation is not a large priority in developing countries; as a result, post-consumer plastics litter the ground and shorelines. To cut down on waste plastics in these areas, a process was designed to allow for mobile waste processing by means of extrusion and pyrolysis.

Sponsor Organization: Gonzaga University Civil Engineering Department

Team Members:

Tiffany Stampka - Chemical & Materials Engineering
Addison Rutz - Chemical & Materials Engineering
Carson Kraft - Chemical & Materials Engineering
Daniel France - Chemical & Materials Engineering

Faculty Advisor(s): David Drown, Mark Roll

Mentor(s): Armando McDonald

Engineering Design EXPO Student Projects

GUIDED PARAFOIL SUBSYSTEMS “GPS” TECHNOLOGY

Develop and improve the guided parafoil subsystems of the small payload quick return (SPQR) system for small sample returns from the International Space Station. Upgrades include shrinking current electrical subsystems, integrating wireless sensor technology, developing user interface for system communication and developing parafoil deployment systems and inflation.

Sponsor: Marc Murbach

Sponsor Organization: NASA AMES

Team Members:

Stephen Wayne - Electrical & Computer Engineering
Brandon Arakawa - Electrical & Computer Engineering
Jason Bjur - Electrical & Computer Engineering
Effat Takaleh - Mechanical Engineering
Brian Kisling - Mechanical Engineering
Forrest Austin Tanner - Mechanical Engineering
Richard Park - Computer Science
Ben Cumber - Computer Science

Faculty Advisor(s): Feng Li, David Atkinson

Mentor(s): Matt Kologi

IDAHO ENGINEERING WORKS

The goal of the project is to increase our familiarity with the equipment available to students in the machine shop to be more capable of helping seniors with their capstone design projects and showcase the capabilities of the Idaho Engineering Works graduate students.

Sponsor: Edwin Odom

Sponsor Organization: UI Department of Mechanical Engineering

Team Members:

Theron White - Mechanical Engineering
Matthew Kologi - Mechanical Engineering
Rory Lilley - Mechanical Engineering
Samuel Qualls - Mechanical Engineering
Jon Teske - Mechanical Engineering
Shawn Trimble - Mechanical Engineering
Stephen Goodwin - Mechanical Engineering

Faculty Advisor(s): Edwin Odom, Steve Beyerlein

INDUSTRIAL ASSESSMENT CENTER

The University of Idaho Industrial Assessment Center (UIIAC) trains the next generation of energy conscious engineers with hands-on industrial experience by conducting Department of Energy (DOE) sponsored energy audits for businesses in the region. The audit is free for the company and provides practical experience in a variety of industries. The student team prepares company-exclusive reports that focus on high-energy usage areas and provide specific recommendations to minimize their energy costs.

Sponsor Organization: U.S. Department of Energy

Team Members:

Hari Challa - Electrical & Computer Engineering
Chance Sundquist - Mechanical Engineering
Andrew Lake - Mechanical Engineering
Vince Schwartz - Mechanical Engineering
Brian Hanson - Biological & Agricultural Engineering
Gene Staggs - Biological & Agricultural Engineering
Cody Swisher - Electrical & Computer Engineering
Rick Leathers - Mechanical Engineering

Faculty Advisor(s): Steve Beyerlein, Dev Shrestha

Mentor(s): Chad Dunkel, Kevin Kruger

JUST A PORTION OF ABSORPTION

An absorption column using sand was designed to be a cost effective, efficient and robust preliminary separation process that removes emulsified oil from brackish water. The bench-scale apparatus was built to demonstrate the effectiveness; total energy requirement, amount of waste, and water quality analysis; and address potential health and safety issues.

Sponsor Organization: IEE/WERC International Environmental Design Contest

Team Members:

Hannah Law - Chemical & Materials Engineering
Jassim Alshammari - Chemical & Materials Engineering
Jocie Cracroft - Chemical & Materials Engineering
Meshari Ali - Chemical & Materials Engineering

Faculty Advisor(s): David Drown

Mentor(s): David MacPherson, Charles Cornwall

KICKSHOT

Development of a mobile app for the Kickshot board game created by Aziz Makhani. KickShot is the only soccer board game that teaches young players the mental side of soccer and helps lift their soccer game beyond just kicking and running straight for the goal.

Sponsor: Aziz Makhani

Team Members:

Carson Stauffer - Computer Science
Tessa Saul - Computer Science
Jason Alves-Foss - Computer Science

Faculty Advisor(s): Bruce Bolden

LED DISPLAY

LED Display is an attempt to create a clear, bright, and cost-effective medium for displaying video to be viewed during any time of day and from a distance.

Sponsor: Robert Rinker

Sponsor Organization: UI Department of Computer Science

Team Members:

Colin Clifford - Computer Science
Peter Brown - Electrical & Computer Engineering

Faculty Advisor(s): Bruce Bolden

MANUFACTURING GUITAR COATED PWHGMS

Porous wall hollow glass microspheres (PWHGMs) are being developed to improve the performance of lead acid batteries. The microstructural porosity characteristics of the PWHGMs can be modified by heat treatment condition and acid leaching before nano-layer coating with GUITAR.

Sponsor: Dean Edwards

Sponsor Organization: UI Department of Chemical & Materials Engineering

Team Members:

Cesar Torres - Chemical & Materials Engineering
Thassis Peral Araujo - Chemical & Materials Engineering
Gabriel Silva Ikeda - Chemical & Materials Engineering

Faculty Advisor(s): David Drown, Dean Edwards

Mentor(s): Zach Campbell, John Canning



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-Jocie Cracroft, Chemical & Materials Engineering*

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Maybe we don't all get the chance to lap the competition on the racetrack, but what's the next best thing? Building the car that did. UI engineering students designed a hybrid race car that zoomed past other national universities at the 2014 Formula Hybrid competition - taking the checkered flag for innovative engineering. *Your gift helps students build their dreams at the University of Idaho.* So buckle your seatbelt. When you support UI, you're part of a winning team.

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Champion Formula Hybrid Vandal Racing Team Hopes to Repeat

Building off their win at last year's competition the Vandal Racing formula hybrid team is hoping to return to the annual Formula Hybrid SAE event April 27-30, 2015 at the New Hampshire Motor Speedway to prove they remain the team to beat.

The Formula Hybrid competition, founded and run by the Thayer School of Engineering at Dartmouth, is an interdisciplinary educational design and engineering competition. Students are challenged to collaboratively design and build a formula-style electric or plug-in hybrid racecar and compete in a series of events. This year's competition will include over twenty-five teams from the U.S., Canada, India, Turkey and Australia. Teams compete in both "static" and "dynamic" events. Static events involve teams presenting their designs and strategies, whereas dynamic events test vehicle performance such as acceleration, handling and endurance.

In order to improve upon last year's performance the Vandal Racing team has set their sights on key improvements to the vehicle's critical systems: tractive, internal combustion, suspension, control, and brake system.

The team's approach to addressing improvements in the critical performance systems has been to focus on reducing the overall weight of the vehicle. Last year's car weighed 561 lbs. without a full tank of gasoline. The team has worked to bring the dry vehicle weight down to 500 lbs. To do this they have implemented a series of efficient redesigns to parts to allow them to perform multiple functions as well as using lighter materials such as carbon fiber and titanium. The new titanium uprights are certain to attract the judges' attention.

One of the most significant design modifications to reduce the weight of the car and improve performance involves the electric motor battery pack. The team has completely redesigned the car's battery pack to fully utilize the power and torque of the electric motor. By doing so the team has reduced the total weight of the car by 30 lbs and improved the safety and reliability of the car's tractive system.

"This is significant," said Dr. Michael Santora, electrical engineering professor and advisor to the Vandal Racing team. "The redesigned battery pack illustrates how interdisciplinary learning plays an important role in the success of the formula hybrid project. The new lighter battery pack is the product of the collaboration between our electrical and mechanical engineering students."



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Engineering Design EXPO Student Projects

MCDONALD PARK RENOVATION

Our project addresses infrastructure renovations at McDonald Park in Colfax Washington. McDonald Park lies between the Palouse River and a plateau just north of Colfax. The renovations will present solutions to frequent flooding and a need for an improved storage facility.

Sponsor: Mike Rizzitiello

Sponsor Organization: City of Colfax

Team Members:

Craig Martin - Civil Engineering

Ben Cook - Civil Engineering

Gilmer De la Cruz - Civil Engineering

Khaled Alharshani - Civil Engineering

Faculty Advisor(s): Fritz Fiedler

MISSION CONTROL

Drone mission planning software, communications layer for transmitting messages between drone and software, and drone hardware.

Sponsor: Robert Rinker

Sponsor Organization: UI Department of Computer Science

Team Members:

Taylor Trabun - Computer Science

Joe Higley - Computer Science

David Klingenberg - Computer Science

Emeth Thompson - Computer Science

Faculty Advisor(s): Bruce Bolden, Robert Rinker

Mentor(s): Brandon Ortiz

NEAR SPACE ENGINEERING

Moscow High School student experiment sent to 90k feet in near space conditions. Student investigation centers on sound quality and the influence of atmospheric pressure. In addition a set of Pong-Sats from a local elementary school will be flown.

Sponsor: Pat Blount

Sponsor Organization: Moscow High School

Team Members:

Ned Caisley - Moscow High School

Faculty Advisor(s): Pat Blount

NEXT GENERATION FSAE POWERPLANT DESIGN

Design and manufacture an innovative next generation FSAE power plant utilizing a KTM 540 motorcycle engine.

Sponsor: Edwin Odom

Sponsor Organization: UI Department of Mechanical Engineering

Team Members:

Kris Davis - Mechanical Engineering

Jake Gilles - Mechanical Engineering

Tim Hammer - Mechanical Engineering

David Schiff - Mechanical Engineering

Faculty Advisor(s): Dan Cordon

Mentor(s): Matt Kologi

ORCHARD PICKER/PRUNER

Design a self leveling mobile platform for workers to pick and/or prune trees continuously at various heights.

Sponsor: Joe Rumble

Sponsor Organization: Rumble Orchards

Team Members:

Dillon Turnbull - Mechanical Engineering

Vince Schwartz - Mechanical Engineering

Zach Howard - Mechanical Engineering

Dhari Aldehani - Mechanical Engineering

Faculty Advisor(s): Steve Beyerlein, Russ Porter

Mentor(s): Samuel Qualls

PEDESTRIAN LOCATION AND GUIDANCE

The Pedestrian Location and Guidance project aims to monitor an intersection and locate pedestrians while in the crosswalk. Assist visually impaired pedestrians who may have trouble safely crossing the street. If the pedestrian strays or remains in the crosswalk the system should be able to recognize this and give feedback.

Sponsor: Jim Frenzel

Sponsor Organization: UI Department of Electrical & Computer Engineering

Team Members:

Alec Briggs - Electrical & Computer Engineering

Tom Haney - Electrical & Computer Engineering

Faculty Advisor(s): Feng Li

Mentor(s): James Frenzel

POST FALLS WASTEWATER TREATMENT FACILITY UPGRADE

The wastewater treatment facility (WTF), located in Post Falls, Idaho, requires an upgrade in order to meet National Pollutant Discharge Elimination System requirements. The objective is to equalize the flow into the WTF, to dampen flow variation and achieve reasonably constant flow rates through the downstream treatment processes.

Sponsor: Mike Conn

Sponsor Organization: J-U-B Engineers Inc.

Team Members:

Dmitriy Shimberg - Civil Engineering

Brookelynn Vizzerra - Civil Engineering

Terrence Stevenson - Civil Engineering

Adam Storey - Civil Engineering

Faculty Advisor(s): Fritz Fiedler

Mentor(s): Erik Coats, Sunil Sharma, Richard Nielsen

POT O' GOLD ELECTRONICS RECYCLING

Printed circuit boards and other electronic components contain many valuable metals, such as gold, silver, and copper. A process to recover these metals through hydrometallurgy was developed. Electrical components were shredded and soaked in various solvents to selectively extract metals. Metals were recovered by precipitation and electroplating.

Team Members:

David Demers - Chemical & Materials Engineering

Wes Stallings - Chemical & Materials Engineering

Benjamin Bolshaw - Chemical & Materials Engineering

Spencer Clark - Chemical & Materials Engineering

Faculty Advisor(s): David Drown, James Moberly



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-Ben Cumber, Computer Science

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Engineering Design EXPO Student Projects

RADIATIVE COOLING TO THE NIGHT SKY

Electronic manufacturing facilities require a large amount of power, up to 47 million kWh per month. Significant energy can be saved on cooling by utilizing the phenomenon, radiative cooling. Team VOYAGER has developed a model demonstrating the feasibility of dissipating heat from an electronics manufacturing facility to the night sky.

Sponsor Organization: IEE/WERC International Environmental Design Contest

Team Members:

Breanna Wong - Chemical & Materials Engineering
Kai Coldsnow - Chemical & Materials Engineering
Rachel Peterson - Chemical & Materials Engineering
Josh Roper - Chemical & Materials Engineering
Cody Satterthwait - Chemical & Materials Engineering

Faculty Advisor(s): David Drown

Mentor(s): David MacPherson, Charles Cornwall

RAIN GAUGE RETROFIT

Design a cost effective digital conversion for current USDA forest service rain gauges that will increase productivity, longevity, and performance.

Sponsor: Pete Robichaud

Sponsor Organization: USDA Forest Service

Team Members:

Alec Harrison - Biological & Agricultural Engineering
Nick Kirby - Mechanical Engineering
Michael Kaminski - Electrical & Computer Engineering
Peter Frankenfield - Mechanical Engineering

Faculty Advisor(s): Matthew Riley

Mentor(s): Kevin Kruger

ROBOSUB - NAVAL UNDERSEA WARFARE CENTER

To design and produce a working, autonomous submarine capable of completing competition specific goals and tasks.

Sponsor: Michael Kapus

Sponsor Organization: Naval Sea Systems Command (NAVSEA)

Team Members:

Chet McKinnon - Mechanical Engineering
Michael Moreno - Mechanical Engineering
Woovin Yi - Mechanical Engineering
Cody Litzko - Mechanical Engineering
Jeff Crocker - Computer Science
Sean Shepherd - Computer Science
Tyler Jaszowski - Computer Science
Craig Allen - Computer Science
Cameron Morton - Electrical & Computer Engineering

Faculty Advisor(s): Mathew Riley, Bruce Bolden

Mentor(s): Samuel Qualls

ROBOT COMMUNICATION

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

Sponsor: Terence Soule

Sponsor Organization: UI Department of Computer Science

Team Members:

Matthew Trana - Computer Science
Jason Kemp - Computer Science
Greg Donaldson - Computer Science
Gabe Pearhill - Computer Science
Johnathan Flake - Computer Science

Faculty Advisor(s): Robert Heckendorn

Mentor(s): Bruce Bolden

ROBOTIC ARM REHABILITATION DEVICE FOR REACH AND GRASP TRAINING

Design and development of hand rehabilitation modules, adding new functionality and improving upon two first-generation designs. The purpose of the modules is to extend the functionality of an existing arm rehabilitation device (previously for arm reach training) in order to also include the rehabilitation of hand grasp. The existing arm rehabilitation device, called ArmAssist, was developed by Tecnalia.

Sponsor: Aitor Beloso Linacisoro

Sponsor Organization: Tecnalia Research & Innovation

Team Members:

Adrian Alcocer - Biological & Agricultural Engineering
Ryan Clark - Mechanical Engineering
Calvin Connor - Mechanical Engineering
Ronnie Ross - Mechanical Engineering
Tony Totorica - Electrical & Computer Engineering
Brandon Wade - Biological & Agricultural Engineering

Faculty Advisor(s): Joel Perry

Mentor(s): Joel Perry, Samuel Qualls

S.M.A.S.H.: SUSPENDED MATERIALS ANALYSIS OF SODA AND HOMEGROWN FRUITS

HOTLIPS Soda, a real fruit soda company, has been experiencing high bottle breakage in their pasteurizer. They have been able to decrease their bottle failures to below 1% for most of their flavors, but have discontinued the cranberry and cherry flavors because they couldn't get their breakage below 10%. The goal is to improve their processing system to reduce their bottle breakage to below 1% for all flavors.

Sponsor: David Yudkin

Sponsor Organization: HOTLIPS

Team Members:

Megan Dempsey - Chemical & Materials Engineering
Timothy Griswold - Chemical & Materials Engineering
Chad Hancock - Chemical & Materials Engineering

Faculty Advisor(s): David Drown

Mentor(s): Frank Younce, David MacPherson, Charles Cornwall

SEL COMMUNICATIONS NETWORK DESIGN

To further advance the UI Model Power Lab's Ethernet communication network capabilities by increasing the reliability and speed of data transfers between substations. The project will also focus on increasing the cyber-security of the network. Lastly, our group will compile several experiments that will teach university students how to configure Schweitzer Engineering Laboratories (SEL) communication equipment in order to achieve a high level of performance.

Sponsor: Normann Fischer

Sponsor Organization: Schweitzer Engineering Laboratories

Team Members:

John Thompson - Electrical & Computer Engineering
Logan Kunde - Electrical & Computer Engineering
Jake Coddington - Electrical & Computer Engineering

Faculty Advisor(s): Feng Li, Brian Johnson

SMART REHABILITATION ROBOT

A rehabilitation robot designed to facilitate recovery in survivors of stroke using adaptive assist-as-needed controls.

Sponsor: Eric Wolbrecht

Sponsor Organization: UI Department of Mechanical Engineering

Team Members:

Stephen Goodwin - Mechanical Engineering
Michael Jones - Mechanical Engineering
James Tigue - Mechanical Engineering

Faculty Advisor(s): Eric Wolbrecht

Mentor(s): Dee Tigue

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Vandal Team Wins Design and Autocross Awards at Regional ASME RC Baja Car Competition



The U-Idaho Chapter of the American Society of Mechanical Engineers (ASME) recently hosted a 1-day design and performance RC (radio-controlled) Baja car competition in Moscow. Engineering students from schools across the Pacific Northwest attended the event to demonstrate their RC Baja car designs, manufacturing and presentation skills. Participants included teams from Central Washington University, Eastern Washington University, Washington State University, Tacoma Community College and Spokane Falls Community College.

This year's U-Idaho team featured an interdisciplinary and international crew. UI mechanical engineering students Alexx Jensen, Coye Johnson, Zach Maryon, Jacquelin Remaley and James White collaborated with Brazilian electrical and computer engineering exchange students Lucas Albuquerque, Murilo Amaral, Roger Oliveria and Bruno Ramlow to produce "George," their custom designed and machined radio controlled vehicle.

Special features to George's design included a 3D printed gearbox, light-weight suspension, true Ackermann-steering, and vacuum-formed carbon fiber chassis.

"I have never worked with a more professional and organized RC Baja group than this year's Vandal team," said Steve Beyerlein, mechanical engineering professor and advisor to the UI ASME RC Baja team.

Originally planned to take place at the UI Arboretum, due to rain, competition organizers moved the combined slalom and acceleration event and the autocross double-elimination into the UI Student Commons. Speed cones, ramps and obstacles lined the Commons food court, challenging even the most seasoned drivers.

"Overall despite the rain, the event was a great success," said Juvy Jane Tongco, UI ASME student organizer. "I think the participants were inspired and learned new ideas from fellow students which will be useful in their future designs."

The Vandal team took 1st place in the design presentation portion of the event. The drivetrain, suspension, steering and chassis improvements made to George impressed the judges helping the team win top prize.

The autocross portion of the event proved a little difficult for the Vandal team's drivers. Competition rules force teams to alternate drivers in the double-elimination race and maneuvering around obstacles and accelerating over the ramps challenged all drivers, who had to run the course with their cars. In the end the Vandals placed 2nd in the race.

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Engineering Design EXPO Student Projects

SOLID MODELING WITH SOLIDWORKS AND CATIA

Students in ME 301 (Introduction to Solid Modeling w/ Solidworks) will be displaying assembly modeling and engineering drawing packages for a legacy steam engine. Students in ME 421 (Advanced CAT w/CATIA) will be demonstrating results of final projects such as virtual machining with a lego CNC mill, creating furniture for a technology enhanced active learning classroom, repackaging a YZ250 engine, envisioning a new UI Design Teaching Laboratory, using CATIA to design wiring harnesses as well as create wiring diagrams, obtaining photograph renders of a magnetic gear clock, and conducting stress analysis with composite materials.

Sponsor Organization: UI Department of Mechanical Engineering

Team Members:

ME 301 and ME 421 students

Faculty Advisor(s): Steve Beyerlein, Edwin Odom

Mentor(s): Matt Kologi, Amanda White, Zach Maryon, Jacquelin Remaley, Alexx Jensen, Jake Gilles, Jessica Drouin, Christian O'Bryan, Forrest Tanner, Chris Jerue, Ryan Clark

TEAM ROCKET: INTEGRATED ROCKET RAMJET

Design and model an Integrated Rocket Ramjet (IRR) engine design that will transition from the solid rocket phase to the liquid ramjet phase after reaching the designed speed while utilizing minimal breakaway parts or by means of control surfaces. The control surfaces will also serve as an inlet optimization tool to minimize exergetic losses into the combustion chamber and simultaneously maximize exit conditions for optimal thrust.

Sponsor: John Crepeau

Sponsor Organization: UI Department of Mechanical Engineering

Team Members:

Chance Sundquist - Mechanical Engineering
Nate Randall - Mechanical Engineering
Robert Willis - Mechanical Engineering
Steven Elsbury - Mechanical Engineering

Faculty Advisor(s): John Crepeau, Tao Xing

Mentor(s): John Teske

TECHNO-ECONOMIC ANALYSIS OF ALTERNATIVE FUEL CLADDING MATERIALS FOR ADVANCED REACTORS

Following Fukushima-Daiichi incident in 2011, alternative materials have been sought to replace traditional zirconium alloys as fuel cladding in light water reactors. Reactor safety is highly dependent on fuel cladding. The project involved assessing viability of three materials (silicon carbide, molybdenum-based alloy and aluminum-bearing ferritic steel) from a techno-economic perspective.

Sponsor: Indrajit Charit

Sponsor Organization: UI Department of Chemical and Materials Engineering

Team Members:

Moyd Alamri - Chemical & Materials Engineering

Faculty Advisor(s): Indrajit Charit

TENSEGRITY INTERNAL ACTUATION

The goal is to design a moving internal payload to provide a method of locomotion for the NASA concept space exploration robot, SuperBall.

Sponsor: Vytas SunSpiral

Sponsor Organization: NASA AMES

Team Members:

James Tigue - Mechanical Engineering
Amy Wohlschlegel - Electrical & Computer Engineering
Kelsey Rayborn - Mechanical Engineering
Mark Garber - Mechanical Engineering
Dylan Waterman - Electrical & Computer Engineering

Faculty Advisor(s): Matthew Riley

Mentor(s): Kyle Morse, Stephen Goodwin

TESLA COIL GUN

Mobilizing a tesla coil by powering it via battery.

Sponsor: Jacob Turner

Sponsor Organization: UI Department of Physics

Team Members:

Michael Moreno - Mechanical Engineering
Donald Bellevue - Biological & Agricultural Engineering
Weipeng Liang - Physics
Nathan Olaveson - Physics

Faculty Advisor(s): Jacob Turner

THE SOFT-STORY ISSUE

Looking at the issues that arise when a structure has a soft/weak-story and what is generally done about fixing these issues.

Sponsor: Richard Nielsen

Sponsor Organization: UI Department of Civil Engineering

Team Members:

Robert Herrera - Civil Engineering

Faculty Advisor(s): Richard Nielsen

TOUCH-BASED ADAPTIVE PREDICTIVE SCREEN

The goal of this project is to develop modifications for a touchscreen product. The touchscreen should adapt dynamically to changes in light intensities as well as under different kinds of physical vibration. The process of developing the product involves the design of experiments to adequately test its functionality.

Sponsor: Kyle Hansen

Sponsor Organization: Esterline Interface Technologies

Team Members:

David Barry - Electrical & Computer Engineering
Irene Agbecha - Electrical & Computer Engineering
Jonathon Simmons - Electrical & Computer Engineering

Faculty Advisor(s): Feng Li, James Frenzel



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-Jamie Cupps, Civil Engineering

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Engineering Design EXPO Student Projects

TOWER ANIMATION SOFTWARE

Redesign current tower lights animation software in C++ to comply with Association for Computing Machinery (ACM) club requirements.

Sponsor: Robert Rinker

Sponsor Organization: Association for Computing Machinery (ACM) club

Team Members:

Matthew Brown - Computer Science

Cameron Simon - Computer Science

Ranger Adams - Computer Science

Faculty Advisor(s): Bruce Bolden

TURBO-FLAKES

Design and implement a turbocharged system to increase efficiency on a two-stroke platform. The difference in this system is the forced induction is used to increase efficiency rather than increase power.

Sponsor Organization: UI Clean Snowmobile Challenge Team

Team Members:

Dillon Savage - Mechanical Engineering

Crystal Green - Mechanical Engineering

Ryley Reese - Mechanical Engineering

Chris Jerue - Mechanical Engineering

Faculty Advisor(s): Dan Cordon

Mentor(s): Rory Lilley

UNIVERSITY OF IDAHO CLEAN SNOWMOBILE 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: UI Clean Snowmobile Challenge Team

Team Members:

Dillon Savage - Mechanical Engineering

Crystal Green - Mechanical Engineering

Chase Smith - Mechanical Engineering

Tony Keys - Mechanical Engineering

Alex Wright - Mechanical Engineering

Justin Ruehl - Mechanical Engineering

Mechann Hester - Mechanical Engineering

Mark Woodland - Mechanical Engineering

Aaron Eliason - Mechanical Engineering

Conor Swanstrom - Mechanical Engineering

Jason Maas - Mechanical Engineering

Austin Anderson - Mechanical Engineering

Zach Lippie - Mechanical Engineering

Zach Puett - Mechanical Engineering

Cade Smith - Mechanical Engineering

Tessa Aus - Electrical & Computer Engineering

Shea Morrison - Electrical & Computer Engineering

Alexa Aguilar - Electrical & Computer Engineering

Faculty Advisor(s): Dan Cordon, Michael Santora

UNICON LANGUAGE DEVELOPMENT

The Unicon Development team's design project task is to contribute new functionality to the Unicon language including enhancements to its integrated design environment (IDE), and concurrency to Uniconc, the language's optimizing compiler.

Sponsor: Clinton Jeffery

Sponsor Organization: UI Department of Computer Science

Team Members:

Shea Newton - Computer Science

Ian Westrope - Computer Science

Serendel Macpherson - Computer Science

Faculty Advisor(s): Bruce Bolden

UNIVERSITY OF IDAHO BIODIESEL REACTOR UPGRADE

State of the art pilot scale bio-diesel reactor, designed to address challenges in bio-diesel production. The system design will safely handle reagents such as methanol and liquid sodium methlyate. Implementation focus is on enclosure of the system.

Sponsor: Brian He

Sponsor Organization: UI Department of Biological & Agricultural Engineering

Team Members:

Gene Staggs - Biological & Agricultural Engineering

Brian Hanson - Biological & Agricultural Engineering

Andrew Engel - Mechanical Engineering

Conner Saxe - Mechanical Engineering

Faculty Advisor(s): Dev Shrestha, Steve Beyerlein

Mentor(s): Kevin Kruger

US-2/95 BYPASS DESIGN FOR BONNERS FERRY IDAHO

The objective of this project was to develop a highway bypass design to alleviate traffic through the City of Bonners Ferry. To create the highway bypass, topographical data, soil characteristics, and existing conditions were utilized to optimize the alignment for the City of Bonners Ferry.

Sponsor: Don Davis

Sponsor Organization: Idaho Transportation Department

Team Members:

Marshall Bode - Civil Engineering

Angel Gonzalez - Civil Engineering

Keith McCabe - Civil Engineering

Nick Schlotthauer - Civil Engineering

Faculty Advisor(s): Fritz Fiedler

VISSIM TRANSPORTATION ENGINEERING

Full model of Boise street network in VISSIM, a microscopic multi-modal traffic flow simulation software. The model will be used to evaluate the network on both planning and microscopic levels.

Team Members:

Riannon Zender - Civil Engineering

Faculty Advisor(s): Ahmed Abdel-Rahim

VISTA BOOSTER PUMP STATION

The objective of this project is to replace and upgrade the current Vista Booster Pump Station in Moscow, Idaho with an above grade facility.

Sponsor: Jason King

Sponsor Organization: Keller and Associates

Team Members:

Jamie Cupps - Civil Engineering

Taylor Romanesko - Civil Engineering

Will Kirby - Civil Engineering

Jonathan Zacarias - Civil Engineering

Faculty Advisor(s): Fritz Fiedler

Mentor(s): Erik Coats, Sunil Sharma

WATER FOR CARANI BOLIVIA

The UI student chapter of Engineers Without Borders has partnered with the community of Carani, Bolivia to help them gain access to clean, dependable water, among other goals.

Sponsor Organization: Engineers Without Borders

Team Members:

Michael Jones - Mechanical Engineering

Will Parker - Electrical & Computer Engineering

Faculty Advisor(s): Fritz Fiedler

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4,000 feet above the Grand Canyon floor, an engineering firm founded by UI grads designed a glass skywalk that brings the majesty of a scenic treasure to stunning life for visitors from around the world. *Your gift makes student success like that possible.* When you support the University of Idaho, you help lofty dreams find solid ground. So go ahead, look down. Now look up and forward – thanks to you, the future's bright.

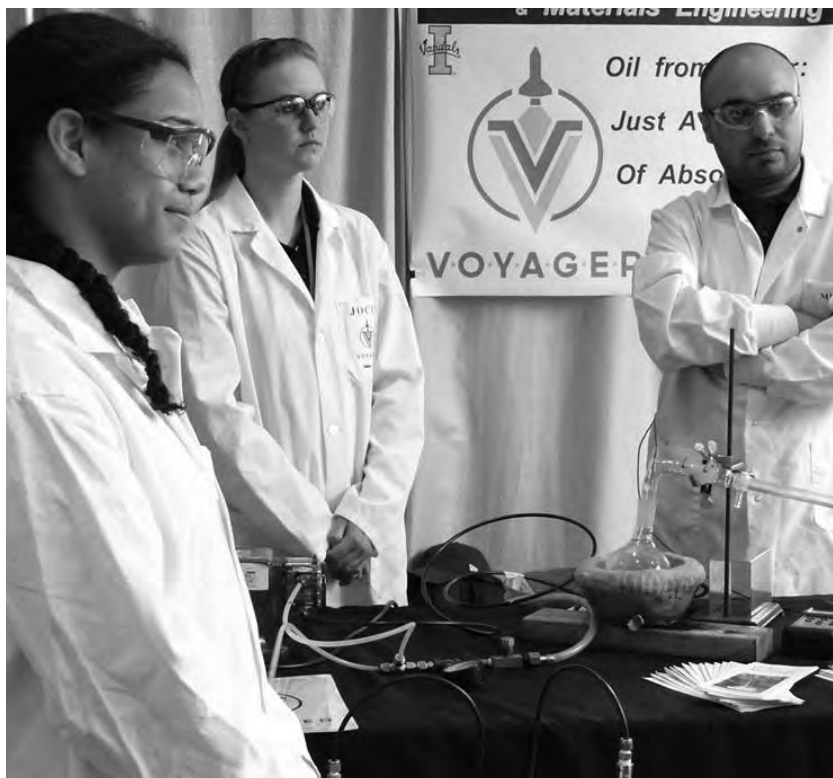
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Vandal Teams Win 1st and 2nd Place Awards at 25th Annual International Environmental Design Contest



Two teams from the U-Idaho Chemical and Materials engineering department recently competed in the 25th annual Institute for Energy & the Environment IEE/WERC International Environmental Design Contest hosted by New Mexico State University in Las Cruces. WERC is a consortium for environmental education and technology development.

IEE/WERC is a unique event that brings industry, government, and academia together in the search for improved solutions to environmental challenges. Students design solutions to real-world problems and develop fully operational bench-scale models of their technologies. The teams then communicate their work through a conference-style poster and both written and oral presentations, which they showcase along with the bench scale model before a panel of environmental professionals who serve as judges.

Upon registration for the contest, teams chose to participate in one of four pre-established "tasks."

"21 task teams from 10 different universities competed in the 4 different tasks," said, Dr. David Drown, chemical and materials engineering professor and advisor to the UI WERC teams. "We entered two tasks teams and our students performed extremely well compared to most of the other schools."

The first U-Idaho team consisting of Meshari Ali, Jassim Alshammari, Jocie Cracroft and Hannah Law competed in Task 2: Separation of Oil from Water. The team's challenge was to design a cost effective, efficient and robust 100 gpm water treatment system that incorporates mechanical, chemical, and/or controls to remove emulsified oil from a brackish water stream intended for reuse in a plant or process. They won 2nd place in their task group and a \$1000 award.

"It may sound cliché, but the best part was working with my team," said Task 2 team member Hannah Law. "I was impressed by my team's work ethic. Each member brought individual strengths to the team, and I think we did a great job bringing out those strengths and making the most of them."

The second UI team consisting of Kai Coldsnow, Josh Roper, Rachel Peterson, Cody Satterthwait and Breanna Wong competed in Task 4: Radiative Cooling to Night Sky. The task was to develop a pilot system that would scale the heat loads of a typical wafer fabrication facility which would have a thermal collector(s) with a storage option, to dissipate this heat to the night sky. The Task 4 Vandal team won 1st place and a \$2500 award.

For the second year in a row a Vandal engineering team has won a 1st place award in one of the IEE/WERC task challenges.

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¹Based on HP internal testing of predecessor devices completed 1/2015 or published information and subject to device settings. Actual results may vary. Faster refers to First Page Out Time (FPOT). For energy efficiency, the HP M252 is 15%, HP M277 is 16% and the HP M553 is 53% lower versus predecessor. For details see hp.com/go/ljclaims
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Women in Engineering Day

Women in Engineering Day is a fun filled free one-day workshop for female high school students, grades 11-12, designed to introduce post-secondary education and careers in engineering and computer science. The workshop provides the opportunity for participants to explore future career possibilities through hands-on activities, exposure to current engineering students, faculty, and professionals, as well as interaction with specific engineering disciplines.

For additional information about the fall 2015 event visit: uidaho.edu/wie

PARTICIPANTS WILL HAVE THE OPPORTUNITY TO:

Earn a scholarship toward your undergraduate degree in engineering

Stay overnight with college women in a dorm or sorority (optional)

Learn about the diversity of careers in engineering

Tour College of Engineering labs and facilities

Interact with current students, faculty and industry professionals

Participate in hands-on engineering design activities



Engineering Makes a Difference

Diego Juarez, class of 2016, is a mechanical engineering major and is a member and past President of the U-Idaho Chapter of the Society of Hispanic Engineers (SHPE). SHPE's objective is to build a national organization of professional engineers to serve as role models in the Hispanic community. As president of SHPE, Diego helped transform the group's campus and community engagement. SHPE now provides study help, scholarships, community service and outreach projects, as well as leadership and career development opportunities for engineers on campus. Recently Diego and members of U-Idaho SHPE returned from southeastern Idaho where they held STEM workshops for local high school students.

"SHPE is a great representation of how engineers are not just number crunchers but well developed individuals ready to make a difference in the community. The opportunity to serve as SHPE's president has allowed me to acquire valuable leadership and management skills." -Diego Juarez

The University of Idaho, College of Engineering provides students with many opportunities to get involved to make a difference. With over 25 clubs, competition teams and professional organizations you are sure to find one that fits your interests. Contact, Maria Pregitzer, Director of Student Services at mpregitzer@uidaho.edu or learn more at uidaho.edu/engr

STUDENT CHAPTERS OF PROFESSIONAL ORGANIZATIONS AT UI ENGINEERING

- American Society of Civil Engineers
- Association for Computer Machinery
- American Institute of Chemical Engineers
- American Society of Mechanical Engineers
- Engineers Without Borders
- Institute of Electrical and Electronics Engineers
- International Microelectronics & Packaging Society
- Society of Hispanic Professional Engineers
- Society of Automotive Engineers
- Society of Women Engineers
- American Society of Agricultural & Biological Engineers
- National Society of Black Engineers
- Technical Association of the Pulp & Paper Industry
- Institute of Transportation Engineers
- Material Advantage
- Tau Beta Pi

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COLLEGE OF ENGINEERING SURPASSES \$15 MILLION INSPIRING FUTURES CAMPAIGN GOAL



Through the generosity of our alumni, faculty, staff, and friends, we have surpassed our \$15 million goal for the Inspiring Futures: Invest in the University of Idaho capital campaign. This historic milestone is a reflection of the passion and commitment our supporters have for the future of our great College.

Generous gifts in support of College of Engineering students, faculty, facilities and programs fuel our ability to generate and disseminate knowledge that transforms our students, our communities, and our world.

Our mission is quite simple – and exceedingly important – to educate tomorrow's engineering and computer science leaders. Our students' contributions will help create a safer, well-designed, and more sustainable world.

The University of Idaho's College of Engineering provides students with a first-class education and the opportunity to learn from educators who are leaders and innovators in their fields of study. We've been educating engineers for more than 100 years and reaching our campaign goal allows us to continue this legacy for years to come.

More than 4,500 individuals have given over 1,300 gifts to the College of Engineering, and we are not done yet! Thank you for your support!

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