



ME NEWS

University of Idaho MECHANICAL ENGINEERING • FALL 2007

IdeaWorks: A research and teaching laboratory for mature, complex and innovative thinking



IdeaWorks members: Back row, l to r: Edwin Anderson, Tye Reid, Chris Huck, Jason Sagen, John Lacy; Front row: Brandon Folk, Alberto Castro, Jessica Sampson, Aaron Goodin, Randall Storms

The initial thinking for a laboratory of the type fulfilled by IdeaWorks—a place reserved for our seniors and graduate students to solve our most difficult design and research questions—was developed nearly nine years ago. Our goal was to furnish this laboratory with the best computers and most sophisticated software possible to create an environment that beckons the user to do his or her best work. No e-mail, no internet, no word processing; just a place for mature, complex and innovative thinking.

This fall while construction was going on we restricted access to 15 students. Now that the lab is fully functional, we will have 24 students taking a CAD/CAM course and another 15 graduate students using it for research during spring semester. Initial response from students has been very positive.

THE CAD/CAM EXPERIENCE

In this innovative laboratory, graduate students, seniors, and faculty use sophisticated software to:

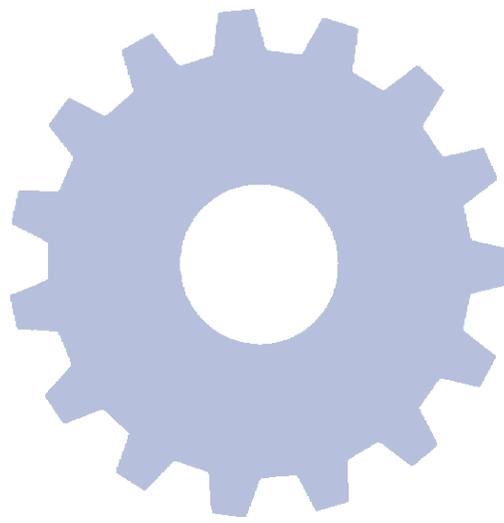
- Learn from great engineers and designers through reverse engineering
- Promote design visualization and team communication
- Unleash engineering creativity
- Animate and analyze breakthrough design concepts

THE OUTCOME

“Stretch projects” are specifically chosen to push students to the edge of what they believe they can accomplish. In completing a stretch project, students add an attractive item to their resume and have opportunities to reflect on their growth as engineering professionals. ⚙️



Don Blacketter



Words from the Chair

Dear Friends,

First let me thank you for your generous support—both time and resources. Our goal is to continue the strong tradition we have for the program. I am proud of a number of events and developments this past semester.

One bright spot is the opening of our new Advanced CAD Lab—IdeaWorks as it is called. The room is stunning and inviting and the computers are hot! Thanks to Ed Odom for driving this project which has already enhanced our ability to attract research funding and new students.

Faculty members have attracted a number of significant research contracts including a \$500,000 grant from the

state to improve engine combustion. (Steve Beyerlein, Karen, Judi and Ralph will be very busy this next year.)

Some of you know that we had our regular visit by ABET—the accrediting agency for engineering. The visit follows a report submitted in August. As a result of the way the faculty members presented the department the ABET visit went very well. While we don't know the official outcome we are confident that the committee was quite impressed.

In addition, our students continue to perform well above national norms on the Fundamental of Engineering Exam. The high demand for our graduates is a testament to the students' hard work and the efforts of dedicated faculty members.

Our four new faculty members are all that we expected—teaching

and mentoring graduate students like they have been here forever. We are fortunate to have them on our faculty.

Next year we are looking forward to having Karen Den Braven and Don Elger back from sabbatical. Ed Odom will be on sabbatical next year and we wish him the best.

Again, I want to thank alumni and friends for your generous support of our program. Special thanks go to our Advisory Board members for their dedication and willingness to come to campus and provide input into the program. Of course I want to express my appreciation to a group of faculty members who continue to amaze me with what they accomplish and how they do their job in a professional manner.

I encourage everyone to please drop me a note or stop by for a visit.

Best regards,

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ME NEWS

ME News is the newsletter of the University of Idaho Mechanical Engineering Department, PO Box 440902, Moscow, ID 83844-0902. Phone (208) 885-6579.

Any opinions expressed herein are those of the writers and do not necessarily represent the official position(s) of the university or its Board of Regents.

Editor: Elaine Queener

University of Idaho

Round 'N About: Faculty, Staff, Student Activities

Professors Judi Steciak, Steve Beyerlein, Karen Den Braven and Ralph Budwig received a \$550,000 two-year award from Idaho's Higher Education Research Council to continue their research in sustainable transportation fuel and engine systems. The HERC program goals are to boost equipment and resources to improve national competitiveness and strengthen ties with local industry. A strong university-industry connection is expected to help broaden the economic base of the state.

The award, administered through the National Institute for Advanced Transportation Technology, will fund equipment, graduate students, and a post-doctorate in support of the Small Engine Laboratory in Moscow and the Combustion Laboratory in Boise. NIATT researchers in the Center for Clean Vehicle Technology have been working for several years with Automotive Resources, Inc., in Sandpoint, Idaho, to support catalytic ignition of fuel-lean renewable fuel-air mixtures in vehicles.

Don Elger, on sabbatical this year, is working on the Results Measurement System, a performance measurement system that helps people in companies and higher education get results that they care about. It is a web-based performance measurement in five minutes or less with integration with reflective practice.

Elger is also working on the 9th edition of *Engineering Fluid Mechanics*. The goal for this edition is a textbook that aids student learning with lots of visuals, clear direct writing, organized examples and application photos.

Karl Rink was elected an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA). Beginning in May 2008, Rink will serve as the chairman of the AIAA Energetic Components and Systems Technical Committee, a group which furthers the design, development, and testing of energetic components and system integration into civilian and military

applications. A student chapter of the AIAA has been formed here at the University of Idaho.

Rink was an invited speaker for the 2007 International Autumn Seminar on Propellants, Explosives, and Pyrotechnics in held in Xian, China.

Karen Den Braven is on sabbatical for the 2007-2008 academic year, working with an engine manufacturer to develop catalysts for two-stroke engines. She also continues as Director of the Center for Clean Vehicle Technology in the UI's National Institute for Advanced Transportation Technology (NIATT), overseeing work in alternative fuels such as ethanol and biodiesel, as well as air bag safety.



Gabriel Potirniche and Don Blacketter with a fine catch.

New faculty:

Dr. Gabriel Potirniche has received the "Orr Early Career Award" from the Materials Division of the American Society of Mechanical Engineers at their November, 2007, meeting in Seattle. The award cites his outstanding contributions to the field of computational fatigue and fracture. Dr. Potirniche has recently joined the ME

Department as an Assistant Professor in Computational Mechanics. He performs research in computational plasticity and damage mechanics, fatigue and fracture, stress analysis and finite element methods.

Originally from Romania, Potirniche came to the US after earning his undergraduate degree and master's degrees in both Transportation and Mechanics at the Polytechnic University of Bucharest. His Ph.D. study in Mechanical Engineering was at Mississippi State University where he also served as Research Assistant Professor in the Center for Advanced Vehicular Systems.

Dr. Potirniche is particularly fond of snow for the sports opportunities it presents, so is hoping for several feet of it this winter. He also doesn't pass up any fishing opportunities, and had a successful steelhead outing with our department chair on the Clearwater, as you can see by the photo.

Dr. Jay McCormack grew up in Mount Jewett, PA, in the Allegheny National Forest (northwest PA). He attended Carnegie Mellon University in Pittsburgh, earning three degrees in mechanical engineering; BS in 98, MS in 00, and PhD in 03. McCormack served as research faculty member at CMU for a year before starting a company with four other people from CMU. The company, located in Pittsburgh, is called Design Advance Systems and makes and sells CAD tools for automating the layout process of printed circuit boards. The company still exists and is doing well.

Dr. McCormack's research interests are a continuation of his graduate and industry work: using artificial intelligence to automate and computational support in the design process.

Even with Marcie, his wife, and two delightful daughters, Wren, 3, and Jayne, 2, when asked about non-engineering "fun" activities, Dr. McCormack observed, "I'm not permitted to have fun activities; I am an assistant professor."



Dr. Akira Tokuhiro

Dr. Akira Tokuhiro joined the Nuclear Engineering Program of the Department of Mechanical Engineering this August in Idaho Falls as an Associate Professor within the College of Engineering at the University of Idaho–Idaho Falls.

Akira was previously Associate Professor of Mechanical & Nuclear Engineering at Kansas State University, Assistant Professor of Nuclear Engineering at the University of Missouri-Rolla (UMR) and Director, UMR Research Reactor (UMRR) facility. At UMRR, he held a NRC SRO license.

Dr. Tokuhiro received his Ph.D. degree in nuclear engineering from Purdue University in 1991; his M.S. in mechanical engineering from the University of Rochester in 1984, and his B.S.E. in engineering physics from Purdue in 1981. Being more than 25-years beyond his B.S. makes him an 'old-timer'. Students and colleagues should not be fooled by his youthful looks or manners.

After finishing at Purdue, he spent 5 years each as a researcher at the Paul Scherrer Institute (PSI, Switzerland) and the Japan Nuclear Fuel Cycle Development Institute (JNC). At PSI, he participated in the last years of the European Fast Reactor program and the thermohydraulic system certification test of the GE-SBWR. At JNC, he co-developed applications of ultrasonic velocimetry in reactor engineering and thermohydraulic designs of the Japanese LMFBFR.

He brings to the University of Idaho several active DOE NERI research programs in nuclear energy technology; one on testing of printed circuit heat exchangers and a second on ultrasonic velocimetry and thermometry technologies for the sodium-cooled fast

reactor. He just completed a DOE NEER on applications of polymer and silica gel materials for waste processing.

Akira has also developed and interest and activities in facial and voice expression biometrics, applied robotics, dynamic modeling of complex processes such as the fuel and energy cycles.

Akira will be teaching undergraduate and graduate courses in reactor engineering and the thermal-fluid sciences. He can be reached at 208-282-7714, tokuhiro@uidaho.edu and at: <http://ksu.facebook.com/home.php?> and <http://www.if.uidaho.edu/faculty/Tokuhiro/tokuhiro.html>

Finally, Akira is a knowledgeable Formula 1 follower and misses his 1992 red Mazda Miata. He hopes that his wife Victoria will let him buy a used Porsche 944 Turbo.

Dr. Eric T. Wolbrecht is a new assistant professor in the Department of Mechanical Engineering at the University of Idaho. He received a B.S. degree in mechanical engineering from Valparaiso University, Valparaiso, Indiana, in 1996, a M.S. degree in mechanical engineering from Oregon State University, Corvallis, Oregon, in 1998, and a Ph.D. degree in mechanical and aerospace engineering from the University of California, Irvine, in 2007. He has worked for Delta Faucet as a student CO-OP engineer, and at Yamaha Motor Corporation and John Deere as a production engineer.

Dr. Wolbrecht's research interests include robotics, nonlinear, optimal, and adaptive control, compliant actuation, motor learning, and neurorehabilitation.

Wolbrecht was accompanied to Moscow by his wife, Amy, and three-year-old son Micah, who supplies artwork for his Dad's ME office.

SleepSound, a baby sleeper with a sensor to alert parents to irregularity in breathing rate of the child, competed in the Innovation Showcase contest in Seattle. The team has made an advertising video and is moving forward with starting a technology company.

A video about the clean water for Africa project, "**Kenya Venture 2007**" will be released nationally to an audience of over 1 million people. Kenya Venture II is planned for March 2008.

This year, 55 University of Idaho students were honored at the Alumni Association's Awards for Excellence program in December. The Alumni Award for Excellence is presented to approximately 40 undergraduate senior-level students along with 15 graduate and law students who have achieved outstanding academic success and leadership in campus and community efforts. **Austin Howard**, master's student in Mechanical Engineering, was one of the honorees. Austin was joined by his faculty mentor, Donald Elger.

Austin was also one of six University of Idaho engineering students who showcased their research in front of a worldwide audience at the fifth annual International Planetary Probe Workshop in Bordeaux, France.

News from August 2007 graduate, **Joshua Benton**: Right now I'm in California at NASA Ames, working with my former senior design sponsor on planetary descent probes. In the last few months I've gotten to do a lot of design work on some of these probes which will eventually get launched from Wallops Test Facility in Virginia in an experimental sounding rocket. I'm not sure how much I'm allowed to say about it, but the rocket is made by ATK (the same folks who make the space shuttle solid booster engines, among other things), and it has a very experimental nosecone (shaped a bit like a flat-blade screwdriver tip) from a NASA Langley team which will gather aerodynamic data at hypersonic velocities. I got to travel to the east coast for our own critical design review, as well as the entire rocket's critical design review, which was a very interesting but very long three days. After that my boss let us stay the rest of the week so we could check out the sites in DC. We will have to go back there several more times to work with our east-coast colleagues, so I'm getting to do a fair amount of traveling. The probes we're working on are the sixth iteration of my boss's SOAREX project, which is part of a larger proposal of his, working toward a Mars lander mission. 🌌

EXPO

engineeringdesign 2008

Sr. Snapshot Day

A "peek" at the capstone projects in progress, was held at the end of November. Final presentation of projects is at the Engineering EXPO on April 25, 2008.

The projects and sponsors are:

- Rain Chamber—Itron
- Deer & Elk Active Deterrent System—Idaho Dept. of Fish & Game
- Keyboard Voice Input Architecture—Advanced Input Systems
- Space Elevator—College of Engineering
- Transformer Fault Detector—Schweitzer Engineering Lab
- Fuel Element Disassembly Equipment—Idaho National Lab
- Wireless Thermal Protection System for Shuttle Tiles—NASA
- Knee CPM Machine—McKelor Technologies
- Fuel Cell to DC Battery Power Interface—Office of Naval Research
- Sediment Trap—UI Water Resource Center
- Non-Prehensile Lunar Manipulator—NASA/Idaho SpaceGrant Consortium
- FSAE Vehicle—ME Department
- Outboard Emissions Clean-up—Bombardier Recreation Products
- Potato Waste Conditioning for Biodiesel Fuel—JR Simplot
- Sanitary Gate Design—Key Technologies
- Soil Proportioner—Potting Shed Creations
- Open Architecture Robot—EE Department
- Hybrid Small Engine Packaging—ME Department
- Performance-Testing Rig for Micro-Stepping Motors—Manning Applied Technology



Keep in touch! We want to hear from you!

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Name _____

Email _____

Address _____

City _____

State/Zip _____

Home Phone _____

Employer _____

Position _____

UI Degree & Year _____

Comments _____



ASME News

We are winding down a very fun and exciting Fall 2007 Semester, one of our most active to date. In August we supported the ME Department with their welcome-back-to-school BBQ which saw one of the largest crowds in a long time, well over 120 people. The line for hamburgers seemed endless.

ASME highlighted our three new professors, Dr. Gabriel Potirniche, Dr. Eric Wolbrecht, and Dr. Jay McCormack, over the course of the semester by having them talk and introduce themselves at general ASME meetings. Already these professors are encouraging kids and are a great addition to the current faculty. Special events this semester included a tour of Wagstaff in Spokane, a company that builds aluminum ingot-making devices for companies around the world. What a great way to see alumni in action along with planting creative seeds in young engineers' minds. Our first ASME BBQ at Robinson Park was a great

success and we look forward to having more in the future. Our semester-ending social at Patty's is always a great time to spend with fellow students and faculty.

This year University of Idaho has entered the Student Design Competition to make an autonomous window washer. What an incredible challenge this is. The team has to create a device that will adhere to a window while washing. Also, the device is required to cross a sash for the completion. Abraham Shryock is heading up the team with our bright engineers following. Can't wait to see the competition in the spring at the ASME District Conference in Tacoma March 28 and 29. If you are in the area stop by and support our Vandals. Go to www.asme.org for the location and directions to the venue.

Other ASME activities planned include a trip to Seattle in January to tour Boeing and Delta Yachts. We will have at least three general meeting

throughout the semester with guest speakers, the first of which will be a recruiter from Boeing. Others will be announced closer to the dates. We will also tour ATK, an ammunitions manufacturer in Lewiston and Fab-Tech, a metal fabricator of production parts located in Moscow. Special events planned include a ski day in McCall, March Madness at Wingers, hockey trip to Spokane, bonfire, Engineering Design Expo BBQ, and ending the semester with another trip to Patty's.

We would like to extend a big thank you to the Alumni and ME Department for support. Without you we could not present fun and educational opportunities for our young engineers.

Regards,

Kurt Hall, University of Idaho Student ASME Chapter



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College of Engineering

Mechanical Engineering Department

University of Idaho

