

November 15, 2012

Miller accepts NRC Research Associateship

Joe Miller, mechanical engineering PhD graduate and current visiting researcher with Dr. **Terry Meyer's** research group, was recently awarded two different postdoctoral Fellowships.



Miller

Miller was awarded an Alexander von Humboldt Postdoctoral Fellowship to work with Prof. Dr. Markus Motzkus at the Institute for Physical Chemistry, Heidelberg University, Germany. This is Germany's highest postdoctoral award for visiting postdoctoral researchers. He was concurrently awarded a National Research Council (NRC) Research Associateship to work with Dr. James Gord at the Air Force Research Laboratory (AFRL) at Wright-Patterson Air Force Base, OH. This is a prestigious postdoctoral award given by the National Academies of Science and Engineering.

Miller has accepted the NRC Research Associateship (declining the Humboldt award) and will be starting at AFRL in January. His research will focus on understanding combustion processes on the time scales of molecular movements (10^{-15} seconds or femtoseconds) which drive individual reactions. This will include work in femtochemistry where specific intermediate molecular states are observed and potentially controlled using ultrafast laser pulses. This could lead to increased understanding of complex chemical reactions and the potential for manipulating the progress of individual reactions.

Hurricane Sandy alters conference plans



A group of staff and students from multidisciplinary research backgrounds in biofuel production listen attentively to a presentation on October 31, at Marston Hall. Photo by William Deaton/Iowa State Daily.

Twelve students and four staff from multidisciplinary research backgrounds in biomass gasification and pyrolysis and techno-economic analysis of biofuels production were originally scheduled to fly out to Pittsburgh on Oct. 29 to present their work at the week-long American Institute of Chemical Engineers conference.

"As of Sunday night, it looked like the storm would pass directly through Pittsburgh," said **Robert Brown**, director of ISU-based Bioeconomy Institute and Anson Marston distinguished professor of Engineering. "I made the decision late Sunday not to go based on the fact that I was responsible for a large group, [and] we were essentially flying into a hurricane."

Grad student works with next generation biofuel technology



Nicholas Creager, graduate research assistant in mechanical engineering, shows the condensing equipment used in a research experiment. Photo by Yanhua Huang/Iowa State Daily.

One ISU researcher plays an important role in designing the future of next generation biofuel technology. **Nicholas Creager**, graduate student in mechanical engineering, designed and built a prototype gasifier, which combines elements from gasification and fast pyrolysis to produce transportation fuels.

"I looked a lot into literature of other gasifiers that had been built and really looked into how they were built and what properties they had that made them functional and incorporated them into the design," Creager said.

"This gasifier is part of a two-step process. The first step is to convert bio-oil into a gas mixture called synthesis gas or syngas and the second step is to synthesize the product into transportation fuel," said **Song-Chang Kong**, associate professor in mechanical engineering. "We are focusing on the first step. We gasify bio-oil to produce syngas."

Traditionally, gasification uses a biomass feedstock, such as corn stover, corn cobs or wood chips, and exposes the material to high temperatures of 700 C or greater with controlled amounts of oxygen and/or steam to produce a mixture of gases called synthesis gas. The end product can be processed into transportation fuels. ([Full story](#))

Taking the Road Less Traveled

Even Hurricane Sandy's clouds have a silver lining: With the trip to Pittsburg canceled, an ideal opportunity arose for the researchers to still present their work on campus in an event Brown dubbed the "Sandy Alternative Symposium." ([Full story](#))

Deere Day 2012

The Virtual Reality Applications Center's annual Deere Day is a day for sharing ideas and reviewing progress on projects sponsored by the John Deere enterprise. Deere Day 2012 was held on October 25 from 8:30 a.m. to 4:30 p.m.

Research summaries were presented by teams consisting of Iowa State faculty, students, and project leaders from Deere to showcase VRAC's John Deere sponsored research projects. These projects explore ways that emerging interface technologies can be used in exciting and productive ways to accelerate new product development, simulate vehicle operations, evaluate human factors and ergonomics, analyze complex engineering data, and build capabilities in a broad range of product and manufacturing process development and business applications.

Mechanical engineering associate professor **Eliot Winer** and assistant professor **Song Zhang** presented their project "High-resolution, Real-time 3-D Shape Measurement for Particle Motion Capture" with students Nik Karpinsky, Yajun Wang, and Bhaskar Bhattacharya.

"Enhancing Integrated Robust Optimal Design (IROD) Environment for Integration of Off-the-Shelf Simulation Tools, User Friendliness, and Expanded Capabilities" was presented by mechanical engineering professor **Atul Kelkar** along with student Punit Tulpule.

Mechanical engineering associate professor **Greg Luecke** and psychology professor and associate director of VRAC Stephen Gilbert presented "Operator Performance Evaluations For Smart-Unload Automation" with students Andrea Peer and Don Kieu.

"Tools for the Design of Multiphase Flows" was presented by mechanical engineering associate professor **Mark Bryden** with student Chad Garber. Bryden also presented "Virtual Engineering for Improved Product Development" with VRAC's Doug McCorkle and student Peter Finzell.

"Development of Advanced Collaboration and Modular Methods to Facilitate Transition Between Concept and Detailed Design Stages" was presented by mechanical engineering associate professor **Eliot Winer** and professor **James Oliver**, who is also director of VRAC. Students Alex Renner, Fred Thompson, and Vijay Kalivarapu assisted.

Upcoming events

November 26 – [Open Forum with Robert Bishop, Dean Candidate Finalist](#)

November 27 – ME Seminar: Karthik Ramani, Purdue, "[Using hands and gestures to create and interact with virtual shapes and real surfaces](#)," 11 a.m., 2004 Black

November 28 – [Open Forum with Mark Law, Dean Candidate Finalist](#)

November 29 – [Exercise for Success in School and Career](#)



Above: Middle and high school girls experience Hogwarts School from the Harry Potter book series through a virtual reality experience in the Multimodal Experience Testbed and Laboratory.

Below: ME graduate student Meisha Rosenberg and EE senior Jane Peters introduce the technology to the visiting students.

The Program for Women in Science & Engineering has been sponsoring the Taking the Road Less Traveled career exploration conferences for girls in grades 6-12 each year since 1987. The conference format includes career exploration workshops led by women working in science, engineering, and other technical fields; tours of ISU labs and facilities; and special sessions for parents and educators. One of the goals of the conference is to encourage young girls to consider engineering and science fields as a career.

Judy Vance, Joseph C. and Elizabeth A. Anderlik Professor of Engineering, and her research group participated in the conference with a both a presentation about virtual reality and hands-on experience with two virtual reality demo stations.

The first station is at Vance's research lab, the Multimodal Experience Testbed and Laboratory, or METaL. Here students experience Virtually Magic, a fully immersive virtual reality application which was developed primarily by undergraduate students **Jane Peters**, senior in electrical engineering, and **Alicia Fleege**, senior in mechanical engineering. The application is loosely based on Hogwarts School of Witchcraft and Wizardry from the Harry Potter book series. Students are told about virtual reality technology, how it works, and how computer programming can be used to build the applications. Students also visit the Haptics Lab in VRAC, experiencing a virtual reality that includes haptic (force) feedback. Students learn about the use of this application in product design, especially product assembly methods prototyping and design for reuse, recycle and recovery.

The mechanical engineering undergraduate students who led the presentations and demonstrations this year were **Alicia Fleege** and **Maria Blaneck**. They are funded on an National Science Foundation (NSF) Research Experience for Undergraduates (REU) supplement to one of Dr. Vance's NSF grants. This project has been continually developed over the last three years. Other students who have contributed significantly include **Meisha Rosenberg**, graduate student in mechanical engineering, and **Zachery SchAAF**, mechanical engineering graduate.

Alicia Fleege attended the Road Less Traveled Conference when she was in high school, and credits her experience as part of the

inspiration of her choice to student engineering at Iowa State.

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