InCYde MECHANICAL ENGINEERING
IOWA STATE UNIVERSITY
Department of Mechanical Engineering

June 26, 2012

Recent Grant Award Announcements


Winer

PI: Eliot Winer
Title: "Immersive Design Center Support"
Award Amount: $156,042
Awarding Agency: Boeing

The Immersive Design Center Support project uses advanced technology and visualization techniques to help aircraft designers efficiently explore many possible designs to find optimal solutions to their design problems.


Kong

PI: Song-Charng Kong
Co-PI: Robert Brown, Eliot Winer, Guiping Hu
Title: "Experiments, Technoeconomics, and Optimization of Bioenergy Systems Based on Bio-Oil Gasification"
Award Amount: $151,464
Awarding Agency: Iowa Energy Center

In this project, researchers are converting bio-oil, derived from non-food biomass via fast pyrolysis, to transportation fuels. They will be developing technology to gasify bio-oil to syngas, which is synthesized to liquid transportation fuels, and constructing a first-of-its-kind bio-oil gasifier and further optimization. They will make use of experimental data to develop a high-fidelity processing simulation model, and combine plant simulation with virtual engineering tools to visualize the layout and operation of commercial plants.

PI: Song-Charng Kong
Title: "Developing Direct Injection Systems to Increase the Engine Load Limit Using Ammonia"
Award Amount: $101,233
Awarding Agency: Iowa Energy Center

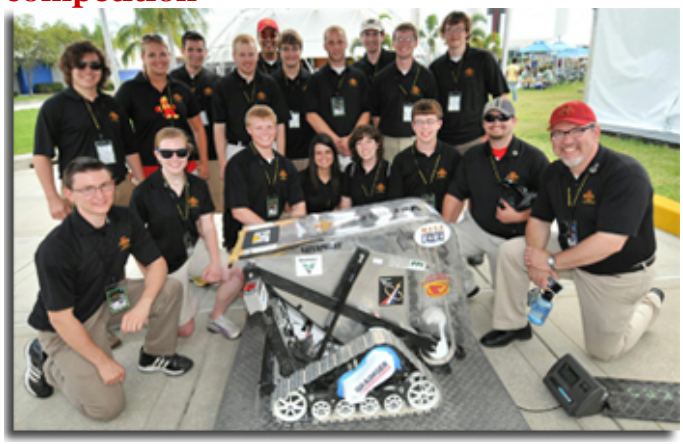
Researchers are developing a novel fuel injection system that is able to inject gaseous fuels into the cylinder of a spark-ignition (gasoline) engine directly, as well as implementing and testing the injection system using gaseous ammonia. It is anticipated that the new fuel injection systems can allow sufficient amounts of ammonia to be inducted into the cylinder to achieve high power output using ammonia as a carbon-free fuel.

Fontanini makes discovery in ductwork


Fontanini

Anthony Fontanini, graduate student in mechanical engineering, is working on several projects that show how simply changing materials can conserve energy by nearly 25 percent in heating, ventilation, and air conditioning (HVAC) systems. He says replacing standard sheet-metal ducts with fabric ducts could be another great way to promote "green" building, and help reduce the carbon footprint of building even further.

Lunabotics club mines success in NASA competition


Traveling members of LunaCy. Front row (L-R): Kyle White, Katie Goebel, Ben Reuter, Mariangela Lindquist, Lauren Wickham-Kolstad, David Pieffer, Ben McNeill, Jim Heise (advisor) Back row: Chris Miller, Ashley Pitkin, Andrew Klein, Nathan Beougher, Ricardo Canahui, Alex Grant, Chris Walck, John Charles, Ryan McCleish, Aren Hill.

After leaving NASA's annual Lunabotics Mining Competition empty handed the past two years, Iowa State team members were determined to stand out at this year's contest. Armed with a new design, Team LunaCY did that and more, earning first place in the categories of on-site mining, outreach, and communications with their robot, ART-E III.

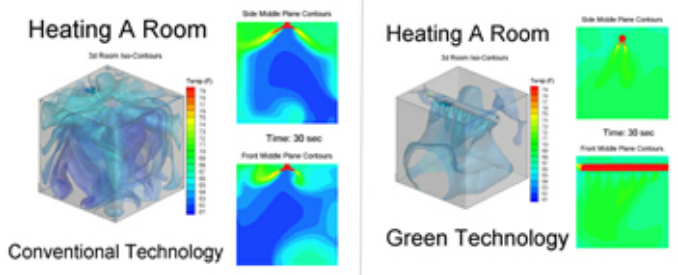
Members of the club traveled to Cape Canaveral, Florida in May, competing against students from 58 other universities to see which teams' robot could mine the most moon soil, or regolith, during a 10-minute time period. ART-E III was able to well surpass the competition's collection requirement of 10 kilograms of regolith, successfully collecting 39 kilograms during the first round and ensuring the team a spot in the final round.

Overall, the team earned an estimated 100 points, a score that factors in all the competition's individual categories. The total was almost enough to surpass the University of Alabama, which earned approximately 109 points and came away with the grand prize, the Joe Kosmo Award. While LunaCY did not receive the top prize, the team won the Communication Efficiency Award as well as the Outreach Project Award−a well-deserved recognition of the club's 200 hours of outreach promoting STEM programs that reached more than 3,000 children. (Full story)

Zhang's research featured on cover of Applied Optics

Assistant professor **Song Zhang**'s paper "Three-dimensional range data compression using computer graphics rendering pipeline" was published in Applied Optics, volume 51, issue 18. An image of his research was featured on the cover.

The featured image is an example



The results on the left represent the dispersal of heat in a room over a period of thirty seconds using conventional ductwork. The results on the right illustrate the more even and timely dispersal of heat using fabric ductwork in a room of the same size and over the same period of time.

"With this research we aren't necessarily trying to prove that fabric ducting is the best. We are trying to change the way engineers and scientists view energy analysis," says Fontanini. "It's difficult to get research funding for younger technologies. We're attempting to develop tools that the entire industry can use for research, design, and analysis, which could open up opportunities to explore other new technologies." (Full story)

Formula SAE team looks for engine answers as it prepares to race

Iowa State's Formula SAE Team. Top row (L-R): Kevin Riley, Alex Schultz, Graham Sawyer, Greg Bott, Dallas Van Wyk, Derek Peters and Johanna Knaeble. Bottom row: Derek Roberg, Jue Wang, Quincy Milloy, Stephen Krug and Adam Witthauer. *Photo by Cyclone Racing.*

Formula SAE's June 20-23 competition in Lincoln, Neb., is currently underway. And the Yamaha YFZ450 engine in the back of the student-designed and student-built mini open-wheel racer is finally close to powering some last-minute tests. The first time the team fired up the engine, it started right up and the team was able to do some quick tests. But it suddenly went rough and the team has been searching for answers since.

The search included a trip to Barrie, Ontario, Canada, for the May 24-27 Formula North 2012 competition. It wasn't an official competition sanctioned by SAE International, formerly known as the Society of Automotive Engineers. But the competition followed the SAE rules and the team looked at it as a good practice session.

Unfortunately, the engine problems kept the team off the track. But the team was able to go through the engineering design, cost and marketing presentations. The team is hoping for a much better showing at the Formula SAE contest at the Lincoln Airpark. (Full story)

Upcoming Events

June 29– Engineer Like a Girl Camp
July 4 – University Holiday, Offices Closed

of Zhang's work with data compression of 3D images. Advanced computer graphics tools permits converting 3D range data into a regular 2D color image (e.g., JPG). By this means, 3D data size is drastically reduced, making it easier to store and transmit 3D data. (Read Zhang's paper)

MacDonald returns from Big 12 faculty fellowship

MacDonald

Erin MacDonald, a 2011-2012 Big 12 Faculty Fellow, recently returned from the University of Texas at Austin with a new partnership and several budding research ideas to improve new product design.

MacDonald, an assistant professor of mechanical engineering, spent two weeks in May, working side-by-side with assistant professor Carolyn Conner Seepersad from the UT mechanical engineering department as part of the fellowship program.

"We discussed new approaches for the early stages of design and product conceptualization that can address the three pillars of sustainability− environmental, economical, and social," said MacDonald. (Full story)

Open forum highlights progress on Dean's Research Initiatives

Brown

Interdisciplinary teams working on the Dean's Research Initiatives (DRIs) presented their progress to date in an open forum held May 15. The DRIs, established by the College of Engineering in 2011, awarded $500,000 to three teams to help them pursue larger funding opportunities.

The Initiative for a Carbon Negative Economy (ICNE) is looking beyond reducing greenhouse gases to develop strategies that remove carbon dioxide from the atmosphere. The team is led by **Robert Brown**, Anson Marston Distinguished Professor of Engineering and Gary and Donna Hoover Chair in Mechanical Engineering. Brown is currently investigating the viability of biomass pyrolysis, which creates three byproducts—biochar, bio-oil, and a gas—and sequesters more carbon in the biochar than it produces. His research includes testing the ramifications of placing the biochar into soil, which ultimately returns carbon dioxide to the earth. (Full story)

Akinc named interim dean of College of Engineering

Akinc

Professor **Mufit Akinc**, a faculty member at Iowa State University since 1981, has been named interim dean of the College of Engineering effective July 30. He succeeds Jonathan Wickert, who will assume the role of senior vice president and provost at Iowa State on the same date.

July 6 – Summer Session I Ends
July 14– Discovery Station: Back-to-Back Building

Akinc is a professor of materials science and engineering and has led the college's international engagement initiative since 2010. He also holds a courtesy appointment in chemical and biological engineering, and is an associate scientist for the U.S. Department of Energy's Ames Laboratory. (Full story)

Department of Mechanical Engineering
2025 Black Engineering Building, Ames, IA 50011
515 294-1423, isume@iastate.edu

Do you have department news you'd like to share?
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