

UNLV | Department of MECHANICAL ENGINEERING ACCELERATION

2013 Newsletter

Best in the U.S.

UNLV's Team Las Vegas places second overall in the Department of Energy Solar Decathlon 2013, the only American team to place in the top three.



Greetings, from UNLV's Department of Mechanical Engineering

Welcome, mechanical engineering alumni and friends! As the fall semester winds down to its conclusion, we wanted to share some exciting news out of our department, from Team Las Vegas' second place finish at the Solar Decathlon, to noteworthy accomplishments by our exceptional faculty. I invite you to contact us, should you wish to hear more about our activities or research.



All the best,
Woosoon Yim
Department Chair



Department of Mechanical Engineering Mission

It is the mission of the department of mechanical engineering to prepare students for the lifelong practice of mechanical engineering and related engineering disciplines. This includes preparation for immediate entry into positions in industry or for further study in graduate school. Additionally, the department sustains an outstanding academic program, motivating the faculty to attain excellence in research by acquiring external funding and incorporating students into their research programs.



The "Variable Pitch Quad Rotor Kopter" is featured at the spring 2013 Fred and Harriet Cox Senior Design Competition.



Mechanical engineering department award winners at the 2013 College of Engineering Honors Convocation.



UNLV's Society of Automotive Engineers student chapter's competition vehicle.



"Stirling Air Conditioner" takes first prize in the mechanical engineering category at the spring 2013 Fred and Harriet Cox Senior Design Competition.

UNLV Wins Second Overall in Department of Energy Solar Decathlon 2013



"Not only did I learn about how to do engineering design and specification, but I also gained first-hand experience in construction management and procurement. I want[ed] to be part of something important that changes people's lives. Thinking of what we do now will affect the way people live in the future; it's challenging and rewarding."

— Jinger Zeng,
DesertSol's Engineering
Project Manager

DesertSol also ties for third place in the engineering contest and was the top performing home by an American team in the prestigious international competition.

By Megan Downs

The UNLV team won second place overall in the U.S. Department of Energy's Solar Decathlon 2013 contest today for its DesertSol home, which blended consumer appeal and design excellence with optimal energy production and maximum efficiency.

"This was truly an honor and a privilege to be here. We did it!" said project manager Alexia Chen when she accepted the award. "This is an incredible and truly innovative team of architects, engineers, communicators, and more.

"We thank our mentors at the university and throughout the community who have helped us make it to this point. This was truly a life-changing experience and everything we got from this experience was incredible."

Team Austria, representing the Vienna University of Technology, won first place overall. Solar Decathlon judges said the contest was closer than ever, reflecting the quality of the competition. The points spread between Team Las Vegas and the first place winner was only five points.

UNLV did very well in several of the individual decathlon events:

- No. 1 in market appeal category, which evaluated the livability, marketability, and constructability of each house and its appeal toward its target client.
- No. 2 in communications, which evaluated the team's website, public exhibit materials, public tours and

audiovisual presentations for clear and consistent messages, images and audience engagement.

- No. 1 (tied) in hot water, which assesses if a home's water heating system can supply all the water needed for washing and bathing.
- No. 3 (tied) in engineering, which evaluates the home for functionality, efficiency, innovation, reliability and documentation.
- No. 7 in home entertainment, which assesses how well the home accommodates the pleasures of living, such as sharing meals with friends and family, watching movies in a home theater, and surfing the web.
- No. 4 in comfort zone, which tasks the team with keeping the home temperature and humidity steady, uniform, and comfortable.
- No. 5 (tied) in the architecture, which judges the team on how solar and energy-efficient technologies are integrated seamlessly into the design.

The international competition educates the public about energy-saving residential designs. It requires collegiate teams to design, build, and maintain a sustainable solar-powered home. This is a student-run project, with guidance and support from faculty members, industry mentors and community supporters. After the competition, the DesertSol home will be installed at the Las Vegas Springs Preserve.

For more information on Team Las Vegas, visit <http://solardecathlon.unlv.edu/>.



Faculty in the Spotlight: Distinguished Professor Robert Boehm

By Shannon Spollen

Twenty-three years after coming to UNLV, Robert Boehm has earned his stripes as an innovator in solar energy research. His title of Distinguished Professor – the highest honor that can be granted to UNLV faculty – reflects not only the extraordinary qualities he embodies as a teacher and scholar, but also his national and international reputation in the field of mechanical engineering.

As Director of the university's Center for Energy Research, named this year as one of five U.S. Department of Energy Regional Test Center Sites, Boehm remains on the forefront of continued research to make solar energy more affordable and reliable. Over the years, Distinguished Professor Boehm has done countless interviews about his research and work. But we wanted to go beyond the standard fare and find out a little bit more about who he is.

What kept you busy between semesters this year?

I was writing proposals for research projects, both here at UNLV as well as for a joint submission with another university. In addition, Professor Jaci Batista and I, as Co-Principal Investigators, were quite busy setting up details related to the large National Science Foundation collaborative project that was awarded to UNLV, University of Nevada, Reno, and the Desert Research Institute earlier in the year. I took two trips to China – one to Inner Mongolia to examine an attempt to develop a “low-carbon” town, and another to Guilin to give two papers. I also worked on some writing projects whose deadlines were rapidly approaching.

What inspired you to get into engineering?

It was almost an accidental thing. I was raised in a small town, and I was the first of my family to go to college. I didn't know what an engineer was when I was getting ready to go away to school. However, a friend, who was one year older than I, went into mechanical engineering. He told me about it, and I decided to go into that major also. It was one of the luckiest decisions I ever made.

If you weren't an engineer, what do you think you'd be doing instead?

I can't imagine what it would be because I am so glad I became an engineer. It is even greater that I was able to become an engineering professor and work with students.



How long have you lived in Las Vegas and what do you like the most about living here?

I moved to Las Vegas in 1990 as the first chair of the newly formed Mechanical Engineering Department. I like many things about Las Vegas including the ability to work with solar energy. I also like that fact that the topography is fairly flat, and I can ride my bike to and from school.

Aside from abundant sunshine, what makes Las Vegas an ideal place for energy research?

One of the things that has been true at UNLV while I have been here is that there has been a great deal of freedom to pursue projects of interest. It is also true that Las Vegas has a small town feeling in that it is easy to get to know great people.

What would people be surprised to know about you?

I am an old car buff. I certainly like things mechanical, I like driving old cars, and I am trying to rebuild a 1928 Chevrolet. The latter is going very slowly, however.

What has been your proudest moment?

It is very hard for me to define only one. I have been lucky to have lived long enough to have experienced many. Several of them have been here at UNLV.

What is the last book you read or would recommend?

The Swerve by Stephen Greenblatt. It is a great history of how the thinking of the Greeks was rediscovered and helped Europe move into the Renaissance.

What do you enjoy the most about working with students?

The enthusiasm and intellect they show. I learn a great deal from them.

What is the most important piece of advice you give to your students?

If you have the option, try to pick a job that will be something you enjoy doing, and that will carry you through life.



Research Highlights

UNLV Leads \$20M Research Project Funded by the National Science Foundation

UNLV is taking a leading role in a \$20 million research project that will enhance solar energy technology and advance understanding of the connection between solar energy, water, and the environment in Nevada. Over the course of the five-year grant, UNLV will receive \$7.4 million to lead the solar energy and water components of the research project. The rest of the funding will go to the University of Nevada, Reno and the Desert Research Institute. This “Solar Energy-Water-Environment Nexus” project will enhance understanding of the balance among water conservation, the environment, and solar energy by addressing a variety of issues related to large-scale solar installations in arid desert lands.

The project will combine research on solar energy generation with the understanding of eco-hydrological impacts of solar installations to advance the economic and eco-friendly viability of solar electricity generation. **Distinguished Professor Robert Boehm**, co-principal investigator on the grant, is leading the major portion of the project on improving solar energy technology.

For more information, visit <http://news.unlv.edu/release/unlv-leads-20m-research-project-funded-national-science-foundation>.

UNLV A Regional Solar Test Center

The UNLV Center for Energy Research was recently named one of five Regional Test Center sites by the U.S. Department of Energy. The sites will work to make solar energy more affordable and reliable through the development of nationwide standards in the photovoltaic (PV) industry.

The Regional Test Centers will test large-scale PV systems made by solar companies to provide unbiased and independent validation of performance and reliability. In turn, the centers will share data to create standardized systems and guidelines that will be made widely available to the solar energy industry.

The work in Nevada will be conducted by highly trained researchers and students at the UNLV Center for Energy Research, part of the College of Engineering. The center is led by Distinguished Professor Robert Boehm, who notes “this puts UNLV at the forefront of establishing a sustainable solar energy industry in America.”

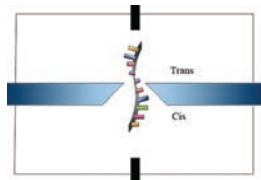
Faculty Research Accomplishments



Professor Kwang J. Kim, as the Science PI, was recently awarded a \$1.1 million grant from NASA for a research project entitled “Advanced Electroactive Polymer Sensors and Actuators for Aerospace Robotic.” This project is to advance the development and understanding of electroactive polymer materials for

sensing and actuating applications in emerging robotic and space vehicles and systems. The ME co-PI for this project is Professor Woosoon Yim. Professor Dong-Chan Lee of the UNLV department of chemistry, and Prof. Kam Leang of University of Nevada, Reno are participating in this program as co-PIs.

Professor Thomas Hartmann’s research group was awarded an additional \$100K grant for fiscal year 2014 from Idaho National Laboratory. This is in continuation of ongoing research activities on the characterization of as-cast fuel plates to support the DOE RERTR (Reduced Enrichment for Research and Test Reactors) program.



Professor Hui Zhao received a Small Research Grant from the National Institute of Health (NIH). The title of the project is “Mathematical Modeling of Biomolecules Translocation through Nanopores.”

Professor Darrell Pepper, in collaboration with Los Alamos National Laboratory, is actively involved in developing and validating an hp-adaptive finite element (FEM) projection technique for fluid flow, heat transfer and species transport within the KIVA program module. KIVA is a combustion and engine design computational model used widely within the automotive industry.

Sponsored by the Office of Naval Research Laboratory (\$413,000), **Professor Kwang J. Kim** is studying artificial muscle (AM) cilia array for underwater systems. The goal of this project is to exploit the unique properties of a new enabling AM to create a cilia-based system for possible use in aquatic applications. It is aimed to extend the fundamental science behind Ionic Polymer-Metal Composite actuator performance based upon a cilia-based system.

Congratulations, Mechanical Engineering Graduates!

Bachelor of Science in Mechanical Engineering

Spring/Summer 2012

Albright, Jacob B.
Bachman, Sally
Benavente, James
Benn, Darren
Bergstrom, Trevor J.
Boles, Jeremiah
Brown, Robert J.
Calvo, Christian
Christy, Jessica M.
Fitzjerrells, Alexander R.
Fjare, Paul David
Frappier, Ann M.
Galli, Justin
Hart, Dustin T.
Herrera, Joshua William
Kebede, Eskender Y.
Lennon, Derek
Leyva, Arnaldo
Magann, Brian
Marshel, Zachary Trent
Montalvo, Marco Antonio
Pratt, Timothy N.
Reyburn, Matthew H.
Richardson, Norman E.
Saenz, Karina
Stern, Jeremy T.
Tran, Vu

Fall 2012

Arview, Michael Alan
Buzar, Jian Paolo B.
Cacal, Scott Y.
Chagin Sanchez, Stephanie M.
Charnkijtararush, Chanatan
Conlin, Geoffrey M.
Cooper, Keith
Escoto, Arturo
Fyda, David
Ghanaatrad, Ryan B.
Gonzalez, Enrique L.
Hartman, Jessica N.
Litton, Kyle
Maher, Caleb W.
Otero, Daniel Raul
Poon, Vincent
Rebman, Kyle W.
Ross, Nathaniel E.
Salazar Jr., Raul
Santos, Ronnie G.
Silva, Daniel F.
Trabia, Sarah S.
Triay, Jose R.
Wu, Solomon G.
Zaidi, Sammy A.
Zeng, Zheng

Master of Science in Aerospace Engineering, Biomedical Engineering, Materials/Nuclear Engineering, and Mechanical Engineering

Spring 2012

Dixon, John M. (AE)
Brink, Justin Robert (BM)
Fojas, Ronn Reinier (ME)
Lorick II, Ronald (ME)
Mellinger, Zachary (ME)
Moumouni, Yacouba (ME)
Sanchez, Jonathan Gamaliel (ME)

Summer 2012

Loftis, Pamela L. (MN)
Hachem, Mohamad R. (ME)
Tokala, Nishanth R. (ME)

Fall 2012

Asuri Sudharshana Chary,
Rohit (ME)
Fossile, Lauren (ME)

Doctor of Philosophy in Mechanical Engineering Nelson, Stacy M.

Dissertation Title: *Material Characterization and Analysis Methods for Blast Loaded Composite Structures*
Supervisor: Prof. Brendan O'Toole

Saadeh, Mohammad Y.

Dissertation Title: *A Refreshable and Portable E-Braille System for the Blind and Visually Impaired*
Supervisor: Prof. Mohamed Trabia

Lowe, Daniel R.

Dissertation Title: *Novel Production Techniques of Radioisotopes Using Electron Accelerators*
Supervisor: Prof. William Culbreth



Sarah Trabia and Daniel Lowe, selected by UNLV President Neal Smatresk as Outstanding Undergraduate and Graduate Students, respectively, were honored at the fall 2012 commencement ceremony



ME graduate student Zheng (Jinger) Zeng is presented with the Troy Bartlett Service Award at the College of Engineering 2013 Honors Convocation.



ME undergraduate student Joseph Mirabile is presented with the Graciel Mechanical Engineering Outstanding Student of the Year Award at the College of Engineering 2013 Honors Convocation



Dr. Mohammad Saadeh, now an Assistant Professor at Southeastern Louisiana University, received UNLV's 2013 Outstanding Dissertation Award for his dissertation "A Refreshable and Portable E-Braille System for the Blind and Visually Impaired"

Meet Our Faculty

Core Faculty

Alexander Barzilov, Associate Professor (Ph.D.: Institute for Physics and Power Engineering, Russia)

Robert F. Boehm, Distinguished Professor and Dominic Marrocco Professor of Energy Research (Ph.D.: University of California, Berkeley; ASME Fellow; PE)

Yi-Tung Chen, Professor (Ph.D.: University of Utah; ASME Fellow)

William Culbreth, Associate Professor (Ph.D.: University of California, Santa Barbara)

Thomas Hartmann, Associate Professor (Ph.D.: University of Heidelberg / Karlsruhe Institute of Technology, Germany)

Kwang J. Kim, Southwest Gas Professor of Energy and Matter (Ph.D.: Arizona State University; ASME Fellow)

Georg Mauer, Professor (Ph.D.: Technical University of Berlin)

Samir Moujaes, Professor (Ph.D.: University of Pittsburgh)

Brendan O'Toole, Professor (Ph.D.: University of Delaware)

Darrell Pepper, Professor (Ph.D.: University of Missouri-Rolla; ASME Fellow)

Douglas Reynolds, Professor (Ph.D.: Purdue University)

Stephen Rice, Professor (Ph.D.: University of California, Berkeley; ASME Fellow; PE)

Mohamed Trabia, Professor (Ph.D.: Arizona State University; ASME Fellow)

Zhiyong Wang, Associate Professor (Ph.D.: Harbin University of Science and Technology)

Woosoon Yim, Professor & Chair (Ph.D.: University of Wisconsin-Madison; ASME Fellow)

Hui Zhao, Assistant Professor (Ph.D.: University of Pennsylvania)

Research/Adjunct Faculty

Denis Beller, Research Professor (Ph.D.: Purdue University)

Rick A. Hurt, Research Engineer

Joon S. Lee, Associate Research Professor (Ph.D.: Hanyang University, S. Korea)

Kris Lipinska, Associate Research Professor (Ph.D.: University of Science and Technology, Krakow, PL)

Charlotta E. Sanders, Associate Research Professor (Doctorate: Royal Institute of Technology, Sweden; P.E.)



Professor Chen and College of Engineering Dean Rama Venkat

Professor Yi-Tung Chen received a 2013 Barrick Distinguished Scholar Award, in recognition of his established record of distinguished research.



Assistant Professor Zhao and College of Engineering Dean Rama Venkat

Assistant Professor Hui Zhao received a 2013 Barrick Scholar Award in recognition of his established record of distinguished research

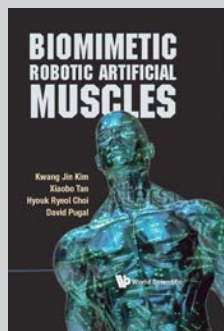


Professor Darrell Pepper received the 2012 American Institute of Aeronautics and Astronautics (AIAA) Energy Systems Award “for sustained development of novel computational modeling techniques related to new advanced energy concepts with exemplary innovations in research, education, and consulting.” Professor Pepper was also recently appointed to serve on ABET’s 2013-2014 Board of Directors.



Professor Mohamed Trabia served as keynote speaker at the 5th International Conference On Mechatronics (ICOM '13) in Kuala Lumpur, Malaysia. His presentation was titled “Smart Finger-Wearable Assistive Display for the Well-Being of the Blind and Visually Impaired.”

Professor Douglas Reynolds has released the third edition of his textbook, *Engineering Principles of Mechanical Vibration*. It is published by Trafford Publishing, a print-on-demand publisher, and is designed for use in junior/senior level undergraduate and introductory/intermediate level graduate courses.



Professor Kwang J. Kim has just released a new, co-authored book, *Biometric Robotic Artificial Muscles*. He also published a new paper entitled *Recent Advances in Ionic Polymer–Metal Composite Actuators and their Modeling and Applications* in a high impact journal, *Progress in Polymer Science*.

Department of Mechanical Engineering
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Department of Mechanical Engineering at a Glance

- Enrollment (as of fall 2013)
 - 416 B.S. students
 - 28 M.S. students
 - 25 Ph.D. students
- Degrees conferred (spring/summer/fall 2012 total)
 - 53 B.S. (ABET accredited)
 - 12 M.S.
 - 3 Ph.D.
- Faculty size: 16 core members
 - 7 ASME Fellows (Boehm, Chen, Kim, Pepper, Rice, Trabia, and Yim)
- \$1.7 million research expenditures (AY 2012)
- 25 referred journal publications (AY 2012)
- National ranking
 - 132 in the mechanical engineering graduate program 2013 rankings (*U.S. News & World Report*)

Academic Programs Offered

- Aerospace engineering: M.S.
- Biomedical engineering: M.S.
- Materials and nuclear engineering: M.S.
- Mechanical engineering: B.S., B.S./M.S., M.S., and Ph.D.

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