

Mechanical Engineering News

Newsletter from the Mechanical Engineering Department, University of California, Santa Barbara

Spring 2009

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Please recycle!

Message from the Chair



Kimberly Turner
Professor and Chair of Mechanical Engineering

It's been a year since our first Newsletter, and many things have changed in that time, both on and off of campus! First off, I would like to introduce myself to you all. I became Chair in November 2008, and I am excited and honored to serve in this new capacity. I have been at UCSB since 1999—coming from Cornell, in Ithaca, NY (a much colder part of the country). I have really enjoyed building my career at UCSB, and I am looking forward to this new role with the same energy I did when I first came to campus. I am happy to note that over the nearly 10 year period I have been at UCSB, the department has continued its upward trajectory, while remaining a collegial and vibrant place in which to academically flourish. New faculty continue to strengthen our key research areas, new buildings house the cutting-edge research taking place here, and continued changes to the curriculum capture current engineering practices, while continuing to give our students a grounded, comprehensive education. We have successfully navigated an ABET accreditation (2008), and our Faculty and students continue to win local, regional, and National awards, thereby demonstrating the strength of our current program.

Our Alumni are very important to the Department, and we'd love to hear about your current positions, thoughts for the future of engineering practice, and memories/anecdotes about your years at UCSB. We would love to be able to do some alumni spotlights in future additions of this newsletter. That said, if you're ever in the area, and would like a tour or just to chat, please feel free to contact me. I hope to see you anytime you are on campus!

Upcoming Events – Save the Dates!

2009 Capstone Design Poster Competition / June 5, 2009
11:00 am – 3:00 pm / Engineering II Courtyard

With faculty and industry leaders as judges, Mechanical Engineering students will compete in teams for top awards in innovation, technical content and marketability among about 20 complex projects. The competition is part of the College of Engineering's capstone courses, geared to challenge the students' ability to apply their knowledge to solve pressing real-world problems. Students will be presenting their projects and posters for the judges, the campus community, and interested representatives of industry and the media.

Commencement Weekend / June 13 – 14, 2009 / Faculty Club Green

College of Engineering Undergraduate Ceremony: Saturday, June 13, 1:00 pm
Graduate Division Ceremony: Sunday, June 14, 4:00 pm

Undergraduate Capstone Design Program and Poster Competition



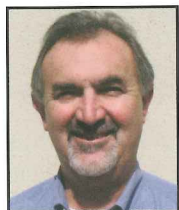
2008 Poster Competition
Steve Laguette Addresses the Large Crowd



2008 Most Marketable Design
Wave Height Pressure Sensor



2008 Supermileage Team
500 mpg at the Shell Eco-Marathon



Steve Laguette Academic Coordinator / Lecturer

Hello again from UCSB! Here's an update on our Undergraduate Capstone Design Program and some photos of last year's Poster Competition. Last year's winners included a team working with Prof. Washburn of the Oceanography Institute that designed and developed a wave height pressure sensor that can be anchored to the ocean floor. Another of last year's teams successfully competed in the Shell Eco-Marathon for high mileage vehicles. Even though it was only our first year in this national competition, our car achieved 500 mpg. We were the highest placed team of all the UC schools, (including Cal and UCLA!).

We continue to have a strong partnership with industry to help sponsor many student projects. This year's projects include spacecraft deployment mechanisms, neurosurgical implant test systems, wind powered turbine blades, and sophisticated IR test instrumentation.

We will have over 40 projects on display at this year's poster competition from both Junior and Senior-level design classes. This is always a special day as we celebrate the results of hard work on the part of the students. I invite you to attend: it is a great opportunity to meet students and to learn about opportunities of becoming involved with the department and the program. Visit our website at www.me.ucsb.edu/projects for more information and to view all of last year's posters.

Join us on Friday, June 5, 2009
11:00 am – 3:00 pm
Engineering II Courtyard
for the 2009 Capstone Projects
Poster Competition!

If you would like to learn more about
the Undergraduate Capstone Design
Course and the Industry Partner
Program, please visit

www.me.ucsb.edu/projects

or contact Steve Laguette at
805.893.2652

laguette@engineering.ucsb.edu

Engineers Without Borders – Mechanical Engineering Students Helping Countries in Need



Engineers Without Borders
Homebuilding Team in Baja California

Last year's feature article on the UCSB Chapter of Engineers without Borders generated a lot of interest, so we are providing a short update. ME students, staff and faculty continue to be very active in all the current EWB projects. As examples, a team of five ME seniors is designing a tool to press sorghum juice for a community organization in Mali. ME sophomores and juniors recently built prototype tools for making beads for a women's group in Rwanda. Large multi-disciplinary teams of students are working in Peru and Kenya, and our students recently completed their second house-building project in Tijuana, Mexico.

Staff engineers Mary Dinh and David Bothman are co-advisors for the chapter (together with Professor Roy Smith in ECE). We were recognized at the EWB-USA 2008 National Conference in Seattle where the chapter won the Community Education Award as well as the poster competition. The Peru team received a Southern California World Water Forum College Grant of \$10,000 from the Metropolitan Water District for its water treatment projects in Araypallpa. The Kenya and Peru projects each received \$5000 grants from EWB-USA's Fall Grant competition. But the most important measure of the Chapter's success though is the growing participation of students and alumni in the program.

Would you like to get involved in **Engineers Without Borders?**

The chapter is always looking for
mentors, contacts and project ideas, as
well as project sponsors!

For more information, visit EWB-UCSB's website: www.engineering.ucsb.edu/~ewb-ucsb
or e-mail Dave Bothman bothman@engineering.ucsb.edu,
or Mary Dinh dinh@engineering.ucsb.edu



Professor Igor Mezic, Director of CEED

Energy is one of the most important challenges of the century. We are increasingly aware that in addition to developing new energy sources, we need to change our way of using the energy we have. In the words of the current Energy Secretary, the Nobel Laureate Dr. Steven Chu “...*People sometimes say energy efficiency and conservation are not sexy; they’re low tech. That’s actually not true. They can be very sexy and very high tech...*”

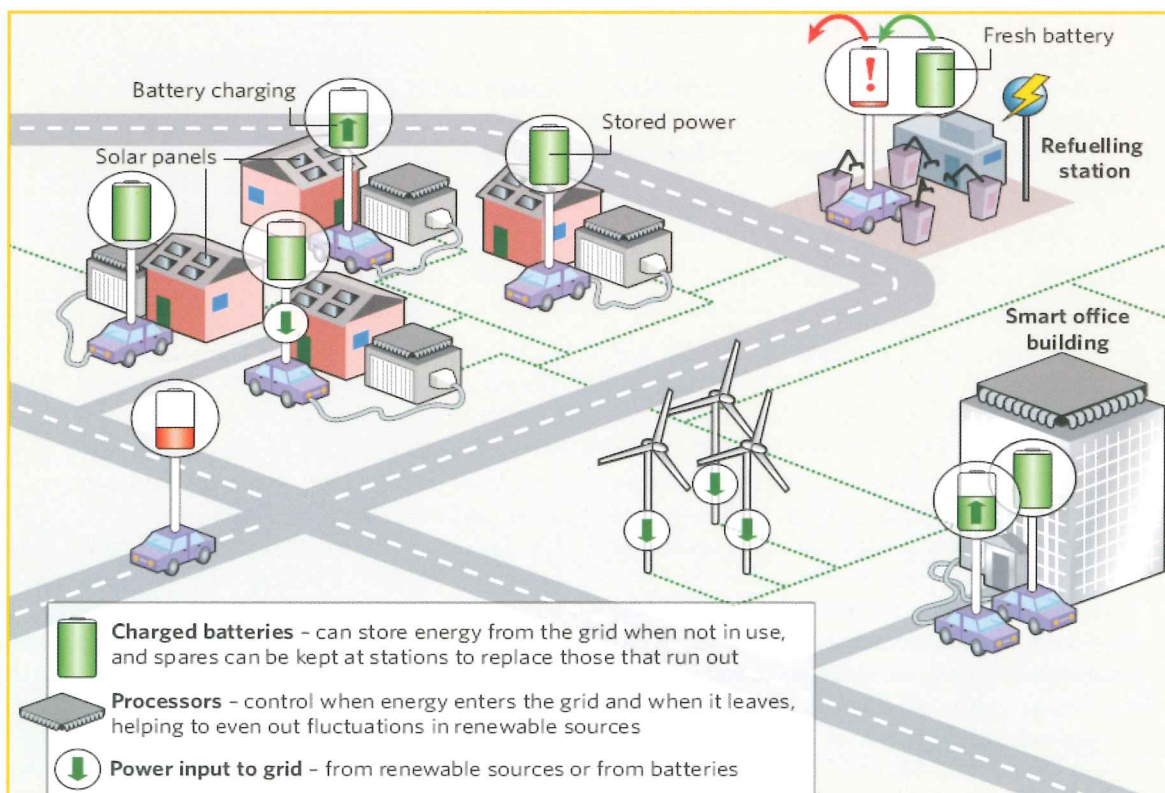
UCSB and the Mechanical Engineering Department have responded to this challenge by establishing the **Institute for Energy Efficiency** and within it, the new **Center for Energy Efficient Design, (CEED)**, established by Professors Homsy and Mezic in 2008. The Center researches topics that include Integrated building systems; Stability and control of the power grid (SmartGrid); Energy efficiency in transportation; Energy storage and retrieval; Energy harvesting and micropower (off-grid) generation; and Data Center energy consumption. More information is available at www.iee.ucsb.edu/research/building-systems.

The Center has established a set of partnerships with domestic (UC Berkeley, Lawrence Berkeley National Laboratory) and foreign (Hong Kong Polytechnic, Hong Kong University of Science and Technology, and Lund University), and industrial partners such as United Technologies Corporation. CEED is also a partner in the HiPerBRIC (High Performance Building Research and

Implementation Center) consortium, developing the vision for modern integrated building design. Two ME undergraduates are already working on a project of modeling the dynamics of buildings under the supervision of Professors Yuen and Mezic.

Another exciting activity in the Center is related to the dynamics of the modern power grid, a special interest of Professors Khammash and Mezic. A large percentage of conventional energy sources ultimately will be replaced with alternative ones and the nature of electric loads will change as well. This brings about a headache to engineers concerned with robustness and efficiency of this new power world: a hiccup in a local microgrid can bring down the entire powergrid. So we need the “smart grid” to be *really* smart. Research is underway in CEED to elucidate core causes of instabilities leading to large disturbances and failure of catastrophic proportions.

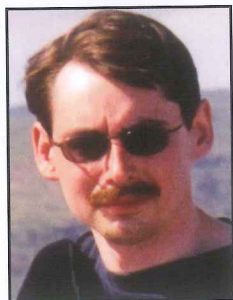
Research on both buildings and the power grid crosses boundaries of many disciplines. This is the hallmark of the CEED approach: the solutions in modern energy engineering do not lie in the domain of a single field or in a single department. The coupling of architecture and dynamics is what matters most. The challenge is to design architectures that are stable *and* energy efficient at the same time. It is the system-level thinking that matters. The Mechanical Engineering Department, with its interdisciplinary approach and strengths in the Mechanical Engineering Sciences, is a natural home for this new effort.



THE INTEGRATED GRID

Image from *Nature*, Vol. 456, November 27, 2008

Announcing Our New Faculty Member:



Krechetnikov, Assistant Professor

Rouslan Krechetnikov joined the Mechanical Engineering Department at UCSB in November, 2008. He received his Ph.D. from Moscow Institute of Physics and Technology (Phystech) in 2004. Prior to joining UCSB, he taught at the University of Alberta and held positions at California Institute of Technology, Central Aero-Hydrodynamics Institute (TsAGI), University of Notre Dame,

and Carleton University. His research involves both theoretical - analytical and numerical - and experimental studies and focuses on the fundamental questions in fluid dynamics motivated by or targeted to applications and natural phenomena. In particular, his interests span from high Reynolds number flows, e.g. aerodynamics and geophysics, to low Reynolds number flows in microfluidics and interfacial fluid mechanics.

Newly Tenured Faculty Member:

Frédéric Gibou, Associate Professor

Frédéric Gibou received his Ph.D. in Applied Mathematics at the University of California, Los Angeles, and then was a postdoctoral researcher in the Mathematics Dept. and in the Computer Science Dept. at Stanford University. He joined the UCSB Mechanical Engineering and Computer Science faculty in 2004. His research interests include the design and applications of computational algorithms



to understand topics in Computational Fluid Dynamics such as porous media flows, Materials Science such as quantum dots/posts, Nanofluidics, Biology, and Image Processing. He is the recipient of the Alfred P. Sloan Research Fellowship in Mathematics (2006-2008), UCSB Regents' Junior Faculty Fellowship (2005) and the Robert Sorgenfrey Distinguished Teaching Award, UCLA (2000).

Faculty Promoted to Full Professor:

Glenn Beltz, Professor

Glenn Beltz received his B.S. degree in Metallurgical Engineering and Materials Science at Carnegie Mellon University, and his M.S and Ph.D. degrees in Engineering Science at Harvard. Prior to joining UCSB in 1994 he conducted postdoctoral research at Brown University and the Max-Planck-Institut in Stuttgart. His teaching and research interests are in ceramic composite design and solid

mechanics applied to materials problems, such as the remediation of crystalline defects in gallium nitride and other optoelectronic films. He was the recipient of a Boeing A.D. Welliver Fellowship in 2000, and the UCSB Academic Senate Distinguished Teaching Award in 2004. Since 2004, he has served the College of Engineering as the Associate Dean for Undergraduate Studies.



Francesco Bullo, Professor

Francesco Bullo received his Laurea from the University of Padova, Italy, and his Ph.D. from the California Institute of Technology. Before joining UCSB, he was an Assistant Professor with the Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign. His research interests include geometric control of mechanical systems, motion planning for autonomous vehicles, and motion coordination for multi-agent networks.

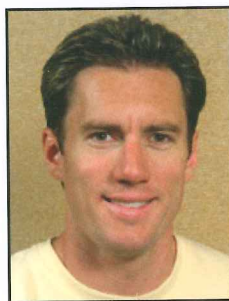
He is the coauthor of "Geometric Control of Mechanical Systems" (Springer, 2004) and of "Distributed Control of Robotic Networks" (Princeton, 2009). He is the recipient of the 2003 ONR YIP award and the 2008 IEEE CSM Outstanding paper award. His students' works were finalists for the Best Student Paper Award at the IEEE Conference on Decision and Control (2002, 2005, 2007), and the American Control Conference (2005, 2006).



Carl Meinhart, Professor

Carl Meinhart completed his PhD and Postdoctoral work in the Department of Theoretical & Applied Mechanics at the University of Illinois in June of 1995, where he studied wall-bounded turbulent flows. Since joining UCSB in 1996, he has focused on developing and applying micro-resolution particle image velocimetry (micro-PIV) to study transport phenomena in microfluidic

devices, including the development and analysis of BioMEMS for immunoassays and molecular diagnostics. Of particular current interest is combining Surface-enhanced Raman spectroscopy and microfluidics, with applications for detection of airborne explosives and narcotics. He regularly consults for biomedical device companies, and is a co-founder of SpectraFluidics, Inc. He holds several patents in the field of microPIV and microfluidics and is a recipient of an NSF Career Award.



Kimberly Turner, Professor

Kimberly Turner received her Ph.D. in Theoretical and Applied Mechanics in 1999 from Cornell University, where she did primarily MEMS-based work. She joined UCSB in August 1999, receiving tenure in 2004, and achieving Full Professor in 2008. She has served as Department Chair since November 2008. Her interests include micro and nanosystems, especially dynamics and characterization, and applications utilizing nonlinear dynamics.

She has authored over 75 archival publications. She is the recipient of the 1997 Varian fellowship award of the American Vacuum Society, a 2001 NSF CAREER award, a 2005 UCSB Distinguished Teaching Award, and a 2007 Michigan Tech University Outstanding Young Alumni award. In her personal time, she races for a locally-sponsored cycling team and shows her Irish Setters.



Mechanical Engineering Alumni Notes

Amir Abo-Shaeer (MS '98) is the founder and current Director of the Dos Pueblos Engineering Academy. He was recently named the Educator of the Year for Grades 7-12 by the Goleta Chamber of Commerce.

Peter Buzyna (MS '99) writes to tell us he has relocated to Florida.

Joy Casas (neePrints) (BS '84) has spent most of her career in CAD/CAM sales. She says that the activities of our Engineers Without Borders chapter makes her proud to be an alum.

John Clement (BS '80) spent 17 years in domestic and international development with companies such as Fluor and Koll. He is currently President of Venture Point Development, a firm he started in 1997, with offices in So. California and Nevada.

Tom Dougherty (MS '71) attended the recent All-Gaucha weekend alumni event and tells us that he retired from a career in the

Aerospace/Defense industry that included positions at the DoD, Thiokol, and Rockwell. He keeps busy by tutoring algebra and astronomy at Alan Hancock College in Santa Maria, CA. The UCSB tradition continues, as his son Tad and daughter-in-law Niloufar are current UCSB/ECE students.

Robert Fischer (BS '69) founded APM, an aerospace machining corporation, in Santa Ana, CA 12 years ago and is still at it.

Steve Gates (BS '81) writes to tell us he has moved from one West Coast to another and is now living in Perth, Australia.

Andrew Ho (BS '95) was recently promoted to Content Development Manager with Hewlett-Packard's software division and is a father of two.

Jonah Manning (BS '96) is now with Raytheon in Southern California.

Eric Paulson (BS '79) is a project engineer with Aera Energy LLC in Bakersfield, CA.

Brian Spence (BS '86) is working locally at ATK in Goleta.

Todd Strong (BS '85) was recently appointed Director of Engineering and Quality for Gulfstream Aerospace.

Shera Wu (BS '03) is now at Raytheon in Goleta leading projects in the area of national defense.

Jessica Yuan (BS '06) is now working for Utility Trailer Manufacturing Co. in the LA region.

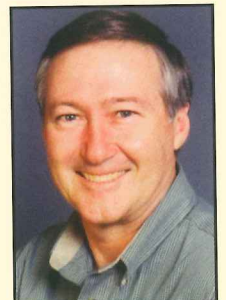
Thanks to all the alums who wrote in after last year's newsletter to fill us in on their activities and new whereabouts. This will become a regular feature of our newsletters so please fill out and send us the form on page 7 so we can keep in touch!



Rain for Rent PCB Clean-Up Project

Alumni in the News:

**John W. Lake, President & Chief Executive Officer
Western Oilfields Supply Company, dba Rain for Rent**



A native Californian, John attended Bakersfield High School, graduated from UCSB in 1970 with a BS in Mechanical Engineering, and served in the USNR from 1970 to 1976.

John is currently President and CEO of Rain for Rent, an Oilfield, Environmental and Irrigation Business founded in 1934 by Charles P. Lake. Today, the second, third, and fourth generations manage the business, which has evolved and expanded its services into the Rocky Mountains, East Coast, Midwest, Gulf Coast and Southeast markets, serving the construction, petrochemical, municipal, environmental and agricultural sectors of the US economy. Rain for Rent is one of the 15 largest rental companies in the United States with over 50 successful locations nationwide.

John started his career with Rain for Rent in 1974 working his way through the various operating affiliates. He founded Lake Leasing Company in 1983, and during his tenure as President, Rain for Rent has expanded into the tank, pump and specialty rental markets.

Rain for Rent has recently celebrated their 75th anniversary and the Lake family was given the California Family Business of the Year Award by the Institute for Family Business.

John worked with the famous modern artist Christo in the design, construction and display of the "Umbrellas" that were displayed in Central California and Japan in October of 1991. John and his wife, Sheila, have two sons, John Paul and Ryan, and two grand-children. John and Sheila attend Riverlakes Community Church.

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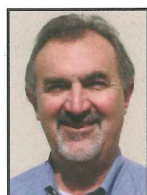
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Karl Astrom
(co w/Tore Hagglund)
Raymond D. Molloy
Award from ISA



David Clarke
NIMS Award for Recent
Breakthroughs in Materials
Science for Energy and
Environment



Steve Laguette
Best Paper Award,
ASME June Conference



Eckart Meiburg
Gledden Fellowship,
Institute of Advanced
Studies, Univ. Western
Australia



Sumita Pennathur
DARPA Young Faculty
Award



Walter Yuen
Fellow of ASME



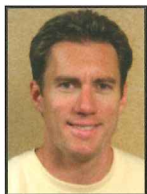
Bassam Bamieh
Fellow of IEEE



Tony Evans
Fellow of the Imperial College;
Fellow of the Royal Academy
of Engineering (London);
NIMS Award for Recent
Breakthroughs in Materials
Science for Energy and Environ.



Carlos Levi
NIMS Award for
Recent Breakthroughs
in Materials Science for
Energy and Environment



Carl Meinhart
Outstanding Paper Award,
ASME Conference, Seattle;
Outstanding Faculty Member,
UCSB College of Engineering



Linda Petzold
Fellow of ASME



Francesco Bullo
Outstanding Faculty Member,
UCSB College of Engineering;
Primo Professor, Kiosk, UCSB;
Outstanding Paper Award, IEEE
Control Systems Magazine



Mustafa Khammash
Fellow of IEEE



Robert McMeeking
South West Mechanics
Lecturer



Jeffrey Moehlis
Northrup Gruman Excellence
in Teaching Award, UCSB;
Kavli Fellow



Tom Soh
2009 Association for
Laboratory Automation
Innovator Award

**Congratulations to all of our
award recipients!**



**Professor Chaitan Khosla (right) receives the
2008 Mohammed Dahleh Distinguished Lecturer
Certificate from Dean Matthew Tirrell (left)**

The 2008 and 2009 Mohammed Dahleh Distinguished Lectures

The 2008 Mohammed Dahleh Distinguished Lecture on "*Celiac Sprue: Fundamental and Translational Investigations into an Orphan Disease*" was delivered by Prof. Chaitan Khosla in May, 2008. The 2009 Lecture on "*Collective Motion and Decision-Making in Animal Groups*," delivered by Prof. Iain Couzin, was held in February, 2009. Both Lectures were delivered to packed houses, and both were outstanding in communicating exciting new developments in their respective fields.

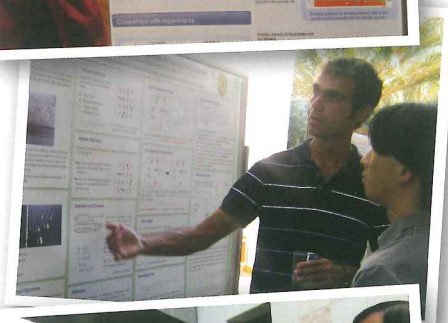
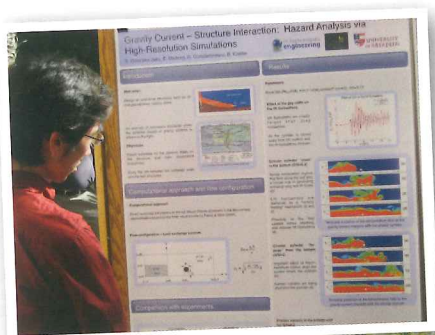


**Professor Iain Couzin (center)
with Professor Jeff Moehlis (left)
and Professor & Chair Kimberly Turner (right)**

Mechanical Engineering News

Spring 2009

UCSB



5th Annual Mechanical Engineering
Graduate Convocation & Research Symposium
Wednesday, October 1, 2008

Mechanical Engineering Undergraduate
Capstone Design Project Poster Competition
Friday, June 6, 2008

Engineers Without Borders
Top Photo: In Araypallpa, Peru
Middle Photo: In Luanda, Kenya
Bottom Photo: On Lake Victoria, Kenya