Mechanical & Aerospace Engineering Department

2010-11

UCLA Engineering

HENRY SAMUELI SCHOOL OF
ENGINEERING AND APPLIED SCIENCE

ANNUAL REPORT 2010-2011

Royce Hall and the Shapiro Fountain.

TC Tsao

Adrienne Lavine

Dear Friends and Colleagues,

We are pleased to present to you the 2010-2011 Annual Report of the Mechanical and Aerospace Engineering Department.

As you will see in these pages, our faculty are delving into basic research that addresses challenging engineering and applied science problems and are successful in attracting external funding to support the research.

They also strive to make continuous and leap-frog improvements in both mechanical engineering and aerospace engineering curricula.

A significant portion of our students are involved in hands-on projects in ASME, AIAA, SAE, and Robotics Club and they deserve the bragging rights of winning national competition awards.

We are fortunate to be in this vibrant and highly intellectual community.

Sincerely Yours,

Incoming Chair: T-C. Tsao

Outgoing Chair (2006-2011): Adrienne Lavine

Mission Statement

Our mission is to educate the nation's future leaders in the science and art of mechanical and aerospace engineering. Further, we seek to expand the frontiers of engineering science and to encourage technological innovation while fostering academic excellence and scholarly learning in a collegial environment.

The Department gratefully acknowledges the UC Atkinson Archives and the UCLA Office of External Affairs for permission to use many of the images in this Report. Front cover photo courtesy of Tung X. Dao (Aerospace '11). Back cover photo courtesy of Pittsburgh State University. All other photos provided by faculty, staff, and students. Design and layout by Alexander Duffy.

UCLA Racing Baja places 1st in maneuverability event
Page 26

Robotics Club takes Gold and more from RoboGames
Page 27

Research Highlights

Overview

Faculty and Staff

Ladder Faculty:	32
Joint Faculty:	3
Emeritus Faculty:	11
Adjunct Faculty:	7
Lecturers:	30
Administrative Staff:	24
Staff Research Associates:	21
Development Engineers:	6
Postdoctoral Scholars:	29
Visiting Ph. D. Scholars:	11
Visiting Intl. Students:	19

Recognitions

Society Fellows:	28
CAREER or Young Investigator Awards:	13
NAE members:	9
Regular Faculty:	4
Affiliated Faculty:	3
Emeriti:	2

Publications

Journal Articles:	133
Conference Papers:	80
Books & Book Chapters:	6
Patents:	10

Research Facilities

The department contributes to five Research Centers:

- Center for Cell Control (CCC)
- California NanoSystems Institute (CNSI)
- Center for Scalable and Integrated NanoManufacturing (SINAM)
- Molecularly Engineered Energy Materials, an Energy Frontier Research Center
- Smart Grid Energy Research Center (SMERC)

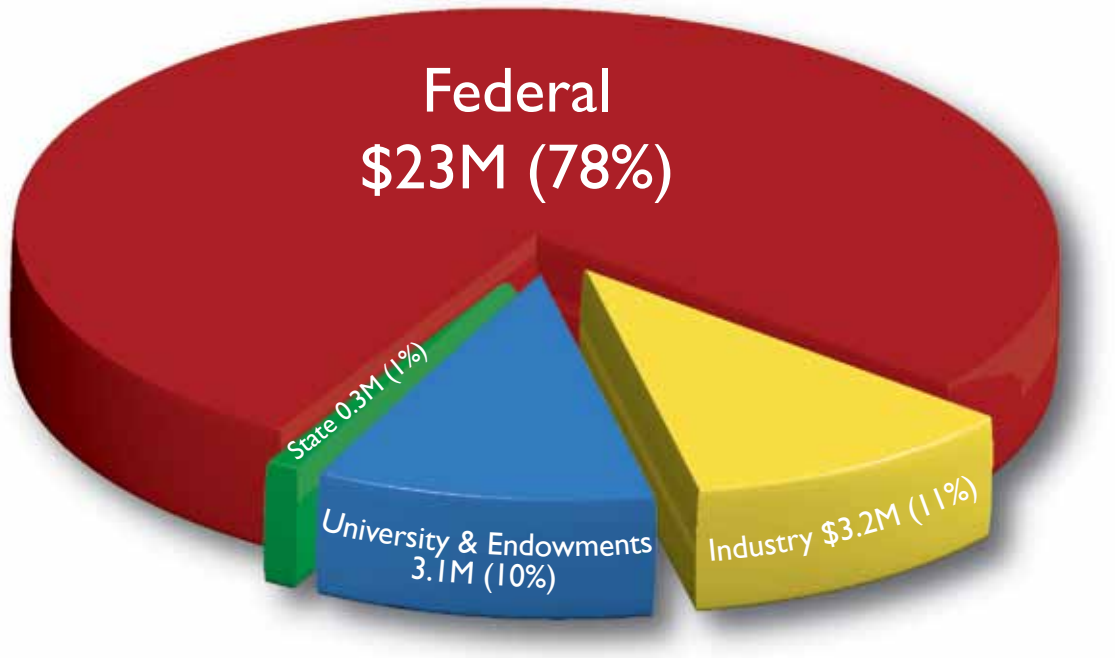
Laboratories and Research Groups: 32

Facilities square footage: 32,743 sq. ft.

Department square footage: 76,918 sq. ft.

Fiscal Year 2010-2011 Sponsored Research Budget - Total $29.6M

(Fiscal Year 2010-2011 Sponsored Research Expenditures - Total $14.2M)



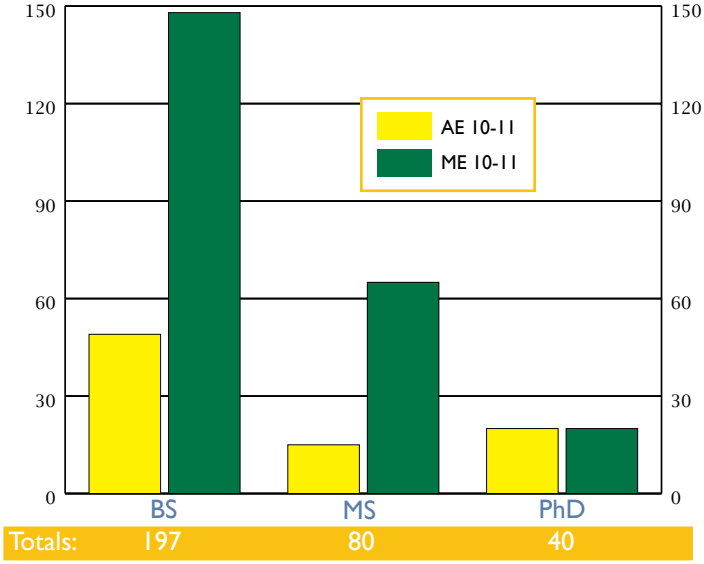
Undergraduate Students

Students Enrolled:	696
Freshmen Applicants:	2152
Transfer Applicants:	429
Admitted:	495 (19%)
New Students Enrolled:	151 (31%)
Average Unweighted High School GPA:	3.92/4.0

Graduate Students

Students Enrolled:	276
Applicants (MS and PhD):	521
Admitted:	250 (48%)
New Students Enrolled:	99 (40%)
Average Undergraduate GPA:	3.55/4.0

AE & ME Degrees Conferred 2010-2011



Department Fellowships and Teaching Assistantships	
TA Funding	$ 610,958.15
Graduate Division	$ 514,881.00
HSSEAS	$ 135,779.85
Matching NRT	$ 117,552.00
GOFP Fellowship	$ 87,580.58
Eugene Cota Robles Fellowship	$ 52,580.58
Chancellor's Prize	$ 30,000.00
Rose and Sam Gilbert	$ 10,000.00
Malcolm R. Stacey Fellowship	$ 7,358.00
UCLA Competitive Edge	$ 6,000.00
Total	**$1,572,690.16**

UCLA researchers eliminate major roadblock in regenerative medicine

New 'cocktails' support long-term maintenance of human embryonic stem cells

By Wileen Wong Kromhout

Please see the related article in Genetic Engineering & Biotechnology News

Chih-Ming Ho

In regenerative medicine, large supplies of safe and reliable human embryonic stem (hES) cells are needed for implantation into patients, but the field has faced challenges in developing cultures that can consistently grow and maintain clinical-grade stem cells. Standard culture systems use mouse "feeder" cells and media containing bovine sera to cultivate and maintain hES cells, but such animal product–based media can contaminate the cells. And because of difficulties in precise quality control, each batch of the medium can introduce new and unwanted variations.

Now, a team of stem cell biologists and engineers from UCLA has identified an optimal combination and concentration of small-molecule inhibitors to support the long-term quality and maintenance of hES cells in feeder-free and serum-free conditions. The researchers used a feedback system control (FSC) scheme to innovatively and efficiently select the small-molecule inhibitors from a very large pool of possibilities.

The research findings, published today in the journal Nature Communications, represent a major advance in the quest to broadly transition regenerative medicine from the benchtop to the clinic.

"What is significant about this work is that we've been able to very rapidly develop a chemically defined culture medium to replace serum and feeders for cultivating clinical-grade hES cells, thereby removing a major roadblock in the area of regenerative medicine," said Chih-Ming Ho, the Ben Rich–Lockheed Martin Professor at the UCLA Henry Samueli School of Engineering and Applied Science and a member of the National Academy of Engineering.

Unlike current animal product–based media, the new medium is a "defined" culture medium — one in which every component is known and traceable. This is important for clinical applications and as drugs or cells enter the world of regulatory affairs, including good manufacturing practice compliance and Food and Drug Administration supervision.

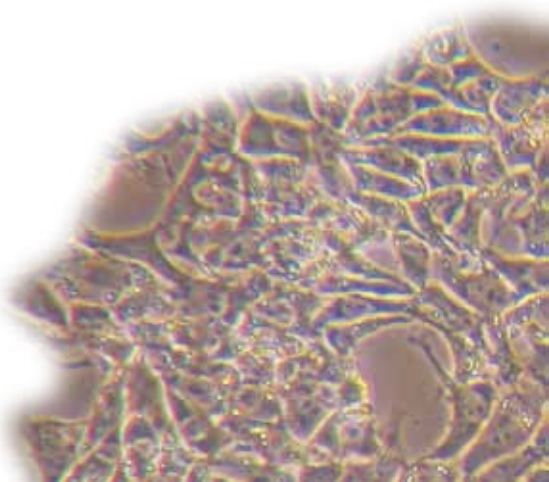
"It is also the first defined medium to allow for long term single-cell passage," said the paper's senior author, Hong Wu, the David Geffen Professor of Molecular and Medical Pharmacology at the David Geffen School of Medicine at UCLA and a researcher with UCLA's Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research.

Single-cell passaging — a process in which hES cells are dissociated into single cells and subcultured through single-cell–derived colonies — is important in overcoming the massive cell death associated with hES cell dissociation during routine passage, and it allows for genetic manipulation at the clonal level.

"Although other studies have demonstrated growth of hES cells under defined media formulations and/or on defined surfaces, to the best of our knowledge, this is the first study that combines defined cultures with routine single-cell passaging, which plays an important role in supplying a large mass of clinically applicable cells," said Hideaki Tsutsui, a UCLA postdoctoral scholar and lead author of the study. "Thus, our hES cell culture system, guided by the FSC technique, will bring hES cells one step closer to clinical therapies."

Initially, the very large number of small molecules in the culture medium and their unknown synergistic effects made it difficult for researchers to assess the proper concentration of each for achieving long-term expansion of hES cells. The major challenge was to find the best way to sort out those molecules and rapidly determine the best combinatorial concentrations.

The breakthrough, ultimately, was the product of a close interdisciplinary collaboration.



Tsutsui, then a UCLA Engineering graduate student, and Bahram Valamehr, then a graduate student at the Geffen School of Medicine, started working on the project two years ago. Armed with biological readouts and analyses of stem cells mastered in Hong Wu's laboratory through the lab's extensive accomplishments in stem cell research, Tsutsui and Valamehr used the FSC scheme — developed previously by Ho's group to search for optimal drug combinations for viral infection inhibition and cancer eradication — to facilitate the rapid screening of a very large number of possibilities.

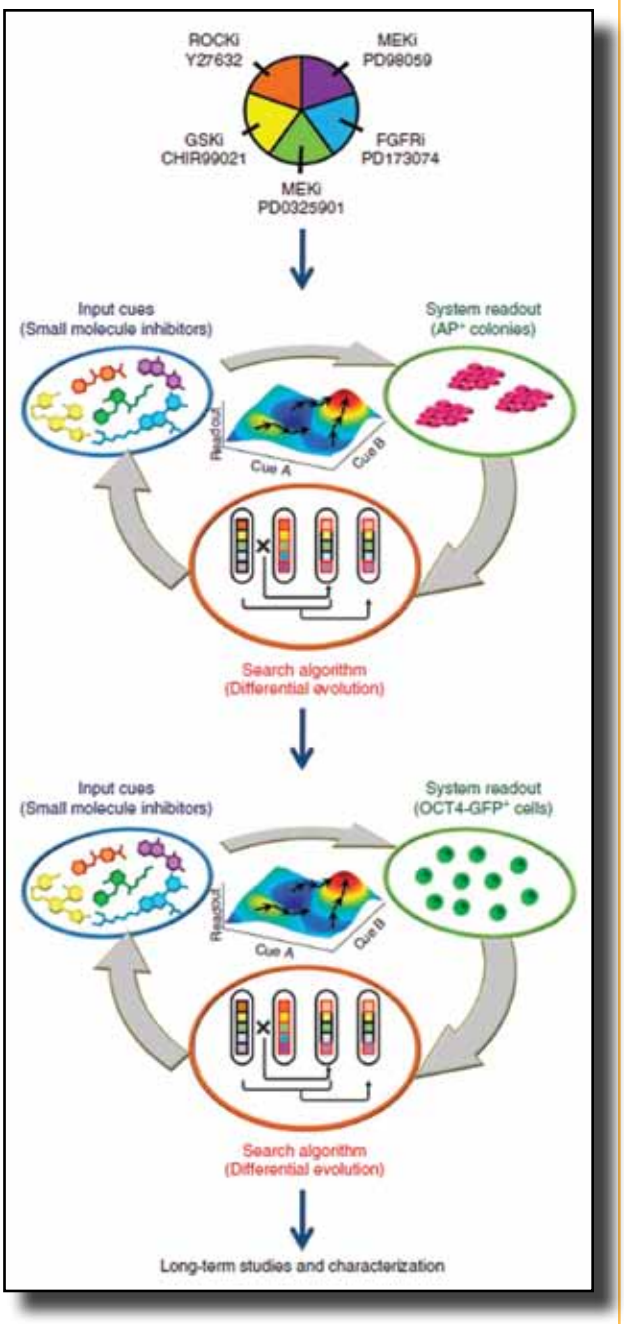
Working together, the team was able to discover a unique combination of three small-molecule inhibitors that supports long-term maintenance of hES cell cultures through routine single-cell passaging.

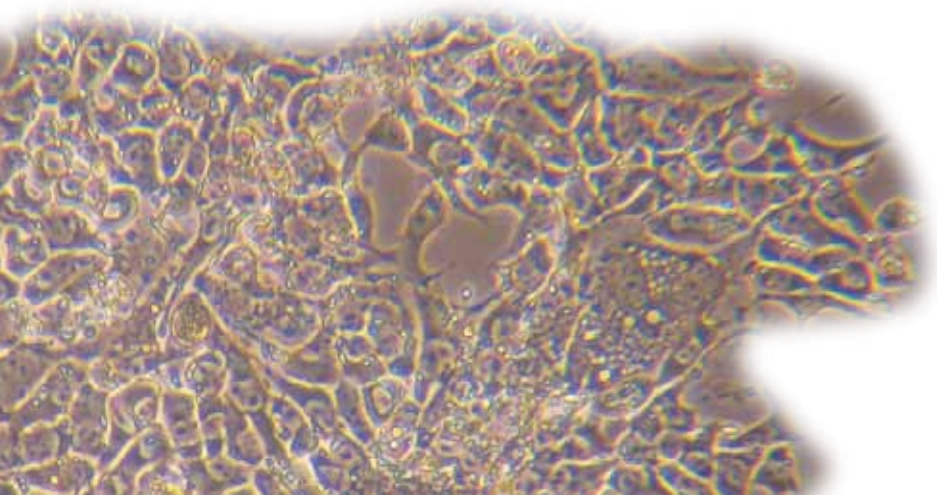
"There are certain research projects biologists can dream about, and we know we can eventually get there, but we don't have the capacity to achieve them in a timely manner, especially in a study like this," Wu said. "It would have taken 10 graduate students another 10 years to test all the possible combinations of molecules. Having an opportunity to collaborate with the engineering school has been invaluable in making this dream a reality."

"This is the best example of demonstrating the strength and potential of interdisciplinary collaborations," said Ho, who is also director of the Center for Cell Control at UCLA Engineering and a senior author of the paper. "Engineers and biologists working side by side can accomplish a mission impossible."

Other authors of the study included Antreas Hindoyan, Rong Qiao, Xianting Ding, Shuling Guo, Owen N. Witte and Xin Liu.

The project received major funding from the National Institutes of Health Roadmap for Medical Research through the UCLA Center for Cell Control and a seed grant from the Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research.





Cooling by boiling

Vijay Dhir leads the first UCLA experiment on the International Space Station

By Matthew Chin

Vijay Dhir

The International Space Station is set to receive its first UCLA-led research project when the Space Shuttle Discovery delivers a new payload of scientific experiments and supplies to the orbiting station. The Discovery launched Thursday, Feb. 24.

The project's series of experiments, which will look at the process of boiling under microgravity conditions, could lead to lighter, more compact cooling systems in space.

The project's principal investigator is Vijay K. Dhir, a professor of mechanical and aerospace engineering and dean of the UCLA Henry Samueli School of Engineering and Applied Science.

UCLA-led nucleate boiling research project

"As a researcher, I'm looking forward to seeing the results from our experiment, which we've worked on for many years." Dhir said. "But also, as someone who grew up during the space age, it's still awe-inspiring that humans can travel into space and work in orbit. The space program has brought many, many benefits to society. It's gratifying to be part of it and to conduct exciting research leading to the development of new technologies."

More than 600 experiments have been conducted on the space station since it first opened in November 2000. This will be the first UCLA-led experiment aboard the facility, according to NASA.

The main objective of the proposed series of experiments is to develop a basic understanding of the heat-transfer and vapor-removal processes that take place during boiling under microgravity conditions in space.

Boiling is often thought of as a way to heat something up, such as a pot of water. But boiling can also be used to keep things relatively cool, since the bubbles that form on the hot object's surface transfer heat away from it when they leave into the liquid. This prevents the object from continuing to increase its temperature. This type of bubble boiling is known as nucleate boiling, and it is commonly used in cooling systems for power plants, electronics and in many other applications.

Boiling as a mode of heat transfer would be very advantageous in space because cooling systems utilizing the process would take up much less room and weigh much less than currently used systems.

This series of experiments aboard the space station would provide experimental data to validate predictions from numerical models. The data will also help establish how bubble growth and size correlate with gravity levels. In the extremely low gravity of space, bubbles are expected to grow to much larger sizes before they leave a hot object's surface than they do on Earth.

Dhir had led previous boiling experiments that were flown aboard NASA's KC-135 airplane, also known as a "vomit comet," which simulates weightlessness for about 20 seconds during the downward part of a steep parabolic flight path.

The current project's co-investigators are Gopinath R. Warrier, a research engineer at UCLA, and David F. Chao of the Glenn Research Center in Cleveland, Ohio.

More information on the experiment is available from NASA on its International Space Station experiments page: www.nasa.gov/mission_pages/station/science/experiments/BXF-NPBX.html.

This will be the final mission for Discovery, which was launched on its first mission on Aug. 30, 1984.

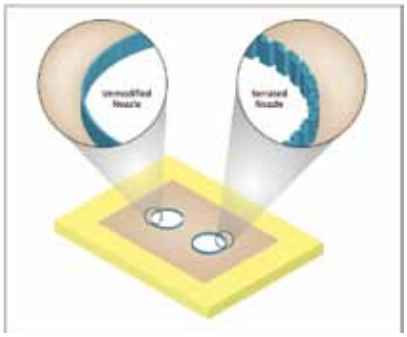
Good to the last drop

CJ Kim develops new method to transfer droplets with no residual behind

From NASA Tech Briefs, May 01, 2010

CJ Kim

The present method ensures that droplets transferred from a nozzle have consistent volume, as needed to ensure accuracy in microarray analysis or consistent appearance of printed text and images. In soft printing, droplets having consistent volume are generated inside a print head, but in the absence of the present method, the consistency is lost in printing because after each printing action (in which a drop is ejected from a nozzle), a small residual volume of liquid remains attached to the nozzle.



Micromachined Serrations on a nozzle surface reduce the liquid/solid contact area, thereby reducing the liquid/solid surface energy and thereby, further, reducing the liquid/nozzle attraction sufficiently to enable complete transfer of a liquid droplet from the nozzle to a nearby print surface.

Gas keeps drag low

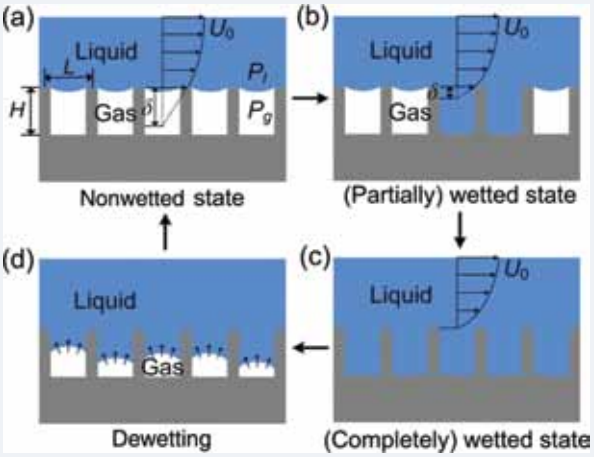
Choongyeop Lee and CJ Kim keep gas on solid surface under water to reduce drag

From Nature, January 20, 2011, vol. 469, p. 268

The flow of water on solid surfaces is significantly impeded by frictional forces — which is bad news for, say, marine vehicles. A gas layer can be introduced at the solid–liquid interface as a lubricant, but even slight hydraulic pressure can destroy this layer. Choongyeop Lee and Chang-Jin Kim at the University of California, Los Angeles, have devised a way to keep the gas layer intact and cut drag even in underwater conditions.

The duo began with a highly hydrophobic surface studded with 50-micrometre high pillars and gold-coated nanostructures (pictured), and submerged this in water. The gold coating allowed an electrolytic reaction to occur, generating gas at its surface when water made contact. Bubbles formed only in areas where there had been no gas before, and because of the surface's architecture, the bubbles spread uniformly across the surface.

Please visit Phys. Rev. Lett. 106, 014502 (2011) for entire research article.



CJ Kim receives a gift for EWOD research

CJ Kim received a grant of $127,800 from the Phelps Family Foundation. The gift was made to assist Prof. Kim's research on electrowetting-on-dielectric (EWOD) by accelerating the activities usually difficult or slow to fund through government agencies. Kim plans to use the fund to develop compact electronic systems that mount and operate EWOD digital microfluidic chips made in his Micro and Nano Manufacturing Laboratory in UCLA's MAE Department. His goal is to establish a handheld system with a user-friendly interface and some degrees of standardization. Eventually, he plans to make multiple systems available so his collaborators can use the EWOD system in their own labs for their own goals (e.g., biology, medicine, radiosynthesis).

Cargo Delivery To Cells Gets Supersized

Pei-Yu Chiou and Michael Teitell develop photothermal nanoblade which cuts cell membranes to inject large goods

From Chemical & Engineering News, January 27, 2011
By Laura Cassiday

Pei-Yu Chiou

For decades, scientists have tinkered with cells' inner workings by injecting foreign molecules, such as DNA plasmids and small molecules, into the cytosol and nucleus. But delivering big cargos such as chromosomes, organelles, or bacteria has been difficult, if not impossible, without killing the cells. Now researchers have developed a photothermal nanoblade that cuts a resealable, micrometer-sized hole in the cell membrane, enabling efficient delivery of large cargos (Anal. Chem., DOI: 10.1021/ac102532w).

Plenty of methods exist to transfer relatively small macromolecules into mammalian cells. They include electroporation, viral delivery, and chemical transfection. To inject larger molecules up to 0.5 μm in diameter, scientists must puncture the cell's surface with the sharp tip of a glass microcapillary. Often, cells don't survive the trauma.

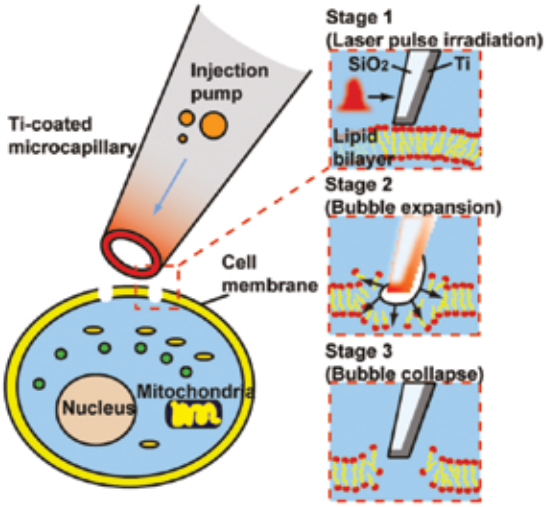
Immunologist and cancer biologist Michael Teitell and mechanical engineer Pei-Yu Chiou of the University of California, Los Angeles, teamed up to develop a gentler method. Instead of stabbing the cell's lipid membrane, they and their colleagues produced a nano-sized bubble of water vapor to pop a hole in it. To generate the bubble, they lightly touched the cell membrane with a glass microcapillary pipet coated at the tip with a thin film of titanium. Next, they aimed a laser and shot a pulse of green light toward the cell. The pulse heated the titanium film, which vaporized a thin layer of water around the pipet. The resulting nanobubble expanded and burst rapidly, cutting the cell membrane with a shearing force.

This half-moon–shaped "scar" in the cell membrane acts like a cat door, Teitell says. The researchers apply pressure to the scar with a small pump attached to the pipet to open the door so that cargo in the microcapillary can flow into the cell. "When we turn the pressure off, the door swings closed," Teitell says.

Unlike a standard glass microcapillary, the photothermal nanoblade never enters the cell, which limits structural damage and speeds repair. As a result, the researchers found, more than 90% of treated cells survive.

The investigators could deliver cargos ranging from 1 nm to 2 μm in diameter, including RNA, fluorescent beads, and live intracellular bacteria. The technique worked on a variety of cell types, such as primary fibroblasts, HeLa cells, and human embryonic stem cells.

"This method is the first to deliver large cargo into cells effectively, reliably, and safely," says Ming Wu, an electrical engineer at the University of California, Berkeley. He says that the technique will be useful for injecting molecular sensors into cells, such as nanoparticles for use with surface-enhanced Raman spectroscopy. In the future, Teitell hopes that the technique might even allow scientists to deliver organelles, including nuclei, to cells.



Evolution of the Precursor Film

Pirouz Kavehpour and Anna Hoang show experimental evidence for phenomenon of spreading drops

By Wileen Wong Kromhout / From UCLA Newsroom

Pirouz Kavehpour

The spreading of a liquid drop on a solid surface is a simple, everyday phenomenon. And while it is known that when a drop of oil is placed on a solid surface, its radius increases as its thickness decreases, the mechanisms underlying the process are still not well understood on a microscopic level, particularly at the moving edge between the liquid and solid, which is known as the "contact line" region.

Research in the early 20th century revealed that the edge of a spreading drop emits a microscopically thin layer of fluid, or "precursor film," and scientists in the 1980s developed a theoretical model for this film that considered intermolecular forces close to the contact line. Since then, physicists have tried to capture experimental evidence of the film's behavior and characteristics, an effort made more challenging by the film's nanoscale features.

In a new study, researchers at the Complex Fluids and Interfacial Physics lab at the UCLA Henry Samueli School of Engineering and Applied Science have successfully measured the dynamic evolution of the precursor film using fluorescence microscopy. The work is the first to provide experimental support for the theory governing the precursor film's behavior with respect to time and space.

IMPACT:

This study contributes to the body of experimental evidence needed to develop a comprehensive understanding of microstructures at the vicinity of the contact line, and it bridges the gap between computational methods and theory. The research will provide insights into the fundamental behavior of fluid-spreading and other surface phenomena.

An understanding of the microscopic dynamics of liquids spreading on solids has many potential industrial and technical applications as well, including coating processes, inkjet printing and even cell manipulation.

Energy research

is one of the most important topics of our time. Here are 10 profiles of UCLA MAE faculty and their energy research.

Mohamed Abdou is researching the responses of solids and fluids for fusion energy, and leading an international team in designing a compact, low-cost fusion facility to demonstrate fuel sustainability and power efficiency.

Ivan Catton researches nuclear energy for a clean, sustainable future.

Sungtaek Ju is researching high-efficiency solid-state cooling devices that do not emit greenhouse gases; waste heat harvesting for vehicle exhaust and industrial structures; and liquid-based mechanical elements to integrate energy harvesting and storage capability into load-bearing structures.

Ann Karagozian is working on several projects to make propulsion and energy generation systems more efficient.

CJ Kim is working on three energy projects: drag reduction superhydrophobic surfaces, micro fuel cells, and 3-D microbatteries.

Vijay K. Dhir is researching mechanistic models for boiling heat transfer that are applicable to nuclear reactors.

The Smart Grid Energy Research Center (SMERC), led by **Rajit Gadh**, is wiring the UCLA campus as a test-bed for a next-generation electrical grid that will be more resilient, robust, secure and reliable.

Laurent Pilon's research includes harvesting waste heat using pyroelectric and thermoelectric materials; developing nanostructured materials for energy generation, storage, and efficiency; technologies for photobiological carbon dioxide fixation and biofuel production.

TC Tsao is working with industrial collaborators in improving vehicle efficiency--one on transient modeling and control of vehicle waste heat recovery with Volvo Powertrains Inc. and the other on design and modeling of compressed air hybrid vehicles with Ford Motors Company.

Richard Wirz is using advanced design and modeling techniques to develop new technologies for wind and solar thermal energy.

UCLA Smart Grid Energy Research Center (SMERC) celebrates its start

By Matthew Chin

Rajit Gadh

The Smart Grid Energy Research Center (SMERC) held a kickoff event in November 2010, celebrating the start of new research programs and partnerships in making a smart electrical grid into a reality.

The center, based at the UCLA Henry Samueli School of Engineering and Applied Science, is funded with a $10 million grant from the U.S. Department of Energy.

While the electrical grid in the United States is very reliable, it is currently somewhat limited in its ability to incorporate new renewable energy sources; to effectively manage demand response; to sense and monitor trouble spots; and to repair itself.

With the advent of advanced wireless sensing, communication and control technologies, this is a great opportunity to explore incorporating those into the existing electrical grid. This smart grid would enable two-way communication along the entire grid to make it quickly and seamlessly send energy to where demand is greatest; while on the consumer end, powering down energy consuming products when they're not in use, and even sending energy back into the grid.

The new research center has two main projects that it will initially focus on:

The first project, the Electric Vehicle Impact on the Grid, will research how to best incorporate electric vehicles into the grid. This project will use the campus as a real-life lab. Parking garages will be linked via wireless communications technologies and power could be returned to the grid from the vehicles, if needed.

Second, the Demand Response Research and Technology Demonstration through an integrated wireless network, researchers will monitor energy demand and use on the UCLA campus, using it as a virtual lab. For example, if a room is unoccupied, lights and heating/cooling would be automatically shut down via sensing and control devices.

The research in both will help lend new insight on how to make the electrical grid much more efficient.

SMERC's director is Rajit Gadh, professor of mechanical and aerospace engineering. The kickoff event was held at the Edward K. Rice Conference Room in Boelter Hall. Representatives from project partners, the University of Southern California, NASA's Jet Propulsion Laboratory/ Caltech; the Los Angeles Department of Water and Power, and the Los Angeles Mayor's office were on hand. Also in attendance from UCLA were Provost and Executive Vice Chancellor Scott Waugh, Vice Chancellor for Research Dr. James Economou, and Dean Vijay K. Dhir.

During his introductory remarks, Gadh pointed out that the smart grid is still in its infancy with much room for creative ideas. And on this project, it will be students doing the bulk of the research on the development of innovative smart grid concepts within the UCLA campus demonstrations.

"It is this student whom we need to get excited into working on the grid - and we do this in universities such as UCLA by giving the students a very loose leash, letting them intellectually meander, letting them apply what they have learnt about packing billions of transistors and thousands of sensors in a single device, and encouraging them to think out of the box," Gadh said. "Every time I have done that, I have found the students have come back with wonders. Our job as faculty is to mentor and mold the creative minds."

The Smart Grid Energy Research Center (SMERC) celebrated its start in November 2010. UCLA Engineering professor Rajit Gadh (first on the right side) and Dean Vijay K. Dhir (fourth from the right), pose for a group photo with partners from USC, LADWP, and JPL/Caltech.

Wind Energy: Picking Up Speed

By Matthew Chin

Richard Wirz

UCLA mechanical and aerospace engineering assistant professor Richard Wirz is leading several research projects on energy solutions using advanced design and modeling techniques. One major area of his research is in wind energy, a resource that may be ready for a big jump in productivity and efficiency.

"Wind has already proven itself as a viable large-scale renewable energy source, but just like airplane design over the last century, we want to continue to push our engineering knowledge and creativity to develop wind systems that are increasingly capable and economically viable," Wirz said.

One project is a spin-off of Wirz's work on plasma thrusters for spacecraft propulsion. Because of the variability of wind speeds, wind turbine blades don't always have an optimal pressure gradient along their surface. The addition of small plasma actuators along the length of a blade creates an electric field that accelerates ions, and thus the local flow, along the blade's surface. The induced flow can create a more favorable pressure gradient along the blade for improved efficiency and operation over a larger range of wind speeds.

Wirz is also conducting research on a new approach to blade design for large wind turbines that improves the aerodynamic performance and structural stability of the blades. The design could lead to larger and structurally stronger turbines. In particular, this holds promise for offshore wind energy systems. The concept is being tested both computationally and experimentally. A grant from the California Energy Commission is helping to fund modeling and wind tunnel testing of the new design.

Late last year, Wirz worked out an agreement for UCLA students to have research and training time at a working wind turbine. The 1.5-megawatt turbine is operated by the North American Wind Research and Training Center (NAWRTC), which is run by Mesalands Community College in Tucumcari, New Mexico.

"The UCLA-NAWRTC relationship is exciting and unique since their turbine is specifically available for research and training the next generation of wind energy engineers and technicians," Wirz said. "This is a wonderful opportunity for students in the UCLA research community to have hands-on experience with a state-of-the-art commercial-scale wind energy system."

And finally, Wirz is exploring designs for small vertical axis wind turbines that are specifically designed for the urban environment and can generate energy at relatively low and unpredictable wind speeds.

More information on Wirz' work can be found online at: http://www.wirz.seas.ucla.edu/

Richard Wirz partners UCLA's MAE with Mesalands Community College's North American Wind Research and Training Center

(The news release and photos are from Kimberly Hanna, Director of Public Relations at Mesalands Community College.)

TUCUMCARI, NM- Mesalands Community College recently partnered with the Mechanical and Aerospace Engineering Department at the University of California, Los Angeles, (UCLA), and the Mechanical Engineering and Material Science Department at Washington University in St. Louis. Both universities signed Memoranda of Understanding (MOU) with Mesalands. These documents allow the universities to use the commercial-sized turbine and the first-class facilities at the new North American Wind Research and Training Center. This partnership will aid groundbreaking wind energy research at both universities.

(l to r) Dr. Richard Wirz, Assistant Professor of Mechanical and Aerospace Engineering Department at the University of California, Los Angeles, Dr. Phillip O. Barry, President of Mesalands Community College, and Dr. David Peters, Professor of Engineering.

Faculty News

Eric Chiou's research paper was selected as the inside cover paper for the journal *Lab on a Chip*, issue 13, 2010.

The article was "Single-sided continuous optoelectrowetting (SCOEW) for droplet manipulation with light patterns."

Greg Carman

Greg Carman has accepted the position of Co-Executive Director for the Center for Advanced Surgical and Interventional Technology (CASIT). Carman, a Professor of Mechanical and Aerospace Engineering, has been a member of CASIT's Board of Directors since 2006 and has been proactive in providing a leadership role. In announcing the appointment, the current leadership of CASIT noted that Professor Carman has mentored many students, graduate students, postdoctoral scholars, surgical residents, and faculty. He interfaces with medical and non-medical scientists in a very collegial and productive manner, and has been successful in winning competitive grants from NIH and the DoD. The MAE Department looks forward to Professor Carman's leadership within CASIT and the potential for increased collaborations with Engineering.

CASIT is a UCLA-designated research facility with 3,700 sq. ft. including the Gonda Robotic Center, a wet research laboratory, a telecommunications center, a computer simulations facility, an integrated operating room suite, and administrative offices. Its mission is to define and advance the state-of-the-art of surgical and interventional technology and to revolutionize surgical education and training.

Rajit Gadh was interviewed on KNBC-TV about thieves stealing credit-card information using radio waves and the types of security precautions vendors and consumers can take. Please view the interview here: http://www.nbclosangeles.com/on-air/as-seen-on/Electronic_Pickpocket_Los_Angeles.html .

Ivan Catton was interviewed by KNBC-TV's Ted Chen about the nuclear plants in Japan and radiation threat. The link to the interview is here: http://www.mae.ucla.edu/news/news-archive/2011/professor-ivan-catton-provides-nuclear-reactor-expertise-in-nbc-news-interview

Jeff Eldredge

Jeff Eldredge was quoted in a May 7, 2011, Los Angeles Times article concerning the "stealth helicopter" used in the Osama Bin Laden raid.

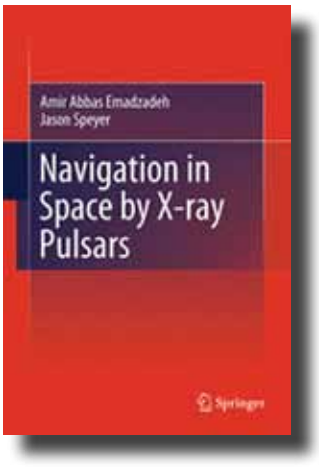
Eldredge said helicopter noise is extremely complex and requires many approaches to controlling it.

"The idea of a stealth helicopter is something of a misnomer," he said. "It is very unlikely this is a helicopter you wouldn't hear coming."

Jason Speyer and Amir Abbas Emadzadeh have a revolutionary new book out called "Navigation in Space by X-ray Pulsars," published by Springer Books.

From springer.com:

"This monograph on different aspects of utilizing X-ray pulsars for navigation of spacecraft in space contains two unique features. First, it provides a solid mathematical formulation for the absolute and relative navigation problems based on use of X-ray pulsar measurements. Second, it presents a comprehensive framework for signal processing techniques needed to obtain the navigation solution."



Albert Carnesale, UCLA Chancellor Emeritus and professor of public policy and mechanical and aerospace engineering, was elected to the National Academy of Engineering (NAE) on February 8., 2011

Pei-Yu Chiou was the lead guest editor of special issue "Optofluidics for Lab on a Chip," for the journal of Advances of Optoelectronics.

UCLA MAE Ph.D. alumnus **William R. Goodin** received the Rodney D. Chipp Memorial Award at the Society of Women Engineers (SWE) National Conference in Orlando in November. This national award "celebrates the work of a man or company who has made a significant contribution to the acceptance and advancement of women in engineering."

Ted Iwasaki received the 2010 Steve Hsia Biomedical Paper Award at the World Congress on Intelligent Control and Automation for the paper entitled "Analysis of weakly coupled neuronal oscillators and its applications to leech swimming," coauthored by Z. Chen at the University of Newcastle.

Ann Karagozian received the Decoration for Exceptional Civilian Service from the Department of the Air Force on October 6, 2010. This award, the highest granted to civilians by the United States Air Force, was presented to Professor Karagozian on behalf of the Secretary of the Air Force at the Fall Board meeting of the Air Force Scientific Advisory Board (SAB).

Pirouz Kavehpour won the 2010 L. E. Scriven Young Investigator Award. The award was announced at the 15th International Society of Coating Science and Technology (ISCST) Symposium on September 14, 2010. Prof. Kavehpour received the award for "innovative work in the field of interfacial fluid mechanics including measurements of drop coalescence and direct observation of precursor films ahead of wetting contact lines."

CJ Kim was elected a Fellow of the American Society of Mechanical Engineers (ASME).

Kim was also selected as one of "100 People Who Will Light Up Korea in Year 2020" by S. Korean Dong-A Newspaper.

Christopher Lynch received the 2011 Intersociety Adaptive Structures and Materials Systems Prize. The prize is awarded through the ASME Aerospace Division.

Laurent Pilon received the 2011 Henry and Susan Samueli Teaching Award from UCLA MAE Department.

Pilon was also elected a 2011 SPIE Senior Member by the International Society of Optics and Photonics.

TC Tsao was elected a Fellow of the American Society of Mechanical Engineers (ASME).

Tsao and graduate student Herrick Chang received the Best Paper Award in the International Symposium of Flexible Automation held in Tokyo, Japan, July 2010, for the paper "Repetitive Control of a Levitated Shaft – FPGA Implementation based on Powell-Chau Filters."

Graduate Student Shalom Ruben was Finalist of the Student Best Paper Award in the American Control Conference, Baltimore, June 2010, for the paper "Optimal Commutation Law by Real-Time Optimization for Multiple Motor Driven Systems," written by Ruben and Tsao.

Richard Wirz won the 2010 Northrop Grumman Excellence in Teaching Award. The Northrop Grumman Excellence in Teaching Award honors junior faculty members who demonstrate a commitment to high teaching standards, reflected in the positive course evaluation scores from their students, and their contributions to the curriculum.

Wirz was also awarded a US Air Force Young Investigator Research Program grant, to study near-surface cusp confinement of micro-scale plasma..

NAE
National Academy of Engineering Members

Albert Carnesale
Chancellor Emeritus

Albert Carnesale is Chancellor Emeritus and Professor at the University of California, Los Angeles (UCLA). He was Chancellor of the University from July 1, 1997 through June 30, 2006, and now serves as Professor of Public Policy and of Mechanical and Aerospace Engineering. His research and teaching focus on public policy issues having substantial scientific and technological dimensions, and he is the author or co-author of six books and more than 100 articles.

Vijay Dhir

Vijay K. Dhir, Dean of the UCLA Henry Samueli School of Engineering and Applied Science and professor of mechanical and aerospace engineering, was elected into the National Academy of Engineering (NAE) in 2006, in honor of his work on boiling heat transfer and nuclear reactor thermal hydraulics and safety. Dhir has been a faculty member at UCLA since 1974, and leads the Boiling Heat Transfer Lab, which conducts pioneering work in fundamental and applied research in phase change heat transfer.

Chih-Ming Ho
Ben Rich
Lockheed Martin Chair

Professor Chih-Ming Ho, director of the Center for Cell Control and holder of the Ben Rich Lockheed Martin Chair, was elected in 1997 for his contributions to the understanding and control of turbulent flows. He joined UCLA to lead research in microelectromechanical system (MEMS) in 1991, and served as the founding director of the Center for Micro Systems. UCLA's MEMS program has been recognized as one of the top three programs worldwide.

John Kim
Rockwell Collins Chair

Professor John Kim was elected into the National Academy of Engineering in 2009 for development of direct numerical simulation and seminal contributions to the understanding of the physics and control of turbulent flows. Kim, who also holds the Rockwell Collins Chair in Engineering, revolutionized the way turbulent flows are studied and modeled. He has made outstanding contributions to the development of direct numerical simulations and large eddy simulations as reliable and respected tools for understanding the physics and control of turbulence.

Kuo-Nan Liou

Professor Kuo-Nan Liou, who holds a joint appointment in mechanical and aerospace engineering, was elected in 1999 for contributions in the theories of radiation transfer and light scattering, with applications to remote sensing technology and climate modeling.

Jason Speyer

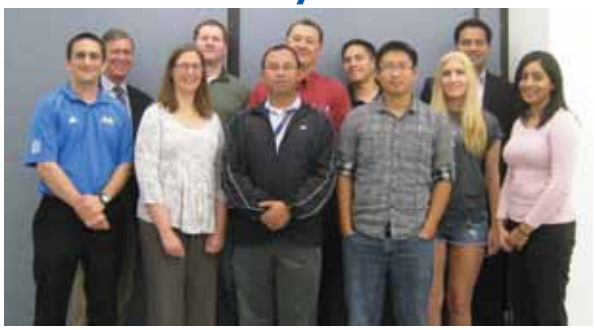
Professor Jason Speyer was elected to the National Academy of Engineering in 2005 for "the development and application of advanced techniques for optimal navigation and control of a wide range of aerospace vehicles." He has pioneered new optimal deterministic and stochastic control, team and differential game strategies, estimation, and model-based fault detection.

MAE's Industrial Advisory Board met in the Rice Room on October 29, 2010, to advise the department on research and curricular matters. L to R: Prof. Robert Shaefer, Prof. T.C. Tsao, Prof. Mohamed Abdou, Philip A. Conners (Lockheed-Martin Aeronautics Company), Pat Fitzgerald (Raytheon Space and Airborne Systems), James Hardy (Conoco-Phillips), Natalie W. Crawford (Rand Corporation), Dan Goebel (Jet Propulsion Laboratory), Adrienne Lavine (UCLA MAE Professor and Chair), Shawn Phillips (Air Force Research Laboratory), Jason Hatakeyama (Boeing Phantom Works), Wayne H. Goodman (Aerospace Corporation), Bogdan Marcu (Pratt & Whitney Rocketdyne), William Goodin (Director, Short Course Program, UCLA Extension), Gary Ervin (Northrop-Grumman Corporation), Lance Richards (NASA Dryden Flight Research Center), Prof. Les Lackman, and Prof. Xiaolin Zhong.

CURRENT PARTNERSHIPS

- Aerospace Corporation
- Air Force Research Laboratory
- Boeing Phantom Works
- ConocoPhillips
- Honeywell Engines, Systems & Services
- HRL Laboratories, LLC
- Intel
- Jet Propulsion Laboratory
- Lockheed Martin Aeronautics Company
- Meggitt Safety Systems
- NASA Dryden Flight Research Center
- Northrop Grumman Corporation
- Pratt & Whitney Rocketdyne Inc.
- RAND Corporation
- Raytheon Space and Airborne Systems

Alumni Advisory Board

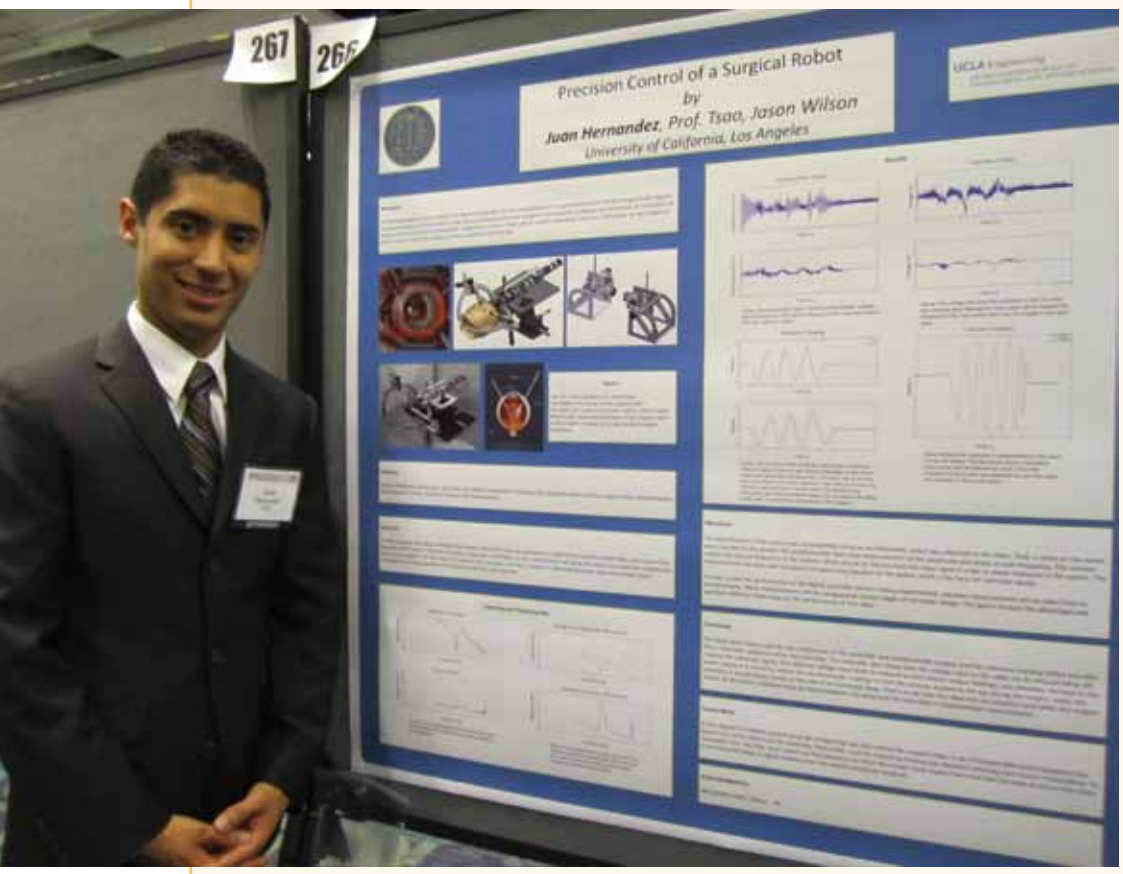


The MAE Alumni Advisory Board, a group of committed alumni, meets annually to advise the department on curriculum and alumni issues. This year's meeting included a discussion of the department's undergraduate educational objectives and a review of the first offering of our new ME design course sequence.

L to R: Armando Cendejas, BS '10; William Goodin, MS '71, PhD '75, ME '82; Prof. Adrienne Lavine; Prof. Robert M'Closkey; Gerard Toribio, BS '08; David E. Lee, BA '85, MS '90, PhD '98; Alan Chang, BS '06; Viet Nguyen, BS '09; Julia Pasternack, BS '09; Alejandro Diaz, BS '98, MA '04; Aditi Gobburu, BS '07, MS '08.

William R. Goodin, MS '71, PhD '75, ME '82, Chair / UCLA Extension
Armando Cendejas, BS '10 / Boeing
Alan Chang, BS '06 / Mitsubishi Electric
Garett Chang, BS '03 / Honda Access America
Christine Cloutier, BS '05 / HDR Architecture
Alejandro R. Diaz, BS '98, MA '04 / Boeing
Alicia Evans, BS '02 / Boeing
Cathy Leong Fong, BS '05 / Boeing
Greg Glenn, BS '03, MS '06 / Newport Medical Instruments
Aditi Gobburu, BS '07, MS '08 / Northrop Grumman
Hannah Jorgensen, BS '10 / Northrop Grumman
Taline Khansa, BS '06 / GKN Aerospace
Nathan Kwok, BS '04, MS '06 / C&D Zodiac
David E. Lee, BA '85, MS '90, PhD '98 / Northrop Grumman
Sasha Lukyanets, BS '07, MS '09 / SpaceX
Mark Malicdem, BS '05 / B/E Aerospace
Margaret Motagally, BS '05 / NASA
Jonathan Nguyen, BS '09 / Jet Propulsion Laboratory
James Sharp, BS '03, MS '06 / Northrop Grumman
Eliza Sheppard, MS '05, MBA '10 / Northrop Grumman
Marianne So, BS '07 / Honeywell
Gerard Toribio, BS '08 / Northrop Grumman
Marisa Huey Wells, BS '04 / Northrop Grumman
Melissa Yee, BS '07 / Turner Construction
Michelle Yi, BS '03 / Consultant

Juan Hernandez wins 1st place in the ERN undergraduate poster presentation session



UCLA Mechanical and Aerospace Engineering Department undergraduate student Juan Hernandez won 1st place in the Emerging Researchers National (ERN) conference undergraduate poster presentation session under the category "Technology and Engineering," held during February 24-26, 2011, in Washington D.C.

His poster was titled "Precision control of a surgical Robot." In the poster he describes how digital control theory is being applied in order to control an ocular surgery robot. The robot being utilized was designed by the Mechatronics and Control lab, and can hold various instruments used in eye surgeries. The robot is to be controlled by the surgeon through two joystick type input devices. The focus of the study is to create a controller that removes the shaking in the surgeon's hands throughout the operation. By successfully creating such a controller, operations can be made safer and therefore implemented more often.

Abstract: Precision Control of a Surgical Robot

The research conducted was to investigate digital motion control of a robotic manipulator for manipulation of a surgical instrument. Surgical eye procedures, such as a vitrectomy, are instrumental in improving the vision of individuals suffering from various conditions. Certain surgical tasks require complex procedures by the surgeon, while others are hampered by the surgeon's susceptibility to fatigue and distraction or limitations of manual surgical instrument manipulation. The hypothesis being tested is that feedback control will be able to generate instrument motion that eliminates the tremor caused by human hand manipulation. Performance of the controller will be based on vibrations measured by accelerometers. In order to design a digital controller, a mathematical representation of the system being controlled is needed. To obtain the system's model a sine sweep test was conducted on the robot, which records the system's amplitude and delay to a series of sine waves. The data collected was used to obtain a representation of the robot and to select the type of controller. A lead compensator was selected, because it could keep the system stable and follow the reference input rather well. Next, the natural nodes of the system and the frequency of hand tremor needed to be filtered out via the controller. The current controller filters the natural frequency of the system. In application of this controller it is noted that as the vibration of the robot is reduced there is an increase in the phase between the reference and output signals. The next step of the project is to filter the frequency of hand tremor. Upon completion of the filter, the controller must be optimized in order to find an acceptable trade-off between vibration and delay. [This study was funded by a grant from NIH NIGMS 55052]

Three UCLA MAE students win in the 6th Annual CEED RISE-UP Poster Competition

The 6th Annual Center for Excellence in Engineering and Diversity (CEED) Research Intensive Series in Engineering for Underrepresented Populations (RISE-UP) Poster Competition was held at UCLA on August 26, 2010, in the California NanoSystems Institute (CNSI) Lobby. There were eight presenters, and the competition was judged by: Robert Candler, Assistant Professor of Electrical Engineering; Catherine Douglas, Events Coordinator for CEED; and KiMi Wilson, Education and Outreach Coordinator for SINAM.

First place was awarded to Abubakarr Bah, who received his Bachelor of Science degree in Mechanical Engineering in Spring of 2010, for his work on The Effect of Volume Fraction on the Properties of a Barium Titanate ($BaTiO_3$) Polymer Composite sponsored by SINAM, under the direction of Professor H. Thomas Hahn.

Second place was awarded to Ashly Ainley, who is entering her 3rd year in Mechanical Engineering, for her work on Synthesis of Barium Titanate ($BaTiO_3$) Nanoparticles sponsored by Intel and SRC, under the direction of Professor Bruce Dunn.

Third place was awarded to Gabriel Garcia, who is entering his 4th year in Mechanical Engineering, for his work on Optical Properties of Nanostructured Indium Phosphide (InP) Thin Films sponsored by Intel and SRC, under the direction of Professor Laurent Pilon.

Please visit http://www.ceed.ucla.edu/programs/undergrad/rise-up-program to learn more about the CEED RISE-UP Program.

Anna D'Entremont receives the NSF Graduate Fellowship

UCLA Mechanical and Aerospace Engineering Department Ph.D. student Anna D'Entremont received the 2011 National Science Foundation Graduate Fellowship for her work on mesoporous materials for energy storage in Professor Laurent Pilon's lab.

Her research project models thermal effects in pseudocapacitors (e.g. predicting the heat generation within the device and the resulting temperature changes), which allows for better understanding of the device's operation under various temperature conditions and design of temperature control mechanisms.

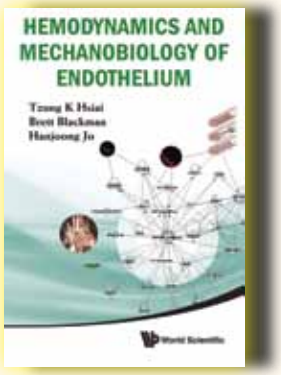
D'Entremont received her BS in Mechanical Engineering at Clemson University.

From http://www.nsfgrfp.org/about_the_program:

The NSF Graduate Research Fellowship Program (GRFP) helps ensure the vitality of the human resource base of science and engineering in the United States and reinforces its diversity. The program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees at accredited United States institutions.

As the oldest graduate fellowship of its kind, the GRFP has a long history of selecting recipients who achieve high levels of success in their future academic and professional careers. The reputation of the GRFP follows recipients and often helps them become life-long leaders that contribute significantly to both scientific innovation and teaching. Past fellows include numerous Nobel Prize winners, U.S. Secretary of Energy, Steven Chu, Google founder, Sergey Brin and Freakonomics co-author, Steven Levitt.

UCLA MAE alumnus Dr. Tzung Hsiai publishes book on hemodynamics and mechanobiology



UCLA MAE Alumnus Dr. Tzung Hsiai published a book on hemodynamics and mechanobiology. The book, "Hemodynamics and Mechanobiology of Endothelium," was co-authored by Brett Blackman and Hanjoong Jo, and is published by World Scientific Press.

Tzung Hsiai, MD, Ph.D. graduated from 2001 from MAE. He is an associate professor at USC. UCLA MAE Professor Chih-Ming Ho was his graduate advisor for his Ph.D. degree.

HEMODYNAMICS AND MECHANOBIOLOGY OF ENDOTHELIUM

by Tzung K Hsiai (University of Southern California, USA), Brett Blackman (University of Virginia, USA), & Hanjoong Jo (Georgia Institute of Technology/Emory University, USA)

The book represents a paradigm shift from the traditional static model of investigation of oxidative biology to the dynamic model of vascular oxidative stress. The investigation of vascular biology and cardiovascular medicine is made possible by the use of tissue engineering, nanotechnology and stem cell research. This is the first textbook to target a wide readership from academia to industry and government agencies in the field of cardiovascular diseases.

Contents:
* Mechanosensors
* Mechanosignal Transduction
* Flow-Dependent Regulation of Endothelial Cell Biology and Pathobiology
* Flow and Vascular Diseases in Vivo
* Flow Models: In Vitro and In Vivo
* Hemodynamics in Cardiovascular Systems
* Emerging Areas

Readership: Researchers, academics, postgraduate students in biomedical engineering, biomechanics, cardiology and MEMS/NEMS.

Soojung Claire Hur selected as one of this year's Rowland Junior Fellows at Harvard's Rowland Institute

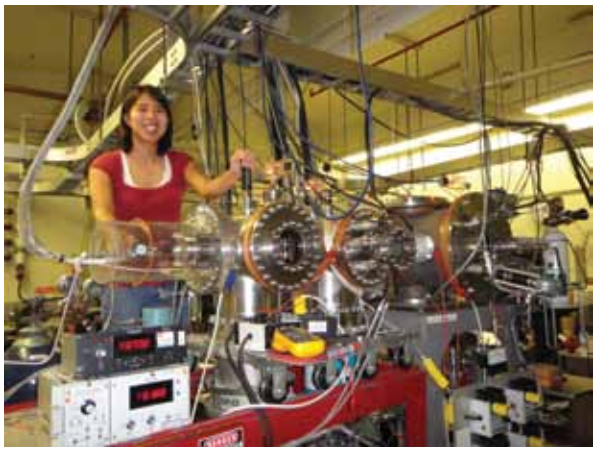
UCLA Mechanical and Aerospace Engineering Department Ph.D. candidate Soojung Claire Hur has been selected as one of this year's Rowland Junior Fellows at Harvard University's Rowland Institute. It is a very prestigious program, and she will have her own research laboratory setup. Hur will be joining the Rowland Institute this September. Her Ph.D. dissertation title is High-throughput Rare Cell Detection and Separation using Inertial Microfluidics, and she conducted her research work under the supervision of Professor Dino Di Carlo of UCLA's Bioengineering Department.

From http://www.rowland.harvard.edu/rjf/program/index.php:

Rowland Junior Fellows Program

The Rowland Junior Fellows are selected to perform independent experimental research for five years, with full institutional support and access to the Institute's outstanding technical and scientific resources. The number of Rowland Junior Fellows will equal about ten, with on average two new appointments each year. Candidates in all the natural sciences (physics, chemistry, biology...) as well as in engineering will be considered, with special attention given to interdisciplinary work and to the development of new experimental methods.

Lauren Chu awarded the 2011 NSF GRFP Fellowship



UCLA Mechanical and Aerospace Engineering Department graduate student Lauren Chu was selected to receive a 2011 National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) Fellowship. Chu's selection was based on her "outstanding abilities and accomplishments," as well as her "potential to contribute to strengthening the vitality of the US science and engineering enterprise."

Abstract:

Electron transport across magnetic field lines is not well understood for partially ionized plasma, which is commonly used in plasma thrusters used in NASA and JPL missions. Currently existing analytical models of partially ionized plasma are inaccurate and cannot be directly validated since existing experimental data are derived from complicated or poorly defined experiments. This effort will develop a well-characterized, simplified experiment that can uniquely capture low energy electron transport behavior and provide clear insight into the behavior of electrons in partially ionized plasma. Detailed measurements of plasma behavior will reveal electron transport mechanisms in a collisional environment that other experiments are not able to isolate and analyze. These canonical experiments will supply benchmark data for the validation of analytical techniques and verification of computational codes that model thruster performance and lifetime, and thruster-spacecraft interactions.

Herrick Chang receives the Best Paper Award at the International Symposium of Flexible Automation

Graduate student Herrick Chang (along with Prof. T.C. Tsao) received the Best Paper Award in the International Symposium of Flexible Automation held in Tokyo, Japan, July 2010, for the paper "Repetitive Control of a Levitated Shaft – FPGA Implementation based on Powell-Chau Filters."

Abstract: Motivated by needing to generate precise periodic scanning trajectories at sampling rate above 100 kHz for application in micro and nano technology, Professor Tsao's group has realized advanced control algorithms at 100 KHz sampling rate using field programmable gate array (FPGA). Such high sampling rate control cannot be realized by general processors due to latency in data transmission. The paper presents a linear phase plant inverse filtering and used it in the repetitive control loop by modifying a special digital filter realization methods based on the Powell-Chau and Kurosu filters. The 100 KHz sampling rate achieved was not limited by the FPGA but by the particular analog converter used so it can readily be made much faster than 100 KHz and thus can be particularly useful for the control of high frequency micro or nano devices.

Shalom Ruben finalist of the Student Best Paper Award in the American Control Conference

Graduate Student Shalom Ruben was Finalist of the Student Best Paper Award in the American Control Conference, Baltimore, June 2010, for the paper "Optimal Commutation Law by Real-Time Optimization for Multiple Motor Driven Systems," written by Ruben and Tsao.

Abstract: Thermally caused distortion of motion stage caused by motor's electric heating during movement or dynamic force balance has been a concern for achieving nano precision. Realizing this problem, the paper proposed a motor coil commutation law, which generates desired stage forces while minimizing the power generation with or without additional constraint on equal motor power for symmetric thermal gradient. By exploiting the redundancy of motor coils and motor force generation that exists in the over actuated motion platform, the paper formulated a constrained optimization problem and solved it in real-time under 35 microseconds, within the 9 KHz coil commutation rate, and demonstrated motor control experiment with this underlying commutation laws.

Chang-Hwan Choi, CJ Kim's former student, received a 2010 Young Investigator award

From NATURE, Vol 465/20, May 2010

Chang-Hwan Choi, a nanoengineer at the Stevens Institute of Technology in Hoboken, New Jersey, received a 2010 Young Investigator Program award from the US Office of Naval Research (ONR) for his design of anti-corrosion surfaces that will make Navy vessels more durable.

What was your most pivotal career decision?

I started studying the work of CJ Kim at UCLA, who was famous for the design and fabrication of micro electromechanical systems (or MEMS). When I contacted him to ask about research openings, he invited me to join his lab.

Katherine Bulgrin wins an ASME IMECE 2009 Best Student Paper Award

UCLA Mechanical and Aerospace Engineering Department Ph.D. candidate Katherine Bulgrin won the ASME IMECE 2009 Best Student Paper Award by the Advanced Energy Systems Division (AESD). The paper is entitled "A coupled thermal and mechanical model of a thermal energy harvesting device," authored by Bulgrin, and co-authored by UCLA MAE Professors Greg Carman, Y. Sungtaek Ju, and Adrienne Lavine.

The award was announced by Michael von Spakovsky, 2010-2011 Chair of the Advanced Energy Systems Division (AESD) Executive Committee. There was a monetary award of $500, which was divided between Bulgrin and her co-authors. During ASME IMECE 2010 in Vancouver, the award was announced and presented at the AESD reception on November 16th.

Hideaki Tsutsui nominated for UCLA Chancellor's Award for Postdoctoral Research

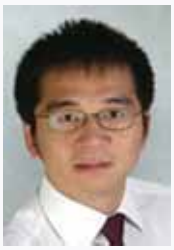
UCLA Mechanical and Aerospace Engineering Department postdoctoral scholar Hideaki Tsutsui was nominated for the Chancellor's Award for Postdoctoral Research.

Tsutsui was the lead author of a breakthrough single-cell passaging research article in Nature Communications. Additional reporting on this research can be found at the following links:

UCLA Newsroom
Genetic Engineering & Biotechnology News
Daily Bruin

Tsutsui received his Ph.D. in Mechanical Engineering in 2009, and continues to work with Prof. Chih-Ming Ho as a postdoctoral scholar. He will be joining the Department of Mechanical Engineering at University of California Riverside as an assistant professor this fall.

Two of Chih-Ming Ho's former students win the 2010 NIH Director's New Innovator Award



UCLA Mechanical and Aerospace Engineering Department Professor Chih-Ming Ho's former students, Tony Jun Huang and Pak Kin Wong, won the 2010 NIH Director's New Innovator Award. On September 30, 2010, NIH Director Dr. Francis Collins officially announced the recipients for the 2010 NIH Director's New Innovator Award in Bethesda, MD. Simultaneously this information was posted at the NIH website (http://nihroadmap.nih.gov/newinnovator/recipients10.asp).

The fact that two out of the 50 awardees are former students of Prof. Ho's speaks loudly of his superior mentorship and tireless promotion of younger-generation engineers. Dr. Ho feels very happy and proud. Both Huang and Wong consider it a blessing to have been a part of Team Ho.

Below are the grant titles:

Pak Kin Wong, Ph.D.
The University of Arizona
Project Title: Mechanoregulation of Tissue Morphogenesis

Tony Jun Huang, Ph.D.
Pennsylvania State University
Project Title: On-Chip Optofluidic Laser Scanning Confocal Microscope for Early Cancer Detection

Haibo Dong, former Ph.D. student of Xiaolin Zhong, wins NSF CAREER award

Haibo Dong, former Ph.D. student of UCLA MAE Professor Xiaolin Zhong, won a 2011 NSF CAREER award. Dong, who is an associate professor at Wright State University, received the award to research "An Integrated Study of Biological Fluid Dynamics in Nature."

Ph.D. student Julie Nichols competes in the 2010 World Rowing Championships

UCLA Mechanical and Aerospace Engineering Department Ph.D. student Julie Nichols competed in the 2010 World Rowing Championships. Held in Karapiro, New Zealand, from October 30 – November 7, 2010, and organized by the International Rowing Federation (FISA), the World Rowing Championships features Olympic-class rowers in fierce competition with each other.

2011 Commencement Awards and Honors Announcement

2011 HARRY M. SHOWMAN PRIZE
Juan Ramon Hernandez, B.S., ME, Sp11

2011 ENGINEERING ACHIEVEMENT AWARD FOR STUDENT WELFARE
Gabriela Bran Anleu, B.S., ME, Sp11
Albert Khim Heng, B.S., AE, Sp11
Michael Thomas Rhodes, B.S., ME, Sp11
Jian Sorge, B.S., ME, Sp11

MECHANICAL AND AEROSPACE ENGINEERING DEPARTMENT
Scott Michael Davidson, B.S., AE, Sp11
Zachary Keith Peterson, B.S., ME, Sp11
Nathan Michael Olson, M.S., AE, F10
Brian Michael De Vitis, M.S., ME, Sp11
Le Duan, Ph.D., AE, Su10
Giacomo Po, Ph.D., ME, Sp11

OASA RECOGNITION
Jeffrey Robert Jonokuchi, M.S., AE, Sp12

OASA SPECIAL CONGRATULATIONS
Wen Peng Zou, M.S., ME, Sp11

UCLA Racing Baja places 1st in maneuverability event

By Anthony Tyson / Photo courtesy of Pittsburgh State University

UCLA Racing Baja is an international collegiate design competition sponsored by the Society of Automotive Engineers (SAE). The contest challenges each team to function as a small manufacturing firm whose task is to design, fabricate, market, and race an off-road vehicle prototype that will be evaluated from a variety of manufacturing angles. Each year various SAE sections host a West, Midwest, and East competition in which approximately 100 teams from across the nation and around the world bring their vehicles to undergo rigorous testing.

This year UCLA Racing competed in the Midwest Competition at Pittsburg State in Kansas with over 100 other universities from 23 different countries. This is the 13th year UCLA Racing Baja has competed. With every passing year members gain extremely valuable experience that drives the next iteration of the vehicle. The team, led by 3rd year Mechanical Engineers Anthony Gambardella and Anthony Tyson, realized that a shift in design was needed to improve vehicle maneuverability to stay competitive with the other top universities such as Cal Poly and OSU. To accomplish this, they decided to implement a new enclosed drivetrain design with a planetary gear reduction followed by an open differential coupled with a driver controlled cutting brake that can individually lock either the left or right rear wheels during tight turning.

These were major design challenges for the team. The team utilizes Solidworks to design and perform FEA analysis on every part of the vehicle. With Solidworks FEA they were even able to reduce the chassis weight by 45 lbs. from the previous year, while still keeping almost the same vehicle strength and resilience. Any experienced engineer also knows that design can only go so far, and that real field testing must be done to prove concepts. Just a week before leaving for competition, after another day of testing, a design flaw in the drivetrain differential caused a failure that destroyed every single gear. This was an event classroom could never prepare you for, but previous crisis experience and resourcefulness were on the UCLA team's side. In less than five days the failure was identified, a redesign was finalized, new gears were obtained and cut by sponsor A&H Wire EDM, new steel shafts were made, and the vehicle was fully operational for competition.

At competition these new design changes proved to be a success. With the 100 universities competing from around the world, UCLA Racing placed 1st in the Maneuverability race, driven by 3rd year Anthony Tyson. This is UCLA's first year placing first in an event and hopefully the one of many to come. Overall UCLA placed 24th with the combined scores from all the dynamic and static events. The team has been steadily rising in the ranks recently among other top universities with a 16th overall placement in 2010. New designs and models for the next year's vehicle have already begun, including even more carbon fiber composite implementations for weight reduction. Just as in aerospace industry, UCLA Racing Baja is pushing every engineering aspect of the vehicle to its limit to create the lightest, fastest, and most agile vehicle possible.

UCLA Racing is providing real-world, on demand, team oriented experience for students to design and compete a fully off road vehicle. Every aspect of the vehicle is designed and manufactured by the students involved. They utilize various manufacturing processes such as CNC milling, Abrasive Waterjet Cutting, Wire EDM, carbon fiber composite processes, and welding. The UCLA racing team functions as a business would and is open to university students from diverse backgrounds and majors, including students studying math, computer science, business, communications, and all engineering fields such as mechanical, aerospace, material science, electrical and software engineering. Mentorship is provided to all new team members. UCLA Racing graduates have a distinct advantage over other graduates in that they have hands-on experience, management/ crisis experience, and have a competition level of initiative, drive, and ability.

Robotics Club Takes Gold and More from RoboGames

By Michael Sechooler

Fellow Members, UCLA Staff, and Faculty,

As president of the Robotics Club at UCLA, it is my honor to report to you the results from our club's envoy to the largest robotics competition and conference, RoboGames. This year, our junior members made UCLA's first appearance in the ribbon climber competition. What started as merely an idea at the beginning of winter quarter grew into a surprisingly small and lean robot that could race several feet up a ribbon (like one would find on a present) at a competitive speed. Project Manager Ed Solis ('12) and Teammates Corbett Cappon ('14) and Darwin Nelson ('14) managed to navigate their first major engineering project, handling logistical problems and unforeseen design conflicts with grace. Their robot successfully competed in the competition, traveling up the ribbon while only causing minor damage to it. Furthermore, and more importantly, they were forced to branch out and learn about various key design points in robotics, from embedded engineering, to radio communications, to motor sizing and control. Their attempt at the ribbon climber provided an exciting capstone on an already exciting trip to Robogames.

Earlier in the day, however, the Robotics Club won its most impressive victory to date in the RoboMagellan contest, in which robots race to autonomously find traffic cones in a park. As returning champions, we had a reputation to uphold and criticisms of last year's rather lackluster performance to dispel. Our performance this year, however, was anything but lackluster. In the first run, our robot found both a bonus cone and the final goal cone with ease, becoming the first robot in over two years to complete the course. With a simple run on record, our operators decided to go for all bonus cones. This run was somewhat touch-and-go. The setting sun made it difficult for our robot, GLaDOS, to see the last two bonus cones. However, after turning in circles a few times, GLaDOS locked onto both cones and made a perfect run, receiving accolades from spectators, fellow competitors, and even our harshest critics from last year. While the total elapsed time of the run was over 10 minutes, the effective time considering the bonus cones was only 40 seconds. With the gold assured and no other improvements left to make, our operators doubled the cruising speed beyond tested limits. While the robot quickly veered off into a picnic table and had to be stopped, its impressive velocity and power certainly turned heads.

The absolutely amazing success that the RoboMagellan team saw this year is largely due to the hard work of Chris Wasson ('11) and Ryan Sohm ('11). While my work as the systems integration programmer may have been largely responsible for our albeit uninspired win last year, their hard work as chief mechanical/navigational lead and vision programmer (respectively) directly translated into the leaps and bounds we grew this year. It has been a privilege to watch Chris and Ryan grow both as Bruins and as engineers, and I wish them the best I can as they finish their last quarters here at UCLA. Unfortunately, as my term will end at the conclusion of this year, I will not have the same honor to watch Ed, Corbett, and Darwin do the same. Nevertheless, I advise all of UCLA's staff, faculty, and students to keep their eyes on the three, as their tenacity and penchant for learning makes them a few of our school's rising stars.

RoboMagellan team at medal ceremony. Left to right: Wasson, Sechooler, Sohm.

Supermileage Vehicle takes home 2nd Place Design Proposal Award

By Melody Vo

This year has been fraught with challenges. However the team overcame and improved. With the majority of the team graduated and moved on, the relatively new team faced many challenges. Nonetheless, we forced ourselves to overcome and continued pushing forward. The 2010-2011 year proved to be one of our most experimental vehicles and one of our most improved teams yet.

Most of our members had little design experience; individuals began to step into lead positions to design our steering system, drive train, engine, and fairing. There was a great deal of self teaching as well as learning from one another. One of our greatest improvements this year was our fairing. With guidance from SpaceEx, donations from C&D Zodiac, and most importantly the involvement of Performance Composites, the Supermileage Team created the best composite work UCLA students have ever achieved.. The involvement of Performance Composites elevated our level of quality. We fabricated our own male mold at UCLA. We brought that mold to Performance Composites in Compton, and they were extremely underwhelmed with our work. This sounds negative, but it was to our benefit. With their guidance, we managed to bring the male mold to a professionally acceptable level to make a female mold. It was a two week long process of driving the team down to Compton every morning to put in hours upon hours of manual labor. We then left our mold with Performance Composites for a few weeks and returned for the female mold. We brought the female mold back to UCLA to do a wet layup of our fairing. The result was some of the best composite work any UCLA student group has ever done.

This year we were lucky to have such financial contributors such as the UCLA Engineering Alumni Association, Lockheed Martin, the Joseph Beggs Foundation, and the Undergraduate Student Association Council. With their contributions, we were able to attend both Shell Eco-Marathon in Houston, Texas, and SAE Supermileage in Marshall, MI. Our first competition, Shell Eco-Marathon, took place April 14th – 19th. Originally we had planned to take our old car as well as our new car. However, there were unexpected problems with the chassis and much of our man hours had gone into fabricating the fairing. We were unable to take the new car. Instead, we attended Shell with the old car to garner competition experience. There were 62 registered prototype vehicles, 33 successful teams with a valid run, we achieved 18th place with 768 MPG.

Left to right, it's Aaron Go (Electrical Lead), Melody Vo (Project Lead), and Christopher Underhill (Assistant Project Lead).

Since Shell, the team has been working on the new vehicle in preparation for SAE Michigan. The chassis was taken to the UCLA R&D Department to be welded. While the vehicle was being welded, the rest of the team was working on the other subsystems such as the steering and electrical work. There were many little setbacks, each which had to be overcome one by one. Nonetheless the team prevailed regardless of being behind schedule. On Wednesday, June 1, the new vehicle was shipped out with the basic necessities to Michigan. All the necessary parts were machined ahead of time, ready to be assembled at competition. It was a hectic time for our team. In one week, the team faced finishing the car, finals, and Michigan storms. With the rains and lack of appropriate cover, we were unable to safely mount all the necessary components and make a valid run. Nonetheless, we still took home the 2nd Place Design Proposal Award and a prize of $300.00.

UCLA Rocket Project soars

By Kurt Zimmerman

The UCLA Rocket Project continued its development of its custom hybrid rocket motor, known as the Hybrid Propulsion Experiment (HyPE). The team successfully test fired two different engine designs this past year, the HyPE 1AT, a testing platform, and the HyPE 1B, a new more powerful, flight capable variant. Development of a 16 foot carbon fiber aerobody, an advanced avionics package capable of precise altitude targeting, and a reliable ground based launch control system, which allowed for remote fueling, launch, and abort procedures, were all completed in parallel with the engine development.

The team had around 30 active members for the 2010-2011 academic year, all working very hard. With their efforts culminating in participating in the 6th Intercollegiate Rocket Engineering Competition (IREC) taking place June 16-18, 2011 in Green River, Utah. The judges were very impressed with the team's technical and procedural knowledge. UCLA made the first ever flight in the IREC's advanced category, however owing to technical issues related to 3rd party hardware the day of the launch, the rocket was under fueled and only managed 200 feet, short of the 25,000 foot target. While technically meeting the requirements for 1st place in the category, the team graciously deferred the award until a higher altitude could be attained. Excited at the first, albeit short flight, of the student designed rocket engine, the team is already planning improvements to next year's design, and looks forward to taking another crack at their 25,000 foot goal.

UCLA Rocket Team. Photo by Tung X. Dao (Aerospace '11).

List of UCLA MAE Student Societies

AIAA: DBF Team
AIAA: Rocket Team
ASME Robotics
Robotics Club at UCLA: Mars Rover, RoboGames
SAE: Mini-Baja
SAE: Supermileage Vehicle

New mechanical engineering capstone design sequence builds camaraderie and competition among students

By Wileen Wong Kromhout

A new mechanical engineering (ME) capstone design sequence for all graduating ME seniors was unveiled this winter quarter by the mechanical and aerospace engineering (MAE) department after two years of extensive preparations and refinement. The two-term sequence was created with the goal of providing the students with a better design experience.

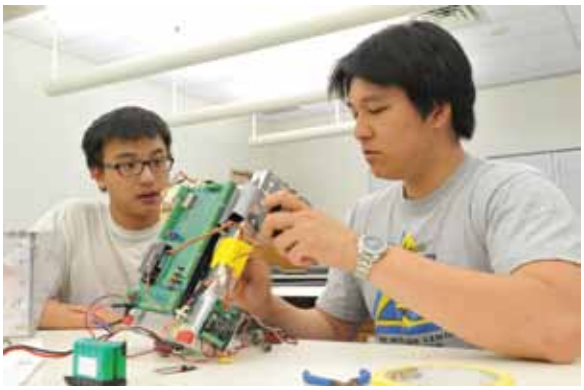
In the first quarter, students are provided with the tools they need to perform the design project (software and hardware) and in the second quarter, they focus on finalizing their design, then building and testing it.

The chair of the MAE department, Adrienne Lavine, challenged a group of faculty to revise the capstone sequence while at the same time reducing costs.

"Honestly, I didn't expect them to achieve both goals, but they did," said Lavine. "An additional benefit with the new sequence was that there could also be a competition at the end of the quarter which was a great motivation and celebration of the students' work."

Leading the charge for this new sequence (162 D/E) was Professor Daniel Yang, who also teaches the course with two other faculty, Professors T-C. Tsao and Robert Shahram Shaefer. Instruction for the first term focused on conceptual design with topics ranging from mechanical component design and mechatronics to thermo design and mechanical system design. Lab work included CAD (computer-aided design), CAD analysis, mechatronics and conceptual design for individual projects.

"Industry today is very interested in students who've taken hands-on design courses like this one," said Yang. "For four years, students at the school learn a great deal about theory. They need to use what they've learned and apply it to this design sequence. These two courses are very practical and provide the necessary hands-on learning experience. The sequence also encourages teamwork in design, in presentations as well as in competition. Therefore it builds camaraderie."



"This sequence," said Lavine, "offers an essential experience for a budding engineer. For example, the newly designed courses introduce students to mechatronics, the combination of electronics with mechanical devices, which is extremely important

in today's engineering world."

Students began designing their projects in 162D in their CAD and Mechatronics lab. Then in 162E, they were provided with opportunities for fabrication and testing, project demonstration and finally competition with their fellow classmates. The class of 100 students worked in groups of five or six throughout the two course series.

Jessica Chu, a student in 162 D/E, found the firsthand experience in project management to be very beneficial.

"We definitely learned the value and importance of time management and teamwork in all conditions, especially under stress," said Chu. "Working with a group and developing an understanding of how to attack a given task were definitely two skills we honed that will be required for industry success."

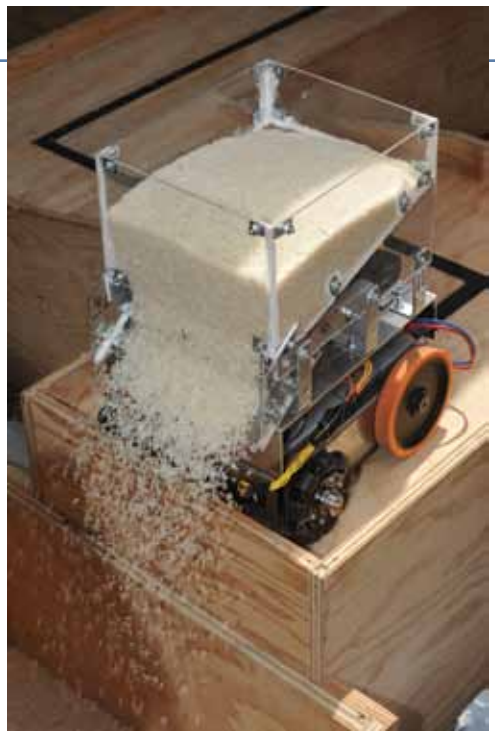
According to another classmate, Ryan Menefee, being able to spend two quarters working towards a physical product made the end result all the more satisfying.

"It's easy to say that a preliminary design will work," said Menefee. "My group thought that our design was fairly solid. But issues arose when fabrication and testing began. We had to develop solutions and work around these problems."

"What I enjoyed most about this sequence," stated senior Seok-Joon Hong, "was the interaction between team members. This type of project let me communicate ideas and improve concepts that would have been impossible by myself. The team experience was invaluable to me as someone looking to go into industry."

The project for this year was to design and build an autonomous vehicle for the transportation of bulk material: a robot rice rover. There were a few requirements too. The rover not only needed to follow a pre-designed pathway but it had to be able to dump a payload of rice into a collection bin at the end of the path.

Students were provided with a detailed description of the pathway (three platforms and two ramps), along with other prerequisites like how the vehicle should be powered, its size, its movement along the pathway, and a budget.



Final scores for teams on competition day was the weight of the transported rice minus all penalties incurred (i.e. accidentally or deliberately touching the pathway or receiving bin during the 10-minute race resulted in a 5% penalty).

"I enjoyed the competition element of the course," said Alex Teunissen. "I think it gives motivation to the students because they want to produce the best vehicle. It would be really cool if this competition became a tradition in the mechanical engineering major."

"The competition element should most definitely be a part of the course," added Hong. "It really brings the students' spirits into the project and that desire to be the best helped in motivating students to give their best."

All systems go: space technology course launches UCLA Engineering students into space careers

By Matthew Chin

With leading aerospace companies, research labs and testing grounds run by NASA and the Air Force, a workhorse space launch facility, and much more, Southern California's aerospace community is unmatched in its breadth, depth and history.

Alumni of the UCLA Henry Samueli School of Engineering and Applied Science have been leaders and contributors to this industry for many years, and part of the reason for this success are classes that challenge students to apply their knowledge and imagination in comprehensive projects.

One example is Introduction to Space Technology, a course students know as MAE (Mechanical and Aerospace Engineering) 161B. The course offers undergraduates an introduction of the key elements of successful space missions, covering space systems and space system technology. By the end of the class, students are familiar with the design and operation of space vehicles; technologies for space mission; as well as aspects of the space environment that impact space missions and spacecraft designs.

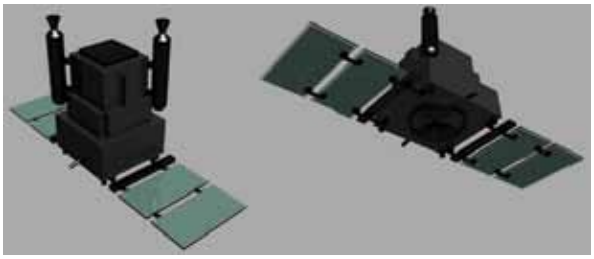
"I always thought space travel was cool, and it was fun to learn how to plan trajectories to other planets," said Anisha Keshavan, a graduating senior majoring in aerospace engineering and applied mathematics who took the class in winter quarter. "I mean, who doesn't wish we could travel to Mars one day?"

The Winter Quarter 2011 class was taught by assistant professor Richard Wirz whose research includes advanced space propulsion systems. The course covered seven systems that just about every spacecraft requires: power; thermal; propulsion; spacecraft structure; attitude control; communications; and command and data handling.

The final exam required students to design a spacecraft for a mission of their own choosing. This included providing details for the necessary technologies for each of the seven systems. Also, they needed to select the appropriate rocket to launch their spacecraft, calculate the time to the target and the duration of the mission, supply potential supplementary objectives, take into account the specific atmospheres and gravitational effects of different planets and moons, as well as a whole host of variables specific to the mission they chose. Essentially, they had to incorporate all the knowledge they learned in the previous 10 weeks into their final.

"I was impressed with their curiosity and ability to assimilate several seemingly unrelated topics and make sense of how they are related and work together to make the mission a success," Wirz said.

Mission ideas for the students' final projects included planet and moon landing vehicles; intra-solar system communication satellites; earth-orbiting satellites that would clean up space junk; and spacecraft targeted for the outermost reaches of the Solar System, just to name a few.



Keshavan's Solar orbiter design

Keshavan designed a spacecraft to observe the sun directly opposite the Earth at what's known as Lagrange point L3. Her design, similar to the European Solar and Heliospheric Observatory, included a Doppler-sensitive photometer, a photometric imager, and an ultraviolet spectrograph.

BEAM-UCLA launches new science and engineering outreach program in LA area

A new science and engineering K-12 youth mentorship program at UCLA, Building Engineers and Mentors (BEAM-UCLA), started in the winter of 2011. This program at UCLA is the sister chapter of the original UC Berkeley program (http://beam.berkeley.edu), which was founded in 2008 and now serves K-12 students in 11 Bay Area schools with 60 student volunteers.

Professor Adrienne Lavine (Chair of the Mechanical and Aerospace Engineering Department) and Professor Richard Wirz (Faculty Advisor for BEAM-UCLA) signed a letter announcing the launch of BEAM's new chapter at UCLA in winter 2011. They strongly urged undergraduate and graduate students from all majors to volunteer with BEAM-UCLA as science and engineering mentors for K-12 students in the LA area.

"If you have an interest in mentoring K-12 students, using your science and engineering skills to lead and develop hands-on activities, planning and leading youth outreach efforts, or just want to give teaching a try and have fun by improving your community, we strongly urge you to consider joining BEAM-UCLA. If your interest in science or engineering began with similar outreach programs, now is your chance to promote science in these young students' lives."

Volunteers with BEAM-UCLA have the opportunity to reach out to younger students through hands-on activities over a 7-week period. During this time, student facilitators help volunteers design and implement their own outreach projects.

The BEAM-UCLA program involves: (a) 1 hour of planning per week and (b) 2-3 field work hours per week with 5th grade students at Celerity Dyad Charter School. Undergraduate and graduate students from all majors are welcome to volunteer.

Please direct any questions to Alex Baker (alexbaker@ucla.edu). More details about BEAM-UCLA are online (http://beam-ucla.tumblr.com).

Continued from page 32

Alex Babb, who just graduated after winter quarter and is now taking classes toward a master's degree, designed a lander to the Jovian moon, Europa. His proposed lander carries a submarine probe armed with cameras, spectrometers, and sonar imaging equipment to search for life after melting through miles of ice to a possible ocean below the moon's surface.

"Should I end up working in the space industry one day, I will have ample opportunity to design communications satellites," Babb said. "I wanted my mission to be exciting and unusual, the kind of thing that engineers like myself would love to be a part of in real life. I'd seen a few different hypothetical missions to Europa before, and it seemed like a nice compromise between 'unlikely' and 'downright impossible.'"

Impossibilities aside, Wirz stressed to the class that with essentially one chance on missions that could cost in the hundreds of millions of dollars, "failure is not an option."

"Unless you are lucky like Hubble or the Space Station, once you are launched you are on your own and pretty much any failure will destroy the mission," he said.

For Babb, he found the class invaluable. He's leaning toward aviation, but is keeping his mind open.

"I learned as much about systems engineering as I did about space technology," Babb said. "To students who think they might ever want to go into the space industry, I highly recommend this class – you will get a very practical sense of almost every aspect of spacecraft design."

DYNAMICS

Oddvar O. Bendiksen

Classical and computational aeroelasticity, structural dynamics and unsteady aerodynamics.
Associate Fellow, AIAA, 1995

James S. Gibson

Control and identification of dynamical systems. Optimal and adaptive control of distributed systems, including flexible structures and fluid flows. Adaptive filtering, identification, and noise cancellation.

Daniel C. H. Yang

Robotics and mechanisms; CAD/CAM systems, computer controlled machines.
Fellow, ASME, 2007

FLUID MECHANICS

Jeff D. Eldredge

Bio-inspired locomotion in fluids; Numerical studies of high-speed flows; Development and application of computational tools for unsteady flow physics and flow-structure interaction; Generation and control and aerodynamic sound; Biomedical flows.

Ann R. Karagozian

Fluid mechanics and combustion, with applications to improved engine efficiency, reduced emissions, alternative fuels, and advanced high speed air breathing and rocket propulsion systems.
Fellow, AIAA, 2004
Fellow, American Physical Society, 2004

H. Pirouz Kavehpour

Microfluidics and biofluidics, biofuel cells, cardiovascular flow, complex fluids, interfacial physics, micro-tribology, non-isothermal flows, drug delivery systems, and artificial organs.

John Kim

Numerical simulation of transitional and turbulent flows, turbulence and heat-transfer control, numerical algorithms for computational physics.
Member, National Academy of Engineering, 2009
Fellow, American Physical Society, 1989

Owen I. Smith

Combustion and combustion-generated air pollutants, hydrodynamics and chemical kinetics of combustion systems, semi-conductor chemical vapor deposition.

Richard Wirz

Electric and micro propulsion, low temperature plasma and plasma discharges, spacecraft and space mission design, alternative energy generation and storage.

Xiaolin Zhong

Computational fluid dynamics, hypersonic flow, hypersonic boundary layer stability and transition, numerical simulation of transient hypersonic flow with nonequilibrium real gas effects, numerical simulation of micro two-phase flow, MHD control of hypersonic boundary layers, high-order numerical methods for flow simulation.
Associate Fellow, AIAA, 2004

HEAT AND MASS TRANSFER

Mohamed A. Abdou

Fusion, nuclear, and mechanical engineering design, testing, and system analysis; thermomechanics; thermal hydraulics; neutronics, plasma-material interactions; blankets and high heat flux components; experiments, modeling and analysis.

Fellow, American Nuclear Society, 1990
Associate Fellow, TWAS, 1989

Ivan Catton

Heat transfer and fluid mechanics, transport phenomena in porous media, nucleonics heat transfer and thermal hydraulics, natural and forced convection, thermal/hydrodynamic stability, turbulence.

Fellow, ASME, 1989
Fellow, American Nuclear Society, 1999

Vijay K. Dhir

Two-phase heat transfer, boiling and condensation, thermal and hydrodynamic stability, thermal hydraulics of nuclear reactors, microgravity heat transfer, soil remediation.

Member, National Academy of Engineering, 2006
Fellow, ASME, 1989
Fellow, American Nuclear Society, 1997

Y. Sungtaek Ju

Micro- and nanoscale thermosciences, energy, bioMEMS/NEMS, nanofabrication.

H. Pirouz Kavehpour

Microfluidics and biofluidics, biofuel cells, cardiovascular flow, complex fluids, interfacial physics, micro-tribology, non-isothermal flows, drug delivery systems, and artificial organs.

Adrienne Lavine

Thermal energy harvesting, thermal control of nanoscale manufacturing, thermomechanical behavior of shape memory alloys, thermal aspects of manufacturing processes including machining and plasma thermal spray.

Fellow, ASME, 1999

Anthony F. Mills

Convective heat and mass transfer, condensation heat transfer, turbulent flows, ablation and transpiration cooling, perforated plate heat exchangers.

Laurent G. Pilon

Radiation transfer, biomedical optics, photobiological fuel production, sustainable energy, nanoscale thermoscience, foams.

MANUFACTURING AND DESIGN

Mohamed A. Abdou

Fusion, nuclear, and mechanical engineering design, testing, and system analysis; thermomechanics; thermal hydraulics; neutronics, plasma-material interactions; blankets and high heat flux components; experiments, modeling and analysis.

Fellow, American Nuclear Society, 1990
Associate Fellow, TWAS, 1989

Gregory P. Carman

Electromagnetoelasticity models, piezoelectric ceramics, magnetostrictive composites, characterizing thin film shape memory alloys, fiber optic sensors, design of damage detection systems for structures.

Fellow, ASME, 2003

Rajit Gadh

Radio frequency identification (RFID), middleware for RFID networks, wireless internet of artifacts, RFID in supply chain/logistics/manufacturing, reconfigurable wireless network sensors, wireless internet architectures for enterprise, wireless multimedia - video/imaging/graphics, digital rights management for multimedia content, CAD/visualization.

Nasr M. Ghoniem

Damage and failure of materials in mechanical design; mechanics and physics of material defects (point defects, dislocations, voids and cracks); material degradation in severe environments (e.g. nuclear, fusion, rocket engines, etc.); plasma and laser processing; materials non-equilibrium, pattern formation and instability phenomena; radiation interaction with materials (neutrons, electrons, particles, laser & photons).

Fellow, American Nuclear Society, 1994
Fellow, ASME, 2006
Fellow, American Academy of Mechanics, 2010

Tsu-Chin Tsao

Modeling and control of dynamic systems with applications in mechanical systems, manufacturing processes, automotive systems, and energy systems, digital control; repetitive and learning control, adaptive and optimal control, mechatronics..

Fellow, ASME, 2011

Daniel C. H. Yang

Robotics and mechanisms; CAD/CAM systems, computer controlled machines.

Fellow, ASME, 2007

MEMS AND NANOTECHNOLOGY

Gregory P. Carman

Electromagnetoelasticity models, piezoelectric ceramics, magnetostrictive composites, characterizing thin film shape memory alloys, fiber optic sensors, design of damage detection systems for structures.

Fellow, ASME, 2003

Yong Chen

Nanofabrication, nanoscale electronic materials and devices, micro-nano electronic/optical/bio/mechanical systems, ultra-scale spatial and temporal characterization.

Pei-Yu Chiou

Biophotonics, nanophotonics, BioMEMS/NEMS, electrokinetics, microfluidics and biofluidics, guided self-assembly, high throughput single cell analysis.

Vijay Gupta

Experimental mechanics, fracture of engineering solids, mechanics of thin films and interfaces, failure mechanisms and characterization of composite materials, ice mechanics.

Fellow, ASME, 2005

Chih-Ming Ho

Molecular fluidic phenomena, nano/micro-elector-mechanical-systems, bio-molecular sensors, control of complex systems.

Member, US National Academy of Engineering 1997

Academician, Academia Sinica, 1998

Fellow, American Physical Society, 1989

Fellow AIAA, 1994

Y. Sungtaek Ju

Micro- and nanoscale thermosciences, energy, bioMEMS/NEMS, nanofabrication.

H. Pirouz Kavehpour

Microfluidics and biofluidics, biofuel cells, cardiovascular flow, complex fluids, interfacial physics, micro-tribology, non-isothermal flows, drug delivery systems, and artificial organs.

Chang-Jin "CJ" Kim

Microelectromechanical systems (MEMS), surface-tension-based microactuation, nanotechnology for surface control, microdevices including microfluidic applications, full spectrum of micromachining technologies..

Fellow, ASME, 2011

Laurent G. Pilon

Radiation transfer, biomedical optics, photobiological fuel production, sustainable energy, nanoscale thermoscience, foams.

STRUCTURAL AND SOLID MECHANICS

Oddvar O. Bendiksen

Classical and computational aeroelasticity, structural dynamics and unsteady aerodynamics.

Associate Fellow, AIAA, 1995

Gregory P. Carman

Electromagnetoelasticity models, piezoelectric ceramics, magnetostrictive composites, characterizing thin film shape memory alloys, fiber optic sensors, design of damage detection systems for structures.

Fellow, ASME, 2003

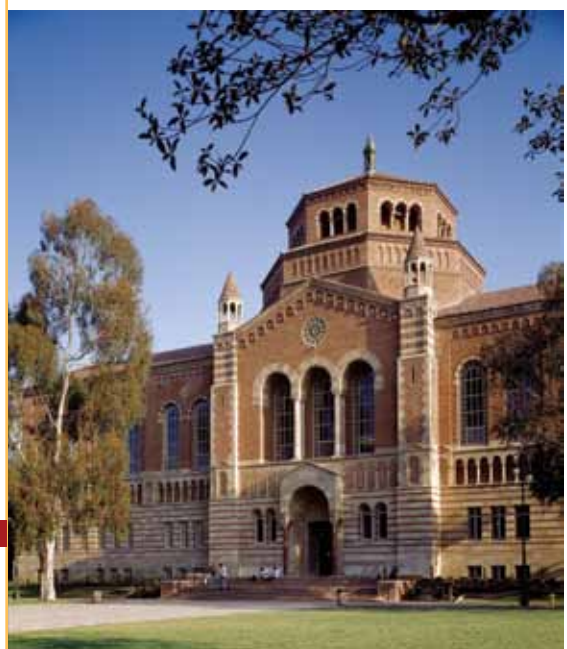
Nasr M. Ghoniem

Damage and failure of naterials in mechanical design; mechanics and physics of material defects (point defects, dislocations, voids and cracks); material degradation in severe environments (e.g. nuclear, fusion, rocket engines, etc.); plasma and laser processing; materials non-equilibrium, pattern formation and instability phenomena; radiation interaction with materials (neutrons, electrons, particles, laser & photons).

Fellow, American Nuclear Society, 1994

Fellow, ASME, 2006

Fellow, American Academy of Mechanics, 2010



Vijay Gupta

Experimental mechanics, fracture of engineering solids, mechanics of thin films and interfaces, failure mechanisms and characterization of composite materials, ice mechanics.

Fellow, ASME, 2005

William Klug

Computational structural and solid mechanics, computational biomechanics, and micro/ nanomechanics of biological systems.

Christopher Lynch

Ferroelectric materials including experimental characterization of constitutive behavior under multiaxial loading.

Ajit K. Mal

Mechanics of solids, fractures and failure, wave propagation, nondestructive evaluation, composite materials, structural health monitoring, biomechanics.

Fellow, ASME, 1994

Fellow, American Academy of Mechanics, 1994

Fellow, International Society for Optical Engineering, 2005

SYSTEMS AND CONTROL

James S. Gibson

Control and identification of dynamical systems. Optimal and adaptive control of distributed systems, including flexible structures and fluid flows. Adaptive filtering, identification, and noise cancellation.

Tetsuya Iwasaki

Neuronal control mechanism of animal locomotion, nonlinear oscillators, and robust/nonlinear control theory and its applications to mechanical, aerospace, and electrical systems.

Fellow, IEEE, 2009

Robert T. M'Closkey

Nonlinear control theory and design with application to mechanical and aerospace systems, real-time implementation.

Jason Speyer

Stochastic and deterministic optimal control and estimation with application to aerospace systems; guidance, flight control, and flight mechanics.

Member, National Academy of Engineering, 2005

Life Fellow, IEEE, 2004

Fellow, AIAA, 1985

Tsu-Chin Tsao

Modeling and control of dynamic systems with applications in mechanical systems, manufacturing processes, automotive systems, and energy systems, digital control; repetitive and learning control, adaptive and optimal control, mechatronics..

Fellow, ASME, 2011

PROFESSORS EMERITI

Andrew Charwat
Peretz Friedmann
H. Thomas Hahn
Walter C. Hurty
Robert E. Kelly
Michel A. Melkanoff
D. Lewis Mingori
Peter A. Monkewitz
Philip F. O'Brien
David Okrent
Lucien A. Schmit, Jr.
Richard Stern
Russell A. Westmann

JOINT APPOINTMENTS

Albert Carnesale
J.S. Chen
Kuo-Nan Liou

LECTURERS (CONTINUING)

Ravnesh Amar
Amiya K. Chatterjee
Carl F. Ruoff
Judy I. Shane
Mahmoud Youssef

ADJUNCT PROFESSORS

Leslie M. Lackman
Wilbur J. Marner
Neil B. Morley
Robert S. Shaefer
Ronaldo Szilard
Gopinath Warrier
Xiang Zhang

STAFF

Lili Bulhoes	Staff Personnel/Payroll
Angie Castillo	Student Affairs Officer
Coral Castro	Fund Manager
Cynthia Rueda	Faculty Support
Duy Dang	Management Services Officer
Alexander Duffy	Web and Publications Manager
Lance Kono	Facilities Manager
Abel Lebon	Student Affairs Officer
Miguel Lozano	Senior Laboratory Mechanician
Mary Ann Macaso	Business Office Manager
David Shatto	Purchasing
Benjamin Tan	Senior Development Engineer
Marcia Terranova	Academic Personnel/Payroll

Aerospace Enginering

Summer 2010

Duan, Le (X. Zhong), "A High-Order Cut-Cell Method for Numerical Simualation of Boundary Layer with Surface Roughness."
Rehman, Syed F. (J. Eldredge), "High Order Methods of Numerical Studies of Receptivity in High-Speed Flows."

Fall 2010

Fay, Gary Lindsay (J. Speyer), "Nonlinear GPS Code Tracking Using a Particle Filter Delay Lock Loop for Interference Mitigation."

Spring 2011

Hwang, Soon Sik (J. Speyer), "Adaptive Resampling Particles Filters for GPS Carrier-Phase Navigations and Collison Avoidance Systems."

Mechanical Engineering

Summer 2010

Lee, Choongyeop (C.-J. Jim), "Superhydrophobic Surfaces for Liquid Drag Reduction: Design Fabriation and Slip Testing."
Navid, Ashcon (L. Pilon), "Pyroelectric Energy Conversion of Waste Heat Harvesting."

Fall 2010

Boyce, Brian Patrick (A. Karagozian), "Tip Vortex Back Cavitation and Suppression in High Pump Inducers."
Calkins, Michael Andrew (J. Eldredge), "Numerical Simulations of Rapidly Rotating Boundary-Coupled Flows."
Coquil, Thomas (L. Pilon), "Thermal and Optical Properties of Highly Ordered Mesoporous Thin Films for Energy Applications."
Gu, Zhen (Y. Chen), "Hydrogel-Based Protein Patterning, Encapsulation and Intracellular Delivery."
Rawat, Pradeep Singh (X. Zhong), "Simulations of Turbulent Flow Interactions with Strong Shocks Using Shock-Fitting Methods."
Ruben, Shalom Dovber (T. Tsao), "Modeling, Control, and Real-Time Optimization for a Nano-Precision Systems."
Wang, Yigang (T. Tsao), "Adaptive Control for Deterministic and Stochastic Disturbances with Application to Precision Motion Control."
Youssef, George H. (V. Gupta), "Dynamic Properties of Polyurea."
Yudovsky, Dmitry (L. Pilon), "Spectroscopy of Multilayered Biological Tissues for Diabetes Care."

Spring 2011

Crosby, Tamer (N. Ghoniem), "Plasticity Induced Materials Damage in Micropillars and in Rapidly Heated Surfaces."
Haulot, Gauvain (C. Ho), "Optoelectronic Reconfigurable Microchannels."
Hur, Soojung (E. Chiou, D. Di Carlo), "High-Throughput Rare Cell Detection and Separation Using Inertial Microfluidics."
Lillehoj, Peter Bjorn (C. Ho), "Microfluidic Systems for Bioprocessing and Biodetection."
Nelson, Wyatt Ceder (C.-J. Kim), "EWOD Mircofluidic Chips for Applications: Fundamentals of Actuation, Extensional Rheometry, On-Chip Heating, and Monolithic Fabrication."
Po, Giacomo (N. Ghoniem), "A Computional Model for Discrete-to-Continuum Dislocation-Based Crystal Plasticity."
Ramirez, Benjamin R. (N. Ghoniem), "Extended Peierl Nabarro Model for Cross-Slip F.C.C. Metals."
Sabet, Leyla (C. Ho), "Biomolecular Sensing and Its Application in Feedback System Control: Optimization of Biofuel Production from Microalgae."
Takahashi, Kosuke (T. Hahn), "An Addressable Conducting Network for Autonomic Structural Health Management of Composite Structures."

Aerospace Engineering
(all are comprehensive exams unless paper title is listed)

Fall 2010
Hourigan, William Christopher (R. Wirz)
Hu, James Douglas (A. Karagozian)
Jung, Da-Eun (J. Kim)
Liew, Kenny Hungyi (R. Wirz)
Noble, Kyle Lee (R. Wirz)
Olson, Nathan Michael (O. Bendiksen)

Winter 2011
Brochier, Andre Emile (O. Bendiksen)
Hawley-Snow, Colin James (R. Wirz)

Spring 2011
Clemens, Joshua William (J. Speyer)
Eilenberg, Bryce Lea (R. Wirz)
Mcgrath, Craig (A. Karagozian)
Reznikov, Victor (R. Wirz)
Simonelli, James Michael (J. Speyer)
Sutevski, Damien Justin (M. Abdou)
Wegener, Jeffrey Lewis (A. Karagozian)

Mechanical Engineering
(all are comprehensive exams unless paper title is listed)

Summer 2010
Gomez, Pedro (L. Pilon)
Keeler, Kevin Macmasters (Y. Chen)
Lysenko, Richard Walter (A. Mal)
Novin, Eliah David (R. Gadh),
"Electrical Properties and Applications of Multiwalled Carbon Nanotube Graphite Fiber Hierarchical Composites"
Parsons, Neal S. (X. Zhong),
"Numerical Study of Hypersonic Receptivity with Thermochemical Non-Equilibrium on a Blunt Cone"
Reed, Robert Julian (M. Abdou)
Saeidi, Sheida (M. Abdou)
Yee, Gary Leong (W. Klug)

Fall 2010
Zare Mirak Abad, Sara (E. Chiou)
Agarwal, Piyush Kumar (V. Dhir)
Delioussine, Peter (T. Tsao)
Grenier, Taylor D (D. Yang)
Hansen, Nicholas (I. Catton),
"Optimization of Heat Exchangers Using Volume Averaging Theory"
Hettel, Rowan Olund (G. Carman)
Kim, Do Yun (J. Eldredge)
Park, Hee-Kun (Y. Chen)
Reilly, Sean William (I. Catton)
Shon, Hoon Suk (X. Zhong)
Vlasyuk, Vladimir Vadimovich (N. Ghoneim)
Wang, Qiming (E. Chiou)
Wong, Nelson Song (R. Wirz)
Yenbamroong, Varayuth (J. Eldredge)

Winter 2011
Chen, Dong (O. Bendiksen)
Cowan, Monica Rose (R. Wirz)
Hsiao, Wei Hsien (W. Klug)
Huang, Anatole Li Tung (V. Gupta)
Kim, Do Sung (Y. Chen)
Le, Michael Quang (G. Carman),
"The Use of Nitinol Actuation in the Prevention of Optical Sensor Occlusion"
Papiri, Nicholas Robert (D. Yang)
Paterson, Robert Jay Patrick (J. Gibson)
Sin, Kevin Michael (A. Mills)
Witkowski, Bradford David (R. Gadh)
Zarka, Omar Adam (C. Ho)

Spring 2011
Bente, Paul F (G. Carman)
Chaconas, Jonathan Hunter (O. Bendiksen)
Chai, Karen Rachel (A. Mal),
"An Experimental Study of the Self-Healing Capability of an Actively Reinforced Carbon-Fiber Composite"
Chung, Ruby (R. Gadh)
D'Alesio, Danielle Teresa (O. Bendiksen)
Dannaway, Steven Elias Tamotsu (W. Klug)
Davis, Matthew Deacon (D. Yang)
De Vitis, Brian Michael (C. Ho)
Geb, David (I. Catton)
Herron, Nicholas Hayden (N. Ghoniem)
Hoang, Anna (P. Kavehpour)
Hockel, Joshua Leon (G. Carman)
Holden, Benjamin Kurt (J. Speyer)
Huang, Lian Xin (C.-J. Kim)
Kuga, Andrew Isamu (J. Eldredge)
Lin, Richard Jiunnyih (N. Ghoniem)
Liu, Tingyi (C.-J. Kim)
Londarenko, Yuriy Y (M. Abdou)
Morales, Eriberto (J. Eldredge)
Panchal, Jay Deepak (R. Gadh)
Regimbal, Wesley Thomas (O. Smith)
Satyarthi, Satyam (T. Tsao)
Shaw, Cheng Kuang (C. Ho)
Ting, Regina Ray-Gin (P. Kavehpour)
Tom, Michael (G. Carman)
Westfall, Mark Thomas (C. Ho)
Wilson, Lauren Duncan (R. M'Closkey)
Winters, Michael Gerard (Y. Chen)
Wong, Joel (C. Ho)
Yeh, Chin-Chia Michael (T. Iwasaki)
Yoon, Sean Chulhong (C. Lynch)
Zou, Wen Peng (C.-J. Kim)

Aerospace Engineering

Summer 2010
Tsui, Kevin Joon-Yin

Fall 2010
Chiu, Brian
Donesa, Louie Alcantara
Duh, Jeffrey
Jiang, Shulin
Park, Sung
Prendergast, Loren Michael
So, Sarah Wai Yin
Wang, Daniel

Winter 2011
Babb, Alexander
Han, Jessica Sang

Spring 2011
Amouyal, Solal
Bernal, Jose Luis
Bigknife, Elan E
Boggeri, Andrew Michael
Chen, Eric
Chin, Paul W
Cross, Jillian Elizabeth
Dao, Tung Xuan
Davidson, Scott Michael
Gemmill, Kelly
Heng, Albert Khim
Hickman, Howard Dewey, Iv
Huynh, Katherine Kim
Kentosh, Brian Clark
Keshavan, Anisha
Kracy, Monica Lynne
Lai, Kar Kit
Lim, Alexander C
Lomas, Gabriel Felipe
Long, Maurice C W
Ma, Lie
Martinez, Brian Anthony
Millikan, Scott Thomas
Obara, Kentaro P
Oey, Sunny
Patel, Aadit Nilesh
Pinchak, Matthew David
Ryno, Kevin Matthew
Sevilla, Cristhian Israel
Shalabi, Adel Mohammed Ii
Shebalkin, Pavel Vladimirovich
Silva, Ryan Matthew
Snow, Russell Thomas
Timotius, Andrew
Tsang, Macarthur John
Um, Young Soung
Wong, Raymond
Zimmerman, Kurt Ulrich

Mechanical Engineering

Summer 2010
Ahmedyar, Ali Ahmed
Au, Ka Yiu
Cheng, Chi Wai Adrian
Chung, Jong Ki
Han, Nicole Jin
Huffman, Scott Matthew
Mujtaba, Abeer Ahmed
Ng, Siu Fai
Onorato, Michael
Pillai, Sahil
Sajed, Hamed
Sun, Chang
Sun, Wei-Chiu

Fall 2010
Barros, Honeylette Mendoza
Barsoum, Michael Makarios
Burks, Jason Donald
Castrejon, Hugo Alexander
Cendejas, Armando Daniel
Chu, Jonathan Chang-Rui
Daniel, Christophe Bernhard
Fong, Ivan Junliang
Green, Joshua Abram
Hlaing, Ye Win
Jeng, Leo
Johnson, Felicia Linstrot
Kristanto, Hanna
Lam, Shan Kwan
Li, Wilson
Limbach, Alexander D
Lin, Yuhua
Manji, Aaron Adam
Reyes-Perez, Juan Carlos
Soeryanto, Kenny Chandraseteja
Vasa, Sonali Kiran

Winter 2011
Anderson, Joshua Kyle
Chudnovsky, Yury
Cotter, Danny John
Harrison, Kari Jannae
Huey, Nicholas James
Joo, Sung-Yoon
Kawar, Khaldoun B
Kohannim, Saba
Li, Jing Xing
Lin, Kai
Liu, Jin Lin
Loewke, Nathan Owens
Lynn, Travis Fielder
Mora, Paola
Munandar, Bambang Tri
Saito, Yuko
Sakuma, Kevin Yukio
Schuyler, Christopher James
Shirkhani, Sepideh
Smyth, Craig
Stapleton, Brian Adam
Sundararaj, Manojith Velusamy
Szweda, James William
Tan, Anthony T
Ueda, Tsuyoshi
Youn Yi, Cristiano

Spring 2011
An, Ran
Anders, Mark
Arulmoli, Vithuran
Baghshomali, Ali
Bellers, Daniel A
Bran, Gabriela Alejandra
Brittan, Andrew Meyer
Bush, Russell Scott
Carini, Gregory David
Chan, Andrew Chun-Hao
Che, Edward
Chen, Daniel
Chhay, Dennis
Chiou, Casey Jianzhi
Choi, Kevin Kinyee
Chu, Jessica Ming
Chu, Michael Xinjie
Chui, Richard Kai
Depuy, Jennifer Jackson
Do, Hieu Quang
Dunford, Alyssa Renee
Duong, John Nguyen
Gao, Edward Xiang
Gatti, Jordan Christopher
Gilbert, James Matthew
Granlund, David Earl
Han, Frederick T
Hanover, Matthew Loukas
Heise, Kevin John
Hernandez, Juan Ramon
Hong, Jeffrey S
Hong, Seok-Joon
Johnson, Krystina Cecile
Johnson, Nicholas T
Jung, Yongwha
Katsumata, Grant Akira
Kerchman, Zachary Royce
Kijatanath, Nataporn
Kim, Bumjun
Lai, Elaine Jenjen
Lam, Ho Yin
Le, Khoanam Dinh
Lee, Ian
Li, Benjamin Jahow
Liew, Dennis Hungteh
Lin, Wei-Yi
Liu, Alexander Johnson
Magallanes, Romulo, Jr
Manzanera, Silvia Elizabeth
Marcil, Thomas Henry
Marconet, Ronald Paul
Menefee, Ryan Addison
Meza, Lucas
Murphy, Jon-William Givargis
Nazari, Shane Marshall
Ngo, Justin Shawn
Ngo, Lisa
Nguyen, Johnny Thanh
Nguyen, Valery Thang-Long
Oey, Michael W
Orh, Danny Ho-Fai
Pan, Albert Yu
Peterson, Zachary Keith
Pyun, Rosali Sun
Ramirez, Carlos
Rhodes, Michael Thomas
Simonyan, Andranik
Song, Timothy Myungjin
Sorge, Jian
Tamanaha, Wesley David
Tepayotl-Ramirez, Daniel
Teunissen, Alex Thomas
Thompson, Matthew John
Truong, Quyen Duc
Tse, Jonathan Sze Ming
Vechersky, Pavel
Vo, Melody B
Voorhees, Grant Adam
Wagner, Michael C
Wang, Jennifer Hwa-Yun
Wang, Jennifer Lee
Wasson, Christopher James
Willman, Rachel Aileen
Wong, Scott
Wu, Diana Der-En
Yen, Michael
Yoo, Ga-Youn
Zhang, Wenjie

Journals

Fluid Mechanics

Calkins, M.A., Noir, J., Eldredge, J.D., and Aurnou, J.M., "Axisymmetric simulations of libration-driven fluid dynamics in a spherical shell geometry," Physics of Fluids, 22(8), 1-12, 2010.

Eldredge, J.D., Toomey, J. and Medina, A., "On the roles of chord-wise flexibility in a flapping wing with hovering kinematics," Journal of Fluid Mechanics, 659, 94-115, 2010.

Juan, T., Hubschman, J.P., and Eldredge, J.D., "A computational study of the flow through a vitreous cutter," Journal of Biomechanical Engineering, 132(12), 1-9, 2010.

Wilson, M.M., and Eldredge, J.D., "Performance improvement through passive mechanics in jellyfish-inspired swimming," International Journal of Non-Linear Mechanics, 46(4), 557-567, 2011.

Lagha, M., Kim, J., Eldredge, J.D., and Zhong, X., "A numerical study of compressible turbulent boundary layers," Physics of Fluids, 23 : 015106, 2011.

Lagha, M., Kim, J., Eldredge, J.D., and Zhong, X., "Near-wall dynamics of compressible boundary layers," Physics of Fluids, 23 : 065109, 2011.

Karagozian, A.R., "Transverse Jets and their Control," Progress in Energy and Combustion Science (invited); 36(5), 531-553, 2010.

Davitian, J., Getsinger, D., Hendrickson, C., and Karagozian, A.R., "Transition to Global Instability in Transverse Jet Shear Layers," Journal of Fluid Mechanics, 661, 294-315, 2010.

Davitian, J., Hendrickson, C., Getsinger, D., M'Closkey, R.T. and Karagozian, A.R., "Strategic Control of Transverse Jet Shear Layer Instabilities," AIAA Journal, 48(9) 2145-2156, 2010.

Aryafar, H. and Kavehpour, H.P., "Electrocoalescence Fireworks," Physics of Fluids, 22(9), 2010.

Kim, J., "Physics and control of wall turbulence for drag reduction," Philosophical Transactions A, 369(1940), 1396-1411, 2011.

Wirz, R., Katz, I., Goebel, D., and Anderson, J., "Electron Backstreaming Determination for Ion Thrusters," Journal of Propulsion and Power, 27(1), 206-210, 2011.

Wirz, R., Anderson, J., and Katz, I., "Time-Dependent Erosion of Ion Optics," Journal of Propulsion and Power, 27(1), 211-217, 2011.

Rawat, P.S., and Zhong, X., "On high-order shock-fitting and front-tracking schemes for numerical simulation of shock-disturbance interactions," Journal of Computational Physics, 229(19), 6744-6780, 2010.

Duan, L., Wang, X., and Zhong, X., September 2010, "A high-order cut-cell method for numerical simulation of hypersonic boundary-layer instability with surface roughness," Journal of Computational Physics, 229(19), 7207-7237, 2010.

Tumin, A., Wang, X., and Zhong, X., "Numerical simulation and theoretical analysis on hypersonic boundary-layer receptivity to wall blowing-suction," AIAA Journal, 49(3), 463-471, 2011.

Heat and Mass Transfer

Zhou, F., and Catton, I., "Numerical Evaluation of Flow and Heat Transfer in Plate-Pin Fin Heat Sinks with Various Pin Cross-Sections," Numerical Heat Transfer, Part A: Applications, 60(2), 107-128, 2011.

Zhou, F., Hansen, N., Geb, D., and Catton, I., "Obtaining closure for fin-and-tube heat exchanger modeling based on Volume Averaging Theory (VAT)," ASME Journal of Heat Transfer, 133(9), 2011.

Zhou, F., Hansen, N., Geb, D., and Catton, I., "Determination of the number of tube rows to obtain closure for volume averaging theory based model of fin-and-tube heat exchangers," Journal of Heat Transfer, 133(9), 2011.

Hwang, G.S., Nam, Y., Fleming, E., Dussinger, P., Ju, Y.S., and Kaviany, M., "Multi-artery Heat Pipe Spreader: Experiment," International Journal of Heat and Mass Transfer, 53, 2662-2669, 2010.

Hwang, G.S., Fleming, E., Carne, B., Sharratt, S., Nam, Y., Dussinger, P., Ju, Y.S., and Kaviany, M., "Multi-Artery Heat-Pipe Spreader: Lateral Liquid Supply," International Journal of Heat and Mass Transfer, 54, 2334-2340, 2011.

Coquil, T., Lew, C., Yan, Y., and Pilon, L., "Thermal Conductivity of MFI and MEL Zeolite Thin Films." Journal of Applied Physics, 108(4), 2010.

Yudovsky, D., Nouvong, A., and Pilon, L., "Hyperspectral Imaging for Diabetic Foot Wound Care," Journal of Diabetes Science and Technology, 4(5), 1099-1113, 2010.

Coquil, T., Reitz, C., Brezesinski, T., Nemanick, E.J., Tolbert, S.H., and Pilon, L., "Thermal Conductivity of Mesoporous Titania Films Made From Nanocrystalline Building Blocks and Sol-Gel Reagents," Journal of Physical Chemistry, 114(29), 12451-12458, 2010.

Fang, J., Frederich, H., and Pilon, L., "Harvesting Nanoscale Thermal Radiation Using Pyroelectric Materials," ASME Journal of Heat Transfer, 132(6), 2010.

Yudovsky, D., and Pilon, L., "Modeling of Local Excitation Fluence Rate and Florescence Emission in Absorbing and Strongly Scattering Multilayered Media," Applied Optics, 49(31), 6072-6084, 2010.

Wang, H. and Pilon, L., "Accurate Simulations of Electric Double Layer Near Itramicroelectrodes," Journal of Physical Chemistry C, 115(33), 16711-16719, 2011.

Fang, J., Reitz, C., Brezesinski, T., Nemanick, E.J., Kang, C.B., Tolbert, S.H., and Pilon, L., "Thermal Conductivity of Amorphous and Crystalline Mesoporous Titania Thin Films from 30 to 320 K," Journal of Physical Chemistry C, 115(30), 14606-14614, 2011.

Navid, A., and Pilon, L., "Pyroelectric Energy Harvesting using Olsen Cycles in Purified and Porous Poly(Vinylidene Fluoride-Trifluoroethylene) Thin Films," Smart Materials and Structures, 20(2), 025012, 2011.

Yudovsky, D., Nouvong, A., Schomacker, K., and Pilon, L., "Assessing Diabetic Foot Ulcer Development Risk with Hyperspectral Tissue Oximetry," Journal of Biomedical Optics, 16(2), 026009, 2011.

Kandilian, R., Navid, A., and Pilon, L., "Pyroelectric Energy Harvesting Capabilities of PMN-PT Near the Morphotropic Phase Boundary," Smart Materials and Structures, 20(5), 055020, 2011.

Yudovsky, D., and Pilon, L., "Retrieving Skin Properties From In Vivo Diffuse Reflectance Measurements on Human Skin," Journal of Biophotonics, 4(5), 305-314, 2011.

Navid, A., Vanderpool, D., Bah, A., and Pilon, L., "Towards Optimization of a Pyroelectric Energy Converter For Harvesting Waste Heat," International Journal of Heat and Mass Transfer, 53(19-20), 4060-4070, 2010.

Nguyen, H.T., Navid, A., and Pilon, L., "Pyroelectric Energy Converter Using Co-Polymer P(VDF-TrFE) and Olsen Cycle for Waste Heat Energy Harvesting," Applied Thermal Engineering, 30(14-15), 2127-2137, 2010.

Wang, H., Varghese, J., and Pilon, L., "Simulation of Electric Double Layer Capacitors with Mesoporous Electrodes: Effects of Morphology and Electrolyte Permittivity," Electrochimica Acta, 56(17), 6189-6197, 2011.

Manufacturing and Design

Liu, H., Abdou, M.A., Reed, R.J., Ying, A., and Youssef, M.Z., "Neutronics assessment of the shielding and breeding requirements for FNSF (standard aspect ratio)," Fusion Engineering and Design, 85(7-9), 1296-1300, 2010.

Smolentsev, S., Wong, C., Malang, S., Dagher, M., and Abdou, M., "MHD considerations for the DCLL inboard blanket and access ducts," Fusion Engineering and Design, 85(7-9), 1007-1011, 2010.

Wong, C.P.C., Abdou, M.A., Dagher, M., Katoh, Y., Kurtz, R.J., Malang, S., Marriott, E.P., Merrill, B.J., Messadek, K., Morley, N.B., Sawan, M.E., Sharafat, S., Smolentsev, S., Sze, D.K., Willms, S., Ying, A., and Youssef, M.Z., "An overview of the US DCLL ITER-TBM program," Fusion Engineering and Design, 85(7-9), 1129-1132, 2010.

Ying, A., Abdou, M.A., Hunt, R., Zhang, H., Munipalli, R., Ulrickson, M., Youchison, D., Sawan, M., and Merrill, B., "Progress on an integrated multi-physics simulation predictive capability for plasma chamber nuclear components," Fusion Engineering and Design, 85(7-9), 1681-1688, 2010.

Ueki, Y., Kunugi, T., Morley, N., and Abdou, M., "Electrical insulation test of alumina coating fabricated by sol–gel method in molten PbLi pool," Fusion Engineering and Design, 85(10-12), 1824-1828, 2010.

Zhang, H., Ying, A., and Abdou, M.A., "Integrated simulation of tritium permeation in solid breeder blankets," Fusion Engineering and Design, 85(10-12), 1711-1715, 2010.

Di Sanzo, C., Abdou, M., and Youssef, M., "Transuranic transmutation efficiency of a small fusion–fission facility for spent uranium-oxide and inert matrix fuels," Fusion Engineering and Design, 85(7-9), 1488-1491, 2010.

Gadh, R., Roussos, G., Michael, K., Huang, G.Q., Prabhu, S., and Chu, P., "Guest Editors Introduction: RFID - A Unique Radio Innovation for the 21st Century," Proceedings of the IEEE, 98(9), 1546-1549, 2010.

Michael, K. Roussos, G. Huang, G.Q. Chattopadhyay, A. Gadh, R. Prabhu, B.S. Chu, P., "Planetary-Scale RFID Services in an Age of Uberveillance," Proceedings of the IEEE, 98(9), 1663-1671, 2010.

Song, B.Y., Gadh, R., Lee, J., and Lee, J.Y., "Feasible and effective IT asset management using surface acoustic wave based RFID," The International Journal of Manufacturing Technology, 55(9-12), 1209-1221, 2011.

Mal, S., and Gadh, R., "Real-Time Push Middleware and Mobile Application for Electric Vehicle Smart Charging and Aggregation," International Journal of Communication Networks and Distributed Systems, (accepted for publication) 2011.

Sethian J. D., Colombant D. G., Giuliani J. L. Jr., Ghoniem, N.M., et al., "The Science and Technologies for Fusion Energy With Lasers and Direct-Drive Targets," IEEE Transactions on Plasma Science, 38(4), 690-703, 2010.

Sharafat S., Aoyama A., Ghoniem N., et al., "Heat Testing of a Prototypical SiC-Foam-Based Flow Channel Insert," IEEE Transactions on Plasma Science, 38(10), 2993-2998, 2010.

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Sharafat S., Aoyama A., Ghoniem N., et al., "Design and fabrication of a flat-plate multichannel he-cooled refractory hx for divertor applications," Fusion Science and Technology, 60(1), 203-207, 2011.

Sharafat S., Aoyama A., Ghoniem N., et al., "Design and fabrication of a rectangular he-cooled refractory foam hx-channel for divertor applications," Fusion Science and Technology, 60(1), 208-212, 2011.

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Sharafat S., Aoyama A., and Ghoniem N., "Assessment of the dcll tbm thermostructural response based on iter design criteria," Fusion Science and Technology, 60(1), 264-271, 2011.

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Kim, B.-S., and Tsao, T.-C., "Development of a novel variable rake angle mechanism for noncircular turning and its control," Journal of Mechanical Science and Technology, 24(5), 1035-1040, 2010.

Bourges, J.L., Hubschman, J.-P, Wilson, J., Prince, S., Tsao, T.-C., and Schwartz S., "Assessment of a hexapod surgical system for robotic micro-macro manipulations in ocular surgery," Ophthalmic Res., 46(1), 25-30, 2010.

MEMS and Nanotechnology

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Ahn Y.S., Kim, K., Park, H.K., Hahn, H.T., and Chen, Y., "Functionalized Carbon Nanotube Networks with Field-Tunable Bandgaps," Advanced Materials, 23(27), 3075-3079, 2011

Schopf E., Liu, Y., Deng, J.C, Yang, S., Chengb G., and Chen, Y., "Mycobacterium Tuberculosis Detection Via Rolling Circle Amplification," Analytical Methods, 3(2), 267-273, 2011.

Lei, Y., Huang, S., Sharif-Kashani, P., Chen, Y., Kavehpour, P., and Segura, T., "Incorporation of Active DNA/Cationic Polymer Polyplexes into Hydrogel Scaffolds," Biomaterials, 31(34), 9106-9116, 2010.

Yue, Z.C., Zhang F.F., Liu, Y.-H., and Ho, C.H., "Interrogating a cell signalling network sensitively monitors cell fate transition during early differentiation of mouse embryonic stem cells," Science China-Life Science, 53(1), 78-86, 2010.

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