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METRICS
MECHANICAL ENGINEERING

A newsletter for alumni and friends of the Department of Mechanical Engineering

INSIDE

ME Faculty & Students Dominate Maryland OTC Invention Awards

Mechanical Engineering Associate Professor Gregory S. Jackson along with Maryland Professor Bryan W. Eichhorn and graduate student Shenghu Zhou were recognized with the Physical Science Invention of the Year Award at the University of Maryland Office of Technology Commercialization (OTC) 19th Annual Invention of the Year Reception held in April.


Jackson

Their invention is a patent-pending technology that for the first time can produce hydrogen from hydrocarbon fuels without the high levels of carbon monoxide that traditionally occur in this type of process. The majority of commercial hydrogen is produced from hydrocarbon fuels.

Assistant Professor Bao Yang was second in the same category for his patent-pending invention that develops a process of using liquid nanodroplets to enhance thermal conductivity in such poorly conducting fluids as 3M's Perflurocarbon liquids. This technology has potential applications as high thermal conductivity coolants, electronic cooling, lubricants, hydraulic fluids and metal-cutting fluids.


Yang

Each year a panel of judges made up of University of Maryland personnel and industry experts selects one winner from groups of finalists in each of three categories: information science, life science, and physical science. The winners are chosen based on the creativity, novelty and potential benefit to society of each of the inventions.

With some 21 – or more than 50% – of the inventions, ME dominated the Physical Sciences category. In addition, the department featured two nominees in the Life Sciences category and three in the Information Sciences category for a total of 26 nominations, or nearly one-quarter of the 113 total disclosures in 2005.

Professor Reinhard Radermacher, a 2001 Inductee into the A. James Clark School Innovation Hall of Fame, had seven disclosures with several different co-inventors. Bao Yang had four, Associate Professor Elisabeth Smela had three, and several other faculty had two disclosures each. Congratulations to the entire mechanical engineering faculty for this impressive display of innovation in 2005.


Radermacher

2004-2005 Annual Report
A special insert to this issue of METRICS
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Review of the flu queue - ME research helps health clinics plan for the worst
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Tough Terrapins
ME seniors Cara Martin and Tristan Churm keep busy all year 'round
page 15

Message From the Chair - *Education for Innovation and Entrepreneurship*

IN THE MONTHS FOLLOWING the October 2005 publication of the National Academies' report "Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future," there has been much discussion throughout this country on ways to stop the erosion in America's competitive advantage. President George Bush's embrace of the report's recommendations and eloquent presentations by Maryland President Dan Mote and A. James Clark School Board of Visitors member Dr. Norm Augustine, Chair of the Committee which prepared the report, have served to highlight the unique role universities can play in nurturing and advancing competitiveness, through a greater emphasis on education for science-driven innovation and entrepreneurship.

For the State of Maryland, whose economy is intimately tied to high-technology and knowledge-based businesses, the challenges and opportunities are especially great. In April President Mote hosted a topical summit entitled "Protecting Maryland's Competitive Edge," attended by some 300 business, technology, and legislative leaders from throughout the region, including several ME faculty, to identify clear and compelling actions that will ensure the state's competitiveness in economic growth and development among our sister states, and the readiness of our workforce for the scientific and technological challenges of the future.

In response to this "gathering storm," the Department has identified education for innovation and entrepreneurship as one of its key goals and has begun to deliver on this promise. Mechanical Engineering faculty are among Maryland's most active participants in MTECH's Maryland Industrial Partnerships (MIPS) program, which puts our formidable research capability at the service of Maryland's technology-driven businesses. Industrial consortia strongly support the Department's research through several of its Centers, including CALCE-EPSC and CEEE. The Department's Center for Energetic Concepts Development (CECD) was instrumental in obtaining recent congressional and state support for the creation of an industrial Energetics Technology Center (ETC) in Southern Maryland. Broadly-defined agreements have facilitated considerable expansion of the Department's involvement in the research underway at NIST and the Aberdeen Automotive Technology Center. The Department co-sponsors a course with MTECH focusing on developing innovation, has recently introduced a course on "Bio-Inspired Robotics," and offers several other undergraduate courses in which students are challenged to tackle real-word engineering problems with the support and involvement of local companies. Moreover, ME faculty and students play a leading role in the Clark School – Smith School collaborative Quest undergraduate program, and ME students have been among the most successful participants in the Hinman – Campus Entrepreneurial Opportunities program.

Most remarkably, this spring ME faculty accounted for nearly 25% of the 113 nominations for UMD's Office of Technology Commercialization (OTC) Invention of the Year Award. More than half of the nominees in the Physical Science category, ultimately won by an invention disclosure from ME Associate Professor Greg Jackson, were submitted by our faculty. Second place in that category was won by Assistant Professor Bao Yang. Successful innovation within the department was made evident this winter by the television and news media coverage of the pioneering research conducted by Professors Michel Cukier, Michael Pecht, and Jeffrey Herrmann in subjects as diverse as computer network security, tin-whisker growth in microelectronic assemblies, and planning for immunization against possible epidemics.

Along with the focus on innovation and entrepreneurship, the Department's commitment to educational excellence at the undergraduate and graduate levels remains our highest priority and was recently rewarded with a top-24 (top 15 among public universities) ranking in the U.S. News & World Report analysis of Mechanical Engineering Departments in the U.S.. Moreover, with 40 PhD graduates, Mechanical Engineering was the most popular doctoral degree on campus this year!

Innovation is alive and well in our department, and thankfully so, for it is critical to the competitiveness of the United States in the 21st century. The depth of mechanical engineering knowledge, the strength of its foundations, the significance of its contributions to mankind, and the resilience of its practitioners promise a future rich in opportunities and a profession that will—and must—continue to play a critical role in the creation of innovative solutions to meet and solve society's needs.

So thank you for your involvement and support and we hope you will stay engaged with our continuing efforts to reach the pinnacle of Mechanical Engineering education, research, and innovation in the years ahead.

- Dr. Avram Bar-Cohen

facultyNEWS

Mosleh Awarded Kim Eminent Professorship


Mosleh

Ali Mosleh, Professor of Mechanical Engineering and Director of the Reliability Engineering Program, was awarded the Nicole Jurie Kim Eminent Professorship in the A.J. Clark School of Engineering effective August 2005.

The appointment is in recognition of his sustained and influential scientific and scholarly work in the area of reliability engineering. The funds from the Nicole Jurie Kim endowment further support Mosleh's research and education programs, allow him to play a more active role in the promotion of the reliability engineering program, and to serve as a role model for other faculty.

Pecht to Receive Distinguished International Service Award


Pecht

Michael Pecht, the George E. Dieter Professor of Mechanical Engineering and CALCE EPSC Director, will be the recipient of the 2006 Distinguished International Service Award, to be presented by University of Maryland President C.D. Mote, Jr. on November 28. The award honors Pecht for his extensive contributions to international academic/industrial partnerships in the electronic industry through the establishment and leadership of the CALCE-EPSC Research Center. The award is designed to recognize significant contributions to the University during the past few decades when international programs were being developed for the first time on our campus.

Han Promoted to Professor


Han

Associate Professor **Bongtae Han** will be promoted to Professor of Mechanical Engineering on July 1, 2006.

Han's expertise in photo-mechanics has underpinned significant contributions to the technical literature and leadership positions in the mechanics and electronic packaging communities. This promotion is a tribute to Han's advancement of knowledge and the service he has provided to students, the University, and to the State of Maryland. Earlier this year Han was awarded the 2004 ASME Journal of Electronic Packaging Associate Editor of the Year Award. The award recognizes his technical and administrative service to the journal during the 2004 calendar year.

In the fall of '05 Han was also elevated to Fellow status in the Society for Experimental Mechanics (SEM). Han received this recognition for his notable service to the Society and to the field of Experimental Mechanics, specifically by his efforts in extending the applicability of moire interferometry into the micromechanics domain, development of new optical techniques, and stress analysis of multi-layer structures using photomechanics methods.

Kim Appointed ASME Fellow


Kim

Associate Professor **Jungo Kim** was elevated to Fellow status as a member of The American Society of Mechanical Engineers (ASME). Jungho is a pioneer in the use of microscale heater arrays to study the fundamental mechanisms by which heat is transferred during phase change processes. Early in his career he performed research on gas turbine heat transfer, and his current interests include phase change heat transfer for electronic cooling, radiation absorption measurements of fuels at high temperatures, emissivity measurements, inverse heat conduction methods, and instrumentation.

His professional service includes serving as session chair for ASME and Engineering Foundation conferences, ASME K-13 Committee on Multiphase Heat Transfer, ASME Heat Transfer Visualization Committee, and the ASME Heat Flux Gauge Calibration Committee. He has published more than 80 technical papers. Kim received his BSME from UC Berkeley (1982), and his MSME (1986) and Ph.D (1990) from the University of Minnesota.

Barker Wins IEST Journal Award


Barker

Professor of Mechanical Engineering **Donald Barker** of the CALCE Electronic Products and Systems Center (ESPC) received the 2006 Maurice Simpson Technical Editor's Award from the Institute of Environmental Sciences and Technology (IEST) for his paper "Practical Assessment of Electronic Circuit Cards Under Mechanical Shock Loading." The paper was co-written by Thomas J. Stadterman, and will be published in the 2005 Jounal of the IEST. Formal recognition for this prestigious accomplishment will take place at the ESTECH 2006 Awards Recognition and Membership Luncheon on May 9 in Phoenix, Arizona.

In February 2006 Barker and Michael Freda of Sun Microsystems, Inc. won the "Best U.S. Paper for 2006" award from the IPC Printed Circuits Expo, APEX and Designer's Summit 2006 Technical Program Committee for their paper "Predicting Plated Through Hole Life at Assembly and in the Field from Thermal Stress Data."

In Brief


Yu

Assistant Professor of Mechanical Engineering **Miao Yu** was recently granted the Ralph E. Powe Junior Faculty Enhancement Award. Yu is one of only two Maryland faculty nominated by the University to earn this award, the other being Assistant Professor **Bao Yang** in 2004. The funds are given to full-time assistant professors at ORAU member institutions within the first two years of their initial tenure track appointment at time of application. Yu plans on using the funds to support her research on biology-inspired miniature fiber-optic directional microphones for sound localization.


Sandborn

Associate Professor of Mechanical Engineering **Peter Sandborn** and Pameet Singh won the 2004 SOLE (The International Society of Logistics) award for the best paper published in the SOLE Proceedings in 2004. The title of the paper was "Forecasting Technology Insertion Concurrent with Design Refresh Planning for COTS-Based Electronics Systems." The award was made at the 40th Annual International Logistics Conference and Exhibition in Orlando, Florida in August 2005.


Radermacher

Professor **Reinhard Radermacher** was awarded an honorary guest professorship in April by the Institute of Refrigeration & Cryogenics Department of Shanghai Jiao Tong University (SJTU) during a ceremony celebrating their 50th anniversary. He was also featured as a guest lecturer at the International Academic Conference of Research in Air Conditioning & Refrigeration at SJTU.


Pecht

A May 2006 article featured on IEEE Spectrum Online, written by **Michael Pecht,** the George E. Dieter Professor of Mechanical Engineering and CALCE EPSC Director and Sanjay Tiku of Microsoft, highlights the problems associated with the growing global traffic in counterfeit electronics parts. The danger of this practice ranges from having to replace a poorly-made computer part to the potentially life-threatening failure of an airplane's computer system due to the breakdown of inferior counterfeit components.


DeVoe

Associate Professor of Mechanical Engineering and core faculty member of the Bioengineering Program **Don DeVoe** was issued several U.S. Patents for his technologies developed in conjunction with Calibrant Biosystems in late 2005. Patents titled "Plastic Microfluidics Enabling Two-Dimensional Protein Separations in Proteome Analysis" and "Two-Dimensional Microfluidic Gene Scanner" were issued and a third, entitled "Microfluidic Apparatus for Performing Gel Protein Extractions and Methods for Using the Apparatus," is expected to be issued soon. The technologies were developed by DeVoe and Prof. Cheng S. Lee, Associate Professor in the Department of Chemistry and Biochemistry in the College of Chemical and Life Sciences. DeVoe's two-dimensional protein separation technology is designed to allow complex protein samples to be analyzed in about fifteen minutes, compared with a full day using standard methods.


Bruck

Associate Professor of Mechanical Engineering **Hugh A. Bruck** recently received the 2006 A.J. Durelli Award from the Society for Experimental Mechanics (SEM). The award recognizes a young professional who has introduced, or helped to introduce, an innovative approach and/or method into the field of experimental mechanics. Bruck earns this recognition for his contributions in the area of optical methods for full-field deformation measurements, and its application to the development of new functionally graded materials, nanocomposites, and smart structures. Digital imagery from Bruck's research was featured as cover art on the June 2005 issue of *Optical Engineering*, a leading journal for research and development in optical science and engineering. The cover art is taken from his article in the journal, "Theoretical Development for Pointwise Digital Image Correlation," co-authored by Prof. Huiqing Jin, one of Bruck's recent Ph.D. graduates.


Bar-Cohen

Chair and Distinguished University Professor of Mechanical Engineering **Avram Bar-Cohen** was selected in March to serve on the Technology Advisory Board of Celsia Technologies. As a member of the five-person board, Bar-Cohen will inform and guide Celsia Technologies' management and technical teams on relevant thermal management developments and research in the global marketplace.


Balachandran

A paper written by Professor **Bala Balachandran**, visiting Professor, Lecturer Sergio Preidikman, and University of Maryland President C.D. Mote, Jr., titled "Nonlinear free and forced oscillations of piezoelectric microresonators," was published in the February 2006 issue of the Institute of Physics (IOP) Journal of Micromechanics and Microengineering.

Further research conducted by Balachandran and Research Associate Professor **Moustafa Al-Bassyiouni** was featured in The ScienceDirect Top 25 Hottest Articles in the Journal of Sound and Vibration for April-June 2005. Their article, "Sound transmission through a flexible panel into an enclosure: structural-acoustics model," can be found in volume 284 of the Journal.

Department Presents 2006 Research Review Day

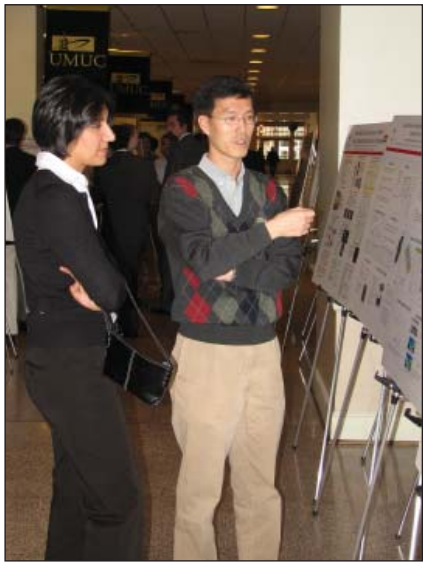
The Mechanical Engineering Research Review Day, held on March 20, 2006 at the University Inn and Conference Center, showcased the Department's research efforts and provided an opportunity for the 100 supporters, friends, students, and alumni to share in the faculty's many accomplishments and to gain insights into the challenges ahead. In introducing the program, Prof. Avram Bar-Cohen, Chair of Mechanical Engineering, noted that "In the 5 years since the last ME Research Review Day, this Department has become synonymous with prolific ME-related research: working at the cutting edge of emerging fields - nano, info, and bio technology; setting the pace in electronic packaging, MEMS and small smart systems, environmental energy engineering, and Reliability Engineering; and making major contributions in combustion, turbulent fluid mechanics, and decision systems in manufacturing and design."

The 2006 ME Research Review Day opened with a Panel, chaired by Prof. George Dieter (Emeritus), discussing the role of university research in developing U.S. preparedness and competitiveness. The Panel consisted of Dr. Richard Carlin, Undersea Weapons and Naval Materials Division, ONR; Dr. Mark Lewis, Chief Scientist of the USAF (and professor of aeronautical engineering at Maryland); and Dr. Hratch Semerjian, Deputy Director of NIST. Prof. Bala Balachandran then introduced the second Panel and invited Dr. Michael Zachariah, Professor of Mechanical Engineering & Chemistry; Dr. Don DeVoe, Associate Professor of Mechanical Engineering & Bioengineering Program; and Dr. Satyandra K. Gupta, Associate Professor of Mechanical Engineering & Institute for Systems Research to describe their cutting edge research in emerging mechanical engineering science and technology. The research underway in the Department's research centers was reviewed by Dr. Reinhard Radermacher, Director of the Center for Environmental Energy Engineering; Dr. Amr Baz, Director of the Small Smart Systems Center; Dr. Patrick McCluskey, CALCE EPSC; Dr. Ali Mosleh, Director of the Center for Risk and Reliability; and Mr. James M. Short, Deputy Director and DoD Liaison for The Center for Energetic Concepts Development in the third Panel, chaired by Prof. Ashwani Gupta.

Professors S.K. Gupta, Don DeVoe, Bala Balachandran, Michael Zahariah and Department Chair Avram Bar-Cohen discuss emerging science and technology research at Maryland.

The Panel sessions were followed by ME graduate student poster presentations, covering more than 60 research topics, ranging from "Actuation of Artificial Muscles in Biofluids," "Pressurized Swirling Spray Flames: Combustion and Unsteady Two-Phase Exhaust Jet Characteristics," "Combinatorial Materials Science Development of Polymer Nanocomposites using Twin Screw Extrusion," "Solid Oxide Fuel Cells Running on Practical Fuels: Understanding Kinetics and Challenges," to "SimPRA: A New Platform for Integrated Probabilistic Risk Assessment of Complex Systems."

The ME Research Review Day closed with a festive dinner and musical accompaniment. Prof. Patrick McCluskey, chair of the Research Day Committee, has commenced planning for the next ME Research Day, scheduled for March 2007 in the Kim Building. Please contact him at *mcclupa@eng.umd.edu* with any suggestions or interest in participating in this event.



ME graduate students Parisa Foroughi and Dae Whan Kim discuss their respective research projects.

CEEE Engineers Offer Long-Term Relief for Heating and Cooling Costs

With energy prices on the rise, American homeowners are opening their energy bills with trepidation, and heating and cooling system manufacturers are seeking ways to offer them relief.

New software developed at the Center for Environmental Energy Engineering (CEEE), with support from industry sponsors, may provide some answers. Called CoilDesigner, it helps manufacturers design customized heating and cooling systems that cost less to build and use less energy. The result could be dramatic savings for consumers within a year.

"CoilDesigner can help designers reduce heating system equipment costs by more than 10 percent," says Reinhard Radermacher, professor of mechanical engineering, director of CEEE and an internationally recognized expert in energy conversion systems; in particular integrated cooling, heating and power (CHP) systems, heat pumps, air-conditioners and refrigeration systems. "It also gives manufacturers the ability to design products that could use less energy to heat and cool homes, and even switch from gas-powered components to electricity-powered components on the fly, depending on prevailing energy prices. The advantages to system manufacturers and their customers will be significant."

Developed with the support of industrial sponsors such as YORK, a Johnson Controls Company, CoilDesigner software allows manufacturers to search through millions of design options to create the most efficient and/or lowest-priced heat pump or air conditioning system for their clients' needs.

"CoilDesigner's analysis tools pointed us in the right direction," says Mahesh Valiya Naduvath, manager of YORK/ Johnson Controls' engineered systems heat transfer team. "The software's features and capabilities are very user-friendly."

When used early in the product design process, the software can provide significant benefits to manufacturers, which in turn can mean cost savings for consumers, Radermacher says. "The benefits to consumers from this design software could be seen as early as 12 months from now."

There are several programs available as part of the CoilDesigner package. CoilDesigner is a tool for creating air-cooled heat exchangers used in a wide variety of applications, from automotive radiators and climate control components to air-conditioners, heat pumps and refrigeration systems of a wide range of sizes. Two of these programs include VapCyc and TransRef. VapCyc simulates vapor compression cycles (the processes that make heat pumps work) in residential air conditioners, heaters and various types of refrigeration systems, and allows for the optimization of efficiency and cost. TransRef helps in the design of the controls of these systems.

Software features include a user-friendly interface specifically geared towards the needs of design engineers and allows for programming by multiple users. Other utilities include unit converters and calculators for assorted variables.

Center for Environmental Energy Engineering Integrated Systems Optimization Consortium:
http://ceee.umd.edu/isoc/index.htm

ISOC Software Datasheet (PDF document):
http://ceee.umd.edu/isoc/software/ISOCSoftwareFlyerV6.pdf

CALCE Research Featured on The History Channel's "Modern Marvels" Program

The History Channel aired an episode of "Modern Marvels: Engineering Disasters," that featured interviews with staff and footage of the labs of the department's Center for Advanced Life Cycle Engineering Electronic Products and Systems Center (CALCE-EPSC).

The segment focused on microscopic structures called "tin whiskers" that spontaneously grow from the pure tin coatings on electronic boards and microchips, causing short-circuits in electronic products, often leading to product failure. These whiskers can wreak havoc within the electronics industry and have affected systems such as the Galaxy satellites.

The show featured the research that CALCE-EPSC has been conducting on this phenomenon. Check the Modern Marvels episode guide online for more details about the episode.

More information about CALCE-EPSC:
http://www.calce.umd.edu/

Cukier to IT Admins: Rethink Your Security Solution

Center for Risk and Reliability Researcher Publishes Data on Hackers, Creates Free Windows Software to Check Vulnerabilities

In a lab at the University of Maryland's A. James Clark School of Engineering, researchers have set the bait: computers with built-in weaknesses to entice hackers to attack.

And attack they have—thousands upon thousands of times. Now, Clark School researchers have released quantitative data on how hackers break into computers. Their work could change the way system administrators secure their computer systems.

Many in the computer security community have assumed for years that "port scans" precede actual attempts to hack into computers (in a port scan, the hacker tries to find the availability and potential weaknesses of the computer). While some of the largest corporations and government agencies have focused on similar issues, they have not released their findings. The Clark School researchers, in an article published earlier this year at the Institute of Electronics and Electrical Engineers (IEEE) International Conference on Dependable Systems and Networks (DSN '05), revealed that port scans precede attacks only around five percent of the time. More than 50 percent of attacks are not preceded by a scan of any kind. Hackers don't necessarily look before they leap.

This means that security administrators may be using flawed assumptions to prevent attacks. Many IT administrators try first to detect scans and then take preventive measures to secure their networks. The research shows they may be acting too late to prevent the bulk of hacking attempts.

"We found that the confidence administrators have in their security solutions seems often to be misplaced," says Michel Cukier, assistant professor in the Center for Risk and Reliability in the Clark School's Department of Mechanical Engineering, and an affiliate of the university's Institute for Systems Research. "We now have scientifically derived data—we know what kinds of hackers attacked our research test-bed network and what they did once they broke into it—and we have made them available."

Cukier

Further experiments conducted by Cukier include the measurement of the time separating scans from attacks, a longitudinal study of malicious activity recorded over one year, and a comparison between malicious activity from inside the University of Maryland with malicious activity from the outside. The design and development of the test-bed collecting malicious activity has been led by Susmit Panjwani, a reliability engineering Ph.D. graduate student, with the help of several undergraduate students who conducted independent research studies.

Above: Reliability Engineering Ph.D. candidate Susmit Panjwani and Pierre-Yves Dion monitor "honeypot" computers set up to attract hacker attacks.

While collecting the data, Cukier realized there is a need for a tool that checks for a wide range of host vulnerabilities for Windows computers. He and his team have developed "Ferret," an open-source software tool that checks for these weaknesses on Windows platforms.

"Ferret automates what some Windows system administrators do manually," Cukier says.

The program has more than 50 plug-ins for finding and fixing weaknesses in Windows operating systems. New plug-ins easily can be added as new vulnerabilities are identified.

The code is available for free and available to study, not just use, in order to gain the trust of those who may want to install it, Cukier says.

For more information about the program, visit this website: *http://ferret.sourceforge.net/*

researchUPDATE

First Hanyang University - UMD Workshop Held in Seoul, Korea

The first international workshop between Hanyang University (HYU) and the University of Maryland was held at Hanyang University in Seoul, Korea on January 13, 2006.

As part of this Workshop, Profs. S.K. Gupta and Don DeVoe from UMD, and Kim Woo-Seung and Han Seong Young from HYU presented overviews of their current research and interests. A panel discussion followed, aimed at identifying opportunities for research collaborations between engineering faculty at Maryland and Hanyang.

The titles of the presentations from Maryland professors were: *Microfluidic and Nanofluidic Systems for Biomolecular Analysis*, by Prof. **Don Devoe**; and *Integrated Product and Process Development for Molded Multi-Material Structures* by Prof. **S. K. Gupta**. Hanyang was represented by Prof. Kim Woo-Seung and his presentation on *The Fabrication and Numerical Analysis on the Soft Lithography-based pH Self-Regulating System*; and *Application of Growth Strain Method for Shape Optimization* by Prof. Han Seog Young.


S.K. Gupta

The workshop was organized by Professors Jae-Eung Oh and Kyung-Soo Yi of Hanyang University, and Professors **Avram Bar-Cohen** and **Bongtae Han** of Maryland. It follows an exchange of visits between the two institutions dating back to early 2004, and is part of HYU's participation in the BK21 program for the enhancement of higher education in Korea.


Han

NIH Proteomics Award to Benefit Cancer Research, Drug Development


DeVoe

Associate Professor of Mechanical Engineering **Don DeVoe**, Associate Professor of Chemistry Cheng Lee, and Assistant Professor of Chemistry Doug English were awarded a $1.2 million grant by the National Institutes of Health (NIH) National Institute for General Medical Science (NIGMS). The award, titled "Ultrasensitive Proteomics via 2-D Microfluidic Profiling," involves the development of new micro and nanofluidic technology for analyzing proteins in limited biological samples such as human tissue biopsies. The system will provide an effective platform for ultrasensitive protein detection and identification by coupling multiplexed microfluidics to mass spectrometry. Much of the research will take place in the Maryland Microfluidics Laboratory (MML), a new research facility currently under construction in Glenn L. Martin Hall which is focused on the development of micro/nano fluidic systems for ultrasensitive proteomic analysis.

This technology will be used initially to analyze microdissected tissue from cancer biopsies, leading to the identification of novel protein biomarkers which can be used at the clinical level for early detection, effective diagnostics and prognostics, and treatment selection. In addition, discovered biomarkers may be used by pharmaceutical companies as potential targets for future drug development.

The project is funded by NIGMS through the interdisciplinary Bioengineering Research Partnerships (BRP) program. The BRP is a special NIH program enabling interdisciplinary bioengineering research. The project brings together Maryland faculty from mechanical engineering, chemistry, and bioengineering.

Rapid Prototyping Lab Helps Design Research

A 3-D rapid prototyping machine is available for undergraduate design research projects in the Product Innovation Realization Laboratory Suite (PIRLS), managed by Associate Professor **Linda Schmidt**. The prototyping machine creates affordable plastic prototypes, often in miniature, from CAD/CAM design images drawn by students completing design projects in ENME 371: Product Engineering and Manufacturing and ENME 472: Integrated Product and Process Development classes. The prototyping machine has also supported the work of several research groups, according to PIRLS manager David Morgan. Using the objects (seen on the right) created by this "3-D printer," students and researchers are able to arrive at improved design solutions and better manage product part realization issues.

Above: Plastic objects created by the rapid prototype machine, initially created with a computer-aided design (CAD) program. The machine can create single parts or whole, functional devices for product realization.

Department of Mechanical Engineering Annual Report 2004-2005

A special pull-out section to the Spring 2006 issue of *Metrics*

The Year in Review

Avram Bar-Cohen
Professor and Chair

Dear Friends, Alumni, Faculty, and Students,

The 2004-2005 academic year was a memorable one for the Department of Mechanical Engineering—filled with awards, accomplishments, and new opportunities. I could not have wished for a more rewarding year as the Department Chair and I hope the brief recapitulation and statistics that follow will serve to reinforce our collective pride in the significant steps taken in 2004-2005 towards the upper echelons of academia.

DURING THE PAST ACADEMIC YEAR, OUR FACULTY published nearly 131 journal articles, while presenting 313 conference presentations and seminars, among them 9 plenary and keynote lectures. The department's faculty includes 7 NAE members, 12 journal and book series editors, 25 Associate Editors, and hold 61 Fellowships in the leading professional societies. While our student population this year was 620 undergraduates and 355 graduate students, the Department awarded 174 BS degrees, 52 MS degrees and 34 PhD degrees. During the past five years the department's graduate program has granted 258 degrees, 176 Master of Science and 82 Doctor of Philosophy in both Mechanical and Reliability Engineering.

Research expenditures reached $18.8 million, up by 15% from the previous year, bringing our overall department expenditures in 2004-2005 to more than $24.9 million.

Last year the department was given accolades from *Small Times Magazine*, the leading source of business information about micro- and nano-technology. *Small Times* ranked the University of Maryland first in nanotechnology research and education. Maryland also ranked second in microtechnology research efforts, tied with Michigan.

I want to recognize the efforts of the students, faculty and alumni who have contributed to another successful year. Your support, talent, commitment and skills have made this all possible.

- Dr. Avram Bar-Cohen

The Department at a Glance

42	Faculty
61	Professional Society Fellows
7	National Academy of Engineering Members
12	Journal & Book Series Editors
25	Journal Associate Editors
8	Published Books
15	Published Book Chapters
131	Published Journal Articles
313	Conference and Seminar Presentations
9	Plenary / Keynote Speakers

Based on 2005 statistics from the Faculty Activity Report.

620	Undergraduate Students
1240/1360	SAT 25/75 Percentiles of Entering Freshmen
3.935/4.0	Average GPA of Entering Freshmen
38.5	Percentage of Women/Minority Entering Freshmen
26	Percentage of Undergraduates in Honors Programs
355	Graduate Students
3.65/4.0	Average GPA of Entering Graduate Students

174	B.S. Degrees Awarded
52	M.S. Degrees Awarded
34	Ph.D. Degrees Awarded

2004-2005 Academic Calendar Statistics.

$18.8M	External Research Support
$24.9M	Total Expenditures
199	Research Grants
173	Research Sponsors

FY 2005 Statistics

2005 Graduate & Undergraduate Awards & Honors

Left: Mechanical Engineering students from the ENME 489W Thermal Destruction of Wastes class, and course Professor Ashwani Gupta visited the Wheelabrator Baltimore Company that converts domestic Wastes to Energy on March 3, 2006.

2004-2005 Undergraduate Awards & Honors

American Society of Mechanical Engineers Senior Award
Presented to the senior member who has contributed most to the student chapter: *Melissa Smith.*

Pi Tau Sigma Outstanding Service Award
Presented to a student for outstanding service and contributions to the chapter: *Gregory Sydlowski.*

Pi Tau Sigma Memorial Award
Presented to the senior in mechanical engineering who has made the most outstanding contributions to the University: *Ronald DiSabatino.*

Pi Tau Sigma Outstanding Sophomore Award
Presented to the most outstanding sophomore in mechanical engineering on the basis of scholastic average:
Farhan Choudhary and Cecilia Kye.

Department of Mechanical Engineering Academic Achievement Award
Presented to the junior in mechanical engineering who has attained the highest overall academic average: *David Peckarsky.*

Department of Mechanical Engineering Chair's Award
Presented for excellence in academics, outstanding service to the Department, or leadership in the Department: *Eric Jones.*

Within the A. James Clark School of Engineering, several ME Students were recognized:

The A. James Clark School of Engineering Leadership Award
Presented to a student for outstanding leadership in the college: *Robert Aikins.*

The A. James Clark School of Engineering Dean's Award
Presented to a senior for academic excellence, leadership, and service to the college: *Selin Mariadhas.*

2004-2005 Graduate Awards & Honors

A. James Clark Fellow
James Diorio
Katrina Groth
Daniel Fitzgerald
Paul Nylander
Vincenzo Pezza
Mohammadreza Tavakolinejad
Zhixiang Wang
Justin Williamson

Diorio

ARCS Fellow
Dan Fitzgerald

Fitzgerald

CALCE Fellows
Yuki Fukuda
Sanjay Tiku

Graduate School Fellows
Nikolaos Beratlis
Gayatri Cuddalorepatta
Yuliand Deng
Andrew Dick
Patrice Gregory
Christopher Henry
Arun Kota
Jason McGill
Victor Ovchinnikov
Prahalad Parthangal
Senthikumaran Radhakrishnan
Krista Solderholm

Ovchinnikov

Litton Industry Fellow
Martin Linck

Trigen Fellow
Sandeep Nayak

2004-2005 Graduate and Undergraduate Programs

Dr. Ugo Piomelli
Director of Graduate Studies
and Associate Chair

Enrollment

In the 2004-2005 academic year the Department of Mechanical Engineering had 355 graduate students enrolled. Of these, 115 were Master of Science students and 240 were Doctoral students. 15% of these students were female and 21% were minority students.

Degrees

The Department granted 52 Master's degrees (14 Master of Engineering degrees in ME, 4 in Reliability; 23 MS degrees in ME and 11 in Reliability) and 34 Doctorates (4 in Reliability Engineering, 30 in Mech. Eng.) in 2004-2005. Dissertation titles and the names of Doctoral and M.S. students' advisors are listed later in the report.

Recruitment

As of May 5, 2005, 410 students applied to the graduate program for entrance in 2005-2006. Of these applicants 105 were accepted and 69 enrolled, most with financial assistance in the form of a graduate teaching assistantship, graduate research assistantship, or graduate fellowship.

Research and Fellowships

During the 2004-2005 academic year, the Department supported 51 students through teaching assistantships and 115 through research assistantships. In addition, 23 of our students have been awarded fellowships for the 2004-2005 academic year.

Student Credentials

The students who enrolled in our program in 2004-2005 had an average GRE score of 528 Verbal, 752 Quantitative, a 4.42 Analytic score and an average GPA of 3.65.

B.S./M.S. Program

The B.S./M.S. program continues to provide students with the opportunity to earn both a B.S.M.E. and an M.S.M.E. following five years of study. In 2004-2005, the Department admitted 11 new students and had a total of 35 enrolled in this program. In 2004-2005 there were 7 BSMS students who graduated from the program completing their MS. One was a B.S./ Ph.D..

Dr. Sami Ainane
Director of
Undergraduate Studies

Enrollment

Enrollment in the undergraduate program during the 2004-2005 academic year reached 620 students. Roughly 39% of these were minority or female students, and 162 are in the University Honors Program. The entering freshmen class of 2005 had an average SAT score of 1330 and an average high school GPA of 3.935. Last year, we awarded 174 Bachelor's degrees. Our program features design throughout the undergraduate curriculum and unique teaching methods, including a practical classroom design experience in a course supported by Black & Decker, tailored to students participating in the competition projects, and cutting edge electives.

Career Paths

Several areas of concentration are suggested to the student in the senior year. These areas of focus, such as Design and Manufacturing; Controls, Sensors & Electronic Packaging; MEMS Technology; Energy & Environmental Engineering; Automotive Engineering; Robotics; and Engineering Management enable students to study in unique courses in their areas of interest and to better prepare themselves for professional careers of their choice.

Honors Program

The departmental Honors Program, now in its sixth year, consists of three levels of involvement available to students. The University has a general honors program primarily for freshmen and sophomores, the School of Engineering has an honors program primarily for juniors and seniors, and the Department of Mechanical Engineering has an honors program for students at all levels. It is possible for students to participate in any combination, including all three of the honors programs. The program currently has about 100 participants and has been highly successful in attracting talented students to the Department.

QUEST & Gemstone Programs

The QUEST Program, offered jointly with the Smith School of Business, places students in the workplace to research and develop quality enhancement recommendations for corporate partners. The Gemstone Program focuses students from diverse majors on research that addresses technological and social issues.

2004-2005 M.S. Graduates & Advisors

Fall 2004

Cruz, Jose
Advisor: Prof. Carol Smidts

Ganesan, Sathyanarayan
Advisor: Prof. Michael Pecht

Heard, Isaac
Advisor: Prof. Ali Mosleh

Henry, Christopher
Advisor: Prof. Jungho Kim

Hu, Yunwei
Advisor: Prof. Ali Mosleh

Kratzsch, Kyle
Advisor: Prof. Steve Buckley

Li, Xiaojun
Advisor: Prof. Joey Bernstein

Maddulapalli, Anil
Advisor: Prof. Shapour Azarm

Martin, Gregory
Advisor: Prof. Ali Mosleh

Pines, Michael
Advisor: Prof. Hugh Bruck

Pires, Thiago
Advisor: Prof. Ali Mosleh

Robbins, Fletcher
Advisor: Prof. Greg Jackson

Tiku, Sanjay
Advisor: Prof. Michael Pecht

Spring 2005

Azarkhail, Mohammadreza
Advisor: Prof. Mohammad Modarres

Fukuda, Yuki
Advisor: Prof. Michael Pecht

Jannesari, Leila
Advisor: Prof. Abhijit Dasgupta

Mathew, Sony
Advisor: Prof. Michael Pecht

Nayak, Sandeep
Advisor: Prof. Reinhard Radermacher

Ovchinnikov, Victor
Advisor: Prof. Ugo Piomelli

Peng, Tao
Advisor: Prof. Satyandra Gupta

Pour-gol-mohamad, Mohammad
Advisor: Prof. Mohammad Modarres

Sunkari, Rajesh
Advisor: Prof. Linda Schmidt

Tetter, Keith
Advisor: Prof. Carol Smidts

White, Mark
Advisor: Prof. Joey Bernstein

Summer 2005

Becker, Benjamin
Advisor: Prof. Greg Jackson

Chen, Ezra
Advisor: Prof. Steve Buckley

El Sabbagh, Adel
Advisor: Prof. Amr Baz

Golden, Ira
Advisor: Prof. Satyandra Gupta

Kramer, Jeffrey
Advisor: Prof. Greg Jackson

Kalinger, James
Advisor: Prof. Reinhard Radermacher

Linde IV, John
Advisor: Prof. Reinhard Radermacher

Schwentker, Robert
Advisor: Prof. Reinhard Radermacher

Watkins, James
Advisor: Prof. Don Barker

Yerramilli, Vamsee
Advisor: Prof. Jugho Kim

Professional Master of Engineering Program

Reliability Program Advisor: Prof. Ali Mosleh
Mechanical Program Advisor: Prof. Keith Herold

Fall 2004

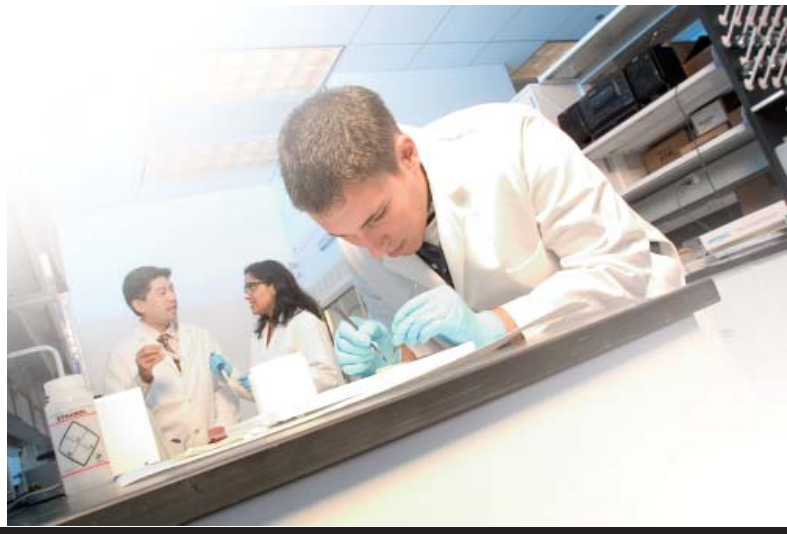
Lauren Hamerski-Cronise
Eva Dixon
Jeffrey Green
Michael Konadu
Mathurin Meillon
Richard Parker
Anshul Shrivastava
David Vess

Spring 2005

David Bragunier
Frank Carreras (ENRE)
Nathan Drees (ENRE)
Brendan Gardes
Kaushik Ghosh
Kai Sen Hsu
Patrick Karvar
Ray Lechner
Michael Riley (ENRE)

Summer 2005

Leon Adams



Research Expenditures

The ME faculty's significant success in attracting funding for a broad range of research topics has underpinned the Department's rise to the U.S. News and World Report's top 25 rankings among both graduate and undergraduate Mechanical Engineering programs. The Department has consistently ranked in the top fifteen in total research and development expenditures for mechanical engineering at American colleges and universities, according to National Science Foundation (NSF) statistics. Research conducted in 1999 through 2003 and published in the *National Science Foundation documents Academic Research and Development Expenditures: Fiscal Years 1999 – 2003* reports show that the department ranked 12th in total research and development expenditures, and 14th in Federal R&D expenditures in 2003. It is noteworthy that in 2003 the department's research and development expenditures were greater than and significantly ahead of those at Purdue, Texas A&M, University of Texas–Austin, Carnegie Mellon, Renssealaer Polytechnic Institute and Duke University.

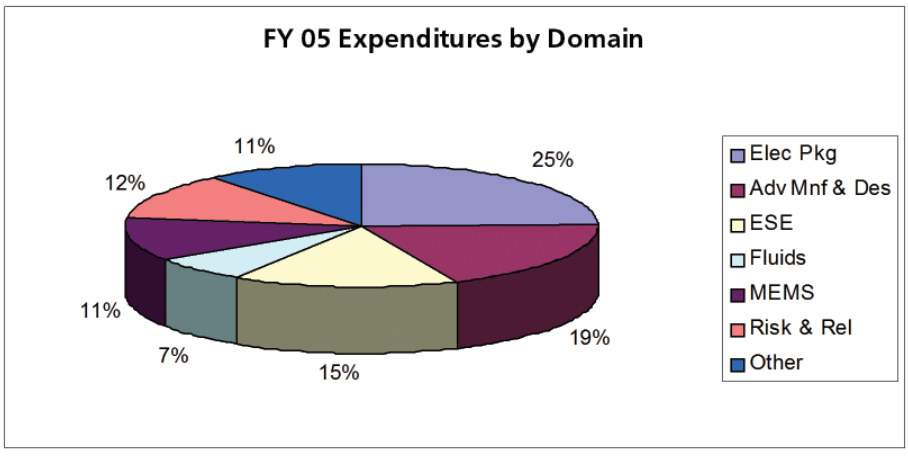
Year	Total R&D expenditures by university	Federally-funded R&D expenditures by university	Non-Federal R&D expenditures by university	Total R&D Expenditures in mechanical engineering	Federal R&D expenditures in mechanical engineering
1999	32nd	30th	26th	12th	17th
2000	36th	38th	32nd	12th	15th
2001	36th	41st	31st	15th	14th
2002	32nd	31st	31st	13th	14th
2003	35th	43rd	32nd	12th	14th

From: Academic Research and Development Expenditures: Fiscal Years 1999 - 2003. National Science Foundation Division of Science Resources Statistics (SRS), Science and Engineering Statistics.

ME faculty in 2004-2005 (starting on page 8 of this section), have participated in a wide variety of cooperative research efforts in various fields of mechanical engineering, ranging from support in the private sector to a great many federal and corporate contracts. FY '05 fiscal expenditures, broken down by research area in the table and chart below, show that 25% of the expenditures were from the electronic packaging domain, 19% from manufacturing and design, 15% from energy systems engineering, 12% from risk and reliability, 11% for MEMS research and 7% dedicated to fluid dynamics research.

FY 05 Expenditures by Domain

Electronic Packaging	$4,621,407
Advanced Mfg. and Design	$3,532,840
Energy Systems Eng.	$2,880,180
Fluids	$1,284,683
MEMS	$2,122,899
Risk & Reliability	$2,286,939
Other	$2,030,671
Total	$18,759,619



2004-2005 Ph.D. Graduates, Advisors & Dissertation Titles

Fall 2004

Deeds, Michael
Advisor: Prof. Peter Sandborn
Qualification of Metallized Optical Fiber Connections for Chip-Level Mems Packaging

Gharavi, Mohammadreza
Advisor: Prof. Steve Buckley
Infrared Optical Sensor for Combustion Diagnostics Using Wavelength Modulation Spectroscopy

Gomez-Ledesma, Ramon
Advisor: Prof. Ken Kiger
An Experimental Investigation of Air Entrainment by Plunging Jets

Jin, Huiqing
Advisor: Prof. Hugh Bruck
New Metrological Techniques for Mechanical Characterization at The Microscale and Nanoscale

Li, Bin
Advisor: Prof. Carol Smidts
Integrating Software Into PRA (Probabilistic Risk Assessment)

Li, Ning
Advisor: Prof. Jim Wallace
Passive Scalar Dispersion in a Turbulent Mixing Layer

Shen, Jun
Advisor: Prof. Peter Bernard
A Grid-Free Lagrangian Dilatation Element Method with Application to Compressible Flow

Shi, Zhen
Advisor: Prof. Peter Sandborn
Optimization of Test/Diagnosis/Rework Location(s) and Characteristics in Electronic Systems Assembly

Shoushtari, Amir
Advisor: Prof. Michael Ohadi
Experimental and Computational Analysis of an Electrohydrodynamic Mesopump for Spot Cooling Applications

Singh, Pameet
Advisor: Prof. Peter Sandborn
Forecasting Technology Insertion Concurrent with Design Refresh Planning for COTS-Based Obsolescence Sensitive Sustainment-Dominated Systems

Spring 2005

Blattau, Nathan John
Advisor: Prof. Don Barker
Models for Rapid Assessment of Leadless Component Failures During Printed Wiring Board Bending

Cho, Seungmin
Advisor: Prof. Bongtae Han
Development of Moiré Interferometry for Real-Time Observation of Nonlinear Thermal Deformations of Solder and Solder Assembly

Donahoe, Daniel
Advisor: Prof. Michael Pecht
Moisture In Multilayer Ceramic Capacitors

Etienne, Bevin
Advisor: Prof. Peter Sandborn
The Development of Cost and Size Analysis for the Assessment of Embedded Passives in Printed Circuit Boards

Han, Chang Woon
Advisor: Prof. Bongtae Han
Shadow Moiré Using Non-Zero Talbot Distance and Application of Diffraction Theory to Moiré Interferometry

Hu, Yunwei
Advisor: Prof. Ali Mosleh
A Guided Simulation Methodology for Dynamic Probabilistic Risk Assessment of Complex Systems

Hwang, Yu-Chul
Advisor: Prof. Michael Pecht
Electrostatic Discharge and Electrical Overstress Failures of Non-Silicon Devices

Liao, Xiaohong
Advisor: Prof. Reinhard Radermacher
The Development of an Air-Cooled Absorption Chiller Concept and its Integration In CHP Systems

Liu, Jing
Advisor: Prof. Don Devoe
Design, Fabrication, and Testing of Time Delay Micromechanisms for Fuzing Systems

Maddulapalli, Anil Kumar
Advisor: Prof. Shapour Azarm
Product Design Selection with Variability for an Implicit Value Function

Rogers, Keith
Advisor: Prof. Michael Pecht
An Analytical and Experimental Investigation of Filament Formation in Glass/Epoxy Composites

Spring 2005 (Continued)

Seyed-Reihani, Seyed-Abdolreza
Advisor: Prof. Greg Jackson
Evaluating Surface Mechanisms for Catalytic Combustion of H^2 And CH^4 On Pd Catalysts

Sinha, Avik
Advisor: Prof. Carol Smidts
Domain Specific Test Case Generation Using Higher Ordered Typed Languages for Specification

Stargel, David
Advisor: Prof. Bill Fourney / Prof. Peter Sanford
Experimental and Numerical Investigation Into the Effects of Panel Curvature on the High Velocity Ballistic Impact Response of Aluminum and Composite Panels

Wakatsuki, Kaoru
Advisor: Prof. Jungho Kim
High Temperature Radiation Absorption of Fuel Molecules and an Evaluation of Its Influence on Pool Fire Modeling

Zhu, Baozhong
Advisor: Prof. Joey Bernstein
Experimental Study of Bias Temperature Instability and Progressive Breakdown Of Advanced Gate Dielectrics

Zheng, Yunqi
Advisor: Prof. Patrick McCluskey
Effect of Surface Finishes and Intermetallics on Power Cycling Reliability of SnAgCu Die Attach

Summer 2005

Archer, Sean
Advisor: Prof. Ashwani Gupta
Morphology of Unconfined and Confined Swirling Flows Under Non-Reacting and Combustion Conditions

Benetis, Vytenis
Advisor: Prof. Michael Ohadi / Prof. Elisabeth Smela
Experimental and Computational Investigation of Planar Ion Drag Geometrical Design Parameters

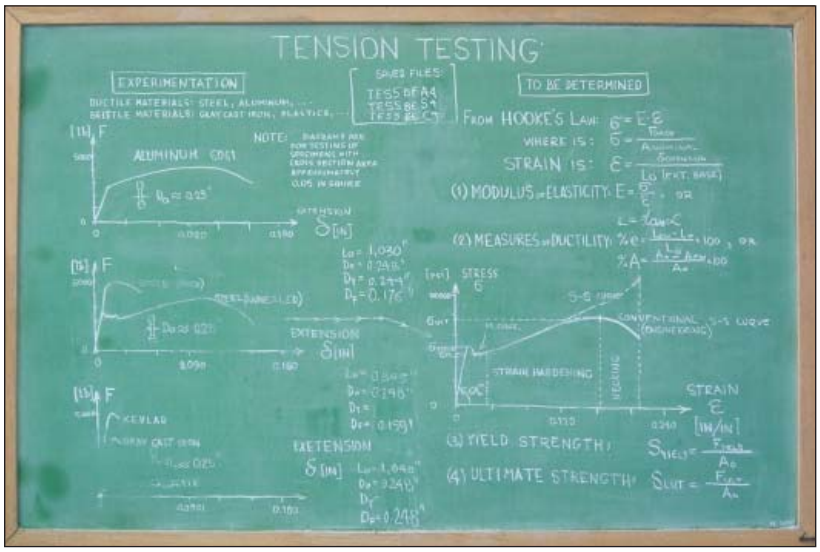
Ferioli, Francesco
Advisor: Prof. Steve Buckley
Experimental Characterization of Laser-Induced Plasmas and Application to Gas Composition Measurements

Ghaderi Yeganeh, Mohammed
Advisor: Prof. Ashwani Gupta
Effects of Preheated Combustion Air on Laminar Coflow Diffusion Flames Under Normal and Microgravity Conditions

Shakeri, Mostafa
Advisor: Prof. James Duncan
An Experimental 2D+T Investigation of Breaking Bow Waves

Wang, Yi
Advisor: Prof. A. Trouve
Direct Numerical Simulation of Non-Premixed Combustion with Soot and Thermal Radiation

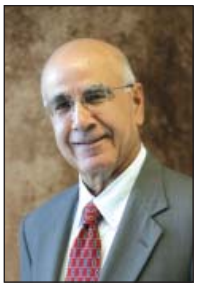
Xu, Changxin
Advisor: Prof. Satyandra Gupta
Computational Foundations for Computer Aided Conceptual Design of Multiple Interaction-State Mechatronic Devices



Right: Chalkboard featuring notes on experimentation, part of the ENES 102 (Engineering Science) class taught by Prof. V.K. Pavlin. It shows important mechanical properties of some materials during tension testing. The graphs and tests are considered important for a basic understanding of ductile and brittle metals in mechanical engineering.

Mechanical Engineering Faculty

Ainane, Sami
Director of Undergraduate Studies
Educational issues in engineering, turbulence modeling.



Anand, Davinder K.
Professor Emeritus, Center for Energetics Concepts Development Director
Control systems; automation; manufacturing and energy.

Azarm, Shapour
Professor
Evolutionary/classical multi-objective and multi-disciplinary design optimization.

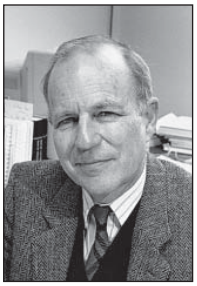
Bar-Cohen, Avram
Distinguished Professor, Chair
Thermal management of micro/nano systems. Thermal design, ebullient heat transfer.

Balachandran, Balakumar
Professor
Nonlinear dynamics; vibration and acoustics control; system identification; signal analysis.

Balaras, Elias
Assistant Professor
Computational fluid dynamics; biomedical fluid flows; fluid-structure interactions; turbulence and transition.

Barker, Donald
Professor
Electronic packaging; experimental mechanics; fracture mechanics; dynamic (high strain rate) material behavior.

Baz, Amr
Professor
Small Smart Systems Director
Active and passive control of vibration and noise; active constrained layer damping.



Berger, Bruce
Professor Emeritus
Dynamical systems, machine tool vibrations, and numerical methods.

Bergles, Arthur
Research Professor
Heat transfer enhancement, cooling of electronic and microelectronic equipment.

Bernard, Peter
Professor
Fluid mechanics; vortex methods; calculation of turbulent flows; turbulent transport theory.

Bernstein, Joseph
Associate Professor
Electronic systems reliability in aerospace and military apps., electronic device physics of failure.

Bigio, David
Associate Professor
Distinguishing polymer mixers and the role of geometry to mixing; blending, multi-viscosity mixing and highly-filled systems.

Bruck, Hugh
Associate Professor
Processing, thermomechanical characterization, and computational design of multifunctional and functionally graded materials.

Christou, Aris
Professor
Materials processing and manufacture technology, strained engineered materials for optoelectronics, physics-of-failure in electronic materials.

Cukier, Michel
Assistant Professor
Fault tolerance, intrusion tolerance, dependability and security evaluation, distributed sytems, software testing.

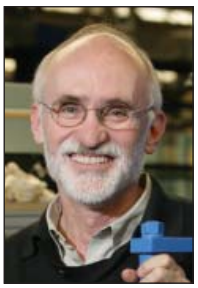
Cunniff, Patrick
Professor Emeritus
Product engineering and manufacturing; shock and vibrations.

Dasgupta, Abhijit
Professor
Mechanics of electronic packaging materials and "smart" composite materials.

DeVoe, Donald
Associate Professor
Microfluidic systems for bioanalysis; MEMS.

Dieter, George
Professor Emeritus
Materials processing, engineering design, quality engineering.

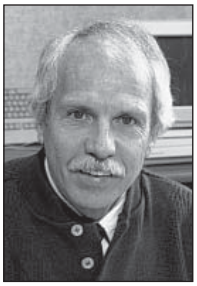
di Marzo, Marino
Professor
Fire protection agents, fire sprinklers, large-scale test instrumentation and data analysis.



Duncan, James
Professor
Experimental and theoretical/ numerical investigations of fluid flows, breaking water waves.

Elliott, William III
Lecturer
Instructor for Ship Design, Human Powered Submarine course (ENME 489P).

Fischell, Robert
Professor of Practice
Developing lifesaving medical devices and systems.



Fourney, William
Professor
Dynamic fracture mechanics; rock fracture and fragmentation; experimental stress analysis.

Gupta, Ashwani
Professor
Swirl flows; combustion; sprays; alternative fuels; pollution; gas turbine combustion.

Gupta, Satyandra *Associate Professor*
Geometric reasoning algorithms for computer aided manufacturing.

Han, Bongtae
Associate Professor
Design of microelectronics devices; Design assessment of microelectronics devices.

Han, David
Visiting Assoc. Prof.
Inverse problems, signal processing, data fusion, imaging solutions.

Haslach, Henry Jr.
Research Associate Professor
Deformable bodies and their material behavior.

Herold, Keith
Associate Professor
BioMEMS, microfluidic systems for bioanalytical assays, heat and mass transfer in bioengineering.

Herrmann, Jeffrey
Associate Professor
Design and control of manufacturing systems; integration of product design and manufacturing system design.

Mechanical Engineering Faculty

Holloway, David
Professor Emeritus
Automotive propulsion systems, hybrid electric vehicles, vehicle dynamics, tire and tire testing technology.

Hsieh, Adam
Assistant Professor
Orthopaedic biomechanics; soft tissue mechanobiology.

Jackson, Gregory
Associate Professor
Combustion, fuel cells, catalytic reactors.

Kiger, Kenneth
Associate Professor
Fluid mechanics and experimental techniques.

Kim, Jeong
Professor of Practice
Communications, wireless technologies, and broadband optical systems and devices.

Kim, Jungho
Associate Professor
Phase change heat transfer process as applied to electronic cooling.

Magrab, Edward
Professor
Integrated product development; vibrations and acoustics.

McCluskey, F. Patrick
Associate Professor
High temperature electronic packaging; computer-aided risk assessment of microelectronics.

Modarres, Mohammad
Professor
Probabilistic risk assessment, functional modeling, intelligent systems in reliability and safety.

Mosleh, Ali
Professor, Center for Risk & Reliability Director
Reliability growth modeling, probabilistic reliability physics, common cause failure analysis.

Mote, C.D. Jr.
Professor, President
Dynamic systems, vibration, biomechanics.

Mulholland, George
Visiting Professor
Soot formation and growth, aerosol dynamics, aerosol metrology.

Ohadi, Michael
Professor
Heat and mass transfer at the meso-, micro- and nano-scales with applications to thermal/fluid system miniaturization.

Pecht, Michael
Professor, CALCE EPSC Director
Competitive product development; product characterization and qualification; supply chain creation and management.

Piomelli, Ugo
Professor, Dir. of Grad. Studies, & Associate Chair
Numerical simulation of turbulent and transitional flows.

Radermacher, Reinhard
Professor, CEEE Director
Advanced energy conversion systems, cooling, heating and power (CHP) systems, optimization of thermal systems.

Sandborn, Peter
Associate Professor
Electronic packaging and reliability; life cycle cost analysis of electronic systems.

Sanford, R.J.
Professor Emeritus
Mathematical principles of linear elastic fracture mechanics and their application to engineering design.

Schmidt, Linda
Associate Professor
System and product design theory and methodology.

Schultz, Greg
Lecturer
Automotive performance testing and design.

Shih, Tien-Mo
Associate Professor
Developing a robust scheme to solve a set of nonlinear equations.

Smela, Elisabeth
Associate Professor
Micro-electro-mechanical systems (MEMS), conjugated polymer micro-actuators.

Smidts, Carol
Associate Professor
Probabilistic dynamics for complex systems, human reliability and software reliability.

Sreenivasan, Katepalli
Professor
Fluid turbulence; complex fluids, combustion, cryogenic helium, and nonlinear dynamics.

Suhir, Ephraim
Visiting Professor
Analytical modeling of the behavior and reliability of microelectronic and photonic materials and systems.

Thamire, Chandra
Senior Lecturer
Computational mechanics; bio-heat transfer and bio-fluid mechanics, design of biomedical devices.

Wallace, James
Professor
Experimental turbulent fluid flow; social implications of science and technology.

Yang, Bao
Assistant Professor
Micro/nanoscale thermal transport and energy conversion.

Yu, Miao
Assistant Professor
Optical sensors, sensor mechanics, micro-scale and nano-scale sensor systems.

Zachariah, Michael
Professor, Center for NanoEnergetics Research Director
Nanoparticle science, manufacturing and measurements.

Zhang, Guangming
Associate Professor
Manufacturing systems, rapid prototyping, dynamics of mechanical structures, engineering statistics, and computer engineering.

AR 11

For more detailed curriculum vitae and contact information on either the faculty or administration staff, visit the following page on our website:

http://www.enme.umd.edu/facstaff/

Faculty & Staff

Administrative Staff

Sami Ainane - Director of Undergraduate Programs

Jim Barrett - Marketing & Communications Coordinator

Elyse Beaulieu-Lucey - Assistant Director, Graduate Studies

Lita Brown - Payroll/Personnel Coordinator

Margaret Brumfield - Director, Administrative Services

Erin Chen - Research Coordinator

Tracy Chung - Graduate Program Coordinator

Melvin Fields - Coordinator, IT

D.B. Galpoththawela - Office Clerk

Dylan Hazelwood - Manager, IT

Juanita Irvin - Coordinator, Business Services & Facilities

Sonja Jennings - Coordinator, Undergraduate Office

Sripen (Penny) Komsat - Business Services Specialist

 Corinne Remy - Assistant Director, Human Resources

Arlene Samowitz - Coordinator, Research

Wafaa Von Blon - Coordinator

Janet Woolery - Business Services Specialist

Zhen Z. Wu - Electro-Mechanical Engineer

Research Center Staff

Gabrielle Barnhart - Administrative Assistant, Small Smart Systems Center

Lise Crittenden - Office Manager, Center for Energetics Concepts Development

Ania Picard - Assistant to the Director, CALCE-Electronic Products and Systems Center

Lori Puente - Program Management Specialist, Center for Environmental Energery Engineering

For more information about our staff, visit:
http://www.enme.umd.edu/facstaff/staff/

From left to right: D.B. Galpoththawela, Corinne Remy, Tracy Chung, Jim Barrett, Zhen Wu, Erin Chen, Sami Ainane, Wafaa Von Blon, Margaret Brumfield, Penny Komsat, Dylan Hazelwood, Arlene Samowitz, Gabrielle Barnhart, Lita Brown, Avram Bar-Cohen, Chiquita Edwards, Lise Crittenden, Juanita Irvin, and Janet Woolery. Photo taken at the new Jeong H. Kim Engineering Building following a staff meeting.

ME Faculty & Staff Developments

Congratulations to the following ME faculty and staff who have experienced joyful developments in 2006:

Francis Patrick McCluskey IV was born March 17th, 2006, the second child born to Associate Professor Patrick McCluskey and wife Monica.

Graduate Program Coordinator Tracy Chung completed her Ph.D. dissertation in English on May 8, 2006 on the subject of "Megatextual Readings: Accessing an Archive of Korean/ American Construction."

Associate Professor Elisabeth Smela & department coordinator Juanita Irvin. Faculty and staff photos by John Consoli.

For more information please contact:
Department of Mechanical Engineering
University of Maryland
College Park, MD 20742

301.405.2410 Telephone
301.314.9477 Fax
www.enme.umd.edu

Review the Flu Queue

Partnership with Montgomery County Leads to Evaluation System Available Worldwide

With the threat of a bird-flu pandemic looming in Asia and Europe, it is often up to local communities to organize vaccines for their citizens. Yet many such communities, including counties here in the United States, lack the expertise to design their clinics to process patients quickly.

Researchers in the department of mechanical engineering have developed software that can help public health officials design mass dispensing and vaccination clinics and streamline their processes, ensuring that the optimal number of people will be vaccinated quickly, especially in times of crisis. Public health professionals from around the world can download the program for free to evaluate congestion in their clinics and find ways to streamline their operations.

The software, implemented in Microsoft Excel, was developed after extensive time studies at exercises for mass smallpox vaccination and for mass dispensing of antibiotics in case of anthrax. Additional data is being collected this year at real flu vaccination clinics. **Jeffrey Herrmann**, an associate professor in the Department of Mechanical Engineering and the Institute for Systems Research at the Clark School, developed the system.


Herrmann

While there are existing clinic planning models available for evaluating clinic capacity, Herrmann's clinic planning model also tackles the problems of congestion and line formation, which other models do not. General queuing software exists, but these are not specifically meant for mass dispensing and vaccination clinics. Testing of the queueing system was performed in a Montgomery County, Maryland influenza clinic.

The clinic planning model can be used now to create emergency preparedness plans and during the early stages of an event.

"Should mass dispensing or mass vaccination be needed, the software can help public health officials adjust their plans to respond to the scenario that is happening," Herrmann says. "They can quickly make important decisions that will affect how fast their citizens receive treatment." By easing congestion in these facilities, widespread panic is much less likely to develop in the face of a possible pandemic like the bird flu.

Planners in Montgomery County recently used the model while creating their plans to respond to a pandemic flu. "In a couple of hours, they considered many different alternatives before selecting the clinic design that was best for their situation," says Herrmann.

Kay Aaby, director of Montgomery County's Advanced Practice Center for Public Health Emergency Preparedness and Response, collaborated on the research with Herrmann and has used the software.

"Public health officials really need to embrace the many new technologies and resources available and partner with our non-traditional partners such as engineering schools who can give insight where public health is challenged," Aaby says.

The software takes into account factors such as staffing, space within the clinics and the flow of patients into them (such as whether they will be arriving in buses or individually). The program can show clinic managers how an increase in staff levels will affect the facility's ability to process more people—even calculating the number of people in line and their approximate average wait time at any station in the clinic.

"Modeling is a very good way of validating our plans," says Aaby. "You can take this model and plug in your plans to see where you need to make adjustments."

The software can be used to evaluate not only the plans for a vaccination clinic, but also any type of facility that dispenses medicine or conducts other types of emergency response activities. The system was developed in cooperation with the Centers for Disease Control.

In addition to Montgomery County planners in other jurisdictions around the country are collaborating on the research and/or using the software to design their clinics. These jurisdictions include Owensboro, Ky.; Cambridge, Mass.; Anoka County, Minn.; St. Louis County, Mo.; Burlington County, N.J.; Corteret County, N.C.; Philadelphia, Pa.; Collin County, Texas; Washington, D.C.; and Wicomico and Worcester counties in Maryland.

"This software is a great example of how engineering techniques can be used to help others," Herrmann says. "It has been a team effort. The public health emergency preparedness planners have been wonderful collaborators and have provided valuable input and feedback. The students working on the project have worked hard to create a useful tool that can have a great impact."

Computer Integrated Manufacturing (CIM) Lab Mass Vaccination Project:
http://www.isr.umd.edu/Labs/CIM/projects/clinic/index.html

Advanced Practice Center for Public Health Emergency Preparedness and Response:
http://www.montgomerycountymd.gov/hhstmpl.asp?url=/content/hhs/phs/APC/index.asp

excellence

Professor James Wallace Recognized for Outstanding Service


Wallace

Mechanical Engineering faculty were honored at the Faculty Recognition Event and Dinner on Friday, May 12 at the Samuel Riggs IV Alumni Center. Special recognition was bestowed by the department on Professor **Jim Wallace** for his outstanding academic career, Kirwan Undergraduate Education Award, and CASE Professor of the Year Award.

The Kirwan Undergraduate Education Award is one of two annual prizes established by former University of Maryland President William E. Kirwan and Patricia H. Kirwan. The award recognizes Wallace's 30-year career of extraordinary dedication to undergraduate teaching and the leading role he played in launching three major University initiatives: the CORE Program, College Park Scholars, and Gemstone, which have enriched the lives of countless Maryland undergraduates and will continue to do so.

Last year Wallace was named the 2005 Maryland Professor of the Year by The Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education (CASE), honoring Wallace for his outstanding undergraduate teaching in mechanical engineering and for leading the university's development of undergraduate initiatives dealing with the intersection of science, technology and society.

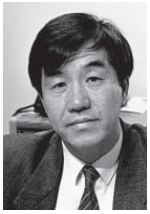
Keystone Academy Fosters Great Fundamental Teaching

Two ME professors are among the six A. James Clark School faculty who have been named to Keystone: The Clark School Academy of Distinguished Professors. The program fosters exemplary undergraduate teaching skills and commitment to excellence in fundamental engineering courses.

William Fourney, chair and professor of aerospace engineering and professor of mechanical engineering, was selected as lead Keystone Professor. The other Keystone professors are **Kenneth Kiger,** mechanical engineering (ME); **Guangming Zhang** (ME and Institute for Systems Research); Peter Kofinas, chemical and biomolecular engineering; Bruce Jacob, electrical and computer engineering (ECE); and Wesley Lawson (ECE).


Kiger

Professor Zhang received the 2004 Clark School's Poole and Kent Outstanding Teaching Award for Senior Faculty. Professor Ken Kiger was granted the National Science Foundation CAREER Initiation Award in 1997. "Keystone courses will be a good vehicle to show what engineering is all about, and we hope to create some excitement about the students' next four years at Maryland," says Kiger.


Zhang

Keystone professors receive renewable three-year appointments with a base salary increase and discretionary funds to support their activities, and are assisted by additional support personnel in covered courses.

ENES 100: "Introduction to Engineering" is the first course to be taught by the Keystone Professors. Other fundamental engineering courses will be included in the future.

"Keystone will help to improve student retention and graduation rates by ensuring students the best possible learning experience in the early, formative stages," said Nariman Farvardin, professor and dean.

New Endowments and Donations Help Mechanical Engineering Students

The Department of Mechanical Engineering in the A. James Clark School of Engineering is pleased to announce the establishment of The Aris and Marianne Mardirossian Endowed Scholarship in Mechanical Engineering, to be awarded to recipients in the '06-'07 academic year. The purpose of the endowment is to provide annual scholarships to mechanical engineering students.

The donation of $150,000 from Aris Mardirossian is one of several scholarships available to students in the Clark School and ME department thanks to the generosity of alumni and faculty. Other recent gifts include The Professor Boris L. Krayterman Memorial Scholarship Endowment for mechanical engineering students, and The Ruth and Sam Salzberg Family Endowment for ME students with the intention of working in the construction field. Both of the above are also available in in '06-'07. This year an award was also made to undergraduate ME student Nicholas Peretta for the Arsen Mardirossian Scholarship, established in April 2001 by the department to honor Aris Mardirossian, who has made many contributions to the department.

In the Spring 2006 semester, over 150 scholarships were given to students in the Clark School.

Last year Professor of Mechanical Engineering and Chair of Aerospace Engineering **William Fourney** donated $30,000 to endow a scholarship fund for students who transfer into the Clark School to study mechanical or aerospace engineering. The Fourney Scholarship Endowment will provide at least two $1,000 scholarships each year.

In addition to supporting mechanical engineering students, donors can invest in faculty research, laboratories and initiatives. For more information on how you can help the mechanical engineering department and Clark School, please visit:

http://www.eng.umd.edu/giving/index.html

studentNEWS

Dick Awarded Fellowship, Support for Study in Japan


Dick

Andrew Dick won a one-semester Dean's dissertation Fellowship for the 2006-2007 academic year. Andrew is a Ph.D. student working with Professor **Bala Balachandran** performing research on the oscillations of micro-resonators.

Andrew will also be studying at The University of Tsukuba in Japan this summer, thanks to research and travel support from the Japanese Society for the Promotion of Science and the National Science Foundation's East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI). Andrew will be hosted by Professor Hiroshi Yabuno in Tsukuba's Institute of Engineering Mechanics and Systems. There he will pursue additional research, the application of bifurcation control to promote grazing-type behavior for soft-impacts between atomic force microscope probes and biological samples.

ME Ph.D. Candidate Leila Jannesari Earns Amelia Earhart International Award

Mechanical Engineering Ph.D. candidate Leila Jannesari earned the 2006-2007 Amelia Earhart International Award in recognition of and support for her engineering research. Leila Jannesari is advised by Professor **Abijit Dasgupta**. The focus of her research is the mechanics of materials - especially fatigue and damage properties of material used in electronic products.


Jannesari

The award is granted annually by the Zonta International Foundation to highly qualified women pursuing a Ph.D. or doctoral degree in aerospace related sciences and engineering. The award will be presented by the Zonta district of Mid Atlantic North America in August.

Diorio Honored for Distinguished Teaching Assistantships


Diorio

Mechanical Engineering Ph.D. student **James Diorio** was recently recognized by Maryland's Center for Teaching Excellence with the 2005-2006 Distinguished Teaching Assistant award. The award was given at the Distinguished Teaching Assistant Ceremony on Friday, May 12 at the Samuel Riggs IV Alumni Center.

In March Diorio was named the Achievement Rewards for College Scientists (ARCS) Endowment Fellow for the 2006-2007 academic year.

Undergrad Thomson Earns Merrill, NOAA Scholarships

Mechanical engineering undergraduate senior **Jennifer Thompson** was chosen as a 2006-2007 Philip Merrill Presidential Scholar this spring. The award recognizes academic excellence in Maryland students and the important role teachers and faculty have as mentors. Thompson named Associate Professor **Greg Jackson** as the faculty mentor who made the most impact on her academic achievement.

In addition to recognizing outstanding seniors, the Philip Merrill Presidential Scholars Program also honors the K-12 teachers and Maryland faculty whom the students have selected.

In the fall of 2005 Thompson was also awarded a prestigious National Oceanic and Atmospheric Administration (NOAA) Ernest F. Hollings scholarship. Thompson was one of four students from Maryland to win the award, granted to only 100 students in the United States each year. Thompson is a participant in the Gemstone honors program on the College Park campus, which is directed by Professor of Mechanical Engineering **James Wallace**.

ME Graduate Students Awarded ASHRAE Grant-in-Aid Funds

Mechanical Engineering graduate students **Parisa Fouroughi & Gohua Kuang** have received the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Grant-in-Aid monetary awards for the scholastic year to support their research in fields of interest to the heating, ventilating, air-conditioning, and refrigerating (HVAC&R) industry.

The ASHRAE Graduate Student Grant-in-Aid Award Program provides research funds to full-time graduate students in support of development of innovative ASHRAE-related technologies. It is awarded once each year for use in the following academic year. Normally a total of 10 to 25 grants are made each year and the competition is open to both students in the U.S. and abroad. The department congratulates Parisa and Gohua for their outstanding achievement.

The grant is intended to encourage the student to continue his/her preparation for careers in the HVAC&R industry. The relevance of the research proposed by the candidate is a consideration for awarding the grant. Typical expenditures include living expenses, tuition, travel to ASHRAE meetings, experimental equipment, and supplies.

Foroughi was given the award for her research on the spot cooling of sensors and detectors at cryogenic temperatures utilizing a micro cooling system. Kuang will use his award to continue his efforts on development of a comprehensive mathematical model for study of mechanical stresses caused through operation of heat exchangers at harsh environments, such as military applications.

Their advisor Professor **Michael Ohadi** adds, "Our laboratory has been very successful in receiving these awards. Over the past ten years at least one of our students each year has received these highly competitive ASHRAE Grant-in-Aid awards."

Engineers Without Borders:
Project Brings Clean Water to Ecuadorian Communities


Kim

Associate Professor Jungho Kim and a student from the University of Maryland Engineers Without Borders (EWB-UMD) team visited the villages of Uduzhapa and Raric in Ecuador this winter to assess and plan for future water sanitation improvement efforts. Kim is a faculty advisor for the College Park chapter of Engineers Without Borders.

The villages are located in the Andean region of the Republic of Ecuador and have a combined population of 160 people. The closest city to Uduzhapa and Raric is Cuenca, which has a population of 350,000 and it is the third most important city in the Ecuador. Professor Kim was joined by Ecuador Project Manager and Team Leader Yohannes-Kassahun Bitsat, graduate students Javier Ordóñez and Sebastian Ordóñez, and private engineering specialists David Hill and Elizabeth Maloney. The EWB-UMD team was in Ecuador again this May to complete the planned projects, and were joined by Dr. Kim in June.

The lack of drinkable water and sanitation systems within each community forces the people of each community to obtain their water from river canals. The water quality in these canals is not optimal for human consumption leading to problems with parasitic infections and severe dysentery in children. The local government organization which handles water and sanitation in the area, Fondo de Inversión Social de Emergencia (FISE), is working on securing a cleaner water supply for these communities with the help of EWB. The project was requested by the Comite por Mejoras, the community-elected committee for the Uduzhapa and Raric villages.

Much of the EWB-UMD winter trip was to review and select appropriate methods of sanitation for each community's specific needs, such as a lack of latrines, septic tanks, and working water purification systems. The chapter plans on designing and constructing an efficient and sustainable sanitation system for both communities and a shared school, including the construction of forty new latrines.

So far the team has completed the construction and rehabilitation of a water collection and supply system from two springs to each village. A new spring was discovered 500 meters away from the school, and the construction of a collection and storage system with PVC pipes into the village and existing system is underway.


Above: Villagers dig a well in Raric that allows the testing of water quality with a perc test, which will help the EWB-UMD team evaluate the potential potable water resources in the area. The water was tested for Ph, iron, alkalinity, hardness, chlorine, nitrite and nitrate levels.


Above: A functioning water sanitation facility in a village near Uduzhapa and Raric, built by a previous EWB-UMD group led by Dr. Peter Chang of Civil Engineering. The team hopes to build smaller facilities in Uduzhapa and Raric, Guatemala.

ME Graduate Program Rankings Positive in 2006

U.S. News & World Report "America's Best Graduate Schools 2007" Releases Favorable 2006 Ranking Statistics

U.S. News & World Report's "America's Best Graduate Schools 2007" ranks the Department of Mechanical Engineering graduate program at Maryland as one of the best in the nation. The Mechanical Engineering graduate program ranked 24th overall, and in the top 15 among public institutions. The department ranked just below Johns Hopkins, Ohio State and Texas A&M Universities (all tied at 20th), and ahead of UC–Santa Barbara, the University of Pennsylvania, and the University of Southern California. In 2005 the ME graduate program ranked 20th, and 24th in 2004.

The A. James Clark School of Engineering rose to 15th, tied with University of California–Los Angeles (Samueli) and the University of Wisconsin–Madison.

ME "Most Popular" Doctoral Degree at Maryland in 2006

During the May 2006 graduation ceremony it was announced that the department graduated 40 doctoral students in 2006, making ME the most popular Ph.D. degree on the College Park campus.

Terps Racing, Human-Powered Submarine Teams Gear Up for a Fast and Furious '06-'07 Season

Under the direction of Mechanical Engineering Lecturer **Greg Schultz**, students from the University of Maryland Society of Automotive Engineers (SAE) are set to compete in several summer competitions with vehicles of their own design. Terps Racing offers Maryland undergraduate students the opportunity to design, build and race their own baja all-terrain and formula racing vehicles in various regional and national competitions. The vehicle construction and racing is part of the ENME 408 Selected Topics in Engineering Design class.

Formula SAE and Mini-Baja Terps racing invites students of any major to participate, although most are engineering students. Vehicle design and construction for next year's competitions is already underway.

Above: ME senior Gustavo Plaza prepares the formula vehicle frame.

Terps Racing Website:
http://www.terpsracing.umd.edu/

The University of Maryland's Human Powered Submarine Team (HPS) is working on competing again in July 2007 with their team of 30 cross-disciplined engineering students. This year the students have worked on restoring and improving the 2003 class winning boat *RSR Fourier*. Next year they plan on designing and building a new boat while finishing the construction of another boat that was started in March of 2005, for a total of three boats competing in 2007. Comprised primarily of aerospace and mechanical engineers and operational since 1996, the team competes at the International Sumbarine Race at the Carderock division of the Naval Surface Research Center (NAVSEA), a race held every other year. At the 7th International Submarine Race, Maryland took first place in their division.

Above: ME undergrad James Michael prepares the human-powered submarine fiberglass shell for competition in 2007.

alumni NEWS


Ekezie

Obinna Ekezie, a 6'9" power forward/center for Lottomatica Roma's basketball team, is under consideration to represent Nigeria in the FIBA World Championship in Japan this fall. Ekezie is enrolled in the ME undergraduate program. "My dad is an engineer and I grew up wanting to be an engineer. Having that major taught me a lot about discipline," says Ekezie. He also gained discipline as a hoops player under Maryland coach Gary Williams.

Helena (Huiqing) Jin (Ph.D. '04), former Ph.D. student of Associate Professor **Hugh Bruck**, was recently profiled on the Engineers Week website as an ASME New Faces of Engineering Program. A native of China, Jin is a post-doctoral researcher at Sandia National Laboratories/California in Livermore, California. Jin's Ph.D. work concentrated on new metrological techniques for mechanical characterization at the microscale and nanoscale and involved advances in the development of nanometrological techniques. Since joining Sandia National Laboratories/ California, Jin has continued to make innovative contributions to the mechanical and material characterization of microsystems and nanostructured materials.


Lacey

Mary Lacey (B.S. '78), the only woman in the University of Maryland's undergraduate class of 1978 who majored in mechanical engineering, is now working on redesigning the way DOD civilian employees are hired, paid and promoted. Tasked with this duty in May 2004, she was appointed as the National Security Personnel System (NSPS) Program Executive Officer (PEO). Lacey started her DOD career by interning at the White Oak, Maryland, Naval Ordnance Laboratory while still in high school. She spent much of her career designing explosives and served as technical director of the Naval Surface Warfare Center before accepting her current position.

Professor **Keith Lindler** (B.S. '75, M.S. '78, Ph.D. '84) has been selected as the new Chair of the Mechanical Engineering Department at the U.S. Naval Academy in Annapolis, Maryland. Professor Lindler formerly served as the Program Director for the Marine Engineering curriculum at USNA before a merger of that program and the Mechanical Engineering program earlier this decade. Lindler was a Maryland ME student advised by Professor Emeritus of Mechanical Engineering **Davinder Anand**.


Panchapeksan

Balaji Panchapakesan (Ph.D. '01), assistant professor of electrical and computer engineering at University of Delaware and 2001 Maryland mechanical engineering Ph.D., has developed a unique "nanobomb" that can literally blow up breast cancer tumors. "Make no mistake, we are focused on eradicating cancer," Panchapakesan said, explaining that the innovation holds great promise as a therapeutic agent for killing cancer cells, with particular emphasis on breast cancer cells.

Panchapakesan was also presented the National Science Foundation's prestigious Faculty Early Career Development Award. The award will support Panchapakesan's work in the development of carbon nanotube actuators, which have applications in both medicine and deep space research. The award is one of the National Science Foundation's highest honors for young faculty members, and it recognizes and supports the early career activities of those teachers and scholars who are most likely to become the academic leaders of the future. Panchapakesan was the first Ph.D. student advised by ME Professor **Don DeVoe**.

Scott Roza (M.S. '90) recently joined Bellevue-based i-Conclude as vice president of marketing and business development. In his new role at iConclude, Roza's mission will be to drive marketing strategy and develop iConclude's partner programs, including channel reseller partnerships, services partnerships, and technology alliances. Roza holds a B.S. degree in marine engineering from the U.S. Naval Academy, an M.S. degree in mechanical engineering from University of Maryland in 1990 under **Don Barker**, an M.S. degree in mechanical engineering from Massachusetts Institute of Technology, and an M.B.A. from Massachusetts Institute of Technology's Sloan School.


Schrantz

Steve Schrantz (B.S. '84) has been named a Principal Engineer in Structural and Life Methods for GE Aircraft Engines in Evendale, Ohio. Steve has worked at GE specializing in Finite Element Analysis Methods in the Rotating Parts Center of Excellence. Steve is a licensed Professional Engineer in Ohio, received an MS degree in 1987 from the University of Cincinnati, and his B.S. degree in mechanical engineering at Maryland in 1984. Steve and his wife, Danielle, have two children, Joe and Emma, and live in West Chester, Ohio.

In Memoriam

James Martin Butler, 2000 ME Graduate

The Department of Mechanical Engineering extends its condolences to the family of James Martin Butler of Olney, Maryland. James received his BS in Mechanical Engineering from Maryland in May 2000. He was working with BAE Systems since his graduation.

James passed away on Sunday, July 24, 2005. He was the beloved son of John J. and the late Madelon D. Butler; brother of Matthew Joseph and the late Michelle Ann Butler; grandson of Martin and Isabel Drain, and James J. and the late Catherine M. Butler. Memorial contributions may be made to: Cystic Fibrosis Foundation, 6931 Arlington Road, Bethesda, MD 20814.

John Warren Jackson
January 29, 1912 – July 9, 2005

Mechanical Engineering faculty John Warren Jackson passed away on July 9, 2005, survived by daughter Sharon Jackson Clark and granddaughter Kristen Leone. Born January 29, 1912, Professor Jackson was awarded Emeritus status in 1976, having served in the mechanical engineering department from 1942 to 1975.

Above: John Warren Jackson, January 29, 1912 – July 9, 2005.

ME Seniors are Tough Terrapins!

Mechanical engineering seniors Cara Sanderson Martin and Tristan Churm are busy all year, not just during the academic semesters.

Cara, pictured below on the far left, is enrolled in the joint B.S./M.S. program and plans on starting her master's work with Professors Reinhard Radermacher and Yunho Hwang in the Center for Environmental Energy Engineering (CEEE). She started her own project with CEEE in the Spring 2006 semester as part of the undergraduate Engineering Honors program.

Cara is "extremely involved" in the campus Ultimate Frisbee Club as the women's team co-captain and club co-president. During her freshman and sophomore years she was also active with the campus Equestrian Club.

Above: ME B.S./M.S. student Cara Sanderson Martin (left) with Ultimate Frisbee Club co-captain Megan Cuoco (right).

Above: ME senior Tristan Churm playing for the University of Maryland Rugby Football Club.

In addition to being a member of the University of Maryland Rugby Football Club since '02, ME Senior Tristan Churm (above right) has been working with the Terps Racing team as one of the chief engineers on the formula vehicle project. Tristan helped design the body and coolant system for a car that will compete this summer and fall in several national competitions. Tristan will use the engineering skills learned from his Terps Racing team experience at an internship with Pierce Mechanical as an assistant project manager this fall.

Metrics is published twice a year for alumni and friends of the Department of Mechanical Engineering at the A. James Clark School of Engineering.

Your alumni news and comments are welcome. Please send them to: Editor, Department of Mechanical Engineering, 2181M Glenn L. Martin Hall, College Park, MD, 20742-3035.

Phone: 301.405.2410
Fax: 301.314.9477

Visit our Web site at:
www.enme.umd.edu

Do You Remember?

This year the campus celebrates its 150th Anniversary, and in honor of this wonderful time we feature a vintage mechanical engineering photo. Can you identify what year this photo was taken? Were you a student who used the lab in the photo? Send your answers to *jcb@umd.edu* and you may be eligible for a special anniversary gift.

Fabrication Shop - photo marked 'Mechanical Engineering', date and photographer unknown. University of Maryland Archives.

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