



ME TRICS

M E C H A N I C A L E N G I N E E R I N G

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

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Maryland Nanotechnology Research & Education Ranked #1

The May / June 2005 issue of *Small Times Magazine* ranks the University of Maryland first in nanotechnology research and education. Maryland also ranked second in microtechnology research efforts, tied with Michigan.

The article makes note of the development of the new Jeong H. Kim Engineering Building, the Maryland Center for Integrated Nano Science and Engineering (MCINSE), nearly 100 faculty, 120 published papers in 2004, and more than 400 grants for the nano science research ranking, and five undergraduate and six graduate-level nano-related courses for the education ranking.

"Mechanical Engineering is clearly contributing in a profound way to both these areas and providing significant leadership in micro-engineering. We take great pleasure in these rankings and in the affirmation of the path we have chosen to follow," states department Chair Avram Bar-Cohen.

In addition to the micro-technology curriculum in the department's undergraduate and graduate programs, the Mechanical Engineering (ME) department also boasts centers and labs that actively pursue micro-systems and nanotech research. ME faculty lead the Maryland Micro-Electro-Mechanical

Systems Lab (MML), the CALCE Electronic Products and Systems Center (EPSC), and the Smart Materials and Structures Research Center (SMSRC) which are all part of the Mechanical Engineering department and ME faculty research. The Small Smart Systems Center (SSSC), a college-level center, is also directed by ME Professor Amr Baz.

Michael Zachariah, Professor of Mechanical Engineering and Chemistry, is the Director of the new Center for Nano Manufacturing and Metrology, which brings together experts from both the University of Maryland and the National Institute of Standards and Technology (NIST). This center seeks to improve nano-manufacturing methods and quality control for large-scale nanotechnology products. Zachariah is also the Director of Maryland's Center for NanoEnergetics Research and the Co-Laboratory for Nanoparticle Based Manufacturing and Metrology, another research effort with NIST.

Small Times Media, publisher of *Small Times Magazine*, is the leading source of business information about micro- and nano-technology, detailing technological advances, applications, and investment opportunities to help business leaders stay informed about these fields.



2003-2004 Annual Report
A special insert to this issue of METRICS following page 8



Newsmakers
ME Hosts Tsunami Science Forum as part of greater Tsunami Relief Day page 9



Student Volunteers
ME undergrad Zach Kline spends summer assisting water purification development in Uzbekistan page 12



Message From the Chair

I AM PLEASED TO WELCOME you to the Fall 2005 issue of METRICS, not long after the Mechanical Engineering Department was given accolades from *Small Times Magazine*, the leading source of business information about micro- and nano-technology. *Small Times* ranks the University of Maryland first in nanotechnology research and education. Maryland also ranked second in microtechnology research efforts, tied with Michigan.

This is due in no small part to the efforts of the department as a unit and its constituent parts, including faculty, students, alumni and staff that have made 2005 a tremendously fruitful year. As we begin the Fall semester at Maryland the offices, labs, and classrooms are already abuzz in preparation for what promises to be a great academic year.

Over the summer undergraduate students from the University of Maryland Society of Automotive Engineers (SAE) competed in two competitions with vehicles of their own design under the direction of ME lecturer Greg Schultz. Entering both a formula vehicle and a mini baja vehicle in separate competitions across the nation, our students were able to experience first hand how to design, build, test and market a competitive working product. This is just one of many undergraduate projects with faculty that

prepare our undergrads for a future in some of the many facets of mechanical engineering.

In addition to being well-prepared in their fields of study, our students also display a well-rounded life outside of engineering, or in the case of undergrad Sam Hollenbach, the promise to shine on the football field as quarterback for the upcoming Terps football season. Another undergraduate student, Zachary Kline, volunteered his knowledge of engineering last summer in Central Asia, assisting in drinking water quality improvement for the people of Uzbekistan. Read more about his work on page 12.

This year the undergraduate program ranked 20th overall in U.S. News & World Report's "America's Best Colleges 2005." The department ties with Rensselaer Polytechnic Institute and Virginia Tech for this position.

Also this year our graduate program ranked 24th overall by U.S. News, 15th among public institutions, and produced more Ph.D. and M.S. students than ever before. More news about our graduate program student successes can be read on page 11 of this issue, detailing numerous awards for best papers, fellowships and grants.

The department celebrates several cooperative agreements made this year with the Department of Defense that

benefit the agencies, our nation, and our faculty and students. Our faculty will be sharing their expertise with the Navy, Army and even NASA in training and research efforts. International cooperations continue with agreements made with China and Poland and faculty exchange to Israel. Numerous agreements with local technology companies were recognized by the Maryland Industrial Partnerships Program (MIPS) this year, promoting research projects that help local companies develop technology-based products.

These developments within the department ready our students, faculty and our constituents for the future of mechanical engineering. The scales of design and fabrication continue to shrink. Minimization of mass and required energy are now a common expectation in product development. "Smart" materials with embedded controllers are no longer a novelty. The application of mechanical engineering principles to biological systems is being pursued by a greater and greater number of new graduates. Rather than signaling the end of mechanical engineering, these developments portend the continued, and perhaps even more rapid, evolution of the profession in the decades ahead - where we intend to hold a secure place.

- Dr. Avram Bar-Cohen

Honored Faculty

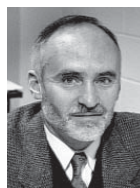
Professors George Dieter & Jim Duncan Recognized for Service



Dieter

Professor **George Dieter** received the President's Medal for 2004 at the Faculty and Staff Convocation on October 12, 2004.

This award is the highest honor bestowed on a member of the university community. Dieter is recognized for his many contributions to a campus culture of excellence, including significant increases in research expenditures, promoting research collaboration with industrial and scientific constituencies, and aiding a campus-wide Total Quality program. He is also recognized for his contributions to the professional engineering community with several long-running publications and leadership roles in numerous professional societies.



Duncan

Professor **Jim Duncan** was honored with the Distinguished Scholar-Teacher award at the previously mentioned convocation honoring outstanding faculty at Maryland.

The award recognizes Duncan for being a dedicated instructor who exhibits a philosophy of encouraging students to master core topics and inspiring independent thinking in each classroom setting. In addition, Duncan was recognized for his research contributions in the field of fluid dynamics.

Last year Duncan was also awarded the Poole and Kent Teaching Award for Senior Faculty of the College of Engineering.

ME Faculty Jeong Kim Named Bell Labs President



Kim

Mechanical Engineering alumnus, benefactor and Professor of Practice **Jeong H. Kim, Ph.D. '91**, returns as President to Lucent Technologies, Inc., according to an announcement released April 19 by Lucent.

Dr. Kim obtained his doctorate in reliability engineering at the Clark School after serving in the United States Navy Nuclear Submarine Service. He quickly became a leading entrepreneur in the field of wireless communications. His company, Yurie Systems, developed a revolutionary asynchronous transfer mode (ATM) switch for military and commercial uses. He sold the company to Lucent Technologies in 1998 and served at Lucent as president of Broadband Carrier Networks and

head of its Optical Networking Group. He left Lucent in 2001, when he became professor of practice at the Clark School, with joint appointments in electrical and computer engineering and mechanical engineering. Dr. Kim continues his work as professor of practice in the department's Reliability Engineering program.

Kim has generously supported the construction of the new Jeong H. Kim Engineering Building, which features multidisciplinary research labs and state-of-the-art technologies. The building will have its formal dedication on September 19, 2005.

In February of 2004, Kim was among seventy-six new members and 11 foreign associates elected to Fellow of the National Academy of Engineering (NAE).

Professor Miao Yu Joins ME



Yu

Professor **Miao Yu** joined the Mechanical Engineering Department in January as a tenure-track Assistant Professor. Professor Yu conducts research in fiber-optic sensors and has a vision for creating a robust research and educational program in sensor engineering at Maryland.

Professor Yu received her Ph.D. in Mechanical Engineering from the University of Maryland in December 2002. Prior to coming to Maryland she received her B.S. and M.S. degrees in Engineering Mechanics from Tsinghua University, Beijing, China. Yu's research interests include sensor systems, adaptive optics, and theoretical and experimental mechanics.

Awards received include the Invention of the Year Award (2002) in the Physical Sciences Category from the University of Maryland. Yu also has three invention disclosures, a U.S. patent, and two pending U.S. patents in the area of fiber-optic sensor systems. She has published several archived papers in the *Optical Society of America* journal, among other publications.

Smela Promoted to Associate Professor



Smela

Elisabeth Smela was recently awarded the status of Associate Professor with tenure in Mechanical Engineering.

This year Smela was also awarded the E. Robert Kent Outstanding Teaching Award for Junior Faculty by the college. Smela received the award for her commitment to education through teaching, course development, curriculum innovation, and mentoring. She has developed three new courses, including a two-part MEMS course, and a graduate course in active polymers.

Smela was recently the recipient of the highly prestigious Presidential Early Career (PECASE) Award for 2003, presented in September 2004. The award is the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers. Elisabeth was nominated by NSF for developing a highly innovative actuator technology, employing dielectric elastomers for microrobotics, flying microdevices, and micromanipulation. For NSF, that year's Presidential Career Awards marked the first time that a majority (12) of its awardees were women.

Campus Honors David Holloway



Holloway

A dinner and roast honoring the achievements of Professor **David Holloway** was held the evening of October 30 at the Maryland Golf Club. Members of The Society of Automotive Engineers (SAE) International,

the SAE DC Chapter, and many of Holloway's students from the past and present were among the 80 people in attendance. The event was coordinated by ME Lecturer Greg Schultz and Scott Schmidt from the Alliance of Automobile Manufacturers.

Holloway played an integral role in elevating the impact of "project-based" learning for Maryland automotive engineering students and undergraduates throughout the country. In the past two decades such project-based learning has become synonymous with excellence in engineering education and has helped propel the ME Department to the top ranks of Mechanical Engineering education in the country. "We all owe Dave Holloway a great debt of thanks for his success in educating many generations of outstanding Terrapin engineers," states Professor Avram Bar-Cohen, Chair of the Department of Mechanical Engineering.

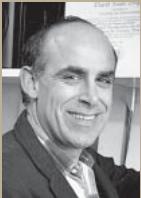
In Brief



Bar-Cohen

Chair and Professor of Mechanical Engineering **Avram Bar-Cohen** was appointed as a **Distinguished University Professor** in recognition of his work in the thermal management of electronic systems. Distinguished University Professors are selected from faculty who have been recognized nationally and internationally for the importance of their scholarly and/or creative achievements and who have demonstrated the breadth of interest characteristically encompassed by the traditional role of scholar, teacher, and public servant.

Bar-Cohen was also one of the five 2004/2005 lecturers who participated in the prestigious Southwest Mechanics Lecture Series (SWMLS). Bar-Cohen traveled to the University of Oklahoma and Oklahoma State to address the challenges and opportunities in the thermal management of nano electronics. His lecture was also broadcast by video to University of Texas - Arlington. Professor Bar-Cohen is the first Maryland lecturer in nearly 30 years to participate in the SWMLS.



Bigio

Associate Professor of Mechanical Engineering **David Bigio** was named Fellow by the Society of Plastics (SPA) Engineers in May. Bigio was also awarded Fellow status by the American Physical Society (APS).



Bruck

Associate Professor **Hugh A. Bruck** was granted a Fulbright Scholar award by the Council for the International Exchange for Scholars in the 2005-2006 academic year. Professor Bruck will pursue research and teaching activities with colleagues at Tel Aviv University (TAU) in Israel. During his stay at TAU, Bruck will be hosted by Professor Jacob Aboudi, an internationally recognized leader in the area of micromechanical modeling of materials.



Han

Associate Professor of Mechanical Engineering **Bongtae Han** won the Gold Award in Analysis and Simulation of the 1st Annual Samsung Technical Conference on November 9, 2004. The paper, Predictive Modeling Solutions for Next Generation LCD Driver IC Chip Package, was authored by Professor Han, Changsoo Jang and Seongyoung Han.



Piomelli

Professor of Mechanical Engineering and Director of ME Graduate Studies **Ugo Piomelli** was the keynote lecturer at the 2005 Research Symposium on Environmental and Applied Fluid Dynamics, held on May 19 at the Johns Hopkins University in Baltimore, MD. Piomelli discussed the generation of turbulence in hybrid computations in which large-eddy simulations are coupled to the solution of the Reynolds-averaged Navier-Stokes equations. Piomelli was recently awarded Fellow status by the Institute of Physics and is also a Fellow in the American Physical Society (APS) and an Associate Fellow in the American Institute of Aeronautics and Astronautics.



Ramahi

Associate Professor of Mechanical Engineering **Omar Ramahi** was awarded the 2004 Purple Cam Shaft Award by the Maryland Tau Mu Chapter of Pi Tau Sigma. The recipient of this award is a professor whose class is difficult and challenging, yet fair. Because of Ramahi's demand for superior work, his students felt that they left the class better prepared for their careers as engineers. The 2005 recipient of the award was visiting Professor and Lecturer **Sergio Preidikman**.



Schmidt

Associate Professor of Mechanical Engineering **Linda Schmidt** was selected from a group of more than 90 nominees to participate in the Women in Engineering Leadership Institute (WELI) Leadership Conference April 28 through May 1st, 2005 in Cocoa Beach, Florida. Participants were selected by WELI through a nomination process. The conference is supported by the National Science Foundation, University of Central Florida, Northeastern University and University of Pennsylvania.



Zhang

The Tau Mu Chapter of Pi Tau Sigma, the University of Maryland's Honorary Mechanical Engineering Society, honored faculty and students during their initiation ceremony on May 4th. Associate Professor of Mechanical Engineering **Guangming Zhang** was awarded the Faculty Appreciation Award for his friendliness and commitment to students outside of class. Pi Tau Sigma started this award to recognize professors whom they feel have performed above and beyond the high expectations of university professors. Associate Professor **Linda Schmidt** also received a plaque recognizing her seven years of service to Pi Tau Sigma as a faculty advisor.

Faculty & Students Win Invention, Business Plan Awards

Mechanical Engineering students and faculty won first place awards at two University of Maryland innovation and business plan competitions.

In April the Office of Technology Commercialization (OTC) at the



Smela

University of Maryland hosted their 18th Annual Invention of the Year Reception and awarded the Physical Science Invention of the Year Award to Benjamin Shapiro, Elisabeth Smela, Pamela Ann Abshire, and

Denis Wirtz for their Cell Sensor Based Pathogen Detection invention. This new technology will enable selective pathogen detection by exploiting the signaling machinery of living cells.

Each year a panel of judges, consisting 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.

The Office of Technology Commercialization (OTC) at the University of Maryland was established in 1986 to facilitate the transfer of information, life and physical science inventions developed at the university to business and industry. In the past 18 years, OTC has recorded more than 1,400 technologies, secured more than 225 patents and licensed nearly 750 technologies, generating more than \$22.6 million in technology transfer income. In addition, more than 40 high-tech start-up companies have been formed based on technologies developed at the university.



Smidts

Student-led start-up company Test2do received \$12,500 by winning the graduate student category of the 2005 New Venture Challenge, the University of Maryland's \$35,000 business plan competition held on May 6. Test2do's team includes Associate Professor Carol

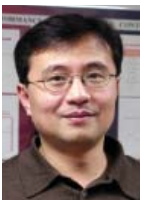
Smidts and Ph.D. student Avik Sinha, both from the Department of Mechanical Engineering, as well as Jean LaFonta, manager of administrative service for the Centre for Scientific Computation and Mathematical Modeling.

Test2do is developing front-to-back, automated tools for testing software. The tools are designed to make software more reliable, and to reduce the costs of testing and fixing faulty programs. U.S. corporations spend \$60 billion per year to repair software defects, according to the company. Test2do's tests have shown its tools yield a three-fold gain in effectiveness, and a two-fold gain in efficiency, over current tools in the market.

During the competition, 6 teams of finalists presented their ideas for new companies to a panel of 5 distinguished judges from the regional technology venture community.

5

Professors Han & Pecht Honored With IEEE Best Paper Award



Han

Associate Professor of Mechanical Engineering Bongtae Han and Professor of Mechanical Engineering Michael Pecht were honored with the The Institute of Electrical and Electronics Engineers

(IEEE) Transactions on Components and Packaging Technologies editor's Best Paper Award of 2004.

Their paper, "Characterization of hygroscopic swelling behavior of mold compounds and plastic packages," co-written by Ph.D. student Eric Stellrecht, was published in the September 2004 issue of *IEEE Transactions on Components and Packaging Technologies*. The paper was



Pecht

selected from nearly 100 manuscripts published in that year's volume of *Transactions*, which included many outstanding papers from authors from around the world.

The award was presented at the 55th Electronic Components and Packaging Technology Conference (ECTC) in Lake Buena Vista (Orlando) Florida during the CPMT Luncheon on June 2, 2005.

The Award includes a \$2500 cash prize (shared by the authors) and a certificate for each author. The department congratulates the authors on this wonderful recognition of their scholarship.

Radermacher Granted Exceptional Service Award



Radermacher

Professor of Mechanical Engineering Reinhard Radermacher was given the Exceptional Service Award from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) at the Society's

2005 Annual Meeting this June in Denver, Colorado. The award recognizes ASHRAE members who have served the Society faithfully and with exemplary effort. Radermacher was recognized for his work as an internationally recognized expert in energy conversion systems, integrated Cooling, Heating and Power (CHP) Systems, heat pumps, air-conditioners and refrigeration systems.

CALCE Receives High Marks from Navy BMP

The Computer Aided Life Cycle Engineering (CALCE) Electronic Products and Systems Center (EPSC) at the University of Maryland, College Park hosted a Best Manufacturing Practices (BMP) survey of its practices the week of November 1, 2004.

BMP conducted the survey in the Department of Mechanical Engineering. Through the unique survey process of BMP, an organization's practices are gathered, validated, and documented in a survey report. Organizations that are surveyed receive feedback and recommendations from BMP's survey team of experts, enjoy a high level of visibility through the distribution of their Survey Report, and are recognized by the BMP Program.

BMP reports are disseminated to a large U.S. industrial base. They are available in print and on-line on their website at www.bmpcoe.org. Numerous companies and government facilities access these reports daily looking for solutions to reduce costs and to improve their overall competitiveness in both domestic and global markets.

CALCE presentations prepared for the survey showed some very unique capabilities that the Center possesses especially in the area of health monitoring, uprating and obsolescence forecasting.

CALCE EPSC is recognized as a founder and driving force behind the development and implementation of physics-of-failure approaches to reliability and life cycle prediction. In 1999, CALCE EPSC became the first academic research facility in the world to be ISO 9001 certified. Over the past 15 years, CALCE EPSC has developed methodologies, models, and tools that address the design, manufacture, analysis, and management of electronic systems. Maryland is a partner in the BMP Center of Excellence, which made this survey an exciting event.

More information about CALCE:
<http://www.calce.umd.edu/>

Maryland, U.S. Army Sign Test Center Agreement

The Maryland Center for Automotive Research and Testing (MCART) and the University of Maryland entered an Educational Partnership Agreement with the U.S. Army Aberdeen Test Center (ATC) in Aberdeen, Maryland in April. Present at the April agreement signing ceremony at the ATC were University President C.D. Mote, Jr., Dean of the School of Engineering Nariman Favarin, and Chair and Professor of Mechanical Engineering Avram Bar-Cohen in addition to ME faculty Greg Schultz, Professor Balakumar Balachandran, Associate Professor Linda Schmidt, and Professor Edward Magrab. Also present were Brian Darmody and Rae Grad of the Office of the President of Maryland.

The agreement will aid UM students by encouraging and enhancing study in automotive engineering and test technologies. As of mid-April, up to five students, including two each from Electrical and Mechanical Engineering, will be hired to assist research and development at the ATC through the agreement. An additional part of this agreement awarded Professor Balakumar Balachandran \$125,000 to carry out research at the ATC and to help provide guidance in the areas of rigid body dynamics and controls, as well as to develop requirements and specifications for ATC's proposed Vehicle Durability Simulator (VDS).

MCART is managed by ME lecturer Greg Schultz, who teaches the ENME 489V Vehicle Dynamics course, and is the advisor for the Formula One SAE racing team and Mini Baja vehicle project.

The agreement recognizes the importance of education to the future and economic well-being of the nation, as well as the importance of the resources of the ATC to business, industrial, and educational institutions in Maryland and the United States.

Under the partnership, MCART will:

- Provide access to people, data, programs and facilities;
- Be a virtual resource for automotive engineering, testing, research, education, and technology demonstration;
- Provide the opportunity for participation in collaborative research in the disciplines mentioned above.

Following the signing, the visitors were given a demonstration of the roadway simulator, the largest automotive simulator for vehicle dynamics in the world. After the simulation the tour proceeded to the Munson Test Area, an automotive field test area consisting of nine miles of roadways and test courses encompassing 150 acres.



University of Maryland President C.D. Mote, Jr. observes the Roadway Simulator in action at the Aberdeen Test Center.

CEEE Hosts Advanced “Combined Heat and Power” System Demo and Dedication

THE CENTER FOR ENVIRONMENTAL ENERGY ENGINEERING (CEEE) at the University of Maryland demonstrated an advanced combined heat and power (CHP) system on September 9, 2004. This system simultaneously generates power and cooling for commercial buildings and substantially increases the energy efficiency of these buildings. This demonstration was supported by DTE Energy Technologies, Inc. and Kathabar Systems, the manufacturers of the equipment. Substantial funding for the CEEE CHP program is provided by the Office of Distributed Energy of the U.S. Department of Energy through a contract administered by Oak Ridge National Laboratory.

A dedication ceremony and reception was held on Thursday, September 9, from 5–6 p.m. at the Chesapeake Building on the University of Maryland campus. Pat Hoffman, Distributed Energy Program Manager, DOE; Dr. Mike Faubert, Vice President, DTE Energy Technologies; Bill Griffiths, Director of Engineering, Kathabar Systems; and Dr. Avram Bar-Cohen, Chair of Mechanical Engineering were featured speakers.

The CEEE assembled and tested a series of CHP systems at the Integration Test Center. The latest system was one of the first demonstrations to show that liquid desiccant systems are reliable and practical for commercial buildings. This system combines a 75 kilowatt (kW) energy|now® generator produced by DTE Energy Technologies with a KBERS liquid desiccant unit produced by Kathabar Systems. The electricity produced by the energy|now unit displaces utility purchases and heat recovered from its exhaust is used to power the dehumidification system. The Kathabar desiccant unit dehumidifies the ventilation makeup air that is supplied to the building, which substantially reduces the load on the existing air conditioning system.

The demonstration CHP system is designed to address an air conditioning load that is problematic in many commercial buildings – namely dehumidification. Inadequate dehumidification can lead to mold and mildew damage, indoor air quality problems, and uncomfortable conditions. Using a liquid desiccant unit reduces the size and cost of the conventional air-conditioning equipment, improves indoor air quality, provides better control of humidity and temperature and lowers emissions. Using waste heat recovered from the generator to power the desiccant system reduces the amount of electricity that must be purchased to power the conventional air-conditioning system.

Combined heat and power systems such as this demonstration unit are one of the best ways available to address the energy price and supply problems we face today. Conventional utility power plants throw away about two-thirds of the energy in the fuel they burn. Generating power in a CHP system located near the point of use enables the recycling of heat that otherwise would be wasted. This reduces operating

costs, lowers air pollutant emissions and increases energy supply reliability.

The CEEE test program supports further improvement in the cost and reliability of packaged CHP systems to help accelerate use of this valuable technology.

The 75 kW generator that DTE Energy Technologies has provided for this demonstration is packaged with an integrated heat recovery system. The unit features a low emission, low cost automotive natural gas-fired engine that is ideally suited for waste heat utilization applications. The ENI unit offers a pre-engineered “packaged” design, which reduces up-front engineering, site design and installation costs. It has the capability to support base load or peak operation and it can be sized to serve part or full load requirements. In addition, the unit can provide full power in the event of utility outages.

The Kathabar unit is a 4000 CFM liquid desiccant air cooling and dehumidification system. In this unit, a liquid desiccant solution absorbs humidity out of the ventilation air being supplied to the building and cools that air. The moisture that is absorbed by the solution is then driven out using the heat recovered from the DTE energy|now generator. Pre-conditioning the building ventilation air with the Kathabar unit reduces the refrigeration cooling load of the building about 25 percent.



From Left to Right: Patti Garland, Oak Ridge National Lab (ORNL); Avram Bar-Cohen, Chair, Mechanical Engineering; F. Michael (Mike) Faubert, VP of Engineering, DTE; Bill Griffiths, Director of Engineering, Kathabar; Ron Fiskum, Program Manager, DOE Distributed Energy Program; Pat Hoffman, Acting Director, DOE Distributed Energy Program; Dennis Moran, Director; Reinhard Radermacher, Director, CEEE.

For more information about CEEE, visit their website:
<http://www.enme.umd.edu/ceee/>

MIPS Program, Maryland Companies Award Funds to ME Faculty To Develop Technology-Based Products

Three faculty members from the Department of Mechanical Engineering at College Park were recipients of joint funds awarded from The University of Maryland's Maryland Industrial Partnerships Program (MIPS). A February 21 press release from MIPS announced a total award of \$3.2 million in funding to Maryland faculty for research projects to help 17 companies in Maryland develop technology-based products. Nearly \$500K of that amount was awarded to ME faculty MIPS projects, detailed below.

Total funding includes \$1.1 million from MIPS and \$2.1 million from Maryland companies. Maryland faculty and students conduct the projects in close coordination with company personnel. Funding rounds occur twice yearly.

ME-related projects include 3D inspection of automobile and aerospace parts, integration of advanced materials and structures into industrial molds, and noise control for industrial fans. Past MIPS recipients from the department include Elisabeth Smela's work with medical microvalves, Don DeVoe's development of a portable lab-on-a-chip system, and Henry Haslach's project creating a mobility assistance system for children with neurological disorders.

MIPS provides funding - matched by participating companies - for university-based research projects that help companies develop technology-based products. Companies with operations in Maryland are eligible, as are faculty from any of the University System of Maryland's 13 institutions. Projects must deal with innovative technological or scientific concepts and have direct commercial applications. MIPS contributes up to \$100,000 for each project year; projects can be funded for one or two years. There is no limit on company project contributions. All funds go towards the university research. Reported company matching

funds include both cash and in-kind contributions, such as salaries and wages, materials and equipment, travel and other expenses budgeted for projects.

MIPS is a program of the A. James Clark School of Engineering's Maryland Technology Enterprise Institute (MTECH), whose mission is to enable technology commercialization, strengthen companies, and catalyze new ventures in Maryland.

The 2005 awardees and brief descriptions of their products follows:

Company: Automated Precision, Inc. (Rockville)

Project: Develop algorithms and prototype software to perform 3D inspection of automobile and aerospace parts. The new system could enable 100 percent inspection, as well as reducing both its time and cost.

Total Project Budget: \$126,437

Partner Institution: University of Maryland, College Park

Principal Investigators: Dr. Kam Lau, President; Dr. Satyandra K. Gupta, Associate Professor, Department of Mechanical Engineering, Institute for Systems Research

Company: Rampf Molds Industries, Inc. (Hagerstown)

Project: Integrate advanced materials and structures technologies under development at the University of Maryland into molds manufactured by Rampf. These molds are sold to customers that manufacture concrete products, such as Pavestone. The new technologies will extend the life cycle of the molds, and possibly reduce their weight—and subsequent setup times.

Total Project Budget: \$275,251

Partner Institution: University of Maryland, College Park

Principal Investigators: Doug Clark,

Purchasing Manager; Dr. Hugh A. Bruck, Associate Professor, Department of Mechanical Engineering

Company: Warner Air, LLC (Randallstown)

Project: Developing an active noise control (ANC) system that can be used with Warner's axial fans. The project will include developing an adjustable controller to optimize noise cancellation for a specific installation.

Total Project Budget: \$104,103

Partner Institution: University of Maryland, College Park

Principal Investigators: Michael Warner, Managing Member; Dr. Amr M. Baz, Professor, Department of Mechanical Engineering

Pecht Signs Cooperation Agreement with Poland University

George E. Dieter Professor of Mechanical Engineering Michael Pecht visited Poland this September to sign an agreement of cooperation with the Technical University in Wroclaw, Poland. This trip was funded by a Collaboration in Basic Science and Engineering (COBASE) grant funded by the National Science Foundation (NSF). CALCE ESPC has initiated research with this university on the long-term reliability of lead-free solders. Wroclaw Technical University was represented by the Faculty of Microsystem Electronics and Photonics. The agreement was guided by a mutual desire to engage in cooperative efforts in the areas of research, teaching, and student exchanges and by a conviction that such efforts are in the mutual interest of both institutions.



Department of Mechanical Engineering Annual Report 2003-2004

Dear Friends, Alumni, Faculty, and Students,

The 2003-2004 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 2003-2004 towards the upper echelons of academia.

DURING THE PAST ACADEMIC YEAR, OUR FACULTY published nearly 130 journal articles, book chapters, and books, while presenting more than 300 Conference presentations and seminars, among them 14 Plenary and Keynote lectures. While our student population this year rose to 660 undergraduates and 355 graduate students, the Department awarded 162 BS degrees, 71 MS degrees and 22 PhD degrees. Research expenditures reached \$17.8 million, up by 15% from the previous year, bringing our overall department expenditures in 2003-2004 to more than \$22.9 million.

Reading through the list of the contracts, grants and awards earned by the ME faculty in 2003-2004 (starting on page 6 of this section), you will see 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 military agreements. Our list of research sponsors (page 8) continues to grow and diversify.

New faculty include the addition of Miao Yu, who specializes in sensor technology, and Yasser Shabana as a Fulbright Scholar. The inclusion of Adam Hsieh to our department compliments the Clark School's Bioengineering Graduate Program, while Emeritus Professors David Holloway and Davinder Anand announced their retirements. Erin Chen and Rachel Newmann were new inductees to a administrative staff assisting in the development and smooth working order of our day-to-day academic and research capacity of the department.

2003-2004 was another wonderful year for UMD's Mechanical Engineering Department. Your support, talent, commitment and skills have made this all possible.

- Dr. Avram Bar-Cohen

A special pull-out section to the Fall 2005 issue of *Metrics*

The Year in Review Avram Bar-Cohen Professor and Chair



Department at a Glance — FY 2004

46	Faculty
58	Professional Society Fellows
7	National Academy of Engineering Members
12	Journal & Book Series Editors
24	Journal Associate Editors
9	Published Books
20	Published Book Chapters
100	Published Journal Articles
293	Conference and Seminar Presentations
14	Plenary / Keynote Speakers
660	Undergraduate Students
1240/1360	SAT 25/75 Percentiles of Entering Freshmen
3.965/4.0	Average GPA of Entering Freshmen
38.5	Percentage of Women/Minority Entering Freshmen
20	Percentage of Undergraduates in Honors Programs
355	Graduate Students
2041	Average GRE of Entering Graduate Students
3.54/4.0	Average GPA of Entering Graduate Students
162	B.S. Degrees Awarded
71	M.S. Degrees Awarded
22	Ph.D. Degrees Awarded
\$17.8M	External Research Support
\$22.9M	Total Expenditures
228	Research Grants
234	Research Sponsors

2003-2004 M.S. Graduates & Advisors

Fall 2003

Bruce Baumgarten
Advisor: Dr. M. Ohadi

Paul Casey
Advisor: Dr. M. Pecht

Arvind Chandrasekaran
Advisor: Dr. P. McCluskey

Mark Edelen
Advisor: Dr. J. Cardenas-Garcia

Mukul Karnik
Advisor: Dr. J. Cardenas-Garcia

Eric Kommer
Advisor: Dr. S. Buckley

Bonnie Lawford
Advisor: Dr. L. Schmidt

Satchidananda Mishra
Advisor: Dr. M. Pecht

Lance Oh
Advisor: Dr. E. Smela

Subramanian Rajagopal
Advisor: Dr. M. Pecht

Lawrence Salzano
Advisor: Dr. P. Sandborn

Jun Shen
Advisor: Dr. P. Bernard

Vidyasagar Shetty
Advisor: Dr. M. Pecht

Amir Shoushtari
Advisor: Dr. M. Ohadi

Spring 2004

Babak Besharati
Advisor: Dr. S. Azarm

Nathan Blattau
Advisor: Dr. D. Barker

Robert Dickens
Advisor: Dr. A. Baz

Bevin Etienne
Advisor: Dr. P. Sandborn

Lewis Gershen
Advisor: Dr. R. Radermacher

Mohammad Yeganeh
Advisor: Dr. A. Gupta

Susmita Ghose
Advisor: Dr. C. Smidts

Arindam Goswami
Advisor: Dr. P. Sandborn

Shirish Gupta
Advisor: Dr. P. McCluskey

Aisha Jenkins
Advisor: Dr. A. Mosleh

Erin Mack
Advisor: Dr. M. Modarres

Jeremy Ou
Advisor: Dr. J. Kim

Mostafa Shakeri
Advisor: Dr. J. Duncan

Matthew Shepley
Advisor: Dr. A. Mosleh

Mary Jo Skeet
Advisor: Dr. J. Bernstein

Travis Tempel
Advisor: Dr. S. Buckley

Chengdong Wang
Advisor: Dr. A. Mosleh

Daniel Yates
Advisor: Dr. M. Modarres

Summer 2004

Aydin Celik
Advisor: Dr. R. Radermacher

Gregory Fowler
Advisor: Dr. SK Gupta

Scott Heatwole
Advisor: Dr. S. Buckley

Kathryn Hitchcock
Advisor: Dr. D. Hristu-Varsakelis

Layla Monajemi
Advisor: Dr. R. Radermacher

Lesia Ross
Advisor: Dr. A. Mosleh

Anil Sharma
Advisor: Dr. M. Cukier

Phillip Yip
Advisor: Dr. S. Buckley

Wei Zhang
Advisor: Dr. A. Mosleh

Professional Master of Engineering Program

Program Advisor: Keith Herold

Fall 2003

Luis Colmenares Alvarez
Alireza Bekri
Alfredo Echeverri
Daniel Gaither
Jeong-Ki Hong
Allen Morris
Kenneth Powell
Sujay Shah
Ryan Simmons
Leslie Smith

Spring 2004

Devendranath Agrawal
Timothy Alberts
Eric Christensen
Michael Dunningan
David Jones
Matthew Piester
Patrick Schuett
Zachary Spears
Kartik Vaithyanathan

Summer 2004

Ebenezer Akinbohun
Alan Lawrence Gershon
Sidhur Kumar
Usha Surreddy

2004 Graduate Awards & Honors

A. James Clark Fellow

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

ARCS Fellow

Victor Ovchinnikov

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
Prahald Parthangal
Senthikumar
Radhakrishnan
Krista Solderholm

Litton Industry Fellow

Andrew Dick

Trigen Fellow

Sandeep Nayak

2003-2004 Graduate and Undergraduate Programs



Dr. Ugo Piomelli
Director of Graduate Studies
and Associate Chair



Dr. Sami Ainane
Director of the
Undergraduate Program

Enrollment

In the 2003–2004 academic year the Department of Mechanical Engineering had 371 graduate students enrolled. Of these, 122 were Master of Science students and 249 were Doctoral students. 14% of these students were female and 24% were minority students.

Degrees

The Department granted 71 M.S. degrees and 22 Doctorates in 2003–2004. Dissertation titles and the names of Doctoral and M.S. students' advisors are listed later in the report.

Recruitment

As of November 1, 2004, 514 students applied to the graduate program for entrance in 2004–2005. Of these applicants 108 were accepted and 78 enrolled, most with financial assistance in the form of a graduate teaching assistantship, graduate research assistantship, or graduate fellowship.

Research and Fellowships

During the 2003–2004 academic year, the department supported 30 students through teaching assistantships and 175 through research assistantships. We can boast of providing graduate assistants with the third highest base stipend of any university in the country, the highest of any public university. In addition, 24 of our students have been awarded fellowships for the 2003–2004 academic year.

Student Credentials

The students who enrolled in our program in 2004–2005 had an average GRE score of 543 Verbal, 759 Quantitative, and 679 or 4.41 Analytic and an average GPA of 3.46.

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. The Department admitted 13 students and enrolled 19 in 2004–2005.

Enrollment

Enrollment in the undergraduate program during the 2003–2004 academic year reached 660 students, an increase of over 20% in the past three years. Roughly 38.5% of these were minority or female students. 162 are in the University Honors Program. The freshmen class of 2004 had an average SAT score of 1310 and an average high school GPA of 3.965. Last year, we awarded 162 Bachelor's degrees. Our program features design throughout the undergraduate curriculum and unique teaching methods, including teaming studio experience and the use of Undergraduate Teaching Fellows.

Career Paths

Several areas of concentration are suggested to the student in his or her 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 and other specific, unique courses enable students to study in depth their areas of interest and to better prepare themselves for careers of their choice.

Honors Program

The departmental Honors Program, now in its fifth 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, of the three honors programs. The program currently has about 100 participants and has been highly successful in attracting talented students to the Department.

2003-2004 Ph.D. Graduates, Advisors & Dissertation Titles

Fall 2003

Christopher Baldwin

Advisor: Dr. S. Buckley

Distributed Sensing for Flexible Structures Using a Fiber Optic Sensor System

Frederick Gallant

Advisor: Dr. H. Bruck

Continuously Graded Extruded Polymer Composites for Energetic Applications Fabricated Using Twin-Screw Extrusion Processing Technology

Christopher Kimball

Advisor: Dr. D. DeVoe

Integrated Temperature Measurement and Control in Polymer Microfluidic Systems

Nathan Sniadecki

Advisor: Dr. D. DeVoe

Field-Effect Flow Control in Microfluidics

Zhaoyang Wang

Advisor: Dr. B. Han

Development and Application of Computer-Aided Fringe Analysis

Yubing Yang

Advisor: Dr. D. Barker

Reliability Assessment of Optical Fibers Under Tension and Bending Loads

Spring 2004

Wael Nabil Akl

Advisor: Dr. A. Baz

Smart Foam for Active Vibration and Noise Control

Mohammed Al-Ajmi

Advisor: Dr. A. Baz

Homogenization and Structural Topology Optimization of Constrained Layer Damping Treatments

Paul Elkouss

Advisor: Dr. D. Bigio

Physics Based Modeling and Control of Reactive Extrusion

Subroto Gunawan

Advisor: Dr. S. Azarm

Parameter Sensitivity Measures for Single Objective, Multi-Objective, and Feasibility Robust Design Optimization

Sunil Murthy

Advisor: Dr. J. Kim

Thin Two-Phase Heat Spreaders with Boiling Enhancement Microstructures for Thermal Management of Electronic Systems

Mihai Rada

Advisor: Dr. M. Ohadi

Electrohydrodynamics (EHD) Pumping of Liquid Nitrogen: Application to Spot Cryogenic Cooling of Sensors and Detectors

Mario Toso

Advisor: Dr. A. Baz

Wave Propagation in Rods, Shells, and Rotating Shafts with Non-Uniform Geometry

Kimberly Wrenn

Advisor: Dr. K. Herold

Capillary Pumped Loop Performance Investigation through Flow Visualization

Xin Wu

Advisor: Dr. O. Ramahi

Developing Highly Accurate and Stable Open Region Electromagnetic Simulation

Qian Zhang

Advisor: Dr. A. Dasgupta

Isothermal Mechanical and Thermo-Mechanical Durability Characterization of Selected Lead-Free Solders

Summer 2004

Nathasak Boonmee

Advisor: Dr. J. Quintiere

Theoretical and Experimental Study of Autoignition of Wood

Samuel Chamberlain

Advisor: Dr. M. Modarres

Development of a Physics of Failure Model and Quantitative Assessment of the Fire Fatality Risk of Compressed Natural Gas Bus Cylinders

Lorenzo Cremaschi

Advisor: Dr. R. Radermacher

Experimental and Theoretical Investigation of Oil Retention in Vapor Compressor System

Moustafa El-Bassyiouni

Advisor: Dr. B. Balachandran

Active Control of Sound Transmission into Three Dimensional Enclosures

Lin Li

Advisor: Dr. O. Ramahi

Analysis and Mitigation of Electromagnetic Noise in Resonant Cavities and Apertures

Karumbu Meyyappan

Advisor: Dr. P. McCluskey

Failure Prediction of Wire Bonds Due to Flexure

2003- 2004 Undergraduate Awards & Honors

American Society of Mechanical Engineers Senior Award

Presented to the senior member who has contributed most to the student chapter
Jonathan Shumake

Pi Tau Sigma Outstanding Service Award

Presented to a student for outstanding service and contributions to the chapter
Mike Liszka

Pi Tau Sigma Memorial Award

Presented to the senior in mechanical engineering who has made the most outstanding contributions to the University
Raleigh Stewart (3.77 GPA)

Pi Tau Sigma Outstanding Sophomore Award

Presented to the most outstanding sophomore in mechanical engineering on the basis of scholastic average
Brittany Blueitt & Derrick Treichler (4.0 GPA)

Department of Mechanical Engineering Academic Achievement Award

Presented to the junior in mechanical engineering who has attained the highest overall academic average
Jessica Galie (3.915 GPA)

Department of Mechanical Engineering Chair's Award

Presented for excellence in academics, outstanding service to the Department, or leadership in the Department
Aaron Johnson (3.934 GPA, Magna Cum Laude)

National Science Foundation Research & Development Expenditures

AR 5

The University of Maryland Department of Mechanical Engineering has consistently ranked in the top 16 in total research and development expenditures at American colleges and universities, according to recent National Science Foundation (NSF) studies. Research conducted in 1999 through 2002 and published in the National Science Foundation documents Academic Research and Development Expenditures: Fiscal Years 1999 – 2002, show that the University of Maryland ME department has ranked 12th in 1999 and 2000, 15th in 2001, and 16th in 2002. Adding the substantial University of Maryland Foundation research funding to these statistics propel our rankings into the top ten.

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

From: Academic Research and Development Expenditures: Fiscal Years 1999 - 2002. National Science Foundation.
<http://www.nsf.gov/sbe/srs/nsf04330/sectb.htm>

FY '04 Contracts, Grants, and Awards

PI	Agency	Title
Abshire/Smela/Ghodssi/Rubloff	MD Procurement Office	Nano-Bio Engineering
Anand	ONR	Consortia to Perform Research on Undersea Technology
Anand	ONR	2004 Shockwave International Conference
Anand	NSWC	Extrusion Die Fabrication
Azarm	ONR	Multiple Criteria Optimization and Selection Using Warhead Design
Balachandran/Holloway	Army-Aberdeen	Aberdeen Roadway Simulator Project
Balaras	NSF	Large-Eddy Simulations of Prosthetic Heart Valve Themodynamics
Bar-Cohen	NIST	Cooperative Research in Nano-Metrology and Manufacturing
Bar-Cohen	ONR	Thermal Modeling Methodology for Shipboard Electronic Systems
Baz	SAIC	Smart Snake Robot
Baz / Chung	NSF	Equipment for a Wireless Sensor Monitoring Health of Bridges
Baz/ Apri Walker	NSF	Intelligent Life Searching and Saving (ILSS) System
Baz/ Dean Admin	DARPA	Hybrid Piezoelectric-Acoustic Actuation System
Bernstein	Mission Research Corp.	Laser Programmable Analog Array Software Development
Bernstein	AVSI Coop./ Texas A&M	Methods to Account for Accelerated Semiconductor Device Wear
Bernstein	NIST	Advanced Gate Dielectric Reliability and Metrology
Bernstein	NSA	Laser Restructuring Process Yield Enhancement Using Redundancy
Bigio	TEDCO	Novel Feed Protocol for Injection and Resin Transfer Molding
Bruck	NIA	Multifunctional Materials for Aerospace Applications using Func...
Bruck	NSF	Technical Meeting on Mech. of Biological and Biologically Inspired...
Bruck	NASA	Processing Characterization and Modeling
Cukier	BBNT	"OASIS" Phase II of Contract #F306-02-C-0134
Das	NREL	"Reliability of Plastic Packaging Materials" Seminar
Das	Iktara & Associates	Verification of Software for Visualization of Mechanical Assemblies
Dasgupta	NSF	Nano-technology Product-Realization Road Map Workshop
DeVoe	NIST	MEMS Technology for Refrigeration Systems
Duncan	ONR	An Experimental Investigation of the Implosion of Shell Structures
Duncan	ONR	An Experimental 2D+T investigation of Breaking Bow Waves
Fu/Baz	MD DOT/SHA	Health Monitoring of the New High Performance Steel Bridge
Gupta, AK	ONR	Ultra High Temperature Steam Gasification for the Destruction...
Gupta, AK	GVE	Advanced Combustor Design support for Efficiency Improvement
Gupta, SK	NSF	Mechanical Engineering Curriculum Enhancement to Introduce...
Gupta, SK	NSWC	Pilot Project to Explore Applicability of Data
Han	SRC	Extension of Displacement Measurement Techniques into Nano...
Han	Intel Corporation	Development of Experimental Apparatus Using Far Infrared Fizeau...
Haslach	MIPS	Improved Mobility System for Children with Neurological Disorders
Herold	Maryland State Highway Admin	Prediction of Temperature at the Outlet of Stormwater...
Herrmann	NSWC	Design and Implementation of Lean Motor Loading Operation
Herrmann	NSWC	Lean Battery Manufacturing Facility Design
Herrmann	NSWC	Lean J147 RSD Retrofit Process
Herrmann	ONR	Lean Battery Production Study and Design
Jackson	Alstom	Subcontract on ALSTOM Power Technology Cathlean Project
Jackson & Robbins	NSWC	Explosive and Material Safety in Harbors, Part 4
Jackson & Eichhorn	Oak Ridge Naional Lab	Investigation of Pt-Cu Bimetallic Nanoparticles for Lean-Nox...
Jackson & Eichhorn	ONR	Instrumentation for Characterizing Heterogeneous Kinetics...
Jackson & Radermacher	Virginia Tech/ DOE	Mid-Atlantic Hydrogen Technology Education Center
Jackson & Robbins & Trouve	NSWC	Explosive and Material Safety in Harbors, Part 5
Kiger	NSF	Sediment Transport in Oscillating Turbulent...
Kim	NASA	Microheater Array Boiling Experiment (MABE): Flight Research...
Kim & Kiger	ONR	Spray Cooling Heat Transfer: Effect of Enhanced Surface
Kim/Jackson	NIST	Expansion of a High Temperature Absorption Database and...
McCluskey	Oak Ridge Naional Lab	Reliability of High Temperature Power/Control Electronics for HEVs
McCluskey	Army	Reliability Assessment of Power Modules
Modarres	Wyle Laboratories	Proposal to Wyle Laboratories, Inc. for the DOD Reliability...
Modarres	NAVAIR	Prognosis for Airframe Specifications and Standards
Modarres	NAVAIR	Prognosis for Airframe Readiness and Safety
Modarres/Mosleh	NRC	Use of Best Estimate and Probabilistic Assessment Techniques...
Mosleh	INEEL	Exploring Possible Enhancements to HERA Data Base Development
Ohadi	ASHRAE	Performance Characterization of Micro-Scale Condensers
Pecht & Ganesan & Dasgupta	JHU/Applied Physics Lab	Physics of Failure Analysis for Chip-On-Board Technology
Pecht & Hillman	MPO	In-Situ Temperature Cycling & Data Analysis Statement of Work...
Radermacher	Maryland Energy Administration	Est. Mid-Atlantic Regional Combined Heat and Power Application
Radermacher	DOE - Battelle	Integrated Energy Systems Test Facility 2004
Radermacher	Carnegie Mellon University	Advanced Building Systems Integration Consortium
Radermacher	ManTech - NASA	Laser Risk Reduction Vapor Compression Thermal Control System

Roytburd & Bruck.....	NSF.....	Principle of Engineering Graded Materials with Self-Assembling...
Sandborn	Lockheed Martin Corp.....	MOCA/MTADS Pilot
Sandborn	NSF.....	Forecasting and Proactive Management of Obsolescence for ...
Sandborn/Das	Wesland Helicopters Ltd.....	Evaluation of the Generic Obsolescence Risk Profiles...
Schultz.....	MGPU.....	Development of an Ethanol-Fueled Hybrid Electric Vehicle...
Smidts.....	WVU - West Virginia Univ.....	Integrating Formal Methods and Testing in a Quantitative...
Smidts.....	NASA.....	Integrating Software in PRA
Wilkinson.....	The Boeing Company.....	Semiconductor Trends and Technology Roadmaps
Yang.....	Army.....	Ralph E. Powe Junior Faculty Enhancement Award for Dr. Bao Yang
Zachariah.....	Univ. of Minnesota.....	Processing and Behavior of Nano-Energetic Materials
Zachariah.....	MIPS.....	Laser-induced Breakdown Spectroscopy for Monitoring Turbine...
Zachariah.....	NSF.....	Molecular Dynamics Computation of the Properties and Growth...
Zachariah.....	NSF.....	A New Low Temperature Generic 'Green' Chemistry of Deposition...

Recurring Contracts, Grants & Awards

The following list shows faculty with recurring, or year-to-year grants, contracts, and awards given in the past. To view a more comprehensive list of past awards, click on the links to PDF copies of previous Annual Reports on our website:

<http://www.enme.umd.edu/news>

PI	recurring grants
Anand	4
Azarm.....	3
Balachandran.....	5
Balaras.....	3
Bar-Cohen.....	1
Baz.....	3
Bernard.....	1
Bernstein.....	6
Bigio.....	2
Bruck.....	8
Buckley.....	4
Cardenas.....	3
Cukier.....	3
Dasgupta.....	2
DeVoe.....	7
Duncan.....	3
Fourney.....	1
Gupta, AK.....	6
Gupta, SK.....	9
Han.....	1
Herold.....	1
Holloway.....	2
Jackson.....	4
Kiger.....	3
Kim.....	5
Magrab.....	2
McCluskey.....	4
Modarres.....	7
Mosleh.....	9
Pecht.....	3
Piomelli.....	4
Radermacher.....	8
Robbins.....	2
Sandborn.....	4
Schmidt.....	8
Smela.....	9
Smidts.....	2
Wallace.....	1
Wilkinson.....	1
Zhang.....	1

FY '04 Research Sponsors

This list shows the research sponsors for grants, awards and contracts given in the 2004 fiscal year.

AAVID	DOD - Army	Lucent Tech.	Siemens
Advanced Thermal & Environmental Concepts	DOD - Navy	Maryland Energy Administration	Silicon Power Corporation, Inc.
AF AFMC Wrght Patt	DOD - NSA	Maryland Grain Producers Util. Board	Sony Corporation
AFOSS - Bolling	DOD - DARPA	Matsushita	SRC
Agilent Tech.	DOD - Navy NSWC	MD Grain Prod. Util. Board	Sun Microsystems
American Society for Engineering Ed.	DOD - Navy ONR	Medtronics	Systems Planning & Analysis
AMSAA	Dept. of Energy	Michelin	Tecumseh
Applied Data Systems	DOT	MIPS	TEDCO
Arcelik	Dupont Dow	Mission Research Corp	Teledyne Energy Systems
ARL	EADS, France	MULTI COMP	Telinks, LLC
ARR, Inc.	EMC	NASA	Texas A&M
ARTI	Emerson Electric	Natl Semiconductor	Thermo King
ASEE	EPA	NIST	Trane
ASHRAE	EPRI Solutions	Nokia, Finland	Trigen
ATEC	FAA	Nokia, TX	TRW
Automated Precision	Frontier Technologies	Northrup-Grumman	U. of South Carolina
BAE Systems	Frontier Technology Inc	NRC	U. MED. & DENT/NIH
Battelle	General Dynamics	NSF	UK Ministry of Defense
BBNT Solutions	General Electric	Nu Therna Systems, Inc.	United Nations
Big Bang Products	Geomet Technologies	NYU	University of Denver
Black & Decker	Georgia Tech	Oak Ridge National Laboratory	University of Virginia
Boeing	Goodrich, England	Penn State	UT Battelle
Boland Trane	Grandfos	Pepco	Virginia Polytechnic Institute
Brazeway	Halla Climate	Pepsi	VorCat, Inc.
Business Performance Group	Halliburton	Perkin Elmer	Wolverine
Calibrant Biosystems	Hamilton Sundstrand	Philips	
California Energy Commission	Heatcraft	Potomac Photonics, Inc	
Carneige Mellon	Honeywell	QinetiQ	
Catholic University	Idaho National Engineering and Env. Lab	Qortek Inc.	
Ciena	Idaho Natl. Eng. & Env. Lab	QSS	
Colorado School of Mines	IEEE	Raytheon	
Copeland	Infinite Biomedical Technologies, LLC	RIST	
Corvis	Intel Corp.	Rockwell Collins	
Daikin	Intelligent Automation	RTKL Associates, Inc.	
Delphi Delco	Italian Embassy	Samsung	
Denso	ITRI	Sandia	
DNR / Energy Administration	Japan Science & Tech. Corp	Sanyo	
DOD - Air Force	JHU Appl. Physics Lab	Schlumberger	
	KETI	Seagate	
	LG Electronics	Semiconductor Research	
	Lockheed Martin		

Faculty & Staff

A

Anand, Davinder K.
Armstrong, Ronald
Azarm, Shapour

B

Bar-Cohen, Avram
Barker, Donald
Balachandran, Balakumar
Balaras, Elias
Baz, Amr
Berger, Bruce
Bergles, Arthur
Bernard, Peter
Bernstein, Joseph
Bigio, David
Bruck, Hugh
Buckley, Frank

C

Christou, Aris
Cukier, Michel
Cunniff, Patrick

D

Dally, James
Dasgupta, Abhijit
DeVoe, Donald
Dieter, George
di Marzo, Marino
Duncan, James

E

Elliott, William III

F

Fourney, William

G

Gupta, Ashwani
Gupta, Satyandra

H

Han, Bongtae
Herold, Keith
Herrmann, Jeffrey
Holloway, David
Hsieh, Adam

J

Jackson, Gregory
Jackson, John W.

K

Kiger, Kenneth
Kim, Jungho
Kirk, James

M

Magrab, Edward
Marks, Colin H.
McCluskey, F. Patrick
Modarres, Mohammad
Mosleh, Ali
Mote Jr., Clayton Daniel
Mulholland, George W.

O

Ohadi, Michael

P

Pecht, Michael
Piomelli, Ugo

R

Radermacher, Reinhard
Ramahi, Omar
Riley, Donald
Robbins, Jr. Donald
Rodgers, Peter
Roush, Marvin

S

Sandborn, Peter
Sanford, R.J.
Sayre, Jr. Clifford
Schmidt, Linda
Shih, Tien-Mo
Smela, Elisabeth
Smidts, Carol
Sreenivasan, Katepalli

T

Talaat, Mostafa

W

Wallace, James
Walston, William

Y

Yang, Bao
Yang, Jackson C.S.
Yu, Miao

Z

Zachariah, Michael R.
Zhang, Guangming

Administrative Staff

Sami Ainane - Director of Undergraduate Programs

Jim Barrett - Marketing & Communications Coordinator

Elyse Beaulieu-Lucey - Assistant Director of Graduate Studies

Lita Brown - Acting Payroll/Personnel Coordinator

Margaret Brumfield - Director of Administrative Services

Erin Chen - Research Coordinator

Tracy Chung - Graduate Coordinator

Chiquita D. Edwards - Coordinator, Payroll and Benefits

Melvin Fields - IT Coordinator

D.B. Galpoththawela - Office Clerk

Dylan Hazelwood - IT Manager

Juanita Irvin - Senior Business Manager

Sonja Jennings - Undergraduate Coordinator

Sripen (Penny) Komsat - Business Services Specialist

Ania Picard - Assistant to the Director, CALCE

Corrine Remy - Assistant Director, Human Resources

Arlene Samowitz - Research Coordinator

Wafaa Von Blon - Executive Administrative Assistant I

Janet Woolery - Business Services Specialist

Zhen Z. Wu - Electro-Mechanical Engineer

For more detailed bio and contact information on either the faculty or administration staff, visit the following page on our website:
<http://www.enme.umd.edu/facstaff/>

For more information please contact:
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www.enme.umd.edu

ME Hosts Tsunami Forum

Forum Part of Greater Campus Tsunami Relief Day

The Mechanical Engineering Department at the University of Maryland hosted a Tsunami Science & Tech Forum on February 10 as part of a campus-wide Tsunami Relief Day at the College Park Campus. The forum was held at the Memorial Chapel main chapel area on Regents and Chapel Drive.



Duncan

Professor James Duncan, Mechanical Engineering faculty member and the Director of the College Park Scholars Program in Science, Technology and Society at the University of Maryland, and Mechanical Engineering Department Chair Avram Bar-Cohen coordinated the forum. The program addressed scientific issues in tsunami generation and behavior as well as current efforts in early warning, mitigation and disaster relief.

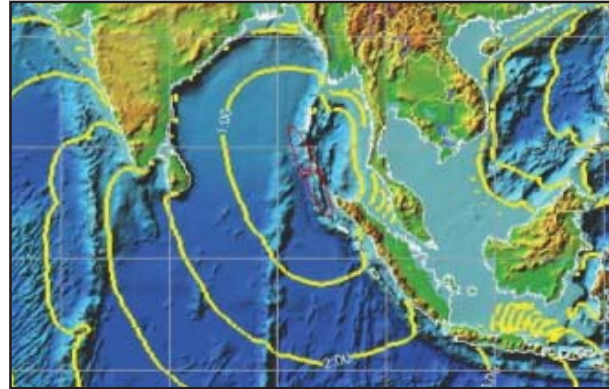
The forum featured the following specialists and topics:

- Roberta Rudnick, Professor of Geology, University of Maryland - *Plate Tectonics Overview*
- David Simpson, President, Incorporated Research Institutions for Seismology - *The Sumatra Andaman Island Earthquakes*
- James Duncan, Professor of Mechanical Engineering, University of Maryland - *The Physics of Tsunamis*
- Scott Kiser, Tropical Cyclone Program Manager, at NOAA's National Weather Service - *Tsunami Warning and Mitigation Systems*
- Prof. John R. Harrald, Director, Institute for Crisis, Disaster and Risk Management, The George Washington University - *Preparing for and Managing Extreme Events: An International Imperative*

The forum was followed by quiet reflection and remembrance in the Memorial Chapel.

A webcast and downloadable resource materials from the above presentations are available on the Mechanical Engineering website at:

<http://www.enme.umd.edu/tsunami/forum/index.html>



Above: Map tracking the Sumatra-Andaman Earthquake readings.

ME Ph.D. Student, Chair Attend Exchange Conference in Russia

Ph.D. Candidate Christopher Henry and Mechanical Engineering Chair and Professor Avram Bar-Cohen attended a scientific exchange conference in Kaluga, Russia in late May.

This XV Seminar-School hosted the conference, which focused on the problems of gas dynamics and heat/mass transfer in power plants. The conference provided an opportunity for discussion of both research and applied studies in the field. The conference was sponsored by the Kaluga Branch of the Bauman Moscow State Technical University system and held across the river from Kaluga. Professor Leontiev, a member of the Russian Academy of Sciences, chaired this Seminar School, which was attended by some 150 researchers and practitioners from across the Russian Federation.

Bar-Cohen and Henry were among five pairings of American professors and their students sponsored by the National Science Foundation (NSF). The intent of the NSF sponsorship was to help foster cooperation and collaboration between the next generation of heat transfer scientists in the US and the Russian Federation.

Henry entered his poster in a competition for young researchers and placed in the top three finalists for his research on *Nucleate Pool Boiling Characteristics from a Flat Microheater Array in Low Gravity*. Henry's Ph.D. advisor is Associate Professor Junggho Kim.

Regarding the trip to Russia, Chris recalls: "The most enduring memories that I'll take away from this trip center around the interaction I had with so many warm and friendly people who welcomed the entire American delegation and made our stay a pleasant one."

Satellite Pioneers Miller, '50, and Plummer, '53, 2005 Draper Prize Winners

On February 21, Edward A. Miller, '50, and James W. Plummer, '53, received the Charles Stark Draper Prize from the National Academy of Engineering—one of the world's preeminent awards in engineering—for their pioneering work in the top-secret Corona Project, which pioneered satellite surveillance during the Cold War. Both were inducted into the Clark School's Innovation Hall of Fame on September 19, now relocated to its new home in the Kim Engineering Building.

The Draper Prize, in the words of the Academy, "...honors an engineer whose accomplishment has significantly impacted society by improving the quality of life, providing the ability to live freely and comfortably, and/or permitting the access to information."

Miller spoke to Clark School students and faculty on February 22, sharing his inspiring wisdom:

"I encourage all of you to continue learning... to take some courses outside of the strict regime of engineering. You don't have to be a Ph.D. economist, but understand the basics. Branch out a little bit."

Mr. Miller, who received a bachelor's degree in mechanical engineering from Maryland; and Mr. Plummer, who received a master's degree in electrical engineering from Maryland, were among five members of the top-secret Corona Project to be presented with the award. Mr. Miller went on to become Assistant Secretary of the Army for Research and Development, and Mr. Plummer to become Under Secretary for the Air Force. Both led highly successful corporate careers as well.

The Corona Project (1959 to 1972) created the field of satellite surveillance, providing vital photographic information that permitted the United States to gauge the nuclear threat posed by the Soviet Union during the Cold War and pursue more effective foreign policies. Mr. Plummer served as project manager and Mr. Miller as project engineer. Their team accomplished the first successful recovery of a man-made object from earth orbit.

Previous Draper Prizes recognized those who pioneered or developed personal computer networking, the global positioning system, fiber optics and other major engineering advances.

Every year the Innovation Hall of Fame committee, made up of Clark School alumni and faculty, selects an engineer or engineers to honor for their technological accomplishments and to recognize innovation at the concept, design or working level of engineering. The Innovation Hall of Fame was conceived and funded by alumnus Stanford Berman, '50, in 1985.



George Dieter, Professor Emeritus of Mechanical Engineering and former Dean of the Clark School; Jacques Gansler, University of Maryland Vice President for Research; Edward Miller, 2005 Draper Prize Winner; Nariman Farvardin, Professor and Dean of the Clark School; and Avram Bar-Cohen, Chair, Mechanical Engineering. Photo courtesy of Mike Morgan.

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New ME Babies!



Congratulations to the following ME faculty and staff who have welcomed new additions to their families in 2004 & 2005:

Erik Thomas Franklin Kiger born May 5, 2005 to Associate Professor Ken Kiger and his wife Sarah Davis.

Erik Riley Jackson born January 7th, 2005 to Associate Professor Greg Jackson and wife Karin.

Rachel Catherine Hazelwood born December 6th, 2004 to Dylan Hazelwood and wife Natalie Hazelwood.

Allen Yang born November 30, 2004 to Assistant Professor Bao Yang and his wife Yan.

Logan Loki DeVoe born November 28th, 2004 to Associate Professor Don DeVoe and his wife Cassandra.

CHP Paper Earns ASME AESD Best Student Paper Award

A paper entitled "Applying CHP to the Ventilation Air of Buildings" by Matthew Cowie, Xiaohong Liao (presenter), and Reinhard Radermacher was selected for annual best student paper award by the officers of the Heat Pump Technical Committee of ASME's Advanced Energy Systems Division (AESD). The paper was originally presented at the ASME Summer Heat Transfer Conference in July 2003 at Las Vegas, Nevada.

The award consists of a commemorative certificate for each author and a check. The award was presented at the ASME International Mechanical Engineering Congress and RD&D Expo AESD luncheon in November 2004.

ASME's Advanced Energy Systems Division was founded in 1964 as the Energetics Division. Organized as one of four divisions within the Society's Energy Resources Board, the Division is concerned with non-conventional or emerging energy conversion processes, both direct and indirect.

Andrew Dick Awarded Litton Industries Graduate Fellowship in Engineering Education

Andrew Dick was awarded the 2004-2005 Litton Industries Graduate Fellowship in Engineering Education. Andrew is a Ph.D. student working with Professor Balachandran performing research on the oscillations of micro-resonators.

The award given to full-time graduate and Ph.D. students in the electrical or mechanical engineering departments who intend to pursue a full-time career as an engineering faculty member.

The fellowship consists of a supplemental stipend added to either a Graduate Teaching Assistantship or Graduate Research Assistantship award by the department.

Cho Awarded Outstanding Teaching Assistant Appreciation Award from Pi Tau Sigma

Seungmin Cho received the Outstanding Teaching Assistant Award from Pi Tau Sigma President Mike Liszka at the Fall 2004 Initiation Celebration Event. Cho was honored for being a great teaching assistant.

The Outstanding Teaching Assistant Award is given out at the end of the fall and spring semesters. The recipient is awarded a plaque, monetary award, and long-term recognition in the form of an additional engraved plaque that is on permanent display. The names of future winners will be added to this plaque in the future.

Pi Tau Sigma is the honorary mechanical engineers' society for undergraduate students at the University of Maryland. Professor of Mechanical Engineering Jungho Kim is the faculty advisor for the organization.

Leila Jannesari Awarded Charles Hutchins Educational Grant



Jannesari

Leila Jannesari, a Ph.D. candidate working with Professor Abhijit Dasgupta, was recently awarded the 2005 Charles Hutchins Educational Grant from the Surface Mount Technology Association (SMTA) and Circuits Assembly magazine. The title of the project is "The Effect of Voids, Caused by Manufacturing Variation, on the Thermo-mechanical Durability of Lead-free Solders."

The grant is awarded annually to a graduate-level student pursuing a degree and working on thesis research in electronic assembly, electronics packaging, or a related field. Jannesari has been invited to the conference to attend the sessions and present her project. This is the first time a student from Maryland has received this award. The award will be presented in SMTA International conference on September 28 in Rosemont, Illinois.

Dan Fitzgerald Awarded ARCS Foundation Scholarship



Fitzgerald

Congratulations to Mechanical Engineering Ph.D. student Daniel Patrick Fitzgerald for being named the Achievement Rewards for College Scientists (ARCS) Endowment Fellow for the 2005-2006 academic year. Daniel's research interest is in the area of Design, Risk Assessment, and Manufacturing. His advisors are Associate Professors Jeffrey Hermann and Linda Schmidt.

The ARCS Foundation is a national volunteer women's organization dedicated to providing financial support to academically outstanding students majoring in the fields of natural science, medicine and engineering. The generous endowment is being granted by the Metropolitan Washington Chapter of ARCS.

Fitzgerald obtained his Bachelor of Science Degree from Maryland with honors in the May of 2004. He was admitted into the Ph.D. Program in Mechanical Engineering at the University of Maryland in the Fall of 2004.

Daniel's research involves studying decision-making systems within product development to improve environmentally responsible product development. He is currently working with Black and Decker in Towson, MD on the implementation of a formal Design for Environment process.

Mr. Fitzgerald's work has appeared in two NSF conference papers. In January he attended the NSF conference in Scottsdale, AZ to present the paper during a poster session. He has submitted two more papers for the ASME Design Theory and Methodology Conference in Long Beach, CA last Fall. The ARCS funds will support general research expenses such as attending technical conferences.

studentNOTES

ME Undergraduate Volunteers in Uzbekistan

Zachary Kline Spends Summer of 2004 Building Sustainable Water Purification Systems in Kokland

Mechanical Engineering undergrad student Zachary Kline volunteered in Kokland, Uzbekistan for ten weeks last summer developing sustainable water purification systems. Zachary worked with Joint Development Associates International (JDA) under the supervision of Beat Grimm, a Swiss Mechanical Engineer working for JDA who lives in Uzbekistan. The third member of his team was Dave Norton, an active Engineers Without Borders student member from Syracuse University. Zachary and his team worked on designing and then building two prototype solar water purifiers.

The JDA office in Kokand runs an educational program advocating solar disinfection, a program invented by the Swiss government which uses ordinary plastic soda bottles to disinfect drinking water. The theory of this program is based on the concept that if a bottle of water is left in direct



Above: Kline (left) and colleague Dave Norton (top) join the Uzbek JDA staff for tea.

sunlight for a few hours so that it reaches 50 degrees Celsius, the heat and solar radiation combined are sufficient to kill any biological contaminants.

Zachary and his team worked on a side project to create large-scale purifiers that would supply a school or hospital with clean drinking water. One such purifier already exists in El Salvador but costs \$1000. The goal of Zachary's team was to produce a similar unit that would purify 200 liters of water per day and cost \$150 or less.

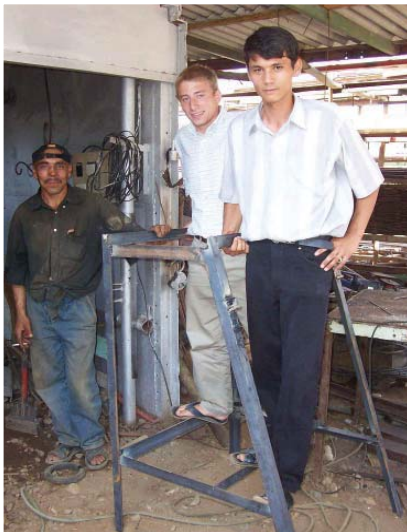
"It was a fascinating summer both in terms of the work and the cultural experiences. Dave and I stayed in an old Soviet apartment complex which was about a fifteen minute walk from the office. There was no running water during the daytime and no hot water ever, and the apartment was regularly around 90° F. I woke up every morning to the cow mooing below my window or else the extremely hoarse rooster which crowed pretty much around the clock. At night we would often play frisbee with the local neighborhood children, who had never seen a frisbee before."

"Much of our working time was spent traveling with our interpreter to local craftsmen (carpenters or welders) to get specific parts fabricated. They were unfamiliar with technical drawings, so we had to rely almost

exclusively on 3-D sketches and then supervise the entire process."

"Things move much slower in Central Asia. If it was a large part that we had fabricated, we would first pay the craftsman from our backpack of cash. There are 1000 Uzbek *soum* to the dollar and the largest available note is the 1000. We had to work with 200 *soum* notes most of the time. Then we would hire a horse-drawn cart to carry the newly fabricated part and ourselves back to the workshop."

"The extreme hospitality of the Uzbek people also amazed me. We were invited to the wedding of the daughter of one carpenter we frequented. I was also amazed at the frequency with which craftsmen would not charge us for work they had completed. They were obviously extremely poor and could use any money at all, but would not accept payment for their services since we were foreigners."



Zachary (center) and Uzbek translator Aziz (right) discuss purifier fabrication with a local welder.

Winning a Top Award

by Tom Kotynski

*From the November 15, 2004 issue of Great Falls Tribune - www.greatfallstribune.com
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Great Falls native Scott McBroom was honored at a recent awards ceremony in Chicago for helping develop a software program that allows engineers to model and simulate vehicle power trains.

The Southwest Research Institute's RAPTOR software, co-developed with DaimlerChrysler, was cited by R&D Magazine as one of the 100 most significant technological achievements of the last year.

He also is the manager of the Advanced Vehicle Technology Department of Vehicle Systems Research Engine, Emissions and Vehicle Research Division.

"RAPTOR offers automotive engineers, through co-simulation and hardware in the loop, a more efficient design and development process that will shorten product development time and improve product design and time to market," according to a news release from his company.

The way his mother explained it to me, the software will help speed the energy-saving hybrid-style cars to market.

McBroom was raised in Ann Arbor, Mich., Paris and the Washington, D.C. area, but "he'd like to come back to Montana," Cheryl Reichert said.

He earned a **BS in mechanical engineering from the University of Maryland in 1988**, and an MS in mechanical engineering from the University of Texas/San Antonio, in 1998.

He began his automotive research career in 1986 as a student research aide in the **University of Maryland's Department of Mechanical Engineering** and joined Southwest in 1988.

Ravinder Chona, A Distinguished Alumnus



Chona

Dr. **Ravinder Chona**, Maryland mechanical engineering alumni, is Senior Scientist for Structural Integrity, Air Vehicles Directorate, Air Force Research Laboratory (AFRL), Air Force Materiel Command at the Wright-Patterson Air Force Base in Ohio. Dr. Chona leads, performs and participates in research and development activities conducted within the Center of Excellence in Structural Sciences. His primary responsibilities ensure that the Air Force has the capabilities in place to provide the war-fighter with structurally sound and affordable vehicles and platforms appropriate to the long-term needs and demands of future mission requirements and challenges. He also works to transition basic research results and state-of-the-art developments in structural integrity and reliability to the aerospace industry.

Dr. Chona holds a Ph.D. (1987) in mechanical engineering from the University of Maryland. His advisor at the time was Professor George Irwin. His personal areas of expertise are engineering design methods, experimental solid mechanics, fracture and failure mechanics, and optical mechanics. Dr. Chona joined the AFRL in 2003, following 16 years on the faculty of the Department of Mechanical Engineering at Texas A&M University.

Dr. Chona has written or co-written numerous technical publications in peer-reviewed journals, peer-reviewed archival monographs, and conference proceedings. He is the presenter of both invited and contributed papers at national and international meetings; has edited three archival monographs; serves on the editorial boards of two major international journals; and has organized and served as chair on national and international technical programs and symposia. Dr. Chona has supervised seven doctoral dissertations, 16 masters degree theses, and more than 25 industrially-sponsored senior and graduate design projects.

ME Alumni Receives ONR YIP Award

Pradeep Sharma, a Maryland ME alumnus and former doctoral student of Professor Abhijit Dasgupta, received the Office of Naval Research Young Investigator Program (YIP) Award for his proposal on the Novel Size-Effects in the Coupled Mechanical Deformation and Opto-Electronic Behavior of Quantum Dots and Wires. The total award amounts to \$262,471 for three years is intended to accelerate Sharma's research as an Assistant Professor of Mechanical Engineering at the University of Houston.

Sharma has been a professor at Houston's Cullen College of Engineering since January 2004 and received his doctoral degree from the University of Maryland-College Park in 2000. For more information on his YIP award, please visit the University of Houston's Mechanical Engineering website newsroom.

Reliability, Energetics Centers Receive Major DoD Initiative Funding

CECD, CFRE to Conduct Vital Research Efforts

The department's Center for Energetic Concepts Development (CECD) will play a major role in a new initiative in southern Maryland to develop the field of energetics, while the Center for Reliability Engineering (CFRE) is set to run the Department of Defense Reliability Information Analysis Center (RIAC). Both centers are under the direction of Mechanical Engineering faculty.

In early July the State of Maryland agreed to give Charles County, Maryland 50 acres for the purpose of developing an Energetics Technology Center (ETC) in Southern Maryland. The ETC is a cooperative activity between the Clark School's CECD, the Naval Surface Warfare Center in Indian Head, and the College of Southern Maryland. One of the initial entities to be housed there will be an energetics laboratory for the development of explosives and propellants.

The Indian Head area of southern Maryland is already described as a "world center for energetics," according to the Navy. Energetics is a field that combines mechanical, chemical and electrical engineering and has implications for both the military and private industry. The same energetics principles behind the explosion of bombs also help deploy vehicle airbags.

CECD is a cooperative research, technology transfer, product development, and science and technology training alliance between the Clark School and the Indian Head Division of the Naval Surface Warfare Center. CECD is under the direction of Professor Davinder K. Anand of the Mechanical Engineering department.

The concentration of research and training in Southern Maryland and the partnership with the University of Maryland has been critical to the Navy's success in energetics, a Navy spokeswoman told the Baltimore Sun. "Their professors work with our scientists and engineers on solutions to Navy programs, and then our employees take classes at the university. So it's been a really win-win combination for both parties."

The U.S. Department of Defense has selected the Clark School's Center for Reliability Engineering (CFRE), under contract to Wyle Laboratories, to run the DoD's Reliability Information Analysis Center (RIAC) in an agreement that will bring some \$5 million to the school.

"The RIAC is a DoD Center of Excellence and technical focal point for information, data analysis, training and technical assistance in the engineering fields of reliability, maintainability, supportability, and quality," said Mohammad Modarres, CFRE



Modarres

director. "CFRE and its faculty will be involved in research, consulting, publications and tool development in the areas of human reliability, structural reliability, the engineering and physics of failure, and software reliability."

Although funded by the DoD, the RIAC will undertake a variety of support projects for other government organizations and corporations.

New Partnership Offers Reliability Education Opportunities for NASA Workforce

The Reliability Engineering program of the Mechanical Engineering Department at the University of Maryland and the NASA Office of Safety and Mission Assurance (OSMA) have established a partnership that will provide enhanced educational opportunities for the NASA workforce (civil servant and contractors) in the areas of system safety, risk assessment, and reliability analysis. Under this agreement NASA employees and contractors, subject to meeting admissions requirements, will be able to take certain courses towards a Graduate Certificate of Engineering in Risk and Reliability or a Master of Engineering or Master of Science Degree in Reliability Engineering with a concentration in Risk Analysis or Reliability Engineering.

The partnership was developed due to NASA's increased use of quantitative risk and reliability assessment, and the subsequent need to train more qualified risk and reliability assessment analysts.

The Reliability Engineering Graduate Program at the University of Maryland is the world's largest and most comprehensive concentration of education and research activities in risk, reliability and safety of engineered systems and processes. With 21 full time, adjunct, and affiliate faculty, it offers 30 Graduate Courses in diverse areas of risk, reliability and safety. Many of the Reliability Engineering faculty have extensive experience in supporting NASA in various safety, risk and reliability projects.

The courses will be offered by 2006 during the regular semesters in two modes: an on-campus, traditional classroom with audio-visual instructional aids, and through electronic distribution of classroom lectures. In either mode the students are to have full access to the faculty, teaching assistant, and Graduate Students administrative support.

Similar agreements have been signed by the Reliability Program in the past few months with NAVAIR, General Electric Transportation Systems, and the Center for Risk Management of the University of Stavanger in Norway.



Anand

In Memoriam

Charles A. Schreeve, Jr.



Schreeve

Distinguished Mechanical Engineering Faculty Member Charles A. Schreeve, Jr. passed away on Wednesday, May 4, 2005. Schreeve was also a Professor Emeritus and had many friends in the A.J. Clark School of Engineering.

Charles Alfred Schreeve, Jr. was born on March 29, 1915 in Baltimore Maryland. In 1937 he met Elsie Starks in Far Rockaway, New York, where they both belonged to a singing group, and later married in 1940. Schreeve obtained his Bachelor's degree in Mechanical Engineering from Johns Hopkins in 1935, and his Master's from the University of Maryland in 1943 with a focus on combustion and fluid dynamics. Following an unexpected vacancy, Schreeve stepped in as acting Chair of the ME department in 1958, eventually serving in full capacity in the position until 1970. He served as a Professor until retiring in 1991. Throughout his university career, he performed practical consulting work for a number of national and regional companies and government agencies.

Memorial services for Charles Schreeve were held on Saturday, May 21st at the Kindley Assisted Living Building, 333 Russell Ave in Gaithersburg, Maryland.

Joseph "Joey" Newhouse

The Department of Mechanical Engineering extends its condolences to the family of Joseph David "Joey" Newhouse of Ann Arbor, MI, formerly of Bethesda, MD and a Mechanical Engineering 1997 Valedictorian.

Newhouse passed away on Saturday, February 12, 2005 after a long and valiant struggle with an unknown malady. Beloved son of Henry and Ruth Newhouse; loving nephew of Daniel and Sarita Sragow; dear cousin of Rabbi Murray and Linda Sragow, Allen and Stacy Sragow and Howard and Holly Sragow.

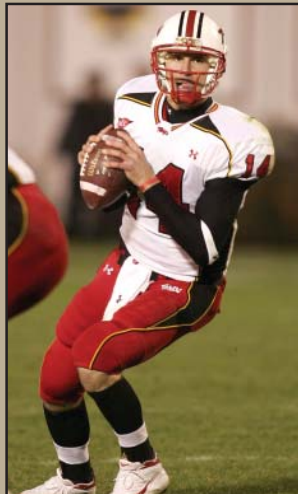
Funeral services were held on Wednesday, February 16, 2005, at Shaare Tefila Congregation in Silver Spring, MD. Memorial contributions may be made to the charity of your choice. Arrangements entrusted to: TORCHINSKY HEBREW FUNERAL HOME, 202-541-1001 (endorsed by the Rabbinical Council of Washington).

Terp Mechanical Engineering Athletes Ready for a Strong Season

As we go to press, the decision to place Maryland undergrad and junior mechanical engineering student Sam Hollenbach as starting quarterback is "all but settled" according to an August 5, 2005 article in the Sports section of the *Washington Post*.

"It is still going to be a competitive situation and there is still a lot of football to be played on the practice fields before our first game, so you never know," states Terps Football coach Ralph Friedgen. "But what he has shown is that he will not turn the ball over, he is a quick study and he continues to improve."

The first scheduled Terps Football game is set for Saturday, September 3, 2005 against Navy in Baltimore, aired on CSTV at 6:00 p.m.



Above: Undergrad Sam Hollenbach is set to start as quarterback for the fall 2005 Terps football season.



Above: Undergrad Craig Salvati starts as goalkeeper for the Terps mens soccer team.

ME undergrad Craig Salvati is likely to start as goalkeeper in the first Terps men's soccer home game against Santa Clara on September 9.

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

Department Chair:
Dr. Avram Bar-Cohen
Editor: Jim Barrett

Mark Your Calendar

Kim Building Dedication

September 19, 2005

U.S. Department of Energy Solar Decathlon

October 7-16, 2005

Research Review Day

March 21, 2006



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