JOHNS HOPKINS ENGINEERING

MECH E FORCE

NEWS FROM THE DEPARTMENT OF MECHANICAL ENGINEERING

SPRING 2011

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Professor Vicky Nguyen and graduate student Baptiste Coudrillier in the Soft Mechanics Materials Laboratory.

RESEARCH HIGHLIGHTS

Dealing with squishy stuff: The mechanics of soft materials

Soft materials are defined as those that can deform easily and to very large strains. Their shape and size can vary greatly even if the applied forces are small. Such materials are ubiquitous in everyday life and include engineered materials, such as polymers, and natural materials, such as skin and other soft tissues that support the human body. In Mechanical Engineering, Assistant Professor Vicky Nguyen directs the JHU Soft Mechanics Materials Laboratory. This lab is dedicated to developing experimental methods and computational models to measure the physical properties of soft tissues and polymers, investigate the relation between properties and the underlying material structure, and predict the material response to applied forces, temperature, and other external stimuli. Studying the mechanical behavior of soft tissues can help us understand the mechanisms of injuries and diseases, design noninvasive diagnostic methods, and develop new medical devices and therapies.

Professor Nguyen and her group's work in soft materials has direct applications to understanding the eye. For instance, glaucoma is a disease defined by progressive degeneration of the optic nerves. An important risk factor for glaucoma and the severity of optic nerve damage is the level of the eye pressure. Natural and glaucoma-induced variations in the mechanical properties of the sclera, the white of the eye, can amplify the effects of this pressure on the stresses and strains in the adjacent optic nerve head. Professor Nguyen and her group have developed an inflation test method to measure and compare the stiffness and creep properties of normal and glaucoma donor eyes. They use this information to develop a computational model of the eye-wall to study the effect of the measured variations in scleral properties on the biomechanical environment of the optic nerves. They are applying similar techniques to measure and model the mechanical behavior of skin

Research Highlights continued on page 3

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JOHNS HOPKINS
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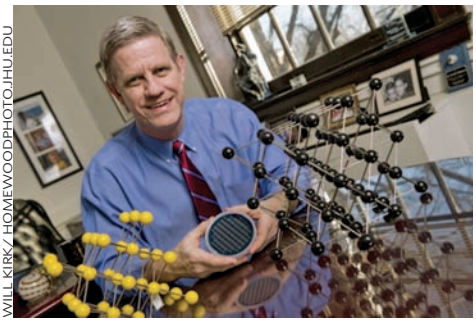
Message from the Chair

The role and scope of mechanical engineering are changing rapidly. It is a very exciting time to be a mechanical engineering student, educator, and practitioner. Global issues and grand engineering challenges, increased societal needs, greater emphasis on interdisciplinary activities, and the rapid acceleration of technological innovation are conspiring to both emphasize and transform our profession. In the past few years we have seen tremendous growth in the number of undergraduate majors, master's and doctoral students, senior design projects, and overall research activity. We have introduced innovative new approaches to the ways in which we teach our students and conduct our research, and we are excited by the results.



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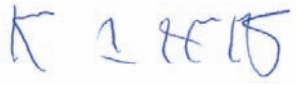
This newsletter will provide you with a snapshot of a few of the many exciting changes and activities that are occurring in our department, and my hope is that it will encourage you to stay in touch and to come back and visit whenever you have the chance. We are especially proud of our revamped undergraduate curriculum. The new suite of Freshman Experiences courses has allowed us to build a sense of community and give our students a chance to use their hands and to explore basic engineering principles before launching into the more theoretical sophomore- and junior-level courses. Similarly, our two-semester capstone Senior Design experience provides students with the opportunity to apply what they have learned in the classroom to real-world engineering problems. We have a very impressive and dedicated group of industrial partners who sponsor our Senior Design projects; as a result the scope and number of these projects have risen rapidly in recent years. The response to these changes has been most encouraging, with our graduates excelling in both industry and graduate school. The rise in quality has been matched by a rise in quantity: The number of freshman majors has risen dramatically, from 30–35 per year to 55–60 per year over the past three years. Biomedical Engineering, Chemical and Biomolecular Engineering, and Mechanical Engineering are now the three largest undergraduate majors in the Whiting School.

Research activity in the department has also risen significantly in the past few years, and we are very proud of achieving "top 5" NRC national ranking in research productivity. We have maintained excellence in the traditional areas of fluid dynamics and mechanics of materials. Our robotics group has coalesced into the Laboratory for Computational Sensing and Robotics (LCSR), which is housed in the newly built Hackerman Hall and has become one of the preeminent robotics groups in the country. Activities in biomechanics now include extensive interdisciplinary collaborations with colleagues in the Institute for NanoBioTechnology, the Whitaker Biomedical Engineering Institute, and the School of Medicine. Interdisciplinary collaborations have become a common theme that is shared across all areas of our department, and mechanical engineering students, scholars, and faculty are heavily invested in this approach to research.

I would be remiss if I did not take this opportunity to highlight a few of the changes that have occurred in the MechE Department in recent years. With the increased number of students and activities we outgrew our home in Latrobe and expanded to Krieger, then Hackerman, and most recently Wyman. We are very excited about the recent acquisition of 3,500 square feet of space that will allow us to revamp and create a state-of-the-art facility for Senior Design. Our faculty has been relatively stable, but there are several changes to report. Professor Bill Sharpe, who re-founded our department in the early 80's, has retired and moved home to North Carolina. Three other faculty colleagues have left the department: Jean-François Molinari is now a professor at the EPFL in Switzerland. Professor Ilene Busch-Vishniac is now provost at McMaster University in Canada, and Professor Shiyi Chen has become the founding dean of the School of Engineering at Peking University in China. We are delighted to see our former colleagues doing so well, and we are very pleased to be able to welcome three new colleagues into the department. Assistant Professor Thao "Vicky" Nguyen came to us from Sandia National Laboratory in 2007 and brings expertise in viscoelasticity, viscoplasticity, and fracture of soft materials with applications to biomechanics and shape memory polymers. Professor Rajat Mittal joined us from George Washington University in 2009 and is highly regarded for his work in computational fluid dynamics, immersed boundary methods, biomimetics, and bioinspired engineering. The most recent addition to our faculty, Assistant Professor Jaafar El-Awady, joined us in September of 2010 and comes to us from the Air Force Research Laboratory. Dr. El-Awady's expertise lies in the development and implementation of advanced, multiscale, predictive computational tools (e.g., molecular dynamics, dislocation dynamics, and statistical mechanics) to describe and link the mechanics of materials across length scales from "atoms to continuum."

I invite you to continue reading this issue of our newsletter, in which you will find more news about our students, staff, faculty, alumni, and various programs. As always, I look forward to hearing from you with comments, news, and input.



Professor and Chair, Kevin Hemker

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Charles Meneveau (Senior Editor), Gregory Chirikjian, Rajat Mittal, Thao "Vicky" Nguyen, Deana Santoni, Sean Sun
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Department of Mechanical Engineering,
223 Latrobe Hall, Johns Hopkins University,
3400 N. Charles Street, Baltimore MD 21218
Phone: 410-516-6782
Fax: 410-516-7254
Email: mech_eng@jhu.edu
URL: http://www.me.jhu.edu

Research Highlights, from page 1

with the goal of developing a more comfortable and secure prosthetic interface. Another material system they study in their laboratory is shape memory polymers, which can change shape in response to a temperature change. These have many applications in biomedical devices, such as biodegradable stents and sutures.

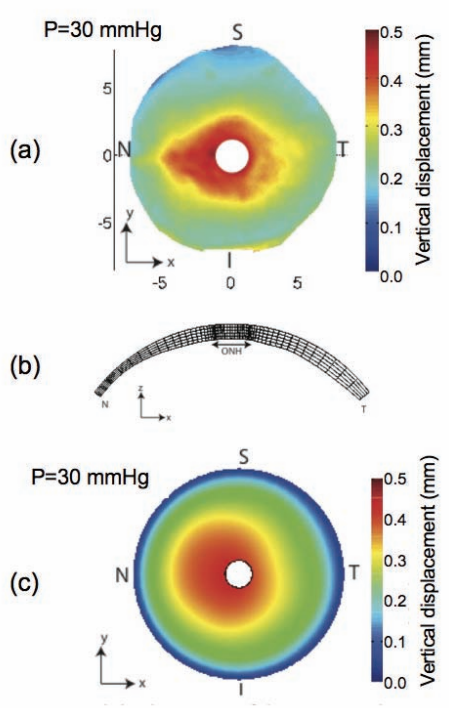


Fig. 1. Modeling the anisotropic viscoelastic response of the posterior human sclera to elevation of pressure. (a) Vertical displacement from the inflation test of a typical normal eye. (b) Mesh of the posterior sclera. (c) Vertical displacement of the posterior human sclera. The sclera modeled as incompressible neo-Hookean materials.

Restoring the human voice using computational fluid dynamics

Stroke victims sometimes lose their voice due to damage to vocal folds, requiring laryngeal surgery. Professor Rajat Mittal and his collaborators are developing novel fluid dynamics computational tools that could provide crucial information in planning the surgery and restoring a patient's voice.

The voice, or generation of sound in the larynx ("phonation"), is a biomechanical process that involves airflow-induced vibration of the vocal folds. Vocal-fold paralysis resulting from a stroke can damage laryngeal nerves leading to incomplete glottal closure, and hence an inability to produce sustained vocal-fold vibrations. A common treatment for this pathology is medialization laryngoplasty, where an implant is inserted into the paretic vocal fold in such a way as to force it to the glottal midline (see Fig. 2). However, the uncertainties associated with the shape, size, and location of an implant can lead to unsatisfactory surgical outcomes. Since phonation is primarily a biomechanical phenomenon, it seems possible that the effect of the implant on the phonatory characteristics of the vocal fold could be predicted and simulated by developing sufficiently realistic physics-based models of the larynx. If this could be accomplished, then in principle, surgeons would have a tool that would allow them to pre-operatively examine various implant configurations for a given patient, potentially reducing intra-operative trial and error.

Fig. 3. Computer simulation of phonation for a simplified model based on a CT scan. Figure shows formation of the glottal jet.

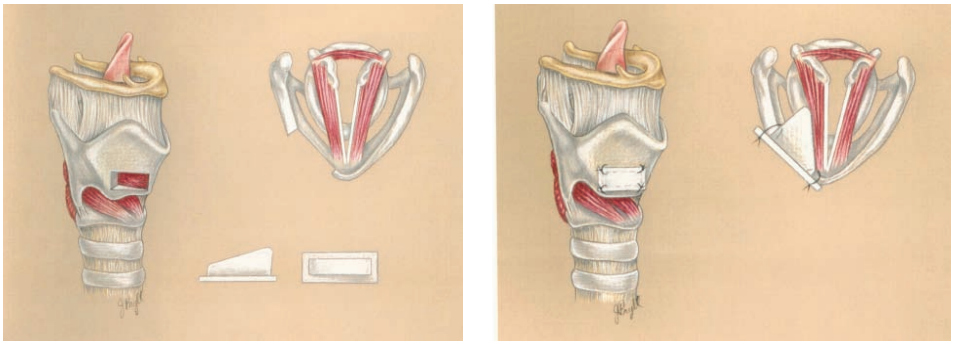


Fig. 2. Schematic depiction of the medialization laryngoplasty procedure.

While the idea is simple, the implementation is fraught with significant challenges; the airflow in the glottal jet is turbulent and the vocal-fold tissue has a complex structure. However, increases in computational power are bringing such a computer-based pre-surgical tool into the realm of reality. The computational fluid dynamics (CFD) tools being developed in Professor Mittal's group are based on a coupled immersed-boundary-finite-element solver that can simulate the glottal airflow as well as flow-induced vibration of the vocal folds and aeroacoustic sound. Supercomputers are employed for these simulations, and Fig. 3 shows the computed flow from one of the simulations. This research involves ME graduate student Qian Xue and postdocs Xudong Zheng, Jung-Hee Seo, and Rajneesh Bhardwaj. Collaborators include Steve Bielamowicz of the George Washington University and Professor Vicky Nguyen of the ME Department. Funding was provided by the National Institutes of Health.

DEPARTMENT NEWS

ME ranked in top 10

The department was very pleased with the latest rankings by the National Research Council (NRC): The ME PhD program was ranked in the top 10 in the nation using the NRC's survey-based quality score, based on the web tool provided at www.phds.org. The Department was also ranked as No. 5 in the country in terms of research productivity.

New faculty members

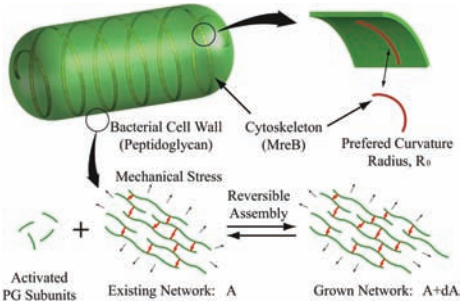
Dr. Jaafar El-Awady joined the department as assistant professor in September 2010. He brings expertise in the development and implementation of advanced multiscale predictive computational tools to describe and link the mechanics of materials across multiple- length scales.

JHU to host large fluid dynamics meeting in 2011

The yearly meeting of the American Physical Society's Division of Fluid Dynamics is coming to Baltimore in November 2011. This meeting is typically attended by more than 2,000 researchers from around the globe. Professor Andrea Prosperetti is the meeting chair and is already busy making the necessary preparations.

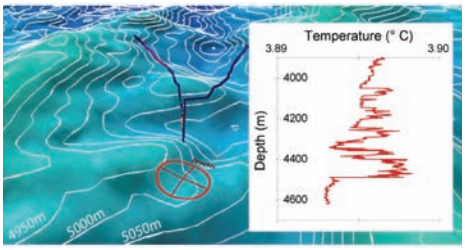
Research Briefs

Modeling the shapes of bacteria: A recent *Physical Review Letters* article by Professor Sean Sun and postdoc Hongyuan Jiang has been highlighted on the APS Synopses website. The study considers how the balance between chemical and elastic energy could explain the morphology of rod-shaped bacteria. The researchers model the bacteria wall as an elastic balloon that is stretched by using the chemical energy stored in newly arrived peptidoglycan. They show that a balance of these forces limits the radius of a rodlike bacterium's ends but allows the cell's length to grow linearly in time. Their approach shows that using mechanics concepts and tools can yield powerful new insights into important biological processes.



Unexpected motions in nanocrystalline materials: In a recently published article in *Science*, Professor Kevin Hemker and his former students (Tim Rupert, BS/MSE '07, and Dan Gianola, PhD '07) describe that newly developed nanocrystalline materials can exhibit surprising activity in the tiny spaces between nanocrystals. This finding is of great importance because these nanomaterials are becoming more ubiquitous in the fabrication of microdevices and integrated circuits. Movement in the atomic realm can affect the mechanical properties of these futuristic materials—making them more flexible and less brittle, for example—and may alter the material's life span.

Robotic tools in extreme environments: Using robot technology from Professor Louis Whitcomb's lab, a team of researchers has explored the deepest submarine vents in the ocean to date, at 5000m depth. In a paper recently published in *Proceedings of the National Academy of Sciences*, they report a surprising diversity of vent styles on the ultraslow spreading Mid-Cayman Rise.



Three-dimensional projection of the CTD-rosette trajectory and temperature profiles, after C.R. German et al. PNAS **107**, 14020-14025, 2010 (copyright National Academy of Science)

New optical scanning tool to detect skin cancer: Researchers from the Johns Hopkins Kimmel Cancer Center and ME's Professor Cila Herman and her PhD student Muge Pirtini have developed a noninvasive infrared scanning system to measure tiny temperature differences between healthy tissue and a growing tumor. This could revolutionize how doctors distinguish between benign moles and melanoma, a lethal form of cancer.

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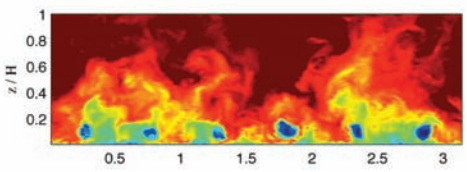
Professor Cila Herman

Elucidating the fluid mechanics of large wind farms: *Physics of Fluids* online has highlighted a research paper by Professor Charles Meneveau and co-workers Marc Calaf and Johan Meyers on a large eddy simulation study. It elucidates the role of vertical transport of kinetic energy and the modeling of large arrays of wind turbines in the atmospheric boundary layer. Professor Meneveau's wind energy research and wind tunnel experiments were also highlighted by the National Science Foundation discovery videos online series.

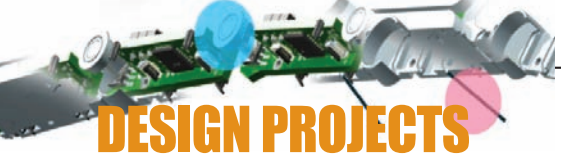


Front view of wind velocities in a wind farm, after Calaf et al., Phys. Fluids **22**, 015110 (2010) (copyright AIP)

Quantum dots as early cancer warning system: Professor Jeff Wang and his research group, along with collaborators at Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins, have developed a highly sensitive test to look for DNA attachments that often are early warning signs of cancer. Using tiny crystals called quantum dots, this test detects both the presence and the quantity of certain DNA changes. It could alert people who are at risk of developing the disease and also could tell doctors how well a particular cancer treatment is working.

WILL KIRK

Professor Jeff Wang and research fellow Vasudev Bailey, a collaborator from the Johns Hopkins School of Medicine



DESIGN PROJECTS

Building a better mousetrap

Each fall, students in ME's Freshman Experiences course taught by Professor Allison Okamura design and build devices powered only by the potential energy stored in up to two mousetraps and six rubber bands. In this year's project, students designed and built vehicles that raced to deliver a payload (a Chipotle gift card later given to the winners) to a finish line. But there was a catch—the vehicles had to pass under a 5-inch height barrier and the payload had to clear a 3-inch raised platform. The students' creative designs were guided by concepts taught in the course, including design, prototyping, experimental methods, potential and kinetic energy, and friction. The members of the winning team (Team Barnett, in honor of their teaching assistant, Andrew Barnett, a Mechanical Engineering senior) were Vincent Wang, Patrick Tamm, and Max Robinson. More information and images may be found at http://gazette.jhu.edu/2010/12/06/building-a-better-mousetrap-car. The ME Freshman Experiences course is part of our revamped freshman curriculum, which was introduced four years ago in the department. Its salient components are two two-semester courses: Freshman Experiences and Introduction to Mechanics. In the first, students use hands-on projects to explore basic engineering principles and form an appreciation for teamwork and engineering design. The second course replaces Physics 101 and is taught in the Mechanical Engineering Department rather than in Physics and Astronomy. Spreading over two semesters this material, which is so crucial, especially for mechanical engineers, enables us to cover it in more depth and ensures that students learn it in a more robust fashion.

WILL KIRK/HOMEWOODPHOTO.JHU.EDU (ALL)

Teamwork: Team MEKe (members Eddy August, Meghan Byrnes, and Kerry Moriarty) set their vehicle at the starting line.

Craftsmanship: This two-stage vehicle was designed by Team Rocket (members Allison Ballinger, Marcella Lunn, and Shelby Strauss).

Senior designs

The capstone design course of our undergraduate programs, Senior Design, was taught by Mike Johnson and Kevin Hemker, with Andy Conn continuing to act as the liaison to industrial partners and providing valuable advice. This course is the crowning experience for the students in our program. It provides them with the opportunity to apply what they have learned in the classroom to real-world engineering problems. All projects are sponsored by an impressive and dedicated group of industrial partners who provide the motivation and financial support to bring novel prototypes to life. Below is a list of projects that were completed in May 2010.

Project BRAINS: Bone Re-Attachment Instrument for NeuroSurgery. During neurosurgery, doctors must temporarily remove a portion of the cranium, the cranial bone flap, to gain access to the brain. Team BRAINS was tasked with developing a simple and fast way, after the surgery is completed, to secure the cranial bone flap in place so that the healing process can begin. Project Designers: Sam Giovannini, Emre Oguzoncul, Kathryn Smith. Sponsor: Synthes, Inc. Contact: Mr. Phil Watt.

Project CURE: Circumcision Use for the Reduction of an Epidemic. Studies have shown that male circumcision can dramatically decrease the spread of AIDS in heterosexual populations. In developing nations, providing a simple, safe, quick, inexpensive, painless, and bloodless procedure for circumcising adult males will be lifesaving. The Project CURE team developed a device that would allow relatively inexperienced caregivers to perform these circumcisions in a way that has the potential for rapid acceptance in developing nations. Project Designers: Catherine Colwell, Pietro Ranieri, Leah Vilkanskas. Sponsor: Jhpiego. Contacts: Dr. Harshad Sanghvi and Dr. Kristin Chrouser.

Project CURE team members

Project DUFF: Design of UAV Fowler Flap. The Fowler flap is a device found on an airplane wing that, by enlarging the wing area and increasing available lift, allows pilots to land at slower speeds on a shorter landing strip without the risk of stalling and crashing. The Project DUFF team created a fully functional version of the Fowler flap, similar to the type found on commercial jets but designed for the much smaller, unmanned aircraft used for battlefield reconnaissance missions. Project Designers: Austin DiOrio, Matti Makela, Josh Skolnick. Sponsor: AAI Corporation. Contacts: Mr. Todd Graves and Dr. Michael Guterres.

Project GRAB BAG: Christine, a high school student with cerebral palsy, is confined to a motorized wheelchair. Although she operates her chair with ease, she is unable to access the contents of her bookbag, which hangs on the back of the chair. The students on Project GRAB BAG designed a sturdy mechanism that allows Christine, with the push of a button, to access the contents of her bookbag without interfering with the use of the wheelchair. Project Designers: Tristan Arbus, Diana Sandy, Adam Sierakowski. Sponsor: Volunteers for Medical Engineering, Inc. Contact: Mr. John Walker.
PROJECT HANDY CAP: Designing a cap that would enable users to open a bottle of soda, a medicine container, or a jar of baby food with one hand—this was the objective of Project HANDY CAP. In addition to ease of use, the

criteria for the cap were that it provides a tight seal and that the container is reusable, child-proof, and affordable. Project Designers: John Lippe, Gordon Mack, Jeremy Reyes. Sponsor: Innovoducts, LLC. Contact: Mr. Lawrence Walters Jr.

Project LEGS: Lunar Explorer Grounding System. Assuring a gentle landing for a new class of robotic lunar exploration vehicles was the objective of Project LEGS. For its assignment, this team designed and built prototypes for remotely operated mechanisms that are suitable for a variety of lunar exploration equipment. Project Designers: Ben Kissner, Christian Murphy, Ezra Obstfeld. Sponsor: JHU Applied Physics Laboratory. Contact: Mr. Tim Cole.

Project MATAR: Move And Translate And Rotate. During the assembly of Baltimore Aircoil Company's cooling towers a key component, the fill bundle, is constructed in a series of steps. This team's objective was to create special handling equipment that would facilitate each of these processes. Team MATAR succeeded in developing a purely mechanical system, requiring minimal changes to the existing production steps and providing much safer procedures for both people and equipment. Project Designers: Ilana Cember, John Chang, Eileen Hernandez. Sponsor: Baltimore Aircoil Company. Contact: Mr. Beau Shideler.

Project MR E: Miniature Radiation Escutcheon. When cancer research is conducted on small rodents, it is necessary to create a very small and controllable zone of radiation exposure. To do this, researchers need a way to automatically adjust the shape and size of the area being exposed to radiation. The students on Project MR E created a miniature version of a multileaf collimator, a tool used for radiation dose delivery on humans. Project Designers: Ioannis Antoniou, Avik De, Christopher Ivey, Rebecca Pierce. Sponsor: JHU NSF ERC CISST. Contact: Dr. Peter Kazanzides.

Project SHARKE: Submerged Harnesser of Available Renewable Kinetic Energy. A method to harness subsea energy, which is needed to power underwater vehicles and systems, was the objective of this project. Its specific application was recharging the batteries of a tethered unmanned underwater vehicle (UUV) while it is submerged. After considering a number of approaches, Team SHARKE chose to tap the flow of underwater currents for use in this project. Project Designers: Oliver Ashley, Adam Barber, Ellen Berlinghof, Robert Calderon. Sponsor: Northrop Grumman Undersea Systems. Contacts: Mr. Daniel Barvenik and Dr. Dave Smallwood.

Project SMARTHOOK: When electrical crews install a new overhead electrical wire, it is essential that they create the correct amount of tension in the wire in order to minimize damage from unusual loads, such as those caused by wind or ice. Because the existing methods (large winch and separate circular tensile gauge) used to achieve this wire tension were cumbersome and slow, the Baltimore Gas & Electric Co. asked the Project SMARTHOOK team to devise an easier means to accomplish this work. Project Designers: Adam Baumgartner, Brian Min, Alex Thibau. Sponsor: Baltimore Gas & Electric Co. Contact: Mr. David Barnard and Mr. Bruce Hirsch.

Project WHISPER: W HIgh SPeed Envelope Registration. The objective of this project was to create a mechanism that enables automatic repositioning of envelopes of varying sizes in PB-DMT's high-speed automated mail processing machinery. This "registration" step is defined as moving all envelopes so that their top edges are aligned. Team WHISPER devised an envelope-shifting mechanism that can complete the action in less than the required 0.05 seconds while the envelopes are moving at 100 inches per second. Project Designers: Anthony Denny, Dante Ross, Yonatan Silverman. Sponsor: Pitney Bowes DMT. Contacts: Mr. Mark MacLeod and Mr. John Masotta.

2010 awards and honors:

Two ME undergraduates win prestigious AIAA award:

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The 2010 AIAA Young Student and Education Conference winners are Alex Englesbe '11 (above, center) and Tiras Lin '13 (below). They won first and third place, respectively, for their presentations at the AIAA Region 1 "Young Professional Student and Education Conference" Undergraduate Presentation competition.

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Best student presentation awards won by ME graduate students: Emily Huskins in the Center for Advanced Metallic and Ceramic Systems won the Student Paper competition at the 2010 Annual Meeting of TMS in Seattle in February with her talk on "Ultra-Fine-Grained Aluminum Alloys." She also won the Student Paper competition at the Society of Experimental Mechanics conference in Indianapolis in June with her talk on "Thermal Softening of an Ultra-Fine-Grained Aluminum Alloy at High Rates." And Will Anderson in the Turbulence Research Group won the Best Student Oral Presentation for his talk titled "A Dynamic Model for LES of Boundary Layer Flow over Rough, Multiscale Surfaces," presented at the 19th Symposium on Boundary Layers and Turbulence, Keystone, Colorado, August, 2010.

Better racing every year: By finishing 28th out of 100 teams, the Hopkins Baja team made history with its personal best-ever finish at the race in Greenville South Carolina. ME is proud of its fast increasing ranking and congratulates the team for its accomplishments.

2010 Baja winners

Baltimore Sun's "Ten to Watch under 30": Graduate student Muge Pirtini has been named one of Ten to Watch Under 30 in the publication *B*, of the *Baltimore Sun*, for her work on a noninvasive infrared scanning system that could be used for the detection of melanoma.

Graduate student Muge Pirtini

Promising research in California: Peter Lillehoj (BS 2006), now a PhD student at UCLA working under the direction of his doctoral adviser Prof. Chih-Ming Ho (himself a '74 PhD graduate from JHU) has been awarded a UCLA Engineering Awarded Grant from the Bill & Melinda Gates Foundation. They will work on developing a disposable malaria biosensor based on the SIM (subscriber identity module) card platform which is a portable memory chip used in many of today's cell phones. "Peter's idea is truly innovative and has the potential to be applied to detect a wide class of diseases," said Prof. Ho.

Faculty awards and promotions

Tenured: Noah Cowan was promoted to associate professor with tenure in May 2010.

New vice chair: Professor Allison Okamura became vice chair in September 2010.

Presidential award: Professor Thao "Vicky" Nguyen has been chosen as a 2010 recipient of a Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor bestowed by the United States government on young professionals in the early stages of their independent research careers. "You have been selected for this honor not only because of your innovative research, but also for your demonstrated commitment to community service and public outreach," President Obama said in a letter to the winners. "Your achievements as scientists, engineers, and engaged citizens are exemplary, and the value of your work is amplified by the inspiration you provide to others." Congratulations to Professor Nguyen on this tremendous accomplishment and national recognition of her contributions.

New Fellows: Professors Gregory Chirikjian was elevated to the rank of IEEE Fellow, effective, January 1, 2010, for his outstanding contributions to hyper-redundant manipulators. And at the November 2009 meeting of the American Physical Society's Division of Fluid Dynamics, Professor Joseph Katz was elected a Fellow of the American Physical Society. Fellowship of the APS is a distinct honor signifying recognition by one's professional peers, and accorded to its most distinguished members. More recently, Professors Allison Okamura and Louis Whitcomb became IEEE Fellows in December 2010. Professor Okamura's citation reads, "For contributions to the design and control of haptic systems and medical robotics," and Professor Whitcomb's citation is, "For contributions to the theory and application of robotics for intervention in extreme environments."

Staff news

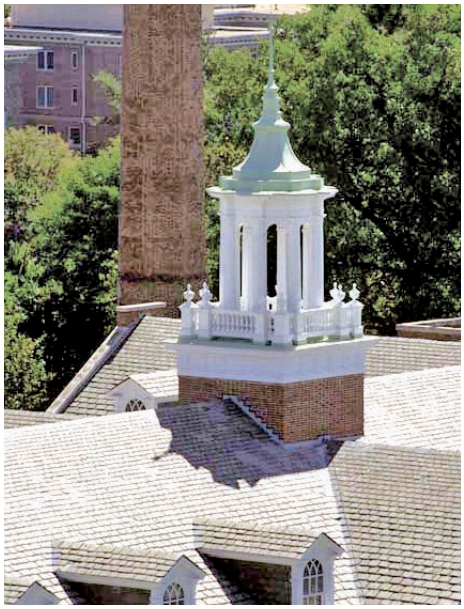
Staff Recognition Award: Senior research service analyst Lorrie Dodd was chosen as one of four recipients of the coveted WSE Staff Recognition Awards. Her dedication and accomplishments were highlighted as she received a plaque and monetary award from Dean Jones.

New ME office management: ME welcomes new senior administrative manager, Marty Devaney. Marty studied and worked as a mechanical engineer before getting his MBA and focusing on project administration and the business side of things. He has gained experience at the University of Maryland, with startup company INTANK Services, Northrop Grumman, and most recently AAI Corporation/Textron Systems.

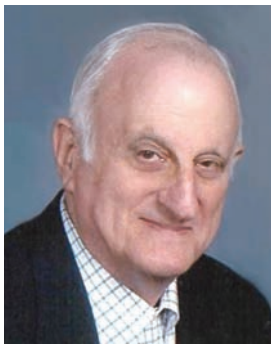
Phyllis Sevick joined the department as a research service analyst. Previously she worked at the Johns Hopkins at Eastern campus.

Barbara Rogowski is the new administrative secretary supporting CEAFM and Professors Joe Katz and Charles Meneveau.

Promotions: This year, Lorrie Dodd was promoted to senior research service analyst, Mike Bernard was promoted to academic program administrator, and Megan Gorhan has a new position as research service analyst.



Bob Buxbaum's Story



Bob Buxbaum (ME '51) is a JHU alumnus who will be celebrating his 60th-year reunion. Bob was employed by the Martin Company working in the structural dynamics section and then in the nuclear power division. With the push to go to the moon in the 1960s, he was tapped to perform a study on the design of the lunar lander legs. His dynamic analysis took into account the vertical and horizontal landing velocities, terrain inclination, and frictional characteristics of the lunar surface. Results indicated that the optimal number of stroking legs for the lander should be ~4.6, which was rounded up to 5 for increased stability. Program management at Martin decided on a 4-leg design. A competing company and eventual winner, Grumman, proposed a 5-legged vehicle. Afterward NASA directed Grumman to go with a 4-leg design. The rest is history. Fortunately all of the Apollo lunar landers had successful touchdowns on relatively flat surface with low descent velocity.

Later, while a member of the nuclear power division, the product line was sold to Teledyne, and Bob went with it. Bob worked on a number of spacecraft programs that made history. He and his team developed the RTGs (radioisotopic thermoelectric generators) that powered the Viking I and II Mars landers which analyzed the surface soil and photographed the Martian landscape. The dual successful landings occurred during the summer of 1976, celebrating the U.S. Bicentennial. The team also developed similar power supplies for the Pioneer 10 and 11 spacecraft that explored Jupiter and then our solar system. In all of these cases the RTGs far outlived the missions by decades.

Unbeknownst to NASA, on the inside surface of the Viking generators' serial number plates, Bob personally engraved his name as well as the names of the other members of the team. If ET decides to phone home, Bob's name might top the list.

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