

# COLLEGE OF ENGINEERING

## DEPARTMENT OF ELECTRICAL ENGINEERING

PENNSTATE



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Coming to Happy Valley for a visit?

Please stop by the department offices. We love to have visitors and would be happy to know when our alumni are in town or on campus.



### Global Enrichment as a University and Department

Being global as a department, college and university is increasingly more important. Penn State's Office of International Programs has outlined its approach to realize Penn State's potential to become the most internationalized university in the world. Its approach, as outlined in its Strategic Plan 2009-2013 ([www.international.psu.edu/about\\_office/PDF/UOIPStrategicPlan.pdf](http://www.international.psu.edu/about_office/PDF/UOIPStrategicPlan.pdf)), is both multifaceted and thorough. One of the many initiatives outlined in the plan is the development of Global Engagement Nodes (GEN). These proposed GENs would be a world wide network of leading academic institutions. The goal would be to partner with an institution(s) in a country with the knowledge base and ability to supply educational enrichment to students and tackle our critical global challenges. These mutually beneficial international partnerships would enhance Penn State's global presence while providing significant opportunities to our students.

To that end, a number of task forces have been assigned to gather information and investigate opportunities in different regions of the world. **Nirmal K. Bose**, HRB-Systems Professor of Electrical Engineering, has been appointed a member of the India as a Global Engagement Node interdisciplinary taskforce. This group is reaching out to the entire Penn State community to get a better understanding of any current teaching, research, service activities, or programs in India that are already taking place or are being planned. The task force will consider partnering with institutions based on regional location and strength of global challenge themes already in place.

As the University explores avenues to increase our global presence, the Department of Electrical Engineering is ever aware of the need to become and remain an important global and diverse unit. Our faculty members are actively involved in international activities and research representing Penn State on a global level on a continual basis. In addition to numerous seminars, plenary talks, workshop chairs, and invited papers in countries throughout the world, the faculty members are also honored and

represented in international activities such as:

**Nirmal K. Bose**, HRB-Systems Professor, was the recipient of the Alexander von Humboldt Award from Germany. In 2009, Bose was again invited as a Humboldt alumni for collaborative research and lectures in Germany at the University Of Wuppertal.

**Iam-Choon Khoo**, W. E. Leonhard Professor, is a board member of the Italian National Research Council International Committee on Multi-Disciplinary Research Center and also a vice president of the International Commission for Optics.

**Raj Mittra**, professor, holds an appointment as a distinguished professor at the Yuan Ze University in Taiwan; serves on the advisory board of the Queen Mary College, University of London; visiting researcher, Institute of High Performance Computing in Singapore; visiting researcher at the Council of Scientific and Industrial Research Organization in Sydney, Australia; visiting researcher, ASTRON Corporation, Netherlands.

**Jerzy Ruzyllo**, professor, has been appointed a distinguished visiting professor at the Center for Advanced Studies, Warsaw University of Technology, Poland and is a guest member, International Scientific Advisory Board, Ministry of Science and Higher Education, Poland.

**Kenji Uchino**, professor, is the chairman of Smart Actuators/Sensors Study Committee for the Japanese Technology Transfer Association; founding member of Worldwide University Network, which encourages partnerships among the U.K. and U.S. universities; and initiator of the Academic Summit organized by Shonan Institute of Technology in Japan, Penn State, Kaiserslautern University in Germany, University of Sydney in Australia, Seoul National University in Korea and Xian Jiaotong University in China.

### International Student Enrollment

University level	Student Designation	% International students
College	Undergraduate	4.9%
College	Graduate	62.3%
Department	Undergraduate	6.7%
Department	Graduate	70.3%

## FACULTY SPOTLIGHT

**Aylin Yener** joined the Penn State Department of Electrical Engineering faculty in 2001 as an assistant professor. Yener received dual bachelor degrees in electrical engineering and physics at the age of 19 in 1991 from Bogazici University in Istanbul, Turkey. After determining that she wanted to live abroad, Yener went to graduate school at Rutgers University in the electrical and computer engineering department where she earned her master's and doctoral degrees, in 1994 and 2000. At Rutgers, Yener was a research assistant in the nation's very first wireless communications research center, WINLAB, where she was exposed to cutting edge wireless research. This experience instilled and solidified her interest in wireless communications.



Yener, a member of the communications and networking research area, was promoted to associate professor in 2006. She is committed to research and has been the principal investigator and co-principal investigator on a number of grants from the National Science Foundation and the Department of Defense. The most recently awarded grant is the Collaborative Alliance Communication Network Research Center. It is a ten-year, \$35 million, multi-institution collaborative technical

alliance grant from the Army Research Laboratory. Penn State is the lead institution and Yener is a thrust lead of the center. The mission of this ten year center is to develop a new field called "Network Science."

Teaching as well as working with graduate students in her research group Wireless Communications and Networking (WCAN@PSU) Laboratory is also a passion for Yener. "It is my job to mold these talented, smart, young people to become independent researchers who can tackle challenging problems and new directions in academia or industry when they graduate," stated Yener.

Yener spent ten months from October 2008 to August 2009 on sabbatical at Stanford University's Department of Electrical Engineering. While at Stanford, she was working on information theory problems related to determining the capacity for wireless ad hoc networks. These networks consist of wireless devices and are formed without the need for centralized infrastructure.

As a member of IEEE, Yener is currently the chair of the Student Committee of the IEEE Information Theory Society. She is the founder of the North American School of Information Theory, a new educational initiative of the IEEE Information Theory Society which brings graduate students together and facilitates interaction with prominent information theorists annually in a campus environment. The inaugural school was held in 2008 at the Penn State University Park campus. The 2009 school, which Yener also chaired, was held at Northwestern University. Yener has also been the technical program chair for several IEEE conferences to date. She is an editor for the IEEE Transactions on Wireless Communications, and for the IEEE Transactions on Communications. She has more than 100 publications including book chapters, journal articles, and conference publications.

Yener, who is a citizen of Turkey, is a permanent resident of the United States and lives in State College.

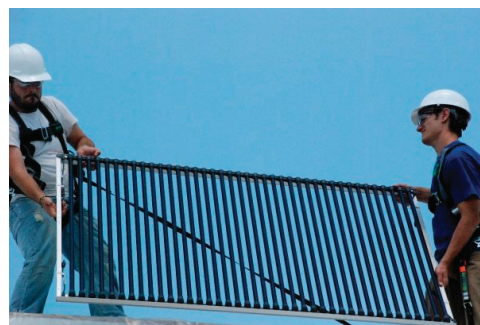
## STUDENT SPOTLIGHT

**Jeff Rayl**, a senior in electrical engineering, is a good man to have on your team. The fourth semi-annual Solar Decathlon was held in October in Washington D.C. and the Penn State team placed 3rd in engineering and lighting. Rayl was the electrical and photovoltaic project manager for the team. The competition, sponsored by the U.S. Department of Energy, boasted 19 teams from around the world which competed in energy related challenges from net-metering to cooking meals and doing laundry. Rayl became involved with the team through his participation in the student organization, Engineers for a Sustainable World. "I've always wanted to do something that would have a positive benefit to the world," commented Rayl. And certainly, Rayl seems to be positioned to do just that.



Originally from Houston, TX, Rayl chose Penn State because of the reputation of the engineering program. He had always had an interest in electronic devices and electrical engineering seemed to be the perfect match. Rayl has been busy in a number of leadership positions at Penn State. In addition to his involvement with the solar decathlon, Rayl is the president of Engineers for a Sustainable World and was a research assistant.

Rayl plans to attend graduate school at Penn State in the Department of Energy and Mineral Engineering with an emphasis in photovoltaics. He will be working with Assistant Professor **Jeffrey Brownson**, who was the faculty adviser for the Solar Decathlon team. Designing and building a sustainable eco-dream home is a goal that this hard working young man would like to realize. Rayl, who is a vegetarian, loves to cook. One day, he hopes to do just that in a sustainable home powered by his own solar design.



Jeff Rayl, left, and Team Leader Kyle Macht, installing Solyndra's cylindrical solar panels for the Solar Decathlon.



## Faculty News

**Craig Grimes**, professor of electrical engineering, presented a plenary talk titled "Ordered 1-D TiO<sub>2</sub> Tube/Wire Nanoarchitectures and Application to Solid State, Liquid Junction, and FRET-based Solar Cells" at the International Symposium on Dye Sensitized Solar Cells in Taoyuan, Taiwan, in October. Grimes also presented "Self-Assembled 1-D TiO<sub>2</sub> Nanotube/wire Arrays for Efficient Conversion of Solar Energy to Electricity or Fuels" to the Department of Chemistry, Hunan University in Changsha, China, in October. In addition, Grimes visited the Institute of Chemistry, Chinese Academy of Sciences in Beijing, China, and presented a talk titled "Photonic Fuels" in October. Grimes was awarded a \$1.4 million grant by Photonic Fuels titled "Towards High Rate Solar Conversion of CO<sub>2</sub> and Water Vapor to Hydrocarbon Fuels."

**Iam Choon Khoo**, William E. Leonhard Professor of Electrical Engineering, presented a keynote plenary paper titled "Nonlinear Optics of Liquid Crystals," at the 13th International Conference on Optics of Liquid Crystals held in Italy Sep. 26 – Oct. 3. Khoo also presented an invited paper titled "Nonlinear and Electro-Optical Metamaterials" at the International Symposium on Trends in Novel Materials for Photonics in Greece in October.

**Yanxi Liu**, associate professor, received a Google research award for an innovative exploration of "Single and Multi-view Urban Scene ReConstruction via Deformed Lattice Discovery and Matching in Real Images" in October.

**Vishal Monga**, assistant professor of electrical engineering, co-authored a paper titled "Meta-classifiers for Multimodal Document Classification" which was voted the best oral paper and ranked in the top 10 percent of papers submitted to the IEEE International Workshop on Multimedia Signal Processing in Brazil in October.

**Victor P. Pasko**, professor of electrical engineering, presented an invited talk on electrostatic mechanism of infrasonic radiation from thunderstorms at 9th International Conference on Theoretical and Computational Acoustic in Germany in September.

**Jerzy Ruzyllo**, professor of electrical engineering and materials science and engineering was the chairman and lead organizer of the 11th International Symposium on Semiconductor Cleaning Science and Technology held in Vienna, Austria, in October.

**Kenji Uchino**, professor of electrical engineering, published a new textbook for business students titled "Entrepreneurship

for Engineers" from CRC Press in October. The textbook focuses on answering questions that are frequently asked by young researchers and ambitious entrepreneurs hesitate to start their own company.



**Douglas Werner**, professor of electrical engineering, presented a seminar titled "Nature-Inspired Optimization of Metamaterials for RF, THz, IR and Visible Wavelength Applications" at Duke University in October.

## Student Recognition

**Keegan McCoy**, an electrical engineering senior, received the Anita M. Todd Internship Student of the Year Award for the 2008-09 academic year. McCoy worked during the summer 2009 semester as a systems engineer at NASA's Goddard Space Flight Center in Greenbelt, MD, where he developed an optical test plan at the Integrated Science Instrument Module level for the James Webb Space Telescope's fine guidance sensor and tunable filter.

**Russell Philbrick**, professor emeritus, and **Sven Bilén**, associate professor, attended the 19th ESA Symposium on European Rocket and Balloon Programmes

in Germany in June. Philbrick and Bilén were accompanied by two electrical engineering students: **Allen Kummer** and **Steve DeVore**, and one recent graduate, **Brain Schratz**. The group presented several papers including:

**Philbrick, C. Russell** and **Hans Hallen**, "Measurements of Contributors to Atmospheric Climate Change;"

**Holmes, Kyle M.**, **Brian C. Schratz**, and **Sven G. Bilén**, "High Energy Monitoring Instrument for Gamma-Ray Burst Studies;"

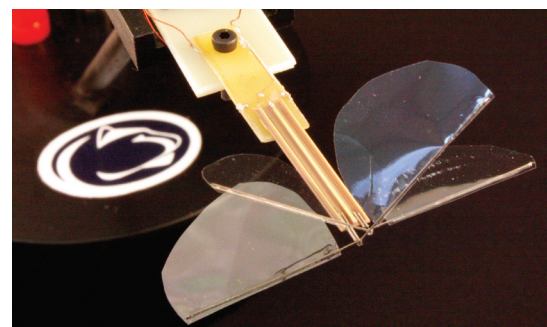
**Kummer, Allen T.**, **Sven G. Bilén**, **Richard T. Fissinger**, and **Brian A. Herrold**, "The Hybrid Plasma Probe: A Unique Combination of Plasma Probes for In Situ Space Environment Characterization;"

**DeVore, Steven M.**, **Allen T. Kummer**, **Brian C. Schratz**, and **Sven G. Bilén**, "The Student Space Programs Laboratory: Fostering Student Space Systems Education and Research within a University Environment;" and

**Lehmacher, Gerald A.**, **Miguel F. Larsen**, **Sven Bilén**, **Charles L. Croskey**, **John D. Mitchell**, **Franz-Josef Lübken**, **Markus Rapp**, and **Richard Collins**, "Where Is the Turbopause?" Rocket Campaign: Overview and First Results."

## CLAPPING WING NANO AIR VEHICLES

Clapping wing air vehicles are inspired by the Weis-Fogh clap and fling mechanism used by certain insects, where opposing wings almost touch during part of the flap cycle, spawning vortex structures that increase thrust. Current vehicles cannot be scaled to nano air vehicle dimensions because they use electromagnetic motors, gears, and linkages that are difficult to fabricate and have poor efficiency at the sub-millimeter scale. With funding from the Air Force Office of Scientific Research, Penn State researchers have developed a novel 4 cm wingspan, 1 gram, clapping wing nano airframe. The four wings are driven by three piezo-electric T-beam actuators that exhibit unimorph behavior and are monolithically fabricated from bulk 1 mm thick PZT-5H. A hinge and lever mechanism amplifies the small actuator displacements to produce 60° wing motions from DC to 12 Hz using 0.4 V/μm applied electric field. The polymer wings clap together at the end of the stroke to amplify thrust.



**Kiron Mateti**, graduate student in electrical engineering (adviser **Srinivas Tadigadapa**) and **Hareesh Kumar Reddy Kommepalli**, graduate student in mechanical engineering (adviser **Christopher Rahn**) co-authored a paper titled "Clapping Wing Nano Air Vehicles Using Piezoelectric T-Beam Actuators" based on this research. The paper won the honorable mention award at the Smart Materials, Adaptive Structures, and Intelligent Systems Conference in September in Oxnard, CA.

## Department Alumni Association

The Department of Electrical Engineering Alumni Association held its fall kick-off meeting and reception at the Nittany Lion Inn on Oct. 2. Department Head, **Ken Jenkins**, reported on the status of the department and **Tom Jackson**, Robert E. Kirby Chair Professor, presented the group with an overview of his research. **Mark Wharton**, president of the electrical engineering alumni association, provided an overview of the graduate fellowship fund which was started by the association in 1996. **Jerry Kolbe**, alumni association guru, discussed the formation of the three main committees to help focus the association's activities: alumni-faculty/staff relations, alumni-alumni networking, and alumni-student relations.

### Mentoring Program

One of the main discussion items on the agenda was the formation of a mentoring program. **Jerry Robertson**, representing the mechanical and nuclear engineering department, informed the group of the successful mentoring program developed in their department. **Jennifer Theiss**, alumni relations coordinator in the College of Engineering, also addressed the mentoring program and referenced material already developed for that purpose. It was the general consensus of the group that this is a program we wish to pursue. A number of people signed up to help with the process. The next several newsletters will have more information on how you can become involved in the mentoring program.

### Homecoming Football Tailgate

You missed it?? Too bad – maybe next year! Actually we all missed it. State College was pounded with 6-10 inches (depending on who you ask) of snow. Since the leaves were still on the trees and the ground had not yet frozen, we had quite a mess of power outages and mud. Penn State closed all of its grass parking areas near the stadium and, because of the potential parking nightmare, all tailgating was prohibited. So we had no choice but to cancel the 1st ever-spectacular electrical engineering alumni tailgate. **Joe Sullivan**, our electrical engineering alumnus who had generously donated his RV parking space to us for the tailgate, has already volunteered the space again for next year. So we'll try it again -



Cold, wet football fans



Wait, are these people tailgating??



Alumni Blue Band

Thank you to **Kate Hess** BSEE '05 and **Randy Eckels** BSEE '82 for sending me these pictures of Homecoming 2009.

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## IS YOUR COMPANY LOOKING FOR TOP-NOTCH ENGINEERS?

Look no further than Penn State!

The Engineering Career Resources and Employer Relations office and the Society of Women Engineers are hosting an Engineering Career Week in February 2010. Events include a diversity showcase, networking events, career fair, and individual interview opportunities. This event is open to all engineering students. If your company would like to participate in this great program or if you would like more information, please access the following: [www.engr.psu.edu/career/ecw/](http://www.engr.psu.edu/career/ecw/)

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Pictures to share, news to post, we'd love to hear from you!

### Contact Information:

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This publication is available in alternative media on request.

Penn State is committed to the affirmative action, equal opportunity, and the diversity of its workforce.

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