

# COLLEGE OF ENGINEERING

## DEPARTMENT OF ELECTRICAL ENGINEERING



ELECTRONIC NEWSLETTER / NOV-DEC 2011 / [WWW.EE.PSU.EDU](http://WWW.EE.PSU.EDU)

### ENERGY CONSERVATION FACULTY POSITION

Applications are invited for a tenure-track faculty position in the Department of Electrical Engineering. Applications are sought from individuals with expertise in energy harvesting, electric drives, and grid interfaces for renewable energy sources and storage systems. For the complete advertisement, see our website: <http://www.ee.psu.edu/jobs.aspx>



### THE MILLENNIUM SCIENCE COMPLEX IS COMPLETED

It took three years to complete the largest academic building on campus. Situated on the corner of Pollock and Bigler Roads, the 275,600-square-foot Millennium Science Complex will house the Materials Research Institute and the Huck Institutes for the Life Sciences. Five electrical engineering faculty members are moving their research labs into the new building which was designed to encourage collaboration between the two institutes.

The complex was designed by architect, Rafael Viñoly, who previously designed the Information Science and Technology Building which spans Atherton Street. Each wing of the L-shaped building is 550 feet long and 110 feet wide. The building's most striking feature is the 150-foot cantilever at the main entrance where the two wings meet. In an effort to build an energy-efficient facility, the building has 60,000 square feet of green roofs which will retain storm water and reduce temperature variation. In addition, there are several heat recovery wheels which recycle air and absorb energy.

Housed in the basement of the complex are 16 state-of-the-art vibration-free quiet labs. It was designed to be located underneath the cantilever to eliminate any building vibration from above. Other measures that were taken to eliminate noise include a two-foot thick concrete slab underneath the labs, an independent roof system, and a double wall system with isolation joints. A 9,500-square-foot clean room is also incorporated in the building. To control the level of environmental contaminants, the clean room has a dedicated tunnel from the loading dock and a unique exhaust system.

The building was designed to encourage and promote an exchange of ideas and expertise across disciplines. With shared lab space, open student offices, and shared meeting spaces, the facility welcomes and supports collaboration across and through University departments and research centers.

The move into the new building began this fall and is being carefully orchestrated. Approximately 300 faculty and staff members will be moving into the building. The five electrical engineering labs are moving in December and January. **Suman Datta**, professor of electrical engineering, is slated to move his lab in January. Datta comments, "I am excited to move into the Millennium Science Building in January of 2011. As an experimental device physicist in the Materials Research Institute, I am interested in demonstrating high performance and energy-efficient nanodevices and integrated circuits that will have a marked impact on the future generation building blocks of information technology. I am looking forward to working closely with the excellent faculty in the new building whose expertise ranges from computational materials design to experimental materials synthesis to high-precision nanoscale metrology. Since I will now be close to the Huck Institute, it also will allow me to explore new research vectors at the intersection of information technology with the life sciences."



Photo credit: Patrick Mansell

## FACULTY SPOTLIGHT



Theresa Mayer, professor of electrical engineering, has been a member of the faculty since 1994. Originally from Hampton, VA, Mayer received her bachelor's degree in electrical engineering in 1988 from Virginia Tech. After considering her options, Mayer chose graduate school at Purdue University and received her M.S. and Ph.D. in 1989 and 1993, respectively. Mayer determined that academia was a good choice based on the flexibility of

projects and ability to be innovative and create new technology.

Mayer's research is in the areas of nanoscale electronic and optical device fabrication, integration, and characterization. More specifically, recent research has been focused on the development of nanomanufacturing techniques to create electronic and optical microsystems with added functions. The team has developed new nanomanufacturing processes and tools to place nanomaterials onto CMOS circuits. These innovations in nanoscale materials and device integration have the potential to revolutionize chip-scale electronics by adding entirely new functions to silicon integrated circuits. One application of this process involves coating a series of nanowires with DNA sequences that match those from disease-causing bacteria or viruses. If DNA from one of those pathogens is present, it will bind to the nanowire with the matching sequence, changing the wire's conductivity. A transistor connected to each nanowire detects the change of conductivity. The electric field draws the particular nanowire to different regions of the microchip snapping into a microwell. The system is very accurate with a 99% success rate.

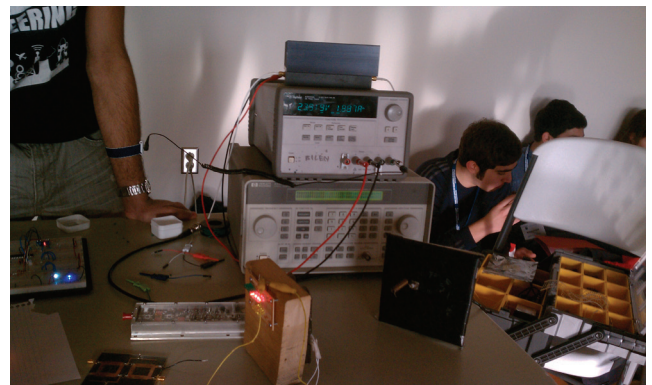
In March, Mayer's office and lab are moving to the new Millennium Science Complex. Mayer, director of the Nanofabrication Laboratory, collaborates with colleagues in chemistry and materials science and engineering, among others. In this regard, the move will make the logistics of partnering and working together much less complicated. Productivity will increase; exchange of ideas will increase. The Nanofabrication Lab and the Materials Characterization Lab housed in the complex are state of the art and professionally equipped. Mayer stated that the layout of the building lends itself to a higher level of collaboration which could dramatically change the way we work.

Mayer is a recipient of the National Science Foundation CAREER Award, Penn State Engineering Society Outstanding Teaching Award, Penn State Engineering Society Outstanding Research Award. She holds 5 U.S. patents and has authored and co-authored more than 150 journal publications.

Mayer and her husband, Jeff, have two sons and live in Port Matilda.

## STUDENT OUTREACH

On Nov. 3, the IEEE student chapter set up a booth at the Engineering Showcase in the State College Municipality Building. The event, organized by the College of Engineering's Multicultural Engineering Program, was designed to show high school students what it is like to be an electrical engineer. Undergraduate electrical engineering students **Ravender Virk** and **Erik Bergstrom** joined electrical engineering graduate student, **Amanda Mills**, in talking to students and engaging them with various demonstrations. One exhibition that was very popular with the students was an experiment that demonstrated power beaming. The equipment was provided by the **Aseem Singh**, from **Sven Bilén's** Systems Design Lab.



## DEPARTMENT UPDATES

**Mohsen Kavehrad**, W.L. Weiss Chair Professor of Electrical Engineering, is an invited panelist and a technical program committee member for the 2nd IEEE Workshop on Optical Wireless Communications as a part of IEEE GLOBECOM 2011 which will be held in December in Houston, TX.

**David Miller**, professor of electrical engineering; **George Kesidis**, professor of electrical engineering; **Qing Yang**, professor in the College of Medicine at the Milton S. Hershey Medical Center, and **Yaman Aksu**, recently graduated Ph.D. student published a paper in the peer-reviewed journal PLoS One on a novel definition of conversion to Alzheimer's and development of a neuroimaging-based system for early prognostication of Alzheimer's conversion in elderly subjects. The paper is titled: "An MRI-derived Alternative to the CDR-based Definition of MCI-to-AD conversion for long-term, automatic prognosis of MCI patients". The team developed a novel machine learning paradigm, used to design a classifier that prognosticates conversion using only a baseline visit MRI image. You can read the paper here: <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0025074>

**Jerzy Ruzyllo**, distinguished professor of electrical engineering, was an invited keynote speaker at the International Conference on Governance and Ethics of Nanosciences and Nnotechnologies NANOETHICS 2011, organized by European Union Commission, in Warsaw, Poland, in October. The presentation was titled "Nanotechnology and Its Many Facets."

A paper titled "Desynchronization Resilient Video Fingerprinting via Randomized, Low-rank Tensor Approximations" written by **Vishal Monga**, Monkowski Assistant Professor of Electrical Engineering, and **Mu Li**, graduate student in electrical engineering, won the top 10 percent paper award at the IEEE International Workshop on Multimedia Signal Processing in Hangzhou, China in October. The entire paper can be viewed here: [http://signal.ee.psu.edu/MMSP\\_f.pdf](http://signal.ee.psu.edu/MMSP_f.pdf).



Congratulations to Professor **Aylin Yener** as she marks her 10th year of teaching and research at Penn State.

## DEPARTMENT HEAD SEARCH

**David Wormley**, Harold and Inge Marcus Dean of the College of Engineering, announced the development of a search committee for a new head of the Department of Electrical Engineering. The committee is being chaired by **David Miller**, professor of electrical engineering. Miller is joined on the committee by five additional faculty members, one staff member, and two students. Miller comments, "We would like to mobilize the faculty as energetically as possible to help us find a strong, long-term leader, to move the department forward."

An advertisement appears on the website here: <http://www.ee.psu.edu/jobs.aspx>.

**Iam-Choon Khoo**, W. E. Leonhard Professor of Electrical Engineering, was an invited keynote speaker at the International Workshop on Nano- and Bio-Photonics which was held in Lyon, France, in October. The presentation was titled "Plasmonic-Liquid Crystals for Next Generation Electro- and Nonlinear-Optics" based on collaborative research with his graduate students: **Y. Ma**, **S. Zhao**, **K. Hong**, and **Tony Huang**, associate professor of engineering science and mechanics. The work is supported by the Air Force Office of Scientific Research and the Materials Research Science and Engineering Center funded by the National Science Foundation.

Graduate student, **Ming-Shih Huang**, won Best Paper of Session, Best Paper of Track, and Best Graduate Paper at the 30th Digital Avionics Systems Conference held in Seattle in October. The paper was titled "Non-cooperative Collision Avoidance Concept For Unmanned Aircraft System Using Satellite-based Radar And Radio Communication." Huang is part of **Ram Narayanan**, professor of electrical engineering, research group.

**Kenji Uchino**, professor of electrical engineering, was presented with the "Inventor Award" from the Center for Energy Harvesting Materials and Systems, at Virginia Tech during the 8th International Workshop on Piezoelectric Materials and Applications, held in Roanoke, VA, in August. The award recognizes Uchino's significant contribution in this field.

On October 20, students from three electrical engineering classes (E E 474 Satellite Communications Systems, E E 009S This IS Rocket Science, and E E 497 Space Systems Engineering Seminar) as well as students from the Student Space Programs Laboratory visited Lockheed Martin Space Systems Corporation in Newtown, PA. The visit exposed them to how satellites are designed, built, tested, and operated. Student were able to see the facilities in which the next-generation Global Positioning System, known as GPS III, is being built and tested as well as actual flight hardware. GPS III will improve position, navigation and timing services, and provide advanced anti-jam capabilities yielding superior system security, accuracy, and reliability.



PENN STATE ELECTRICAL ENGINEERING SOCIETY

INVITES YOU TO THE

GRADUATION RECEPTION/ALUMNI DINNER

DECEMBER 8, 6 P.M.

KUNKLE LOUNGE IN HAMMOND BUILDING,  
PENN STATE UNIVERSITY PARK CAMPUS

WE WILL BE HONORING OUR 2011 EARLY CAREER  
RECOGNITION ALUMNI AWARD WINNER,  
**BRANDON RITROVATO.**

THIS IS A PERFECT OPPORTUNITY TO CONGRATULATE THE  
GRADUATING SENIORS WHILE WELCOMING THEM INTO THE EE  
DEPARTMENT ALUMNI SOCIETY. THE **SENIOR DESIGN SHOW-  
CASE** IS IN THE HUB THAT DAY FROM 1 – 3 P.M. COME OUT  
AND SUPPORT OUR STUDENT'S PROJECTS.

PLEASE RSVP IF YOU ARE ABLE TO ATTEND THE DINNER:  
[HTTP://WWW.EE.PSU.EDU/ALUMNIFRIENDS/FALLMEETING2011.ASPX](http://www.ee.psu.edu/alumnifriends/fallmeeting2011.aspx)



*Pictured from the left: IEEE president-elect, Gordon Day; Raj Mittra; and IEEE president, Moshe Kam*

**Raj Mittra**, professor of electrical engineering, was honored by IEEE with the 2011 IEEE James H. Mulligan, Jr. Education Medal. The medal, sponsored by The Mathworks, Inc., Pearson Education, Inc., National Instruments Foundation and the IEEE Life Members Committee, recognizes Mittra for contributions to graduate education, engineering research and research training in electromagnetic communication. The medal was presented in August at the IEEE Honors Ceremony in San Francisco, CA.



**Janet Woomer**, administrative support assistant for the department, is retiring at the end of the year. Woomer has been the department's receptionist since 1982. A retirement reception is being held on Nov. 30, 2:00 p.m. in 101 EE East. Woomer is looking forward to spending more time with her family.

TAILGATE 2011



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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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