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RESEARCH EXPERIENCE FOR UNDERGRADUATES ENTERS 8TH YEAR

The Research Experience for Undergraduates (REU) is a National Science Foundation (NSF) funded program which supports active research participation by undergraduate students who come to Penn State from other universities. REU projects involve students in meaningful ways in ongoing research programs or in research projects specifically designed for the REU program. Penn State has hosted an Electrical Engineering REU (EEREU) program every summer since the inaugural program in 2003.

The EEREU program at Penn State is a nine-week summer program open to undergraduate students who are citizens or permanent residents of the United States. Each year about 13-14 students are selected from the pool of applicants nationwide to participate in research activities within electrical engineering. The goal of the program is to provide individually challenging experiences in research and well-organized integrative team activities in ethics, entrepreneurship, and professional development to accomplish its objective of attracting talented undergraduate students and providing a program of unique, high quality, and balanced research activities that positively impact the participant's lifelong career choices in engineering research.

With NSF support (from this REU site grant as well as other individual REUs at Penn State), 13 students participated in the 2009 EEREU. Five of the participants were female engineering students and two were Hispanic minorities from universities in Puerto Rico. Demographically, the 13 students represented 13 different institutions, including Western Michigan University, North Carolina State University, University of Puerto Rico, Binghamton University, Franklin W. Olin College of Engineering, University of Pittsburgh, George Washington University, John Carroll University, Milwaukee School of Engineering, University of Arizona, West Virginia Wesleyan College, Inter American University of Puerto Rico, and St. Olaf College.

The 2010 EEREU program dates are May 31-July 30. During the program, the students will explore a wide range of research and investigate how this research is transitioned to commercial ventures. Each student will spearhead a research project, under the guidance of his or her faculty mentor, in laboratories located in the Department of Electrical Engineering and the Materials Research Institute. The students are also guided in understanding how the research they were doing, whether fundamental or applied, has an impact on everyday life and how it transitions from the lab to product development. As part of their research project, the students are challenged to find opportunities for commercializing their research. Understanding the innovation pipeline will ensure that this next generation of researchers will keep the U.S. competitive globally.

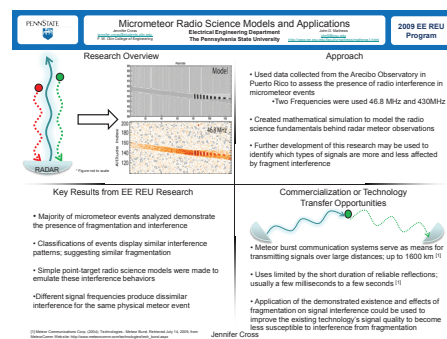
Complementing the research activities, the EEREU program provides an array of group activities including a Weekly Scientific Seminar Series that introduces a broad range of research topics to the students. There are also field trip programs which allow the students to visit prominent local and regional industries, entrepreneurial ventures (including those started by Penn State EE

alumni), and research sites. The students also participate in a weekly workshop on ethics and entrepreneurship which engages the students in debate and analysis of issues in ethics and entrepreneurial topics in engineering.



2009 EEREU students and mentors

At the end of the nine-week program, the EEREU students assemble quad-charts to summarize their research and present commercialization and technology transfer possibilities. The EEREU students present their findings at a full day symposium on the last day of their stay at Penn State. Their research achievements are documented in our EEREU Annual Research Journal published yearly by this program. During the 2009 program, 13 research projects were completed, results summarized, presented, and published in the journal, with the participating undergraduate students as the primary author. Student's research papers are listed in the Penn State library system and published online (<http://www.ee.psu.edu/reu/>).



Quad-chart from 2009

Interdisciplinary research is a strong characteristic of the EEREU research activities at Penn State. All reports are original research and of value for scientific dissemination and publication. All students' research resulted in new experimental results that are of significance to advancement in electrical engineering and/or materials science and engineering. Student's summer

research findings made significant contributions or formed a basis for several regular scientific publications and presentations at national and international professional meetings.

2010 is the last year of the current three-year REU site grant from NSF. Since 2003, a total of 117 students have participated in the Penn State EEREU program. Assessment data has shown that the program has had a significant impact on participant's perspectives of graduate education and research careers (greater than 67 percent post-senior-year EEREU students are engaged in graduate studies or in research positions). This has been a worthwhile and valuable opportunity that we hope to continue with sustained emphasis on interdisciplinary research and increased emphasis on technology transfer and entrepreneurship.

(RETIRED) FACULTY SPOTLIGHT

George Etzweiler, retired professor of electrical engineering, has seen a lot of changes in his 90 years – changes in engineering, changes in Penn State, and changes in town.

Etzweiler, originally from Mifflin County, graduated from Yeagertown High School in 1936. Shortly thereafter, his uncle, who worked for the Lewistown Electric Company, tapped Etzweiler to be an electrical apprentice. His pay was \$10 per week. He had to work one hour to buy a gallon of gasoline.

Etzweiler enlisted in the Navy in 1942 with World War II in full swing. He was sent to California where he taught electronics in the Navy's fire control school. He taught more than 2,000 students by the time the war ended in 1945 and he returned to Central Pennsylvania. With a G.I. bill in hand and a solid background in electronics, it was a natural step to enroll at Penn State. Etzweiler received his bachelor's and master's degrees in electrical engineering in 1949 and 1950, respectively. While in graduate school, Etzweiler received an Office of Naval Research fellowship. He recalls being notified of the award by Eric Walker who was the director of the Ordnance Research Laboratory (now Applied Research Laboratory) even before the paper work was completed making Dean Harry Hammond very upset!

In 1950, Etzweiler accepted a position at Litton Industries in Maryland as a development engineer. While in Maryland, Etzweiler taught control systems classes at the University of Maryland. Etzweiler frequently visited his Penn State friends in electrical engineering when he would return for holidays. Arthur Waynick, electrical engineering department head, convinced Etzweiler to return to Penn State to pursue a Ph.D. degree.

Etzweiler returned to Penn State in 1957 as a full-time instructor and part-time Ph.D. candidate. His fate in teaching was solidified by then and Etzweiler stayed at Penn State as a faculty member after receiving his Ph.D. in 1964, and continued teaching classes in the control systems area. Etzweiler was also the undergraduate student adviser and won the Outstanding Advising Award in 1969, 1985, and 1989. Etzweiler admits being a little hard on his students but also had a lot of fun with them as well. He remembers one very capable student whose father had been in graduate school with Etzweiler years earlier. When the

student performed poorly on a test, Etzweiler attached a note to his test that read: Show this to your father!

In 1970, his colleague, **Tony Ferraro**, convinced Etzweiler to run at Rec Hall with **Hai-Sup Lee** and him during lunch. This became quite a routine for the three faculty members and others joined in as well. Running soon became more than a way to spend his lunch hour for Etzweiler. In 1973, he participated in his first race at the age of 53. He finished first in his age group which earned him recognition in *Runner's World Magazine*.



George Etzweiler, center, with fellow runners Jerry McCullough and Ed Keller.

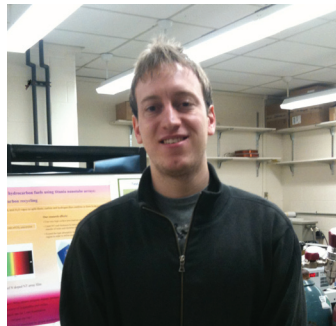
He participated in many more races after that including the New York City Marathon in 1987 where he finished in the top third of his age group. In 1989, at the age of 69, he discovered his favorite race up Mount Washington in New Hampshire. The race is a 7.6 mile course on an 11.6 percent grade. He participated in this race frequently over the years and in 2005, Etzweiler broke the time record for runners 85 and older. However, Paul Harvey mistakenly announced to the world that Etzweiler had won the race. In 2009, at 89, he became the oldest person ever to run the race.

Etzweiler retired from Penn State in 1990 and stayed to teach part time for another four years. He and his wife of 68 years, Mary, have three children, four grandchildren, and two great-grandchildren.

On March 14, Etzweiler will turn 90—and yes, he's still running. He can be seen jogging on the sidewalks through his neighborhood in State College or up Tussey Mountain. He may not run as far or as fast as he used to but it's no surprise that he's still going.

STUDENT SPOTLIGHT

Tom LaTempa, Ph.D. candidate in electrical engineering, has made Penn State his home for nine years. LaTempa is originally from Arizona but more recently lived in Stroudsburg, PA. Upon high school graduation, Penn State was at the top of his list for the next step in his education. LaTempa received his bachelor's degree in electrical engineering in 2005. His interest in engineering began in high school when he took some basic electronic courses. As an undergraduate student, he worked as a lab assistant and became interested in nano-materials and solar applications. LaTempa received his master's degree in electrical engineering in 2007. He has been a graduate research assistant working with Craig Grimes, professor of electrical engineering, since 2006.



His research has centered on developing nano-structured materials for water splitting using sunlight (to produce hydrogen), and converting

CO₂ into fuels such as methane. The novelty of working with solar energy conversion is exciting. "Solar to fuel hasn't been studied as extensively as photovoltaics so there are many opportunities to contribute original work. I enjoy the challenge of working with new original research and the ability to work through all the stages of development – from material synthesis to device testing," stated LaTempa.

In a recent collaboration with the University of California, San Francisco, LaTempa was part of a research team that was looking at the possibility of using bio compatible nanotube coatings for medical implants and controlled drug release studies by filling the tube structures with antibiotics for localized drug delivery. The projected outcome is that nanotubes can promote better adhesion of bio-medical implants to existing bone. The next step is to evaluate the possibility of using nanotubes in vascular stents.

LaTempa plans on receiving his doctoral degree in 2011. He would like to be involved in private industry research related to renewable energies or applications of nano-materials.

In his spare time, LaTempa is an avid snow skier and snowboarder. When he has some time, he would like to ski out West and in Europe.

DEPARTMENT UPDATES

New Staff Member

We welcome **Pam Stauffer**, administrative support coordinator, who joined the electrical engineering department on Feb. 15.

Stauffer began working for Penn State in 1986 in the College of Engineering's Dean's office. She then worked for Aerospace Engineering and Nuclear Engineering before taking a short hiatus to be at home with her young children. Stauffer returned to Penn State in 2000 in the Department of Geography.



Stauffer, who is from Central Pennsylvania, likes being busy and organized. Her strengths are in finding ways to be helpful to others as well as improving processes and work environments. She is excited to be back in engineering and is looking forward to meeting all the staff and faculty members.

In her spare time, Stauffer enjoys gardening (when the snow melts), canning, camping, and spending time with her family.

Graduate School Applications

The Department of Electrical Engineering received more than 920 applications for admission to our graduate program for the fall 2010 semester. They are about evenly split between M.S. and Ph.D. candidates. This is an increase over the previous year by more than 100.

In addition to the United States, we have applicants from the following countries: Afghanistan, Azerbaijan, Bangladesh, China, Colombia, Egypt, Ghana, Great Britain, Greece, India, Iran, Jamaica, Kuwait, Nepal, New Zealand, Nigeria, Pakistan, Portugal, Saudi Arabia, South Korea, Spain, Sri Lanka, Syria, Taiwan, Turkey, and Vietnam. The majority of the candidates are from India and China.

We plan to welcome 55 new graduate students this fall semester.

Students in the News

Keegan McCoy, senior in electrical engineering was selected to be a member of the NASA Student Ambassadors Program.

NASA managers and mentors nominated the recipients from hundreds of former interns and fellows that were engaged in research and education opportunities across the agency. The NASA Student Ambassadors initiative further recognizes exceptional students.

McCoy was an intern in summer 2009 at NASA's Goddard Space Flight Center in Greenbelt, MD.

For more information, see the Penn State Live article, <http://live.psu.edu/story/44568/nw54>

Early Career Recognition Alumni Award

An Early Career Recognition Alumni Award has been created to honor outstanding Penn State electrical engineering alumni at the outset of their career. This is an exciting new way to recognize our alumni. Nominations are due by May 15 and can be made by anyone with knowledge of the career progression and accomplishments of the nominee.

The nomination form as well as award criteria will be sent as an attachment to the e-newsletter. In addition, forms are available in the electrical engineering office and can be mailed or faxed upon request.

Please contact Cathy McClellan, cls118@psu.edu or 814-863-0253. We look forward to hearing all the wonderful things that our alumni have accomplished.

Mentoring Program Update

Currently, we have 14 alumni who have expressed interest in being a mentor for our mentoring program that the department is starting in the fall semester. This is a great start. We will be mailing additional information in the spring. In addition, very soon you will be able to sign up directly on our Web site.

The mentoring program is for junior and senior level undergraduate students in electrical engineering. Students and alumni mentors are matched based on their background and interests and interact on a one-to-one basis to assist the student with their academic and professional development.

The alumni do not need to be located in Central Pennsylvania. The mentors offer guidance, counsel and networking opportunities for students.

To sign up now, please contact Cathy McClellan, cls118@psu.edu or 814-863-0253.

IPAC Meeting

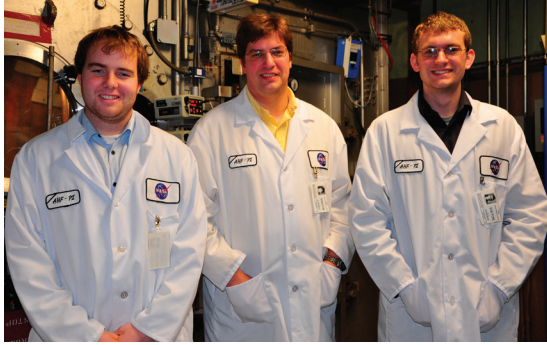
The Department of Electrical Engineering Industrial and Professional Advisory Council (IPAC) will be meeting in March.

IPAC is a select group of representatives from industry, government agencies and academia who advise the department on academic issues and on current trends and future directions in engineering. The group will be meeting in and around the University Park campus on March 17-19.

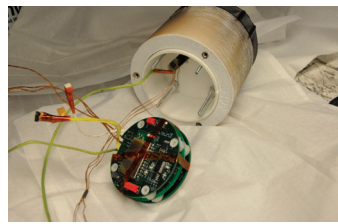
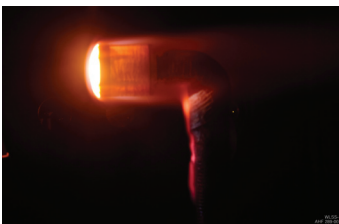
The council will meet with electrical engineering faculty and students to receive an update on the department; undergraduate and graduate programs; and research activities.

At the conclusion of the meeting, a report will be prepared detailing their recommendations. More information about IPAC and their suggestions will be outlined in the April newsletter.

NASA PROJECT



As part of a project funded by NASA's Constellation Universities Institutes Project, Trey Morris, left, aerospace undergraduate student; Sven Bilén, associate professor of electrical engineering; and, Erik Weir, electrical engineering graduate student (pictured above) tested a wireless sensor system prototype they are developing for thermal protection systems (heat shields) in NASA Ames Research Center's Arcjet Heating Facility in late January 2010.



Photos show the system undergoing test in the AHF plume, experiencing heating similar to that of Shuttle re-entry (above left), and the system itself being extracted from the test article after the test (above right).

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For more information, please contact Cathy at 814-863-0253 or cls118@psu.edu.

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Please submit news items to: Cathy McClellan at cls118@psu.edu

This publication is available in alternative media on request.

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U.Ed. ENG 10-70

ANNUAL WAYNICK LECTURE

The Communication and Space Science Laboratory is proud to announce that **David Smith** is the presenter for the 2010 Arthur H. Waynick Memorial Lecture series to be held on **April 30 at 8:00 p.m. at the Cybertorium, 113 IST Building on the University Park campus. A reception will follow in the adjacent West Atrium.**

Smith is the William Bevan Professor of Electrical and Computer Engineering at Duke University and serves as director for the Center for Metamaterial and Integrated Plasmonics.

Smith's research on electromagnetic media includes the study of surface plasmons at visible and near-infrared wavelengths. His research group studies all aspects of plasmonic structures, including plasmon nanoparticles as a platform for biological and biomedical diagnostics, as well as integrated plasmonic components as chip-scale nanophotonic devices for information processing. Recent work has focused on the demonstration of a variety of optical components based on long-range plasmons, including couplers, bends, multimode couplers and interferometers.

Since 1984, the Waynick Memorial Lecture Series has honored Arthur Waynick, who served as the department head for electrical engineering and founded Penn State's Ionosphere Research Laboratory, now known as the Communications and Space Sciences Laboratory. Waynick continued to be active in the laboratory after retirement and until his death in 1982.

To ensure this valuable series continues, please forward contributions to:

MaryAnn Henderson
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The Pennsylvania State University
316 Electrical Engineering East
University Park, PA 16802

