COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL ENGINEERING

PENNSTATE

ELECTRONIC NEWSLETTER / NOVEMBER 2010 / WWW.EE.PSU.EDU

ELECTRICAL ENGINEERING'S TIME TO "KNOW YOUR NUMBERS"

A message from Ken Jenkins, professor and head of electrical engineering

Now that the fall semester is well under way, it is a good time to report on the electrical engineering department's parameters for the 2010 – 2011 academic year. As Figure 1 indicates, the undergraduate enrollment in electrical engineering (EE) at Penn State peaked in 2001 at 663 and then started to decline, reaching a minimum of 371 in 2008. That this was a national trend due to the dot.com bust of the early 2000's, the perception of off-shoring of electrical engineering jobs, and the general recession in the worldwide economy. However, since 2008 the number of engineering students selecting the EE curriculum as their career choice has been increasing, reaching a level of 449 in fall 2010. This recent increase in EE enrollment is likely due to increased employer demand, improved starting salaries, and a recently developing perception that off-shoring is not such a dominant factor in our global economy.

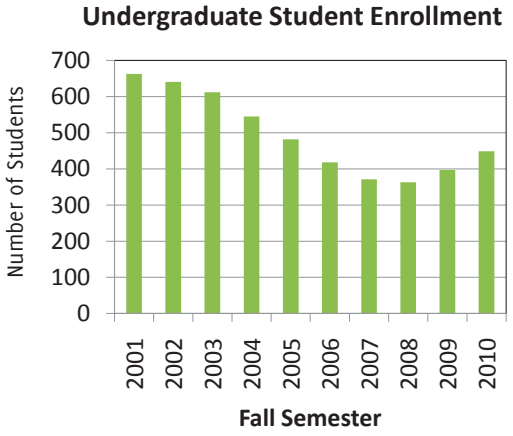


Figure 1

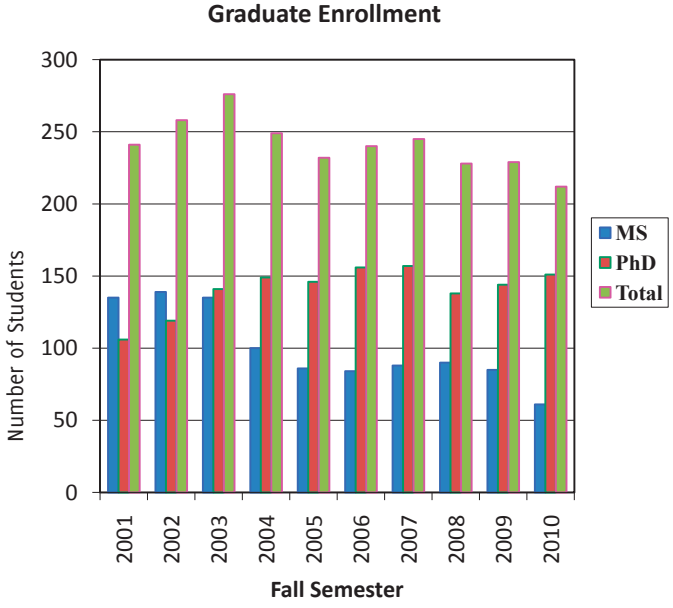


Figure 2

As indicated in Figure 2, the percentage of M.S. and Ph.D. students has changed significantly over the past ten years from 66 percent M.S. and 33 percent Ph.D to 25 percent M.S. and 75 percent Ph.D. This intentional change was facilitated in order to develop a stronger research environment for the EE graduate program. The decline of the total number of graduate students over the last three years is a reflection of the decreased size of the EE faculty due to retirements and departures. It is interesting to note that the graduate application pool has risen from 539 in 2004 to 954 in 2010 and has enabled the overall EE graduate program to grow consistently stronger in terms of research productivity.

Finally, Figure 3 shows the research expenditures for the EE department over the last ten years. Note that there was continual growth in research productivity, as measured by the research expenditures, from 2000 through 2003. Then from 2004 through 2008, there were considerable oscillations due to unstable economic conditions. Finally, there was a marked increase in research expenditures in 2009. This increase was a pleasant surprise because the number of EE faculty and graduate students had decreased. Some of this increase may be due to the stimulus funding provided by the federal government the last two years, as well as to a general increase in productively by the research faculty in the department. Overall, the "know your numbers check-up for 2009" indicates that the EE department is positioned for growth and prosperity in the coming future.

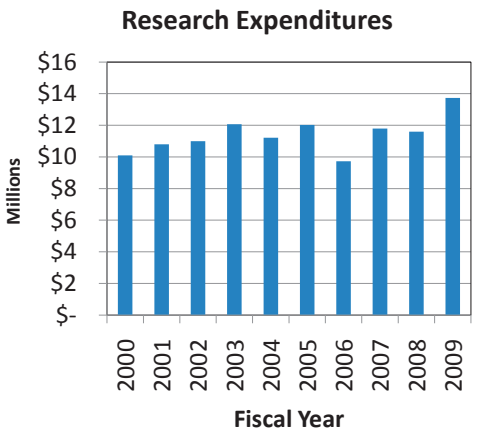


Figure 3

Faculty Spotlight

Srinivas Tadigadapa, professor of electrical engineering, joined the faculty in 2000. Originally from India, Tadigadapa received his bachelor's degree from the University of Delhi and his master's degree in solid state physics from the Indian Institute of Technology in Madras. In 1994, he received his doctoral degree in microelectronics from Cambridge University. Following graduation, Tadigadapa was involved in research at the Microelectronics Research Centre at Cambridge and at the National Microelectronics Research Centre in Ireland.

In 1996, Tadigadapa joined Integrated Sensing Systems, a start-up company in Ann Arbor, MI, specializing in microelectromechanical systems (MEMS) pressure and flow sensors for semiconductor and biomedical industries. As vice president, his work involved research and development of MEMS pressure sensors for the measurement of intracranial pressure for real-time normal pressure hydrocephalus monitoring. During this time he also developed the first prototypes of MEMS scale Coriolis mass flow and densitometers. His move to academia was spurred by his desire to be involved in research and engineering new ideas. "I thought the best thing to do is be in academia so that I can be free to exactly pursue that," stated Tadigadapa, "Also I like teaching since I find it very rewarding and intellectually stimulating to work with students."

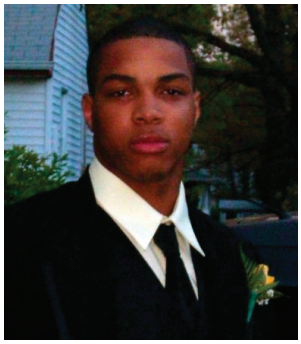
Tadigadapa's primary research focus has been the integration and exploration of multifunctional materials such as piezoelectrics and polymers for fundamental investigation of nano- and biomaterials. The two major areas his research have been thermal MEMS and piezoelectric MEMS for sensing and actuation applications. MEMS devices provide scale appropriate tools for the investigation of nanomaterials and nanoscale interfaces. Combining microfabrication methods with piezoelectric bulk acoustic wave resonators, his group has focused on evaluating the material properties of blood proteins, development DNA-hybridization based biosensors, investigations into electrochemical double layers etc. His group is also working on the development of clapping mechanism based nano air vehicles based on monolithic T-Beam actuators fabricated from bulk piezoelectric materials. In the area of thermal MEMS, his group has designed and worked on MEMS sensors for ultrahigh sensitivity calorimeters for biochemical sensing applications, and on the development of room temperature IR focal plane sensor arrays and tunnel junction based nano thermoelectrics.

He has been the recipient of the Alexander von Humboldt fellowship in Germany, the Walton fellowship by the Science Foundation of Ireland, and the Gledden fellowship at the University of Western Australia. He is a fellow of the Cambridge Philosophical Society and member of the IEEE and Institute of Physics and serves on the editorial board of Journal of Measurement Science and Technology and Microlithography, MEMS and MOEMS journals. He has more than 100 peer reviewed journal and conference publications and four patents.

In his leisure time, Tadigadapa enjoys building things around his house, traveling with family, and listening to jazz and fusion music from around the world. He, and his wife, Pallavi, have two daughters and live in State College.

Student Spotlight

Sonny Smith, graduate student in electrical engineering, is originally from Long Island, NY. He graduated valedictorian from Kellenberg Memorial High School in Uniondale, NY. His interest in electrical engineering stemmed from his interest in designing and building things. Smith explains, "Ultimately, the desire to be an inventor culminated in my decision to pursue a degree in engineering." In 2009, Smith graduated cum laude from the University of Virginia with two bachelor's degrees in electrical engineering and computer engineering and a minor in engineering business.



Smith is currently pursuing a master's degree in electrical engineering with a spring or summer 2011 anticipated graduation date. He is a research assistant working with Ram Narayanan, professor of electrical engineering, in the area of noise radar as well as correlation analysis. While he enjoys theory, the possible applications are what really interest him.

Smith's goal is to be a "practical" engineer who applies and expands on the classical knowledge that he has absorbed. Smith comments, "Real life solutions are frequently not found via text books or simulation. Often, making things work requires regarding "problems" as situations that need to be addressed or opportunities that need to be seized." Smith appreciates the ability to interact and work with the esteemed faculty in the electrical engineering graduate program.

Smith completed an internship at Northrop Grumman Corporation where he developed test software programs for hardware systems. He was the president of the National Society of Black Engineers at the University of Virginia; and he received the Lockheed Martin Corporation Distinguished Student Award. Currently, Smith is a member of the electrical engineering graduate advisory committee.

Upon graduation, Smith plans to continue his education by pursuing a doctoral degree. He has a strong passion to be successful; yet, he admits that the definition of success is fluid and is ever evolving. His long-term plans include owning several companies and, ultimately, teaching. Smith comments, "A desire impressed upon me by my family is that education, in every form, is the only true gift you can pass on to your children."

Outside of school, Smith has a broad spectrum of interests but particularly indulges in ascertaining new knowledge in a wide range of areas. When appropriate, he applies what he has gained from learning to all aspects of his life. Smith also enjoys challenging ventures, outdoor activities, working out, and spending time with family and friends. Moreover, Smith takes much pleasure in offering assistance wherever needed. He remarks, "I truly enjoy helping and enhancing the welfare of others not for self-aggrandizement or to establish a debt of gratitude among those in need, but more so, as a technical and social engineer, I wish to extend my sphere of influence on making this world better."

Department Updates

Mohsen Kavehrad, W. L. Weiss Chair Professor of Electrical Engineering, has been invited to be a plenary speaker at IEEE Globecom 2010 in December in Miami, FL. The title of the talk is "Let There Be Light and Energy-Efficient Wireless Applications." More information on the Global Communications Conference Exhibition and Industry Forum can be found on their website: http://cms.comsoc.org/eprise/main/SiteGen/Globecom_2010/Content/Home/PLENARY_SPEAKERS/Featured_Talks.html

Kenneth Jenkins, professor and head of electrical engineering, served on an external review committee in October for the Department of Electrical and Computer Engineering at Villanova University as part of a university wide strategic planning process.

Aylin Yener, professor of electrical engineering, presented invited papers at two conferences in September. She was an invited speaker at the 21st Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications held in Istanbul, Turkey, and the 48th Annual Allerton Conference on Communication, Control, and Computing held near the University of Illinois, Urbana-Champaign. Both papers were co-authored by recent Ph.D. graduate Xiang He, in the area of secure communications using information theory.

George Etzweiler, retired professor of electrical engineering, participated in the Tussey Mountainback 50-mile relay race in October. At the age of 90, Etzweiler was part of a team who call themselves the Old Men of the Mountains. The team came in second in their division.

Victor Pasko, professor of electrical engineering, presented an invited talk on the impact of electrical discharge physics on the atmosphere at a workshop at the International Space Science Institute in Bern Switzerland in September. The talk was titled "Coupling Between the Earth's Atmosphere and Its Plasma Environment."

SPSEE News

The SPSEE fall meeting was held on Oct. 8, the day before the football homecoming game. It can be said that the meeting was much more successful than the results of the football game on the following day! Following is a quick summary of what transpired at the meeting.

The meeting kicked off with an update from. Ken Jenkins, professor and head of electrical engineering, who talked about enrollment trends and research "hot spots".

Following the department update, Jenkins presented the Early Career Recognition Alumni Award to Paul Mittan.

Mark Wharton, associate professor of electrical engineering and current president of SPSEE gave official notification that he is stepping down as president effective immediately, after serving three consecutive terms. Moreover, he stated that SPSEE is overdue to elect new officers and announced that elections will take place at the spring 2011 meeting. In addition, the SPSEE constitution, which is 10 years old, needs to be revised; it is expected that any changes to the constitution will be ratified at the spring meeting.

Paul Mittan, left, with Ken Jenkins

The SPSEE meeting was the official launch of the department mentoring program. The inaugural cycle has 85 matches of students and mentors. The mentoring program information can be accessed at this link:

http://www.ee.psu.edu/AlumniFriends/MentoringProgram.aspx.

Tim Wheeler, research assistant in the electrical engineering department, and Eric Kline, engineering manager at All Traffic Solutions and a SPSEE member, briefly described the experience SPSEE members have had with performing an outside review of the Critical Design Reviews from Wheeler's senior capstone project section. It was unanimously agreed that the alumni would like to continue participating in this activity going forward.

Finally, Cathy McClellan announced the Department / SPSEE alumni tailgate on Oct. 9. The weather cooperated this year and we had a beautiful day. Thank you to Wayne Breisch (B.S. electrical engineering '59) for assistance in securing the RV space for the tailgate. We hope to make this an annual event (as long as Penn State doesn't require us to buy an RV).

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