

CONNECTIONS

The Department of Electrical and Computer Engineering Newsletter for Alumni and Friends | Fall 2008

Researchers Focus on Wind, Solar Energy

Prof. Receives Best IT Innovation Award

Information Assurance Center Re-appointed National Center of Excellence

MORE NEWS:

- Department's First Female MSEE Graduate Shares Her Experience
- Students Win NSF Fellowships
- New Endowed Professorship Established



Letter from the Chair

Dear alumni and friends,

This newsletter comes to you this fall filled with good news about the impressive research going on in the department, an increase in student enrollment, dedication of our new building addition, and more.

The department is doing extremely well this year in securing a significant number of large competitive grants. Details on some of those projects will be highlighted in the spring newsletter, but information on major breakthroughs in VLSI research and new research on alternate energy are in this newsletter (pages 7-10).

The department has seen an increase in enrollment this year, too. We now have 826 undergraduate students and 306 graduate students.

This fall we brought in three new faculty. The department also plans to hire three to four more new faculty in the coming year in four key areas: power and energy/power electronics, computer engineering with an emphasis in embedded systems, information assurance and security, and software engineering. The department's new faculty are profiled on page 5.

In June, our College of Engineering Dean **Mark J. Kushner** resigned. During his time at Iowa State, Kushner started a new cluster hiring process to hire faculty in interdisciplinary areas, instigated the "2050 Challenge" to ignite research to find solutions for the engineering problems of the next 40 years, and coordinated the university's new resource allocation model across all engineering departments. He was inspiring and was instrumental in organizing faculty to establish Iowa State's new \$18.5 million Engineering Research Center for Biorenewable Chemicals. Look to page 6 for more information.

Earlier in October, the ECpE's new addition was dedicated formally in a ceremony at which Iowa State University President Gregory Geoffroy and several other administrators and ECpE students spoke of the impact the new facility will have on the department. A robot created by Assistant Professor **Alexander Stoytchev** cut the ribbon to ceremoniously open the new building. ■

Best wishes,



Arun K. Somani

Department Chair

Anson Marston Distinguished Professor

Jerry R. Junkins Endowed Chair

IOWA STATE UNIVERSITY



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Photo courtesy of Craig Carroll Photography.

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Department Chair: Arun K. Somani

Newsletter Editor: Dana Schmidt

Published twice a year by the Department of Electrical and Computer Engineering, 2215 Coover Hall, Iowa State University, Ames, IA 50011-3060; www.ece.iastate.edu; schmidt@iastate.edu, (515) 294-2664. © 2008

Cover photo: Assistant Professor Sumit Chaudhary in his research lab

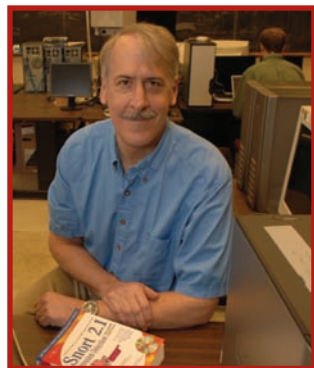
If you're planning a gift to the ECpE department, please visit www.foundation.iastate.edu/gift or contact Keith Fortmann, (515) 294-4280 or kfortman@iastate.edu.

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ECpE Again Designated Center of Excellence

The National Security Agency and the U.S. Department of Homeland Security recently awarded Iowa State University and the ECpE department its fourth designation as a National Center of Academic Excellence in Information Assurance Education. Iowa State was among the first six universities to be designated national centers for information assurance in 1999. Iowa State's designation was renewed in 2002, 2005, and now 2008. The most recent designation is for five years.

"This is something that indicates the depth and breadth of our program," says **Doug Jacobson**, university professor and the director of Iowa State's Information Assurance Center.



Doug Jacobson

The designation helps Iowa State compete for federal scholarships and grants, Jacobson says. It also helps Iowa State attract students to its information security programs.

The centers are "intended to reduce vulnerabilities in the national information infrastructure by promoting higher education in information assurance and producing a growing number of professionals with information assurance expertise in various disciplines," according to a joint statement from the federal agencies.

The agencies sponsor the national centers as part of President George W. Bush's National Strategy to Secure Cyberspace. That strategy refers to cyberspace as the nervous system of the country's critical infrastructure. And it

says a healthy, functioning cyber system is essential to the country's economy and national security.

Jacobson says universities have to pass a two-step process to be designated national centers of academic excellence: First, a program's coursework has to meet government training standards. And second, programs have to complete a large report that details their programs, including the number of researchers working in information security, the amount of research funding they attract, and the information security policies their universities follow.

Iowa State's Information Assurance Center includes 28 faculty members who study a range of computer security issues including intrusion detection, wireless networks, e-commerce, electronic democracy, and curriculum for information assurance education. ■

—Mike Krapfl, ISU News Service

Bioengineering Minor Established

Beginning this fall, undergraduate engineering students at Iowa State University can earn credits towards a new bioengineering minor. The minor is designed to integrate principles and knowledge from basic life sciences and engineering disciplines and give engineering graduates a leg up in the fast-growing bioeconomy, particularly in the areas of biology, biotechnology, biorenewables, agriculture, and health sciences.

For the minor, students will take two introductory core classes (six credits) and nine additional credits from 20 specific courses spread among four tracks or among eight related courses. The tracks allow students to specialize in bioinformatics and systems biology, biomaterials and biomechanics, biomicro systems, or

biosystems and environmental engineering.

Maneesha Aluru, ECpE associate scientist and staff director of the bioengineering minor program, says the program was created to provide students with better career opportunities and unique educational experiences in applying engineering skills to solve problems and develop new bio-based products and devices.

"This program is designed to realize synergies across multiple departments and make the level of educational opportunities across all engineering disciplines commensurate with existing research activity in bioengineering," Aluru says.

An average of 30 students are expected to enroll each year. ■

—Kerry Gibson

Centennial Year: Did You Know?

When the ECpE department was established in 1909, the undergraduate student enrollment was 176 and there were no graduate students. Only four faculty and staff were employed at that time.

Today, the department has more than 11,000 alumni, 826 undergraduate students, 306 graduate students, and 75 faculty and staff.

Find more information about the department's history online at www.ece.iastate.edu/centennial. ■



Calendar of Events

Upcoming events sponsored by the university, college, and ECpE department.

October 20

Distinguished Lecture: Competition and Collaboration in Wireless Networks

Alliant Energy-Lee Liu Auditorium, Howe Hall, 1 p.m.

November 7

ECpE Fall External Advisory Board Meeting

3041 ECpE Bldg. Addition, 10 a.m.-4 p.m.

December 19

Graduate Commencement

C.Y. Stephen's Auditorium, 8 p.m.

December 20

Undergraduate Commencement

Hilton Coliseum, 1:30 p.m.

January 14, 2009

Distinguished Lecture: Lessons Learned from the Internet Project

Alliant Energy-Lee Liu Auditorium, Howe Hall, 1 p.m.

January 27

Spring Engineering Career Fair

Hilton Coliseum, noon to 6 p.m.

January 28

Centennial Distinguished Alumni Seminar: Art Pohm

3041 ECpE Bldg. Addition, 1 p.m.

February 25

Distinguished Lecture: Software Engineering Research and the Influence of GroupThink

Alliant Energy-Lee Liu Auditorium, Howe Hall, 1 p.m.

April 13-19

VEISHEA

ISU campus; event times, locations vary

April 24

ECpE Centennial Gala

Scheman Building, 6:30 p.m.

Visit www.ece.iastate.edu for additional details and up-to-the-minute information on departmental events and seminars. ■

Faculty Receive Prestigious Awards

The Department of Electrical and Computer Engineering (ECpE) congratulates the following faculty for their recent achievements:

■ **Chris Chu**, assistant professor, received the College of Engineering's Young Engineering Faculty Research Award. The award recognizes an individual who has demonstrated the ability to conduct original research, contribute to scholarly literature, and introduce new and/or improved laboratory techniques and instrumentation. It also recognizes faculty whose research has had an impact outside the university. Chu also received a 2008 IBM Faculty Award.

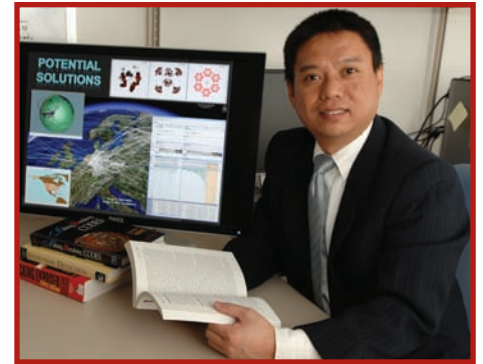
■ **Yong Guan, Jiming Song, Sri Tirthapura, and Zhengdao Wang** were promoted from assistant professor to associate professor with tenure.

■ **Yong Guan** also received the Institute of Electrical and Electronics Engineers (IEEE) Technical Committee on Security and Privacy's Outstanding Community Service Award for serving as general chair of the IEEE Symposium on Security and Privacy.

■ **Doug Jacobson** was promoted to university professor. He also received the Mervin S. Coover Distinguished Service Award. This annual award, named in honor of former Department Head Mervin S. Coover, is given to faculty and staff for their outstanding service to the department.

■ Assistant Professor **Jaeyoun Kim**, Senior Lecturer **Mani Mina**, and Assistant Professor **Daji Qiao** were awarded the 2008 Warren B. Boast Undergraduate Teaching Award. The annual award, named for former Department Head Warren B. Boast, recognizes outstanding faculty in the ECpE department.

■ **Mark J. Kushner**, ECpE professor and College of Engineering dean, received the 2008 Semiconductor Industry Association's University Researcher Award in recognition of his many career contributions to semiconductor technology.



Yong Guan won an award for his service as the general chair of IEEE's top conference on security.

■ **Jim McCalley** was named the Murray J. and Ruth M. Harpole Professor in Electrical Engineering.

■ **Mani Mina** won the Best Paper Award at the 2008 American Society for Engineering Education's 2008 Annual Conference and Exposition for his paper titled "A Guided Tour of the Future of Education." Mina also received the Peer Mentor Supervisor Award for his involvement with the ECpE department's learning community.

■ **Arun K. Somani**, ECpE department chair, and two former ECpE students **Wu Tao** (BSCpE '03) and **Raed Adhami** (BSEE '99) were awarded a U.S. patent for their real-time music recognition and display system (patent no. 7,323,629). Somani, along with **Koray Celik**, an ECpE graduate student, and **Soon-Jo Chung**, assistant professor of aerospace engineering and electrical and computer engineering, also received the Best Paper Award at the May 2008 Electro/Information Technology Conference for their paper titled "Mono-Vision Corner SLAM for Indoor Navigation." In addition, Somani received the Iowa State University Departmental Leadership Award, which recognizes a department chair who has demonstrated exceptional leadership qualities in advancing the faculty, staff, students, and programs in his/her department. ■

New Endowed Professorship Established

The Mehl Professorship in Computer Engineering recently was established by Ross Martin and Marylyne Munas Mehl. The Mehls are longtime friends and supporters of the ECpE program. The College of Engineering and ECpE department are currently working to fill the professorship position.

"We are delighted that the Mehls have chosen to create a professorship in our department," says **Arun K. Somani**, ECpE department chair. "The professorship will support our faculty in their professional

activities including research, teaching, scholarship, and leadership."

Endowed professorships help Iowa State University and the ECpE department recruit and retain faculty who perform at the highest level. Endowed professorships positions are regarded highly and recognize outstanding faculty. Iowa State uses these professorships to encourage professors who have a passion for teaching and desire to seek new avenues of research and discovery. They foster academic and research

innovation, and they positively impact students in the department by allowing them to gain an educational experience that transcends the classroom through assisting faculty with research or being mentored by a faculty member to develop research skills and novel projects.

If you are interested in establishing a professorship or donating other funds to support the ECpE department's programs, contact Keith Fortmann at (515) 294-4280 or kfortman@iastate.edu. ■

Department Welcomes Three New Faculty

The ECpE department welcomed the following three new faculty members this fall semester:

■ **Timothy A. Bigelow** holds a bachelor's degree in electrical engineering from Colorado State University and master's and PhD degrees from the University of Illinois at Urbana-Champaign. He most recently was an assistant professor at the University of North Dakota.

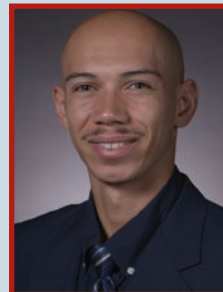
In January 2007, Bigelow received a prestigious National Science Foundation (NSF) CAREER Award to develop a system to use ultrasound to treat cancer. His other research interests include quantifying the physical properties of tissue using backscattered ultrasound signals, applying ultrasound to treat infections that have formed on medical implants, and exploring ultrasound induced bioeffects for both ultrasound safety and ultrasound therapy applications.

■ **Phillip Jones** received his bachelor's and master's degrees in electrical engineering from the University of Illinois at Urbana-Champaign. He received his PhD in computer engineering at the Washington University in St. Louis, Missouri.

Jones's research interests include adaptable computing systems, reconfigurable



Timothy A. Bigelow



Phillip Jones



Nathan Neihart

hardware, embedded systems, and specialized hardware for application acceleration. His recent work has focused on adaptive thermoregulation for applications on reconfigurable devices. As part of that work, he developed a thermal management circuit to protect the Field Programmable Gate Array (FPGA) and protect it from overheating.

■ **Nathan Neihart** earned his bachelor's and master's degrees in electrical engineering from the University of Utah and his PhD in electrical engineering from the University of Washington.

Neihart has served as a reviewer for the *IEEE Transactions on Circuits and Systems I*, *IEEE International Symposium on Circuits and Systems*, and *IEEE Journal of Solid-State Circuits*. In 2007, he was awarded the

Analog Devices, Inc., Outstanding Student Designer Award and the NSF Center for Design of Analog and Digital Integrated Circuits' Best Student Poster Award. In 2008, Neihart was nominated for the University of Washington Department of Electrical Engineering's Outstanding Teaching Award.

One focus of Neihart's research is the development of multiple-antenna transmitters in deep sub-micron CMOS that are immune to harmful parasitic coupling effects between channels. He also is working on the development of multiple-input, multiple-output architectures and algorithms for spectral sensing cognitive radio applications. ■

Engineering Dean Resigns, Interim Dean Named

Iowa State University's **Mark J. Kushner**, dean of the College of Engineering and ECpE professor, resigned from his position this past summer to join the faculty at the University of Michigan, Ann Arbor. Kushner will become a collegiate professor in the Department of Electrical Engineering and Computer Science and the founding director of the Michigan Institute for Plasma Science and Engineering.

Kushner, who in addition to serving as engineering dean was also the inaugural James L. and Katherine S. Melsa Professor, joined Iowa State in 2005. Since then, Kushner focused the college on developing engineers who can be leaders in public policy and solvers of some of the planet's biggest problems. Under Kushner's leadership, the College of Engineering established the Engineering Policy and Leadership Institute to prepare engineers for leadership roles in a high-tech world. And the college established the "2050 Challenge" that focuses its research and education on addressing high-impact problems that threaten the quality of life in 2050, including climate change, crumbling infrastructure and sustainable

manufacturing and agriculture systems.

"The College of Engineering has made excellent progress in all areas under Dean Kushner's leadership, including national rankings, recruitment of outstanding faculty, enrollment and research achievements," says Iowa State University President Gregory Geoffroy. "I am grateful for Mark's tremendous service to Iowa State and to engineering education, and I wish him the very best in his new position."

In August, James Bernard, Anson Marston Distinguished Professor of Engineering and a member of Iowa State's mechanical engineering faculty, was named interim dean of the College of Engineering effective September 1.

"I am very excited that Distinguished Professor Bernard has agreed to serve as interim dean," says Iowa State Executive Vice President and Provost Elizabeth Hoffman. "He is a visionary leader and has a long and distinguished record at ISU in research, education, outreach, and technology transfer."

Bernard is a leading authority in vehicle dynamics, vehicle simulation, and virtual reality applications. In 1990, he

became the founding director of the Virtual Reality Applications Center (VRAC). Bernard also co-founded Engineering Animation, Inc., now part of Siemens PLM Software, a global provider of product life cycle management software, and is a fellow of the American Society of Mechanical Engineers.

"I have enjoyed the opportunity to serve Iowa State as a teacher, researcher, and administrator in the College of Engineering, and I look forward to helping the college continue to move forward as the search for our new dean is under way," Bernard says.

Bernard will lead Iowa State's College of Engineering until a permanent dean is named. ■



Mark J. Kushner



James Bernard

ECpE Professor Helps Develop Biology Video Game

Associate Professor **Julie Dickerson** has helped design an educational video game, MetaBlast, to provide high school and college students with an interactive approach to understanding the inner workings of a plant cell. In the interactive game, students explore the structure and

metabolism of a cell. Players "drive"

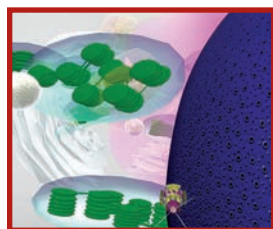
a submarine, meet Dr. Phyllton, who is trapped inside the chloroplast of a plant cell, and try to save the last remaining plant on the planet while going through a series of missions that correlate with the introductory biology text.

"The game is designed to help students understand cell biology and its diverse biochemical processes," says Eve Wurtele, a professor of genetics, development, and cell biology at Iowa State and collaborator on the project. "The

idea is that in playing the game, students will engage in and retain the intricacies and interdependencies of the cellular world."

The National Science Foundation and Iowa State's College of Liberal Arts and Sciences funded this project. Artist and Game Designer Steve Herrstadt, Cell Biologist Diane Bassham, and graduate and undergraduate students from several academic disciplines also contributed to the project.

Read about Dickerson's systems biology research in the 2008 *Research Highlights* (see opposite page for details). ■



This image shows a mesophyll cell with the video game's submarine in the foreground. The mesophyll is the soft tissue between the lower and upper epidermis inside a leaf.

ECpE Professor Wins Best IT Innovation Award

Associate Professor **Manimaran Govindarasu** and Sri Sritharan, associate professor of civil, construction, and environmental engineering, recently won the Best IT Innovation Award at the Network for Earthquake Engineering Simulation's (NEES) 6th Annual Meeting. The award names their real-time system visualization tool (RSVtool) as the best new IT technique or product developed during the past year.

Govindarasu, who served as the co-adviser for the design and development of the software tool, says the team was pleasantly surprised when they found out they had received the award.

Govindarasu and Sritharan's RSVtool helps to effectively engage researchers participating remotely in experiments, particularly in large-scale tests of concrete walls at the University of Minnesota's Multi-Axial Subassembly Testing (MAST) Laboratory.

"This tool not only enables us to remotely participate in experimental research, but also helps us to effectively

contribute to decision making during the tests," Sritharan says.

Govindarasu says the MAST-RSVtool can be activated simultaneously by researchers located at the remote sites as well as by those stationed at the equipment site.

"Because of this, all research participants can obtain critical test information such as the condition of the test unit and status of the equipment in a uniform manner," Govindarasu says.

"With real-time comparison between selected analytical predictions and experimental data, all researchers can contribute effectively to decisions made during tests, such as finalizing load paths for subsequent trials. In this way, the RSVtool enhances collaboration between experimental researchers, theoretical researchers, and practicing engineers."

The research was funded by the National Science Foundation and Iowa State's Information Infrastructure Institute.

Govindarasu and Sritharan collaborated with researchers from the University of



Manimaran Govindarasu won the Best IT Innovation Award for designing and developing a real-time system visualization tool.

Minnesota, the University of Puerto Rico at Mayaguez, and the Nakaki Bashaw Group, a California-based structural engineering consulting firm. **Mohammad Fraiwan**, a PhD student in electrical and computer engineering; Jian Zhou, a postdoctoral researcher in civil, construction, and environmental engineering; and **Tam Chantem** (BSCpE '05), a former computer engineering undergraduate student, also contributed to the RSVtool. ■

2008 Research Report Now Available

The ECpE department's biennial *Research Highlights* magazine is now available.

The magazine has articles on faculty and undergraduate research accomplishments from 2006-08; department enrollment and research funding statistics; and more.



To view a copy of the magazine, visit www.ece.iastate.edu/research/research-highlights.html or contact Dana Schmidt at (515) 294-3071 or schmidt@iastate.edu (put *Research Highlights* in the subject line) to order a copy.

Professors Advance VLSI Research

Professor **Randall L. Geiger** and Associate Professor **Degang Chen** are leading the way in the race for chip design researchers to integrate more analog and mixed signal and RF functions onto a single chip, and provide consumers with high-performance, low-cost products. The researchers recently made major breakthroughs in three key areas of analog and mixed signal research that will enable on-chip testing.

In analog to digital converter testing, they developed a family of analog and mixed signal testing algorithms to test circuits more efficiently. This new method reduces the linearity test signal requirement

by more than 4,000 times.

In digital to analog converter (DAC) testing, Geiger and Chen introduced a new method that allows engineers to use a device that is up to 100 times poorer in linearity metrics, rather than 10 times better, and still get accurate results.

They also developed a new strategy for dynamic element matching (DEM) and introduced a fundamental new idea for DEM: to take advantage of variability in a semiconductor process for resolution enhancement.

For more details on this research, see the "Achieving the Impossible" article in the 2008 *Research Highlights* (see box, left). ■

ECpE Faculty Focus Research on Wind, Solar Energy

Three junior faculty in the ECpE department are addressing one of the biggest challenges of the 21st century—developing new, better methods for using renewable energy and incorporating it into the power grid. Their work is helping to rev up the department's research in alternate energy and power systems. They are addressing these energy challenges from different angles.

Bringing wind energy to power systems

Assistant Professor **Dionysios**

Aliprantis began collaborating with Assistant Professor **Joe Zambreno** last spring on a project for modeling and simulation of wind energy conversion systems on reconfigurable digital logic platforms (aka Field Programmable Gate Arrays, or FPGAs).

"It's an effort to accelerate the speed of simulations used to analyze the behavior of power systems," Aliprantis says. "Specifically, we are trying to accelerate simulations of wind power plants."

Aliprantis and Zambreno say that because of the increased global interest toward generating electric energy from renewable resources, the project could have a big impact on wind energy research and power plants. Currently, a design issue exists when engineers try to connect

the wind turbines to the power grid and operate them efficiently once they are connected. Simulations used to test new design systems are very time consuming, and FPGAs will allow for faster, parallel execution of simulations rather than slower serial simulations performed by other computers. Aliprantis and Zambreno's goal is to speed up the process by an order of magnitude so this could allow engineers to use higher fidelity models to get more accurate results.

"To my knowledge, this hasn't been done before in the way we're trying to do it," Aliprantis says. "If it is successful, it will open more ways to extend research and build on the success of accelerating and simulating power systems."

The project received seed funding from Iowa State's Information Infrastructure Institute and currently is funded by industry through Iowa State's Electric Power Research Center. In addition, Aliprantis is developing the Alternate Energy Grid Infrastructure and Systems (AEGIS) Lab to support his research with funds from the ECpE department's strategic investments initiative. Aliprantis gave the lab the name AEGIS because in Greek, the term means "violent windstorm," which relates to wind energy. Aliprantis is working with Professor **Venkataramana Ajjarapu** to build this power electronics laboratory.



Sumit Chaudhary uses a glove-box system for fabrication of organic solar cells.

Developing high-efficiency polymer-based solar cells

Assistant Professor **Sumit Chaudhary**

is using seed funding from the U.S. Department of Energy's Ames Laboratory to develop polymer-based (plastic) solar cells. While we typically think of plastic as an insulator, such as the sheathing on electrical wires, Chaudhary uses polymers with carbon molecules arranged so that they can conduct electricity. Yet they have all the other characteristics we normally attribute to plastics.

"They're thin, lightweight, flexible, translucent, and relatively inexpensive to produce," Chaudhary says. "They can be printed similar to printing a newspaper."

Chaudhary demonstrated a novel device engineering and material processing approach to realize carbon nanotube electrodes and achieve a power conversion efficiency of 5 percent for polymer-based solar cells, the highest efficiency anyone in

Continued on page 10

Dionysios Aliprantis sits in the new Alternate Energy Grid Infrastructure and Systems Lab that he is developing at Iowa State.





Fill out this form online!
Visit www.ece.iastate.edu/alumni (click Alumni News Form).*

We want to hear about your career moves and personal news for future issues of *ECpE Connections*. You're welcome to enclose photos; however, we can't return them. We need your help, too, with gifts to the department's scholarship funds, lab facilities, building improvements, student organizations, and other departmental activities. If you're making a contribution to Iowa State, please consider designating it for the Department of Electrical and Computer Engineering using the form below. Please enclose your pledge or gift with your news, and mail it to: Iowa State University, Department of Electrical and Computer Engineering, Attn: Communications Specialist, 2215 Coover Hall, Ames, IA 50011-3060. Also, feel free to give us a call at (515) 294-2664 or e-mail us at schmidttd@iastate.edu (subject line: Newsletter).

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*Only the Alumni Information Form is online. Contributions must be sent via standard mail.

[†]For more information on the funds, contact Keith Fortmann (515-294-4280 or kfortman@iastate.edu).

Thank You!

07 EC8:03

Mailing Instructions: Fill out this form with your updated information, and then detach the form along the perforated edge. Fold the form in thirds so that the ECpE address shows on the outside of the form. Tape the form closed and place your stamp in the labeled box. If you're mailing a check, remember to completely seal the edges of the form or send the form along with the check using a standard envelope.

Continued from page 8

the field has reached. He says that number will need to jump to 8 to 10 percent before such polymers are commercially viable for ubiquitous small-scale power generation—something he’s currently working to accomplish.

“I see them being used initially in consumer electronics such as a thin plastic coating on a cell phone that would recharge

the device both inside and outdoors,” he says. Such a solar cell also could be woven into clothing or accessories to power a PDA device, into the fabric of a tent to supply power to a remote campsite or battlefield, or into window shades that could power the lamps in a room.

Chaudhary stresses the multidisciplinary nature of the research, saying it requires not

only electrical engineering skill, but also chemistry and materials science knowledge. His focus is on using 3-D photonics to boost efficiency on hybrid solar cells of polymer and nano-porous titania. His research has been recognized as frontier research in journals of the American Chemical Society and Institute of Physics. ■

—Kerry Gibson contributed to this article.

Professor Receives U.S. Naval Research Grant for Power Systems Research

Professor **Venkataramana Ajjarapu** is part of a multi-university team that has received a \$3.72 million grant from the United States Office of Naval Research for a power systems research project. Ajjarapu will receive \$522,000 over the project’s five-year term. Drexel University, Northeastern University, Texas A&M University, and Mississippi State University are the other institutions involved in the research.

Ajjarapu says the work is motivated by the clear need for improved monitoring and control tools to better predict events that may lead to damaging power system outages.

“In this project, researchers at the five universities are cooperating to develop software and hardware tools to allow distributed software simulation and hardware experiment for remote testing and measurement of power systems,” Ajjarapu says. “The goal is to utilize hardware and software resources in various locations to allow the simulation and experiment to be performed in a virtually interconnected power system.”

Ajjarapu adds that in this framework, members of the system would not need to have complete knowledge of the system but rather would work through the boundaries of the simulation and experiments to get an accurate picture of how the local disturbances affect remote systems.

The philosophy is that hardware experiments can and should be integrated with power software labs, and multiple hardware labs could be combined to form larger, more representative, hardware power system studies by virtually interconnecting the laboratories through the Internet. The experiments will focus on achieving nondestructive testing of power systems by driving these systems beyond normal operating conditions, allowing researchers to investigate power system behavior on the verge of impending collapse without actually destroying the hardware involved and not adversely affecting the surrounding environment.

Ajjarapu also received a U.S. Department of Defense grant to develop hardware associated with the Naval Research grant. ■



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stamp here.



Two ECpE Students Win NSF Graduate Fellowships

The National Science Foundation (NSF) recently awarded two fellowships to ECpE students **Kristin Pudenz** and **Mike Steffen**. The NSF Graduate Research Fellowship Program funds three years of study—up to \$121,500—in master's or doctoral degrees focusing on research in science, technology, engineering, and mathematics. This year, 913 students nationwide received fellowship awards.

Pudenz graduated with a bachelor's degree in electrical engineering in May 2008. She plans to use the fellowship to research quantum mechanical systems and principles to create a fundamentally different type of computer. She hopes to explore the field of quantum computing, contributing to efforts to find out how to build computers based on quantum mechanical systems, which will process

information in a fundamentally different way than today's computers. Pudenz, a native of Lincoln, Nebraska, plans to attend the University of Southern California for her graduate degree.

"I feel very honored to be considered worthy of such generous support and am determined to do work that is a credit to the fellowship program," Pudenz says. "The fellowship will make it possible for me to do the exact research I want to."

Steffen, from Springfield, Illinois, is currently pursuing his doctorate in computer engineering at Iowa State. He plans to continue his research in computer graphics architecture. His focus is on developing architectures to improve the performance of ray-tracing, which is one rendering method used for photo-realistic rendering. During his time as an

undergraduate at Valparaiso University, he aided in the development of a program allowing the user to control remote equipment in a 3-D stereo-vision virtual environment. From his research lab in Valparaiso, Steffen performed basic move commands on a vehicle located in Japan.

"My goal for my research in computer graphics architecture is to make contributions and improve the realism of real-time computer graphics by moving away from current rendering methods," Steffen says.

The purpose of the NSF fellowship program is to guarantee the capability of the human resource base of science and engineering in the United States. NSF identifies and supports exceptional graduate students in the appropriate disciplines who are pursuing research-based master's and doctoral degrees. ■

ECpE Student's Team Earns Best Paper Award

ECpE's **Ben Curtin**, a student in the department's concurrent degree program who will receive his bachelor's degree in December and then continue on to earn his master's degree, recently was part of a team of students that won an Institute of Electrical and Electronics Engineers' (IEEE) Region IV Best Paper Award for their paper titled "Solar Cell Absorption Enhancement Using Photonic Crystals." His interest in this research was sparked as an undergraduate student at Iowa State.

"I became interested in semiconductor and device physics after taking Dr. Vikram Dalal's course, EE 332: *Semiconductor Materials and Devices*," Curtin says. "I participated in undergraduate research the following semester and found that it was interesting and something I enjoyed."

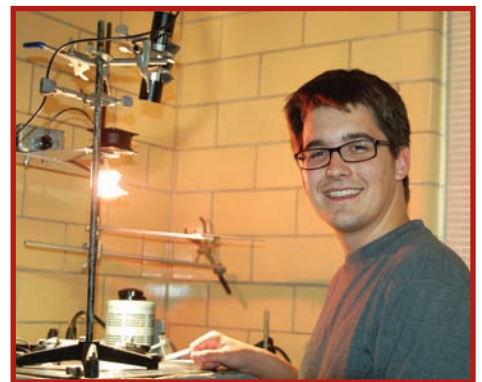
The award-winning paper that Curtin

worked on with students **Anthony Barsic** (BSEE '08) and **Kyle Meyer** (BSEE '08) stemmed from his undergraduate research.

"The efficiency of solar cells is constantly being improved in different and creative ways. One method is to pattern the back of the solar cell with material that is highly reflective, which causes light to exist in the absorption layer for a longer period of time," Curtin says. "Our group implemented a back reflector design suggested by Dr. Dalal and Dr. Rana Biswas, which consisted of a periodic array of cylindrical structures. We were able to show that this structure, also known as a photonic crystal, caused light to scatter inside the solar cell, resulting in an increase in absorption."

Curtin says he found the research project on solar cell back reflectors to be

rewarding and plans to focus his graduate research on photovoltaic devices. He will continue his research on the photonic crystal back reflector project under the direction of Professor **Vikram Dalal**. ■



Ben Curtin stands next to a device that measures solar cells at Iowa State's Microelectronics Research Center, a center affiliated with the ECpE department.

Students Honored for Research, Teaching, & Leadership

The ECpE department congratulates the following students who recently received recognition for their work:

■ **Scott Emrich** (PhDEE '07) won the 2008 Iowa State Zaffarano Prize for his superior performance in publishable research as a graduate student. Emrich worked with his major professor, **Srinivas Aluru**, in bioinformatics research and is now an assistant professor in computer science and engineering at the University of Notre Dame.

■ Graduate student **Michael Frederick** and **David B. Johnson** won a university Research Excellence Award in the spring 2008 and summer 2008, respectively. The award recognizes graduate students at the time of their graduation for outstanding research accomplishments as documented in their theses or dissertations.

■ In May 2008, graduate student **Ryan Gerdes** received a university Teaching Excellence Award, which recognizes and

encourages outstanding achievement by graduate students in teaching.

■ **Eduardo Ibáñez-Sopeña**, a graduate student in electrical engineering, was named one of four recipients of the College of Engineering's first 2050 Challenge Fellowships. The fellowships were established this year to attract greater numbers of students who have the potential to become the world's next generation of insightful thinkers and problem solvers. In his graduate research, Ibáñez-Sopeña plans to identify optimal infrastructure designs in terms of future power generation technologies, energy transport and storage, and hybrid-electric transportation systems to achieve a desirable balance between costs, sustainability, and resiliency. The fellowships are supported through private donations and the College of Engineering general fund. **Jim Waters** (BSEE '81), vice president of Caterpillar Production Systems Division, recently donated funds

to assist the college in meeting its priorities. A portion is being used for the fellowships.

■ **Cory Simon**, a computer engineering senior, received the inaugural Sesquicentennial Learning to Live a Life Leadership Award. The award was inspired by former Iowa State student M.J. Riggs, an 1883 Iowa State graduate who was a president of the Alumni Association and a board president of the Memorial Union. Riggs is remembered for saying, "We come to college not alone to prepare to make a living, but to learn to live a life." The award carries with it an annual \$3,000 monetary prize. ■



Cory Simon displays his award certificate in the atrium of the ECpE Building Addition.

Iowa State to Compete in National Solar Decathlon

The U.S. Department of Energy has selected Iowa State University as one of 20 teams from 25 international colleges and universities to compete in the fourth Solar Decathlon in the fall of 2009 in Washington, D.C. Solar Decathlon teams design, build, and operate attractive and energy-efficient solar-powered homes. Each team is awarded \$100,000 over two years to support the Solar Decathlon's research goal of reducing the cost of solar-powered homes and advancing solar technology.

Iowa State faculty and more than 100 students from 11 departments are participating in the Solar Decathlon. Several ECpE students are designing the house's solar electric system under the guidance of Professor **Vikram Dalal**. ■

Iowa State Solar Car Finishes 8th

Iowa State University's solar race car, *Sol Invictus*, finished in eighth place overall in the 2,400-mile North American Solar Challenge in July. The team's time was 91 hours and 12 minutes. The University of Michigan finished first at 51 hours and 41 minutes.

Final cumulative times include penalties charged for trailering the race car. On one of the race days, 10 of the competing cars had to trailer between Fargo, North Dakota, and Winnipeg, Manitoba, Canada, because they were unable to maintain minimum highway speeds under intense cloud cover.

Iowa State started the race in Plano, Texas, in 13th place. Although 25 teams registered for the race, only 13 cars qualified to compete. Two additional non-competing cars completed the route.

The teams celebrated their accomplishments at an awards banquet in Calgary, Alberta, Canada, the end point of the race.

Four ECpE students participated on the solar car team, including: **Evan Adkins**, sophomore in computer engineering, **Edward Cramer**, senior in computer engineering, **Scott Elliott**, senior in electrical engineering, and **Michael Steffen**, sophomore in electrical engineering. ■



ECpE Alumni Recognized for Achievements

The ECpE department congratulates the following alumni on their recent achievements:

■ **Christopher Bloomquist** (BSCpE '01) and his wife Olivia (BSAerE '00) received the ISU Alumni Association's (ISUAA) James A. Hopson Alumni Volunteer Award for their leadership of their local ISUAA club, located in Seattle, Washington.

■ **Bruce Cory** (BSCpE '91) was selected to receive Accellera's 5th Annual Technical Excellence Award for his commitment to chairing and leading Accellera's Open Compression Interface (OCI) Technical Subcommittee and the Institute



Bruce Cory

of Electrical and Electronics Engineers' OCI standardization efforts. Accellera is an electronics industry's organization focused on electronic design automation standards. Cory is a design-for-test manager at NVIDIA Corporation.

■ **Frederick H. "Fritz" Raab** (BSEE '68; MSEE '70; PhDEE '72) was awarded the Veteran Wireless Operators Association's DeForest Audion Gold Medal Award to honor his technical achievements in 35 years of radio engineering.

■ **Arend J. "Sandy" Sandbulte** (BSEE '59) received the ISU Foundation's Order of the Knoll Cardinal and Gold Award in April 2008. Sandbulte is a retired president and chief executive officer of ALLETTE, Inc. (formerly Minnesota Power), and has devoted his career to the promotion and advancement of business ethics, philanthropy, and community leadership.

He served as chair of the ISU Foundation Board of Directors from 1999 to 2001.

■ **James Tracey** (BSEE '60; MSEE '61; PhDEE '64) was awarded the College of Engineering's Professional Achievement Citation in Engineering (PACE) Award for superior technical or professional accomplishments in research, development, administration, education, and other engineering activities. The PACE award recognizes alumni eminently known for their professional competence and creativity. ■



James Tracey

College of Engineering Revamps Web site; Network with Engineering Alums

The next time you're online, be sure to check out the latest news and videos on the College of Engineering homepage at www.engineering.iastate.edu. The recently revamped site offers videos, college news, and more, so take a minute to watch an interview with an astronaut or see the latest ways that Iowa State engineers are changing the world.

And if you like what you see, tell your friends in Facebook, MySpace, or LinkedIn, and let the world know by linking your favorite stories to Digg, del-icio.us, or another news aggregator. Show your pride in engineering at Iowa State and let the world know about it! ■



Class Notes

Find out what your classmates are doing today.

1980s

Joel Lorentzen (BSEE '80) of Davenport, Iowa, was named president of Genesis Systems Group, the largest integrator of robotic arc welding systems in North America. Lorentzen will oversee operations in Davenport and Detroit, Michigan.

Michael Cook (BSEE '85; BSCpE '99) of Cedar Rapids, Iowa, was selected as a finalist for the 2007 Engineer of the Year at Rockwell Collins. The award honors Rockwell Collins' top engineers each year based on voting from their peers. The selection process is based on technical and financial impact to the company. He was selected as one of the top three engineers out of more than 3,000 engineers in the company's Government Systems business area. Cook is a technical project manager and works in precision GPS. He is the chief

architect for the company's line of precision GPS units for use in artillery platforms.

1990s

Jim Gregory (BSEE '98) of Marion, Iowa, was promoted to senior engineering manager of the signal processing design for Rockwell Collins' Legacy Applications Team.

Chris Justice (BSEE '99) of Prairie Village, Kansas, reports that while vice president of research and development at SOMARK Innovations, his team completed a field demonstration of their patented Chipless RFID Ink Tattoo animal ID system. The demo proved the SOMARK system's ability to apply a tattoo in less than three seconds and read the tattoo using electromagnetic methods. The biocompatible ID system is intended to aid with animal health, food safety, and asset tracking. E-mail: c.d.justice@gmail.com.

See page 9 to submit your Class Notes. ■

CENTENNIAL ALUMNI SPOTLIGHT:

First Female Master's Degree Graduate Shares Her Iowa State Experience, Career Successes

When **Glynis (Fluhr) Hinchberger** (BSEE '76; MSEE '77) enrolled at

Iowa State University in the 1970s, she had no idea she would be a trailblazer for women in electrical engineering (EE) at Iowa State. Hinchberger was the first female to graduate with a master's degree in electrical engineering from Iowa State. Since then, she went on to found Seren

Innovations, an integrated communications provider; become a life Fellow of the Society of Women Engineers (SWE); and lead a 30-year career in the electric systems transmission planning, energy resource planning, utility information systems, and broadband communications industries.

Now working as a transmission planning engineer at Excel Engineering in Fridley, Minnesota, Hinchberger reflects on her days at Iowa State and her career achievements since graduation.

Question: How did you first become interested in electrical engineering?

Answer: My dad, who also was an Iowa State grad, was an electrical engineer, so I guess I at least heard the words, although I couldn't have told you what electrical engineers actually did. I decided to major in EE because I didn't want to be a math teacher and I didn't want to major in English or French. It never occurred to me that there would be so few women in engineering in general, much less in EE.

Q: What was it like to be the first female EE master's degree student to graduate from Iowa State?

A: I didn't know I was the first female EE

master's degree to graduate from ISU until I was contacted for this article. I just knew there were no other women in the EE graduate program while I was there. I didn't go to graduate school to be the only woman. I went because there was more I wanted to learn.

But I do know what it's like to be stared at in class because of my gender. I know what it's like to have everyone else know who you are, but you don't know them because you're the only woman. By the time I reached graduate school, I was accustomed to being the only woman in my engineering classes and for that matter, most of my advanced math classes.

Being the only or one of the few women in my classes taught me some valuable life lessons in a relatively safe environment. I learned that it is possible to do the impossible, or what others might think is the impossible. I learned to challenge the status quo and I am not afraid to be different. I learned to ask "Why?" One phrase I hate to this day is "because we've *always* done it this way." I learned how to deal with and work in uncomfortable situations. But it does not and should not matter who you are, what you look like, or what color your skin is.



Glynis (Fluhr) Hinchberger

You should have the opportunity to prove yourself for who you are.

Q: What clubs and organizations were you involved with as a student?

A: It was at ISU where I began my involvement with the Society of Women Engineers. I was part of the small group of women who re-activated the SWE student section charter in 1973. I served as a student section president. I also was active in the IEEE student section, serving as president of the student chapter.

Q: What career achievements are you most proud of, and why?

A: I am proud of being one of the co-project managers of the first wind power project in Minnesota. Now there are thousands of megawatts here and in Iowa. Also, I helped build Seren Innovation from the ground up. We were front and center with customers and delivering services. It was new and creative.

Q: What else would you like to share about your Iowa State Experience?

A: The truth is that my experiences at Iowa State, good and bad (and they were mostly good), are what has made me the person I am now, and for that, I thank Iowa State. ■

History Book Arriving in Your Mailbox

The ECpE department mailed its centennial photographic history book to all of our alumni in July. If you have not received a copy of the book yet, it may be because we do not have your current address. Please contact the department to update your contact information.

Additional copies of the book may be purchased for \$30 each. Call the department at (515) 294-2664 to order copies or update your information.

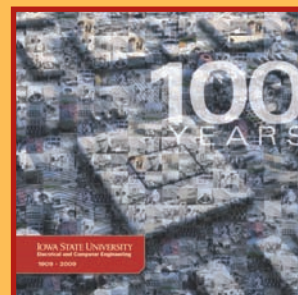


Photo courtesy of Glynis (Fluhr) Hinchberger.

ECpE Alumni Visit Department During Alumni Days

Several ECpE alumni visited the department in the Sproul Intellectual Center during Alumni Days last May.

Alumni Days is an event organized by the ISU Alumni Association each year. This year, the event focused on the Iowa State

Class of 1958. Below is a photograph of the ECpE alumni and their family who visited the department. ■



Front row (from left to right): Maurice Clark (BSEE '43), Felicia Brodien, Donald Vest (BSEE '56), Carol Vest, Georgia Bluhm, Del Bluhm (BSEE '58; MSEE '64; PhDEE '72), and Ken Main (BSEE '43)
Back row (from left to right): Roy Zingg (BSEE '58; MSEE '61; PhDEE '68), Edward White (BSEE '58), R.K. Richards (BSEE '43), Albert Bianco (BSEE '43), Marion Bianco, and Diana Jelich

In Memoriam

The ECpE department recognizes our alumni who passed away this past year. This list includes alumni who died between September 1, 2007 and September 11, 2008. Every effort was made to ensure the accuracy of this list.

1930s

- Carl J. Bruechert (BSEE '37)
- Leo E. Daehler (BSEE '35)
- Laverne D. Lyon (BSEE '35)
- John R. Miller (BSEE '39)
- Willard A. Richardson (BSEE '34)
- LaForest B. Sherman (BSEE '39)

1940s

- Eugene W. Brewer (BSEE '42)
- Karl W. Carlson (BSEE & BSME '48)
- Charles W. Crawford (BSEE '45)
- John N. Daniel (BSEE '46)
- Jerry L. DeDiemar (BSEE '43)
- Kirby L. Gray (BSEE '45)
- Roland G. Hepworth (BSEE '45)
- Richard H. Herman (BSEE '42)
- Calvin C. Hobson (BSEE '45)
- Ralph O. Holbrook (BSEE '43)
- James G. Hughes (BSEE '49)
- William P. Lincoln (BSEE '49)

Two Former Faculty Pass Away

Two ECpE emeritus professors passed away this year. **George G. Koerber** died July 19 in Appleton, Wisconsin. Koerber held various positions in business and academia before coming to the Iowa State ECpE department in 1959. He retired as a full professor in 1983. He was preceded in death by his wife Barbara last year. He is survived by his three children.

John Pavlat (MSEE '61) died August 11 in Ames. He taught in the ECpE department for 40 years and focused on his family and educating young people. He enjoyed the continuous learning process in the field of computer engineering. Pavlat was a student at Iowa State before he became a faculty member. While he was a student, he worked as a radio/television engineer for KOTA/KOZY and WOI. He is survived by his wife, Margaret, and his son, daughter-in-law, and four grandchildren. ■

- Ralph A. Lowry (BSEE '49; PhD Physics '55)
- Paul D. Newhouse (BSEE '43)
- Frank G. Pellegrino (BSEE '44)
- Robert L. Peterson (BSEE '47)
- John W. Shaw Van (BSEE '49)
- Erik T. Sohlberg (BSEE '43)
- Carlton W. Souder (BSEE '41)

1950s

- Paul M. Christensen (BSEE '59)
- John P. Dellett (BSEE '50)
- Arthur D. Haas (BSEE '50)
- Leo R. Huber (BSEE '52)
- Emmett D. Murphy (BSEE '56)
- Peter C. Nelson (BSEE '57)
- John J. Nesler (BSEE '51)

1960s

- Jack H. Barmore (BSEE '62)
- John W. Heckert (BSEE '66; MSEE '69)
- Dale A. Sheppard (BSEE '63)

1970s

- Larry J. Levy (PhDEE '71)
- Julian L. Pugh (BSEE '72)
- David J. Tomlinson (BSEE '74)

1980s

- Roger A. Arens (BSCpE '82)
- James E. Jantzen (BSEE '81)

2000s

- Anirban Chakrabarti (PhDCpE '03) ■

Recent Alumnus Helps Design Dutch Nanosatellite During Graduate Studies Abroad

Recent alumnus **Andrew Riha** (BSCpE '05; MSCpE '08) says he always knew he wanted to pursue a career that combined computer and aerospace engineering. So after he finished his bachelor's degree in 2005, he started work on a master's degree to help him achieve his dream. By 2006, he landed an internship at Boeing's Satellite Development Center in El Segundo, California, and then started working on his master's degree at Iowa State. In his final semester, he studied and worked abroad at Delft University of Technology in the Netherlands, where he helped design the attitude determination subsystem for Delfi-C3, a student-designed nanosatellite that was launched by the Dutch government last spring.

"The mission of the satellite is to test two payloads in a space environment: thin-film solar cells and autonomous wireless sun sensors," Riha says. "The satellite's attitude, or its orientation to a defined reference frame, is useful in determining the reliability of these payloads."

Riha says he created an interface to the database that contained the data (telemetry) received from the satellite for the purposes of attitude determination. The raw, unprocessed telemetry from Delfi-C3

eventually makes its way to a database for further testing.

"In other words, I programmed an interface in MATLAB and Simulink that automatically reads telemetry from the database, sends the relevant telemetry to a black-box attitude determination algorithm, and writes the processed attitude data back to the database for further analysis," Riha adds.

"The interface formed the framework for the Delfi-C3 attitude determination subsystem."

The most challenging aspect of the project for Riha was overcoming technical program hurdles during the testing phase.

"Since I was programming MATLAB and Simulink in an unconventional way (i.e. to interface with a MySQL database), many of the solutions were not immediately obvious," he says.

Riha also adds that the project provided him a unique opportunity to collaborate and learn from international graduate students. He also used his work on the Delfi-C3 project as the basis for his master's project.

After finishing his work at Delft, Riha took a four-month trip to the South Pacific to visit Fiji, Vanuatu, Australia, Samoa, and the Cook Islands. He just recently moved to Los Angeles, California, and started a

full-time position as a guidance, navigation, and controls engineer at Boeing's Satellite Development Center where he will help design the onboard

communication system for the next generation of Boeing satellites.

"My classes at Iowa State exercised the skills and abilities that are required of today's careers: teamwork, problem-solving, and communication skills," Riha says. He also adds that through co-authoring two conference papers on international education and participating in a study abroad experience, Iowa State has provided him with the tools he will need to work as an engineer in today's global workplace. ■



Andrew Riha

Photo courtesy of Andrew Riha.

Share Your Story for ECpE's Centennial!

Tell us about your memories from your time in the ECpE department! Go to www.ece.iastate.edu/centennial/your-ecpe-memories-2.html.

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