ECpE

Connections

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SPECIAL ISSUE:
reach for the top

Reach for the top: Making it happen in ECpE by Arun Somani

Welcome to a new era of excellence in electrical and computer engineering at Iowa State.

By now you may have heard of the College of Engineering's "Reach for the Top" initiative, announced last fall by Dean **Jim Melsa**. As Iowa State's largest department, the success of ECpE is critical to the push to place the college among the top 20 engineering programs in the nation. We're determined to do our part to make this happen.

We'll make it happen by making an already strong undergraduate program even stronger. By developing better assessment and evaluation methods, we'll improve the quality of instruction in our classrooms to ensure that an Iowa State electrical or computer engineering degree commands respect second to none.

We'll make it happen by taking graduate education to the next level. We'll upgrade and streamline recruitment and admission processes for graduate students, and institute progress reviews and assessment measures to make sure students graduate in a timely manner while maintaining high standards.

And we'll make it happen by fostering an increasingly dynamic environment for discovery and innovation. By encouraging faculty to move toward larger collaborative initiatives, while regularly relieving them from classroom teaching responsibilities to pursue research opportunities, we'll develop teachers even better prepared to produce some of the best engineers in the business.

In this issue of *Connections* you'll see more specifically how we intend to meet these goals—and you'll meet a number of experts in making good things happen. From the members of our External Advisory Board to our students and faculty to our distinguished and dedicated alumni, the people and projects profiled here represent a dynamic confluence of minds that forms the engine of progress for ECpE.

Nowhere is this more apparent than in our new presidential initiative, the Information Infrastructure Institute, or "iCube." iCube will bring together some of the best minds around in electrical and computer engineering along with the other participating departments at ISU to address some of the greatest challenges of our time and help Iowa make the transition to a 21st-century economy.

There are many resources we must tap in order to "reach for the top." But our most critical resource is the continued support of our friends and alumni. These are exciting times to be an electrical or computer engineer, and Iowa State is an exciting place to be for people who want to make things happen. Let's make them happen together.

Somani named new chair of ECpE

Dr. Arun Somani has been named as the new chair of the Department of Electrical and Computer Engineering at Iowa State University. He replaces **Dr. S. S. ("Mani") Venkata**, who has assumed responsibility for the department's Palmer Chair in Electrical Engineering (story, p. 12).

"In so many ways, Arun Somani is the ideal person to lead ECpE as we seek to place our programs among the top in the nation," remarked **James L. Melsa**, Dean of the College of Engineering, upon announcing Somani's appointment last spring.

Known primarily for his computing expertise, Somani earned his master's and doctoral degrees from Montreal's McGill University in electrical engineering in 1983 and 1985, respectively. His close collaborations with colleagues from the department's electrical side (see "iCube," p. 7) made him a particularly attractive candidate, Melsa added.

Somani earned his Bachelor of Electronics Engineering from the Birla Institute of Technology & Science, Pilani, India, in 1973 and a Master of Technology in Computer Engineering from the Indian Institute of Technology in Delhi in 1979. He worked in New Delhi for the Indian government's Department of Electronics from 1974 to 1982, where he developed an anti-submarine warfare system for the Indian Navy.

Somani began his academic career at the University of Washington in 1985, rising to the rank of full professor by 1995. He left Washington in 1997 to accept an appointment to the ECpE faculty at Iowa State. Currently the Jerry R. Junkins Chair in Electrical and Computer Engineering at Iowa State, he previously held the department's Nicholas Chair, as well as serving as ECpE's associate chair for resources.

One of America's leading experts in wavelength division multiplexing-based optical networking, fault tolerant computing, and parallel computer systems, Somani has served as a consultant to numerous leading industries, including Boeing, Rockwell International, and Guidant Corporation. A Fellow of the IEEE, he has supervised the research of more than 100 master's and doctoral students, while publishing over 200 refereed journal articles and conference proceedings.

Somani's leisure interests include domestic and foreign travel (he's visited every continent except Africa), reading, and long-distance driving. He is a founder of the Hindu Temple and Cultural Center of Iowa and currently serves that organization as board member and treasurer. Somani and his wife, **Manju**, are the parents of three children, **Ashutosh**, **Parotosh**, and **Anju**.

College pushes campaign for Coover

The computing power that once required whole buildings and massive amounts of energy to generate can now be produced on a desktop for a few cents' worth of electricity. Unfortunately, such efficiencies do not apply to educating the people who make such technological miracles commonplace. That still requires lots of space, often hard to come by at Coover Hall.

That's about to change, thanks to a $25-million campaign that will upgrade current facilities and add 35,000 square feet to Coover. With the help of alumni and friends, the Iowa State Foundation looks to raise half that sum, with the balance provided by the legislature.

"Why do we support the Coover Hall project? Iowa State has given us much we're grateful for. Fifty years ago we received good educations at Iowa State, much of them in Coover Hall. Since then our children, their spouses, and now our grandchildren have come to Iowa State and benefited in the same way. So the Coover Hall Project is an opportunity for us to help provide better facilities now to educate tomorrow's engineers."
—Richard C. Engle, BSEE '57

With more than 1,800 students, ECpE is easily the single largest department on campus. If recent growth rates continue, these numbers could be a door-busting 2,200 students within two years.

Along with increased enrollment comes an increase in faculty, which in turn requires more lab, office, and classroom space. In short, to remain competitive for the best faculty—along with the grants and graduate students such faculty bring— ECpE must provide the best facilities in which to conduct research and teaching.

That's a fact not lost on ECpE faculty and administrators, who have been charged by Dean **Jim Melsa** to vault the department's programs into the top 20 nationally within

the next ten years. Besides top-drawer faculty and students, a quality space is critical to achieving that vision.

In a sense, says alum and current External Advisory Board member **Richard Engle**, the department is actually revisiting an issue that's existed since Coover first opened its doors fifty years ago.

"The building was nearly new when I started," Engle recalls. "But even then we could sense time had passed it by. It was set up beautifully for power work. But it lacked facilities for advanced electronics."

With the adaptability envisioned by the new plans, such instant obsolescence should become a thing of the past. According to **Keith Fortmann**, Executive Director of Development for the College of Engineering, enhancements to Coover will feature modular spaces that can be assigned as workgroups and technologies evolve.

Equally important, the improved facilities will bring together members of the department currently housed in other buildings on campus. These arrangements, Fortmann says, will significantly improve the collaboration and productivity of faculty, enhancing the department's strong national reputation.

Engle agrees. "There needs to be that relationship among the various sub-disciplines of electrical engineering," Engle says. "You need that tie-in among power, electronics, computers, and com-munications— they all fit together." A more flexible space, he notes, will contribute significantly to that needed synergy.

Improvements will include new heating, cooling, and sprinkler systems; new windows, roofs, and plumbing; and redesigned lighting throughout the building. Additionally, existing laboratories will be

renovated to support new classrooms and teaching and research labs.

The improvements "are going to happen," Fortmann insists, reflecting the determination of the College of Engineering to offer incoming students the best possible preparation for a continually changing profession. A reborn Coover Hall will make for an even stronger ECpE,

"Sure research matters. But in the end the biggest beneficiaries of the new Coover Hall are going to be people like you and me: the students who come to Iowa State to get one of the best values in engineering education America has to offer. Those are our kids and grandchildren, our nieces and nephews, and they deserve the same quality experience you and I had. That's why I'm supporting the campaign for Coover."
—David Van Winkle, BSIE '73

and that, Fortmann notes, "guarantees the continued value of and respect for the diploma" of Iowa State electrical and computer engineers. ■

Making it at Iowa State—and in Iowa

Joshua Graves's hometown isn't far from Ames, but the had to come a great deal further in his personal and professional development. Although first in his family to undertake graduate education, Graves had models that hinted at the direction his life would take. His grandmother earned a degree in math and became a teacher. His father was an electrician at John Deere in Waterloo and his mother teaches computer courses to middle-school students.

Graves wove those strands into a sturdy rope to climb even higher, earning his bachelor's degree from Wartburg College before entering the EE master's program at Iowa State. Once here he had to take a number of undergraduate-level courses before he was ready for Professor **Vikram Dalal**'s microelectronics lab.

"Time was an issue," Graves admits, but adds that focusing on fundamentals was worth it. "It allowed me to get into research. Now I'm growing microcrystalline films and learning about thin film transistors."

State leaders want to keep promising young talent such as Graves in Iowa. That's a feeling shared by Graves, who would like to return to Waterloo. However, he concedes he may have to start his career elsewhere.

"Iowa State has exceeded my expectations," Graves says. "Now it remains to be seen whether the state of Iowa can deliver as well for a native son who has reached for the top and delivered his best." ■

A working dialogue between industry and ECpE

There's no denying it: at times, the relationship between industry and the university is as fitful as it is fruitful.

Academic engineers are attracted to basic research into fundamental questions of science, while industry focuses on applications and ensuring a steady stream of qualified engineers to staff design and production facilities. Moreover, this dichotomy is aggravated by the incongruous time frames between basic and applied research: while basic research may extend ten years or longer, industry is subject to markedly shorter market cycles.

ECpE has a tough balancing act. In order to elevate the department in the eyes of the National Research Council, investigators must redouble their efforts in the basic research supported by the National Science Foundation and other agencies. But as part of a land-grant institution, ECpE is obligated to graduate well-prepared engineers and provide technologies to the industries employing those graduates.

Eric Spring, Lockheed Martin

"It's an age-old story," says ECpE's **Jim McCalley**. "Industry people are saying 'you're doing great work on pencil and paper, but that doesn't mean much to me.' How do we bridge that gap? How do we make what we do more significant to people in industry who pay the bills?"

External Advisory Board (EAB) member **David Slump** speaks for many in stressing what he sees as the department's fundamental mission. "I'm biased toward a pragmatist view of education," Slump says. "It's one thing to teach Ph.D.s, but at the undergraduate level it serves the faculty to collaborate with industry."

Yet Slump takes the long view in seeing these imperatives as complementary rather than contradictory. "Basic research is how we get innovation ten years down the road," he reminds. "If somebody doesn't do it now, we don't innovate in the future. Applied research is how we get revenues three years down the road. There's a place for both."

For their part, ECpE researchers are increasingly sensitive both to industrial concerns and the opportunities close collaboration with industrial partners affords the department. Indeed, in an era of diminishing state support, ECpE must increasingly look to industry to support degree programs and new faculty positions.

There is perhaps no better example of this new dynamic than ECpE's fledgling software engineering program, created in large part to directly address the needs of specific industries. EAB member **Eric Spring** of Lockheed doesn't hesitate to enumerate those needs.

"We have a tremendous need to hire great candidates," Spring says, "1,800 to 2,200 new grads every year. So we help sponsor the software engineering program. We were there in '98 when **Arun Somani** first kicked this off, and now we're supporting it at $165,000 to help Arun and **Suresh (Kothari)** get this program going."

Furthermore, Spring adds, undergraduate curricular innovation is not something the department should do in addition to the graduate-level research emphasized by the "Reach for the Top" campaign, it is itself a prime contributor to that effort. "We feel this program could really help put Iowa State on the map," he adds.

Raj Aggarwal, Rockwell Collins

EAB chair **Raj Aggarwal** of Rockwell Collins sums up much of the board's feelings on industry-university cooperation. "First," he offers, "the relationship is critical; secondly, we're doing something about it; but third, we have to do more."

In the final analysis, Aggarwal says, it's not a question of emphasizing one at the expense of the other that will set Iowa State and ECpE apart, but rather the success of the department and industry in developing programs and strategies that are mutually beneficial. That, he says, takes persistence.

"Rockwell and Iowa State have long-term plans and a long-term understanding to help each other," Aggarwal says. "That becomes the discriminator in national competition—collaborations get noticed."

ECpE would like to hear from you!

Name_____ Grad. year, degree, student name if different _____

Address _____ City_____ State_____ ZIP_____

E-mail address _____ I want to help the ECpE department with a gift of **$**_____ for _____

Notes_____

PSERC: Industry helps power connections between research and education

A rising tide may lift all boats—but first you must get your ship in the water. The energy systems group has launched its vessel on a prosperous voyage, thanks in part to its affiliation with the Power Systems Engineering Research Center (PSERC).

PSERC is a consortium of thirteen research institutions collaborating with industry to advance technology and develop markets in the power industry. Currently about three-dozen of the world's top researchers in electrical power systems—six from ECpE—make up PSERC's research base. Besides ECpE's **Venkataramana Ajjarapu**, **Daniel Berleant**, **Jim McCalley**, **Gerald Sheblé**, **Mani Venkata**, and **Vijay Vittal**, the Iowa State contingent includes Professor **Vasant Honavar** of computer science .

PSERC was organized with the help of the National Science Foundation to address issues in the deregulated power industry. Besides collaborating on today's needs, the consortium's members anticipate future scenarios and, in consultation with industrial advisors, develop research proposals to respond to evolving needs and attract support from a variety of sources.

"Power system engineering addresses a central and essential technology," says Jim McCalley. "For that reason there was a perception on the part of PSERC members that there are good things to be had working across university boundaries—not only maximizing the critical mass of work we do, but enriching it."

Industrial partners on PSERC's advisory board represent a broad range of power system operators, manufacturers, and government agencies from across the globe, from regional utilities such as Alliant Energy and MidAmerican Energy to multinational corporations such as ABB and General Electric.

Above right: Glenn Hillesland with a Westinghouse electro-mechanical overcurrent relay of the type that has been around for 60 to 70 years and constitutes about 75% of all the relays in use today. For new installations most utilities are switching to micro-processor-based relays.

Iowa State has been part of PSERC for five years. Besides raising ISU's profile in power systems research, participation has resulted in seven projects totaling nearly $2 million. "Almost all that money supports graduate students," McCalley stresses.

Indeed, the consortium sponsors a vigorous educational program to encourage and develop the next generation of electrical engineers, underscoring the robust relationship between cutting-edge research and instruction at its member institutions. In addition, PSERC offers continuing education programs for working engineers that include short courses, monthly Internet seminars, and on-site seminars.

Most importantly, the synergy created by regular interaction between power researchers in diverse areas offers a valuable resource for industry. "We all have pockets of expertise in what we do with power and energy," McCalley observes. "But with 13 universities we come much closer to covering all the various areas of expertise. When someone in industry calls and asks me questions, I may not always be able to help him—but I can find someone who can."

Short courses power industrial ties

While ECpE faculty conduct research in specialized applications for many firms, equally important are the department's efforts to keep working professionals abreast of the latest developments in their fields. For power system professionals, this often means an ECpE short course.

The department offers one- to five-day courses each year to about 300 electric utility professionals, in addition to courses designed to explain the basics of electric utilities to non-engineers. To build a better bridge to the industrial community, the short course program is supervised not by tenured faculty, but by **Glenn Hillesland**, BSEE '47, who returned to Iowa State in 1986 after 39 years with Commonwealth Edison of Illinois.

According to Hillesland, the courses target several types of professionals and craftsmen. Many of the approximately 130 electric utility companies in Iowa, as well as others in surrounding states, take advantage of the department's offerings. "Deregulation has caused an upheaval and realignment of duties for many in utilities," Hillesland says. "This has increased the need for training."

The department's annual short course for power system operators is widely recognized as "the best in North America," Hillesland says, and attracts students from across the nation and Canada. Many return for refresher courses every several years. "The topics change to address issues that are most critical or pertinent at a given point in time."

Hillesland believes that another highly valuable course is the annual Midwestern Protective Relay Short Course, a three-day workshop that gives attendees hands-on experience with new equipment. "It provides an excellent opportunity for people in the Midwest to come in and look at equipment they may be interested in but would otherwise have no opportunity to work with and evaluate," he says.

Focus is the buzzword for ECpE, according to new EAB chair **Dr. Raj Aggarwal**. More than a buzzword, it's the department's marching orders.

"What are the core competencies?" Aggarwal asks. "Where is the critical mass? If there is no critical mass, there is no core competency."

Aggarwal thinks academic departments often try to be all things to all people. Part of the problem is that, in order to offer sufficient breadth of courses for aspiring engineers, the department must recruit and retain faculty in virtually every area, especially with regard to undergraduate education.

David Van Winkle

David Van Winkle has dealt with this tension as chair of the External Advisory Board himself. "We may need professors in every area from a teaching standpoint," he acknowledges. "But for research, you need to think about doing fewer things well."

After much deliberation, ECpE has moved from nine focus areas to six (see insets pages 6–9). And while it remains to be seen whether such trimming makes ECpE more competitive, it is nonetheless a major move for the department. Now, Van Winkle says, the department must move further.

"If you don't have a critical mass of people willing to work together," Van Winkle points out, "it's difficult to create the view that Iowa State is great at something."

Van Winkle gets no argument from new department chair **Arun Somani** who, together with Software Systems area chair **Suraj Kothari**, is working to get ECpE's software engineering program off the ground. A number of ECpE researchers have secondary interests in the area.

"We need more manpower to support this program," Somani stresses, "people who know how to design, test, and maintain good software. We need to hire at least a couple of software engineering faculty, which would get us to five for a core group."

One way of bridging the gap is to collaborate with scholars from other disciplines through a research center devoted to a narrowly defined set of research objectives, such as the new iCube initiative. Such concentrations of effort among disciplines are increasingly the norm at Iowa State. In fact, one of the university's earliest successes in this vein is the Micro-electronics Research Center (MRC), an ECpE-based effort headed by Professor **Vikram Dalal**.
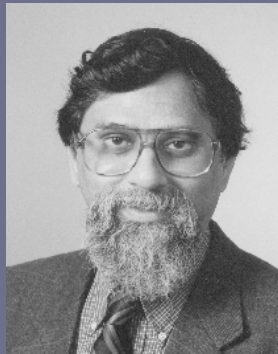
Vikram Dalal

The selective approach of the MRC, Dalal says, attracts attention not only from industry, but from government as well. "We got a major contract from the Air Force in the mid-1980s to set up research facilities as a direct result of the center," Dalal recalls. The center, he says, has concentrated the efforts of researchers from diverse fields and focused them on a common goal, to the point where today the MRC is recognized as a global leader in certain areas.

"Everybody wants to do all they can to help the college become the best," Dalal says. "So we have selected a few areas where we are among the best, for example the area of solar energy conversion. That is widely recognized throughout industry and government."

That's a distinction to which both Kothari and Somani are determined to bring software engineering at Iowa State. And they know what it takes to get there.

"I have no doubt that software engineering will emerge as a research center," Somani insists. "You cannot successfully teach an undergraduate program and even think about the top 20 if you don't have the corresponding research program."

And, Kothari adds, the higher standards involved with that program apply across the board, from the faculty to the undergraduate level. "You have to establish a certain standard," he says. "We don't do anyone a service simply by producing 100 software engineers. To do a good job, you need ten good software engineers. Mediocrity doesn't help."

Software Systems (SS)

Area Chair: Dr. Suraj Kothari

The Software Systems group is engaged in research and teaching in parallel computing, bioinformatics, software engineering, real-time systems, multimedia systems and networks, real-time embedded systems, distributed computing and security, and middleware. Also, several interdisciplinary projects focus on computational science and computational biology. Research in software modeling, design, and verification; parallel and distributed computing; and automated software analysis and synthesis provide enabling software technologies for important and diverse applications.
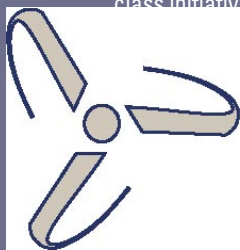
iCube at Iowa State:
Seeing the IT future in three dimensions

You invented the world's first digital computer? Great! But what have you done for the world lately?

Sixty years and one information technology revolution later, ECpE responds: iCube. The Information Infrastructure Institute is the biggest IT news on the Iowa State campus since **John Vincent Atanasoff**'s invention heralded the digital age in the early 1940s.

In keeping with the university's strategic plan to "undertake bold visionary world-class initiatives," iCube joins investigators [from multiple] disciplines to tackle projects [...] and create enterprises its collaborators could never achieve individually.

With operations such as [...] Media Labs and the University [...] Beckman Institute up and running, iCube has its work cut out. Yet, according to its brain trust, iCube's strategy will result in "an integrated approach that provides an opportunity for Iowa State to leapfrog over more reputed institutions in the IT arena."

Modeled along ISU's Plant Sciences Institute and Virtual Reality Applications Center, iCube will focus on "niche critical applications," according to **Vijay Vittal** who, along with **Arun Somani** and **Suraj Kothari**, is one of iCube's prime movers.

"We're not going to compete with high-tech corridors in multimedia, artificial intelligence or robotics," Vittal acknowledges. Instead, iCube will make its name in fields where Iowa State researchers are already blazing trails.

"The institute currently has a broad scope and needs to be focused," Kothari stresses. "Rather than trying to solve every issue in IT, we need to create a core in a couple of areas where we have strength."

But for iCube to become fully three-dimensional, the collaborative spirit of ECpE must include investigators from across the university. That collegial focus has energized Arun Somani's vision from the beginning.

"People from economics, VRAC, computer science and computer engineering, the applications folks in business, political science: we need to think about these things as group efforts," Somani says. Somani is confident that iCube can make that leap and extend the challenge to partners beyond the university.

"Iowa is an agricultural state," he says, "and sees the advantage of technology in that aspect of its economy. But we haven't been able to attract industry as much. Iowa has large insurance companies, a lot of banking companies that use IT, but we don't have the IT developers."

Vittal agrees and expresses iCube's mission in the simplest terms possible. "The aim of the institute," he says, "is to build enough talent and expertise to attract venture capitalists." That, Somani adds, will require fundamental technologies for export to other states and industries, extending well beyond Iowa's agricultural comfort zone.
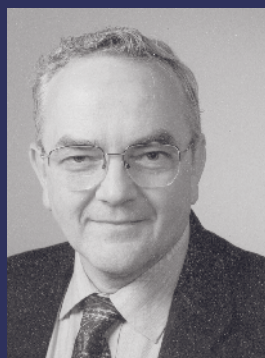
Communications, Control, and Signals (CCS)

Area Chair: Dr. Julie Dickerson

The Communications, Control, and Signals group focuses on innovative research in wireless communications and the control of complex dynamical systems. Major research areas include statistical signal processing; ultra-wide bandwidth communications; bioinformatics; modeling and visualization of uncertain information; nanoscale systems; and the design of hybrid, real-time, and discrete-event systems. This diversity of expertise facilitates leading-edge research in signal processing, communications, and control system design and modeling.

Advanced Materials and Electronics (AME)

Area Chair: Dr. Robert Weber

The Advanced Materials and Electronics group conducts research in three-dimensional electromagnetic field simulation and modeling, nondestructive material evaluation instrumentation, advanced materials processing, thin film semiconductor devices, photonic bandgap materials and devices, solar energy conversion, magnetics, and mixed signal VLSI design. While some faculty work wholly within ECpE, many work in the Center for Nondestructive Evaluation, the Microelectronics Research Center, or the Analog and Mixed-Signal VLSI Design Center.

ECpEople . . . reaching for the top

Associate Professor Srinivas Aluru has been presented with the Young Engineering Faculty Research Award. . . . Professor Vikram Dalal, director of the Microelectronics Research Center, was presented by the Micron Technology Foundation with one of the first Micron Faculty Excellence Awards for his work in microelectronics. The award comes with a $300,000 stipend. . . . Associate Professor Jim Davis has been named interim director of Iowa State's Office of Academic Information Technologies. . . . Associate Professor Julie Dickerson was named Outstanding Professor in Electrical and Computer Engineering by the ISU Engineering Student Council. She has also been recognized with the Warren B. Boast Undergraduate Teaching Award. . . . Dr. Hamid Elahi (BSEE'77, MSEE'79, PhDEE'83), currently with General Electric International, Inc., was named recipient of a 2003 Professional Achievement Citation in Engineering (PACE) Award. . . . Professor Randall Geiger has been recognized with the Warren B. Boast Undergraduate Teaching Award. . . . Assistant Professor Manimaran Govindarasu has received the Young Engineering Faculty Research Award for 2003 from the College of Engineering. . . . Graduate student Bhanu Hariharan received a spring 2003 Research Excellence Award. Grad students Shashank Krishnamurthy, Rama Subba Reddy Sangireddy, and Tao Wu received summer 2003 Research Excellence Awards. . . . Former ECpE faculty members Dr. Marwan M. Hassoun and Dr. Weibiao Zhang were awarded U.S. Patent No. 6,563,444 for their "Apparatus for and Method of Performing a Conversion Operation." . . . ECpE has given Professor Richard Horton the Mervin S. Coover Distinguished Service Award. . . . Associate Professor Doug Jacobson won a 2003 R&D 100 award for "FireBlock," a network security software package developed in conjunction with Palisade Systems of Ames. Jacobson, who is also Palisade's president and chief technology officer, previously won the prestigious award in 2001. . . . Professor Ahmed Kamal has been named to *Who's Who in Engineering Education*. . . . Professor Jim McCalley has been designated chair of the IEEE's PES PEEC working group. . . . David J.

Miller (BS EE 1975), director of Facilities/Utilities Services with Iowa State's Facilities Planning and Management office, has been recognized with the Superior Service Award for 2003 by the ISU Alumni Association. . . . Professor Gerald Sheblé has been appointed a visiting professor at Portugal's University of Porto. . . . Assistant Professor Mani Mina received the VEISHEA Faculty of the Year Award. . . . Associate Professor Steve Russell has been given the Warren B. Boast Undergraduate Teaching Award. . . . Undergraduate Coordinator Vicky Thorland-Oster is the recipient of a 2003 University Award for her work in academic advising. . . . Associate Professor Gary L. Tuttle was awarded U.S. Patent No. 6,593,894 for his Highly Directional Receiver and Source Antennas Using Photonic Band Gap Crystals. . . . Former ECpE chair Professor S.S. (Mani) Venkata has been named to the prestigious Palmer Chair in Electrical Engineering (story, p. 12). . . . Professor Vijay Vittal has received the 2003 University Award for Outstanding Achievement in Research. . . . Nancy Knight served as chair for the National Association of Graduate Admissions Professionals (NAGAP) annual conference.

Secure and Reliable Computing (SRC)

Area Chair: Dr. Doug Jacobson
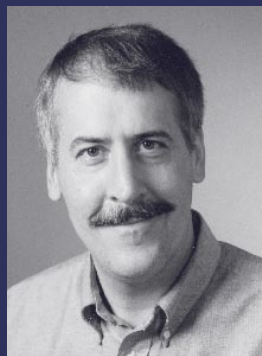
The Secure and Reliable Computing group is a focal point for innovative research targeted at the security and asset protection problems facing the world today. Major research areas supported by the group include intrusion detection, denial of service attacks, attack tolerant networks, reliable networking, fault tolerant systems, and computer security education. Diverse resources facilitate research in problem areas requiring scientific, engineering, and social expertise.

Practical Principles:
Tirthapura Develops Algorithms
for Distributed Networks

It may seem odd that a man with a Ph.D. in computer science would spend his most productive research hours working with pen and paper. However, ECpE Assistant Professor **Srikanta Tirthapura**'s primary interests have always been the math and theory underlying computer systems.

"I like abstraction," Tirthapura says. "I'm very interested in the formal aspects of problems, and in using them to build systems—you could say that I'm interested in the principles of computer systems."

Still, Tirthapura is firmly invested in real-world applications. The native of Bangalore, India, took the interest in math and physics he developed in high school to the Indian Institute of Technology in Madras, then enrolled in graduate school at Brown University, where he earned both his M.S. and Ph.D. in computer science, in addition to working at Bell Labs for a summer. He then joined the ECpE faculty in 2002.

Today, Tirthapura's research revolves around developing and testing algorithms for distributed computing networks. Particular interests include dynamic networks, especially resource location and coordination problems in peer-to-peer systems and the peculiar challenges of wireless networking among computers.

"Distributed coordination problems are one of my primary focuses," Tirthapura says. "My thesis was on distributed queuing, where I analyzed different solutions for this problem."

One of the more interesting applications of queuing that Tirthapura is working on lies in ordered multicast, in which he is developing algorithms to ensure consistency in the transmission and reception of data messages across distributed networks. From on-line gaming to stock quotations between various brokerages, he notes, consistency in the ordering of messages is critical to the efficient functioning of distributed networking systems.

This young up-and-coming scholar plans to continue focusing on distributed algorithms the next few years, as well as their applications to dynamic networks, including those wireless and peer-to-peer systems where computers frequently join or leave the network at will.

"I think peer-to-peer systems have a lot of commercial potential," Tirthapura says. "They represent potentially significant cost savings over more centralized, server-based networks. Both dynamic systems and wireless networks are going to be strong players in the future."
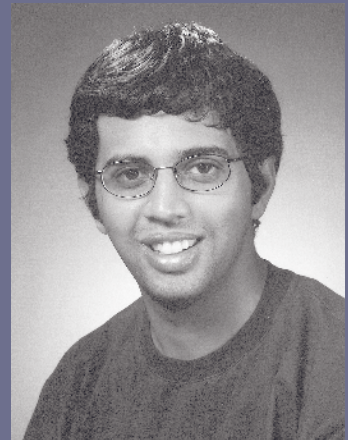
Computing and Networking Systems (CNS)

**Area Chair: Dr. Ahmed Kamal**

The Computing and Networking Systems group addresses performance, power management, security, reliability, and cost issues in computer and network systems and develops distributed programming models. Active research projects include micro-architecture solutions to achieve high integrity, security, privacy, and energy efficiency; and designing embedded systems, high-speed processors, and memory systems. Major networking thrusts are in WDM-based optical networking, wireless and ad hoc networks, network quality of service, data structures and algorithms for distributed computer systems, and middleware solutions.

Energy Systems (ES)

Area Chair: Dr. James McCalley

The Electric Power and Energy Systems group is one of the most active university research groups in the country. Primary thrusts include power system dynamics and control, operational decision making, distribution systems, reliability, voltage security, economic systems and markets, asset management, and power electronic systems. New areas include self-healing networks, adaptive protection, multi-agent systems, market dynamics, and integrated energy systems.
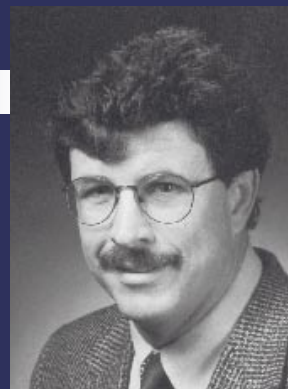
For all the talk about research at Iowa State, there can be no argument that ECpE's best products are the people the department graduates.

"The reputation of ISU graduates is that they're solid," Jim Daughton offers. "They're well-rounded, they work hard. The people I talk to who hire people from Iowa State believe the college does do a pretty good job of teaching."

Adds David Cave, "The experience around Motorola has been that the graduates we've gotten from Iowa State we like very much."

Cave and Daughton should know: of the thousands of excellent engineers that ECpE has turned out over the decades, they rank among the finest and the most accomplished, living testaments of the value Iowa State and ECpE put on teaching. And with young up-and-comers such as Lisa Osadciw, David Slump, and Tracy Summers, it's clear that the strength of the teaching program at Iowa State has not diminished over the years.

As you read the brief stories of these outstanding alumni, you may note the emphasis they place on the importance of teaching, while at the same time acknowledging the imperative to raise the research profile of the department. As men and women of high achievement in multiple areas, they offer the fittest models for excellence in everything we do.

Practical progress is key

David Cave's resume is full of academic degrees and honors. He received a B.S. in physics before he even set foot on the Iowa State campus for the B.S. in electrical engineering, which he earned in 1969. Then, after taking a job with Motorola, he earned his master's and Ph.D. from Arizona State.

But make no mistake: in Cave's opinion, the most valuable of all was his experience at Iowa State. Iowa State felt pretty much the same way about Cave, and last year added the Professional Achievement Citation in Engineering (PACE) award to his impressive list of accomplishments, which recently included elevation to Fellow of the IEEE.

"My B.S. from Iowa State turned out to be the most useful and most influential degree I had in my career," Cave insists. "I was a design engineer, not so much a researcher, and the fundamentals you get in a good B.S. are key."

Those fundamentals would take Cave to the upper reaches of Motorola's semiconductor products sector, where he progressed from design engineer to group leader to engineering manager and finally to service as a vice-president of semiconductor research, eventually winning the company's highest award for technical achievement.

But if you think that such success in the research sector would blind Cave to the basics, think again. "I feel the fundamental mission of the university is to teach," he says. "I look at the emphasis on research now, and it bothers me."

Still, Cave acknowledges the interdependence of research and teaching in the best programs. "In order to gain the quality of faculty and students you want, and the money you need, you have to be ranked highly," he concedes. "My only caution is to make the research practical, or at least a reasonable mix, and you'll have successful students who go out into the world and carry the Iowa State flag."

Vision and values of the entrepreneur

It's true for individuals as well as organizations: rewards don't often come without risks.

That's the mindset of the inventor and entrepreneur, someone who ventures beyond "business-as-usual" to create something of value.

One of the rewards recently to come Dr. James Daughton's way was a 2002 Professional Achievement Citation in Engineering (PACE) award from the Iowa State College of Engineering. A holder of 18 patents and the founder and president of NVE, Inc., a leading designer and manufacturer of giant magnetoresistive devices used in computer hard drives and magnetic field sensors, Daughton was recognized both for his business and engineering accomplishments.

By honoring Daughton with the PACE award, the college acknowledges those values departments such as ECpE must practice in their own "reach for the top." And as a member of the department's External Advisory Board, Daughton isn't reluctant to share his views and values with leaders in both ECpE and the college.

Prominent among Daughton's views is maintaining the proper balance between research and teaching at Iowa State.

"The chief product of the university is the students," he insists. "I see a natural synergy between doing good research and doing good teaching, but I think in some cases that's carried to excess, where the teaching part doesn't get enough emphasis."

Yet, Daughton says, it's not a case of either-or. "Leading-edge technology in a group," he adds, "can lead to good graduate and undergraduate teaching programs that attract some of the brightest people."

Identifying such programs—and leveraging their assets—has been integral to the success of Daughton's company. "In every area we're in," he says, "universities have a leading-edge advantage over doing it ourselves. For instance, we worked with Iowa State because (former ECpE faculty member) **Bill Black** was an outstanding circuits man."

Daughton received his M.S. in electrical engineering from Iowa State in 1961, followed by the Ph.D. in 1963.

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PRIDE

Outstanding alumnus—outstanding advice

If you want to know what makes a young alumnus "outstanding," just ask David Slump about the research dynamics between the university and industry. You'll understand why, in his mid-thirties, Slump already serves on ECpE's External Advisory Board—and why last October the Iowa State Alumni Association named him an Outstanding Young Alumnus.

A 1991 ISU graduate, Slump later earned an M.B.A. from the University of Chicago before joining global technology company ABB Ltd. He rose quickly through the ABB ranks, first leading global marketing and sales for medium-voltage technologies, then as President of ABB's U.S. Utilities Division, then to his present position as head of global marketing and strategy for ABB's Automation Technologies, a $9-billion enterprise.

Yet Slump's discernment and ability to translate knowledge into action didn't begin with a Chicago M.B.A., but rather as a student employee with ECpE at Iowa State.

"I worked for the Electric Power Research Center," Slump recalls. "I had an office next to Vittal and Lamont, and they gave me a lot of exposure to how the university worked behind the scenes as well as to the utilities that were center sponsors. I was very early working between university and industry."

While at Chicago, however, Slump was exposed to a different research ethic—one he feels has much to teach ECpE in its "reach for the top." And he's not bashful about sharing that advice.

"What I saw at Iowa State was everybody doing their own research," Slump says. "You can't add that up to solve a problem. Take a problem in automation, IT, or power system dynamics, get all of your intellect together to solve that problem. Then you'll dominate a research area. Each researcher's specific interests can help solve a common problem while he still dominates his individual area. A team will always outperform an individual."

Hollywood endings, heartland values

Iowa State was among the last places Lisa Osadciw thought of going to college. But since both mother and father of the Syracuse, New York native were alums, ISU made her parents' short list. "It was one of the schools I had to look at, though it wasn't in my list of top schools I wanted to go to," she says.

All of that would change with the breathlessness of a Hollywood romance: "I fell in love with Iowa State the first time I came to visit," Osadciw admits.

Osadciw has been writing happy endings for the screenplay of her life ever since, including her receipt this spring of the Professional Progress in Engineering Award. First she returned to Syracuse for her master's in 1990, then went to Lockheed Martin, where she won several awards for her work in radar and missile tracking technologies.

Osadciw would later go back for her Ph.D. at the University of Rochester, where she fell in love again—this time with teaching. After getting the Ph.D., she returned to work as dean of Lockheed's continuing education program in systems engineering.

"I taught a lot of the classes they do with Syracuse University," Osadciw says, "and decided I wanted to be paid for it." That decision led her in 2001 to join the Syracuse faculty as an assistant professor of electrical engineering.

Osadciw's plans for the future are remarkably similar to those of ECpE: "All I want ten years from now," she says, "is to be a nationally recognized researcher and educator." Part of that recognition, she adds, is tied to the success of her alma mater.

"To have Iowa State in the top 20 gains me more respect," she points out. "It's a serious school and an excellent school. As alumni, that's the biggest benefit one gets."

Long-distance runner

Tracy Summers isn't ten years out of the Iowa State starting blocks, but already she's been named the recipient of the College of Engineering's Professional Progress in Engineering Award for 2003.

Summers had originally planned to go to college on a track scholarship. However, an automobile accident in high school changed all that, and soon the Cedar Rapids native found herself running in a different direction—toward Iowa State and ECpE.

"I had a strong interest in engineering," Summers recalls, "so I was looking primarily at engineering and technology-oriented schools. Iowa State seemed like a natural fit, and I was a homebody who wanted to stay pretty close to my family."

Still, Summers' drive eventually would take her far from Iowa. By her junior year at ISU she was doing high-level semiconductor work with Dr. **Tom Scott** in the Microelectronics Research Center. Her participation in a summer NSF program in semiconductor processing made her an attractive candidate for the Medtronic Corporation, which recruited her to their Tempe, Arizona, R&D center.

At Medtronic Summers works in a strategic group that evaluates technologies for future applications and helps develop processes for upcoming products. "I have an emphasis in device physics," she says. "I work with product groups, determine what they need their products to look like, then work with the process team to put together a process that will give us that."

No sprinter, Summers is a long-distance runner these days, and her vision extends well into the future as she works to add an M.BA. to her resume. "I've gone more into project management," she says. "I'm still involved with process development, but more on a management role than actually going into the lab—it's more strategic."

ECpE Endowed chairs: A lasting contribution to excellence

One way to support excellence at Iowa State is by funding an endowed chair. Endowed chairs are awarded to scholars in recognition of past performance and future potential to make significant contributions in their fields. More than an honor, the income generated by the endowment enables the chair holder to pursue research and teaching opportunities he or she might otherwise be unable to consider.

Endowed chairs usually come to the department by way of bequests from alumni and other supporters or through corporate gifts. Depending on the size of the gift and wishes of the giver, an endowed chair may even fund a new faculty position, increasing the department's human capital. And because the endowment principal is left intact, an endowed chair is a legacy to Iowa State that remembers the giver in perpetuity.

Strong alumni support is characteristic of the nation's best engineering programs, and chairs endowed and named by our alumni are the most visible examples of their commitment to academic excellence. Currently ECpE has seven endowed chairs. While this is a strong showing, in order to reach for the top we need to add more such vehicles to attract and retain the world's best engineering minds.

If an endowed chair in either your own name or the name of a loved one is a consideration for your estate, please contact **Keith Fortmann** of the ISU Foundation at (515) 294-4280. ■

Venkata appointed to Palmer Chair

ECpE is pleased to announce the appointment of **Dr. S. S. (Mani) Venkata** to the Palmer Chair in Electrical Engineering, established in 1986 through a gift to Iowa State by ECpE alumnus the late **James R. Palmer** (BSEE'44) and his wife **Barbara Raeder Palmer** ('46). Dr. Venkata is the second Palmer professor, the chair first held by Emeritus Professor of Electrical Engineering **William Lord**.

ECpE department chair from 1996 to 2002, Dr. Venkata received his B.S. from Andrha University in 1963 and his M.S. from IIT, Madras in 1965. He was awarded the Ph.D. by the University of South Carolina in 1971. Dr. Venkata was at the University of Washington from 1979 to 1996, where he chaired the Electrical Energy Group and served as Graduate Program Coordinator. He is a Fellow of the IEEE, which recognized him with its Outstanding Power Engineering Educator Award in 1996 and Third Millennium Medal in 2000.

Dr. Venkata's research areas include six-phase power transmission, power electronics applications to distribution systems, intelligent systems applications, and engineering education. ■

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