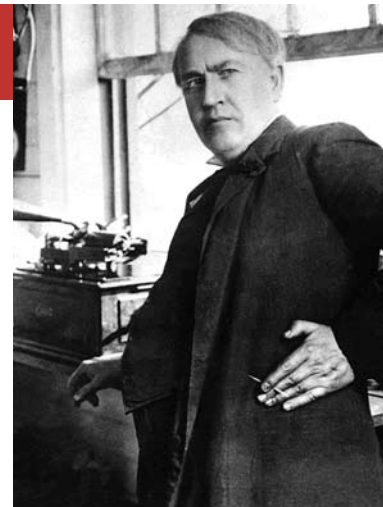




# The Institute

<http://www.ieee.org/theinstitute>

June 2006 VOL. 30, NO. 2



## IEEE WARMS UP TO WIND POWER

BY TRUDY E. BELL

**W**ITH A FEW ADDED here and others installed there, the number of wind farms for generating electricity is increasing in many industrialized countries. Wind power is now the fastest-growing segment of the power-generation industry. And it's one with which, historically, the IEEE has not been much involved.

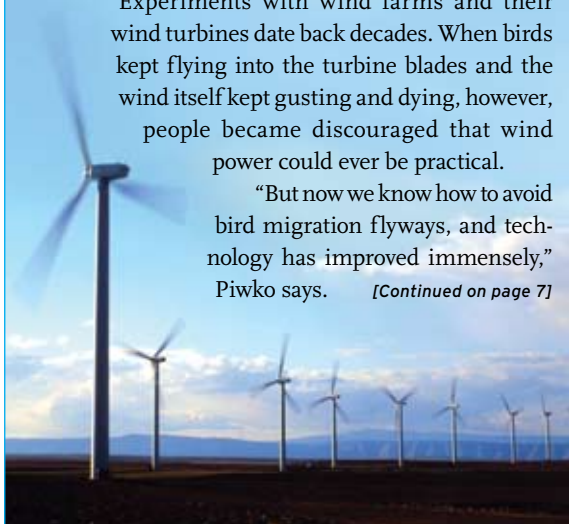
But that is now changing—and fast. The IEEE has formed several committees and educational and public outreach programs to raise awareness of wind power. And the committees have been busy.

“The industry is looking to the IEEE for standards and guidance. Although wind power is still a small percentage of the power-generation industry, it's growing at an astounding pace,” says IEEE Fellow Richard Piwko, director of energy consulting at GE Energy in Schenectady, N.Y. He's also chair of the IEEE Wind Power Coordinating Committee.

“The intent is for WPCC to raise awareness of wind-power issues within the IEEE Power Engineering Society and to focus efforts on the highest-priority issues first,” he says. “We will start by organizing a few panel sessions and forming a few working groups. Ultimately, our efforts will expand to include educational programs, standards, and application guides.”

Experiments with wind farms and their wind turbines date back decades. When birds kept flying into the turbine blades and the wind itself kept gusting and dying, however, people became discouraged that wind power could ever be practical.

“But now we know how to avoid bird migration flyways, and technology has improved immensely,” Piwko says. *[Continued on page 7]*



## Up Close With the President-Elect Candidates

BY KATHY KOWALENKO

**T**HE IEEE elections will be taking place in barely three months. To help members get to know Lewis M. Terman and John Vig, *The Institute* spoke with the two president-elect candidates about a range of professional and personal topics.

Each of these first-time candidates retired this year after a long and distinguished career with a single employer. Terman, an IEEE Life Fellow, ended his 45-year career in January with the IBM Research Division in Yorktown Heights, N.Y. He retired as associate director of the Research Systems Department, and during most of his career worked with circuits, devices, and technology for advanced MOS memory and logic.

Vig, an IEEE Fellow, retired in February after 36 years with the U.S. Army Communications–Electronics Research, Development, and Engineering Center, in Fort Monmouth, N.J. He was a researcher and program manager working on the experimental aspects of frequency-control and sensor devices.

Besides being recent retirees, the two candidates have other things in common. Both were drawn to physics in college. Terman attended Stanford University, in California, got interested in electrical engineering while an undergraduate, and effectively moved into that area when he had finished the minimum physics and math courses for his bachelor's degree in physics. He stayed



Lewis M. Terman [left] and John Vig.

at the school to earn master's and doctoral degrees in electrical engineering.

Vig received his bachelor's degree in physics from the City College of New York, and went on to earn master's and doctoral degrees in solid-state physics from Rutgers University in New Brunswick, N.J. Even though he does not have an engineering degree, Vig says his job title has always been “electronics engineer” or “supervisory electronics engineer.”

Today, when it has become rare for a member to spend an entire career with one company, how did these two each manage to stay with one employer for so long?

Vig says that if you want to maintain career longevity, it's absolutely essential to interact with colleagues. “Most of my best ideas came out of brainstorming sessions where together we thought up how to solve a problem,” he says. “Oftentimes we tried to beat

each other to the punch with a solution.”

Vig was assigned to the government research facility in 1972 to fulfill his military obligation to the U.S. Army. He eventually rose to the rank of captain and, after his military service was over, he was offered a temporary job at the lab. He took it “until something better came along,” he says with a chuckle.

“I was fortunate that I had almost complete freedom in deciding which projects I *[Continued on page 8]*

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After the corporate scandals of the last few years, a new awareness of ethics is taking hold in organizations that employ engineers.

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BY TRUDY E. BELL

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## THE INSTITUTE ONLINE

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Look for these articles on 6 June

**NEWS** An IEEE standard helps consumers select environmentally friendly computers.

**PRODUCTS & SERVICES** The new IEEE Power and Energy Library includes more than a million articles on all aspects of the field.

**FEATURED CONFERENCE** Find out how physics and medicine intersect at the 2006 World Congress on Medical Physics and Biomedical Engineering, to be held 27 August to 1 September in Seoul, Korea.

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# NEWS

FROM AROUND THE IEEE & THE WORLD

## IEEE to Open Office in Beijing

THE IEEE BOARD of Directors voted at its February meeting to establish a “legal and physical presence” in China for the IEEE. Plans are under way to open an office in Beijing’s Haidian Science Park this year. The office will be staffed with up to three employees who will support members and member-related activities in China as well as activities of IEEE societies in China and elsewhere in Asia.

The staff will also work on a number

of other projects, including promotion of the IEEE Computer Society’s Certified Software Development Professional program, which involves a credential test of midlevel software engineers in 11 areas of knowledge. Other strategic activities include encouraging companies in China to participate in global standards development and exploring the possibility of developing accreditation programs for the country’s higher education curricula in the IEEE’s fields of interest.



## Accreditation Activities Expand

THE IEEE SEEKS a strong role in accrediting engineering and engineering technology programs at universities worldwide, under a new program approved at the February Board of Directors meeting. First, the institute will develop its own model guidelines for accreditation, which will express the IEEE’s views about minimum requirements for degree-granting curricula in its principal fields of interest. Then the organization will apply the guidelines to influence the activities of accreditation bodies worldwide. In addition, the IEEE will explore whether it should become an independent accrediting body.

In a motion carried by the board, favoring the boost in accreditation act-

ivities, Moshe Kam, vice president, IEEE Educational Activities, noted that the IEEE has had no formal role in any major non-U.S. accrediting body. Rather, it has operated “in a reactive mode,” and “has done little to establish its leadership in accreditation worldwide.” Kam also warned that “this state of affairs threatens to marginalize the IEEE and reduce its ability to lead the profession.”

In particular, the IEEE will seek to help develop accreditation programs in countries emerging as major developers of new engineering education curricula, such as India and possibly China. The board approved US \$208 500 for the accreditation activities.

## Funding Approved to Study History Center’s Future

THE IEEE BOARD of Directors has designated up to US \$45 000 for a study of how to improve the operations of the IEEE History Center, including its Virtual Museum. As a first step, a workshop on 30 and 31 May (after this issue goes to press) was to examine issues such as the center’s mission and vision, its role, staffing, and finances, and its reporting structure within the IEEE. Invited to attend are IEEE staff and volunteers,

including members of the History Center Committee and the IEEE Foundation, as well as staff from other technology-history centers and museums, academic historians, and preuniversity education experts. The goal is to produce a report that will include a new strategic plan on how the center and museum should operate. The report is to be presented to the Board of Directors at its 25 June meeting.

## New Member Grade for Grad Students Just Around the Corner

ATTENTION, STUDENT MEMBERS: a new graduate student member grade goes into effect in the third quarter. Not to worry, though; you won’t have to do a thing. The IEEE will make the change for those who qualify. When graduate student members (GSMs) renew their membership in 2007, they will receive new membership cards identifying them as GSMs. They will continue to pay the low student dues rate.

Individuals assigned the new grade must meet the same qualifications as those established for the IEEE member grade. Generally, that means the student must have earned a bachelor’s (or equivalent) degree from an accredited institution in a program within the IEEE’s fields of interest. In addition, each person must be a registered graduate student in a regular graduate course of study in one of those IEEE fields and carry at least half of a full-time academic program.

Student and graduate student member grades can be held for a combined total of eight years. After graduation or upon reaching the eight-year limit, graduate student members will be elevated automatically to member grade.

Unlike student members, graduate student members will be able to vote in IEEE elections, and they will be eligible to hold volunteer positions previously restricted to member grade or higher in IEEE sections, chapters, and the affinity groups of Graduates of the Last Decade, and Women in Engineering.

Around the end of September, the IEEE will notify eligible students that their status has changed. If you believe you qualify for the graduate student grade but haven’t been notified by then, contact IEEE Member Services, tel: +1 732 981 0060 or e-mail: member-services@ieee.org.

## Ethics Code Broadens Scope

IN FEBRUARY THE BOARD of Directors approved the proposed change to the first declaration of the IEEE Code of Ethics. In “Members Weigh in on IEEE Code of Ethics Revision” [*The Institute*, December 2005], it was reported that the Ethics and Member Conduct Committee had proposed that any reference to “engineering” in the code be removed, and the board agreed.

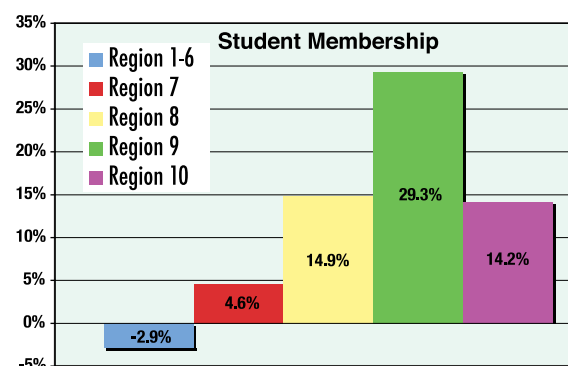
The new code now states that IEEE members agree “to accept responsibility in making decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment.” Originally, the code said that members agree “to accept responsibility in making engineering decisions.”

## 2005 Membership Stats Show Mixed Picture

STUDENT membership in the IEEE soared, while overall membership barely budged in 2005. The number of students rocketed to 73 870, representing an increase of 8.1 percent, with Region 9 (Latin America) leading the way, increasing by 29.3 percent.

Region 8 (Europe, Middle East, Africa) and Region 10 (Asia and the Pacific) also experienced strong gains, increasing 14.9 percent and 14.2 percent, respectively. Student membership in Region 7 (Canada) grew by 4.6 percent, while it dropped by 2.9 percent in the United States.

Higher-grade membership, which excludes student members, saw a modest 0.5 percent increase, for a total of 367 395 mem-



bers. All six U.S. regions as well as Region 10 saw a decrease in membership, but Regions 8 and 9 posted gains of 3.8 percent and 5.8 percent, respectively.

Membership in societies ended the year in a slight decline. The percentage of IEEE members belonging to societies slipped to 55.3 percent in 2005, from 56 percent in 2004.

—Compiled by Kathy Kowalenko & Nancy Salim

RESPONSES TO MARCH'S QUESTION

## Power for the People

The need to generate electric power without producing greenhouse gases has prompted government officials and even some environmentalists to reconsider nuclear power. How would you feel about a new nuclear power plant near your home?

### No Weapons, Just Power

Nuclear energy has been mistakenly associated with nuclear weapons. Generating nuclear power is one of the safest human endeavors in modern history and offers a wealth of important benefits. While nonproliferation of weapons and waste disposal remain serious challenges, there are no insurmountable barriers to overcoming them.

ROBERT B. FULD  
Unionville, Conn.

of. The 1979 accident at the Three Mile Island nuclear power plant, near Middletown, Pa., injured no one, but a number of people have been killed by breached hydroelectric dams.

Nuclear power can be dangerous if managed poorly, as we saw in 1986 in Chernobyl, in the former Soviet Union, but nuclear plants in the United States are safe.

ROGER WELLS  
Manhattan Beach, Calif.

### Back to Reality

Nuclear power does not create pollution and is the only viable alternative to meeting the world's energy needs. The oceans

### Safest in America

I would not be against nuclear power if fuel could be safely manufactured and disposed



can absorb only so much carbon dioxide before marine life starts to die. I live in the Tennessee River Valley where, at one time, nuclear energy supplemented hydroelectric power. Utilities in the area are now burning coal. None of the alternatives to nuclear power is pollution-free, so we must return to nuclear energy.

RONALD GREEN  
Guntersville, Ala.

### Nuclear Nonsense

I strongly oppose building new nuclear power plants. Today's nuclear power is poorly engineered and does not make economic or environmental sense. It is just another attempt by large companies to foist an unwanted product on consumers. Solar and wind power represent the best engineering solutions. As engineers we need to support solutions even when they are not popular with industry or political leaders.

BRIAN WILEY  
Saugerties, N.Y.

### No More Oil

Nuclear power is the most sensible energy solution. Many countries, including France, use nuclear energy effectively. Properly constructed nuclear power plants produce energy cleanly and emit less radioactive materials than coal-fired power plants. The United States should replace oil with nuclear power.

PETER MANDICS  
Boulder, Colo.

### Close to Home

I would support a nuclear power plant in my neighborhood if the company

### Google Blocker

Google's chief executive recently said the company will not lobby to change China's Internet censorship laws. In January, the company's management endured criticism because Google's China site blocks searches on subjects such as democracy or Tibet, topics restricted by the government. What do you think about Google's stance?

**RESPOND TO THIS QUESTION by e-mail or regular mail. Space may not permit publication of all responses, but we'll try to draw a representative sample. Suggestions for questions are welcome. Responses will appear in the September issue of The Institute and are subject to editing for brevity.**

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that owns it pays its own liability insurance. In the past, "safe" nuclear power plants have been built on the condition that the federal government would assume the corporations' liability in case of an accident.

HANS PETER CLAMANN  
Bern, Switzerland

## LETTERS

### Unequal Opportunities

I once thought it necessary to promote engineering to young people ["Program Promotes Engineering to Young People," March, p. 14], but that changed when I entered the workforce. I am a 26-year-old female telecommunications engineer from Serbia and Montenegro. I always dreamed of becoming an engineer and working for a space agency like NASA. Reality hit me after I had studied to be a radar specialist and started my first engineering job. I ended up in a world where science is no longer important and radar specialists cannot find work. In my country, you can only find a job if you have a well-known relative or if you are a political activist.

Instead, I became an information engineer, which is not my field of interest. How can we promote engineering to young people when opportunities are not equal and fair?

SUNCICA BABEL  
Belgrade, Serbia and Montenegro

### Revamping Education

In "Why Won't Jane Go to Engineering School?" [December, p. 16], Moshe Kam correctly summarizes many of the reasons women—and even men—are discouraged from entering the profession. However, I'm not sure that major changes to the engineering curriculum provide solutions. I am concerned that some recent changes undertaken by the U.S. Accreditation Board for Engineering and

Technology have weakened new engineers' capabilities, because educators are focusing on immediate skills rather than providing a strong engineering foundation. I support academic efforts that integrate engineering with other disciplines and provide training in ethics. Such changes provide students with better insights into what engineering is really about while improving opportunities for those with different learning styles.

Kam, however, did not mention the need to change the roles of engineering deans and educators. Educators should stop courting corporations and government for money but instead take a real interest in their graduates' careers, end myths about engineering shortages, and facilitate lifelong learning opportunities. Most important, educators

need to interact with practicing engineers rather than continue to isolate themselves.

I believe the atmosphere for women engineers will change when employers accept responsibility for providing positive work environments and viable long-term career opportunities for all engineers. In addition, the number of male and female engineers who serve as ambassadors and mentors for the next generation will multiply. We'll wonder why there was ever an issue.

I continue to support strengthening precollege math and science, but I no longer "recruit" students into engineering.

LeEARL BRYANT  
Richardson, Texas  
Bryant was the 2002 IEEE-USA president.

# The Challenges of A Transnational Organization

The IEEE is a transnational association with headquarters in the United States and, for many years, a growing membership outside the United States. In a variety of ways, we operate much like any multinational organization.

WE ABIDE BY BOTH U.S. laws and the laws of each nation in which we operate—currently more than 150 countries. But we also are an organization of technical professionals whose vision is to advance global prosperity by fostering technological innovation, advancing members' careers, and promoting community worldwide.

The dual character of our organization sometimes leads to situations that challenge us. Recently, a member who is a citizen of one country asked me to justify the IEEE's moral basis for operating in another nation, given its political position. Because this request was heartfelt and reasonable, and also because the topic is timely, I want to share my perspective on this topic.

As I see it, every IEEE member wears at least two hats; as members, we belong to the global technical community, and each of us also holds national citizenship. As members of the global technical commu-

nity, we recognize that technology is global because ideas have no national boundaries. We also understand technology's power to advance global prosperity. However, as citizens of nations, we often see how our political leaders can take actions to support national goals that sometimes divide the world, raise barriers, and engender distrust, if not enmity.

So, given this contradiction, how should the IEEE act? Should we restrict individuals who want to write papers in our journals or attend our conferences? Should we limit our communication to certain countries or forbid IEEE membership by national boundaries? Further, because we are a transnational organization, should we take stands on national matters?

At first, these questions might seem to have just one answer: "Of course not!" After all, because the IEEE is transnational, we recognize that communication

is the source of understanding and community. We know that technology has no limits, so we push for open communication and participation in our intellectual community. Further, we accept that national sovereignty is a basic element of our business practice.

But the other part of the answer is not as simple, because we are citizens of nations with interests reflected in the concerns of the engineering and technical professionals in each country. So, the questions become: "How should we behave individually when conflict arises between the global and the national communities, and how should the IEEE balance the national and transnational needs of its members?"

Our organization is working diligently to maintain its vision and act globally to promote community and communication. At the same time, we remain sensitive to our members' national interests, starting with our IEEE sections and regional councils, which generally align with national boundaries. We also have cooperative agreements with 64 national societies in 38 countries, and many IEEE societies have agreements with both national societies and industry associations. All these agreements recognize activities within national boundaries, while preserving our transnational character.

IEEE-USA acts as the de facto U.S. national society, because there is no other U.S. professional association covering the IEEE's fields of technical interests. As a result, IEEE-USA may, at times, resemble other U.S. professional associations with national agendas, but nonetheless it operates within the IEEE's larger scientific and educational mission for the public good.

The IEEE as a legal entity is always subject to local laws—including those

regulating its activities and employees—wherever the organization operates. For example, the Wassenaar Arrangement specifies that generally harmonized, local export control laws in some 40 nations—such as Argentina, Australia, and the United States—apply equally to the IEEE and our local members. On the other hand, other local laws may sharply differ between countries and thus pose special difficulties as we seek to operate on a uniform, transnational basis. Two examples of such difficulties include local embargo regulations and local regulations on importing technical journals. The IEEE must respond as consistently as possible—adhering to our core values and mission—while navigating local legal restrictions.

So, how should our organization act when we encounter a tough political situation? My answer is this: we must stay true to our transnational vision, work when appropriate to influence changes in laws that restrict our transnational vision, and be sensitive to national needs and interests affecting our members. Is all this simple? Hardly! This delicate balancing act constantly challenges us.

The global environment will continue to test our profession. But I believe that the IEEE will maintain our rich tradition of transnationalism and our belief in the power of communications and community.

I expect that many readers will want to express their views on this vital subject, and I welcome your comments at [lightnercolumn@ieee.org](mailto:lightnercolumn@ieee.org).



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## WIND POWER from page 1

"Around the world, companies have invested in technologies for developing wind turbines, so issues of designing them, siting them, and connecting them to the grid are no longer a concern," says IEEE Senior Member Clinton J. Andrews, chair of the IEEE New Technology Directions Committee (NTDC). Andrews also is associate professor and director of the program in urban planning and policy development at the E.J. Bloustein School of Planning and Public Policy at Rutgers University in New Brunswick, N.J.

The NTDC, active since 1991, is charged with coordinating the IEEE's efforts on public discussion and debate over the societal context and implications of new technologies such as wind power.

"These issues are worthy of industry focus. And the IEEE has a public responsibility to contribute to the broad discourse on wind power's future," Andrews says.

**FULL SPEED AHEAD** The IEEE has done several things to promote discussion on this energy source. The November/December 2005 issue of *IEEE Power & Energy* magazine focused entirely on wind-power generation.

In April the WPCC cosponsored its first symposium, in Washington, D.C., called Wind Power: Technology, Economics, and Politics, for U.S. policy-makers—"primarily congressional staffers," Piwko says. The other sponsors were IEEE-USA and four IEEE societies (Power Engineering, Power Electronics, Industry Applications, and Social Implications of Technology), plus three trade organizations (the American Wind Energy Association, the North American Electric Reliability Council, and the Utility Wind Integration Group).

At the IEEE Power Engineering Society's annual international general meeting, 18 to 22 June, in Montreal, the WPCC is chairing a panel on 21 June in which wind-power experts will address the six top technical areas needing attention by the Power Engineering Society and the IEEE. The panel will tackle industry concerns about the reliability of wind power, including how much power can be counted on during any given day, and how a power grid can best accommodate the variable nature of wind-power generation. The panel will also discuss the technical design of turbines, and collector and transmission systems, including how to model wind generation

in power-grid planning studies. It will also address economic and regulatory issues, such as how to create incentives for developers and transmission owners to build wind farms in remote areas.

**NOT JUST BLOWING AIR** Meanwhile, the NTDC is taking steps toward participating more actively in public discussion and debate over the societal context and implications of technologies beside wind power. With funds it received in February from the IEEE Board of Directors, the group launched what it calls its Discourse Initiative, which is intended to be "an exercise in technical translation, trying to make cutting-edge technologies comprehensible to nonspecialists" such as policy-makers, legislators, and interested members of the general public. It is "picking topics in which technical activity already exists in the IEEE, and of which the interested public is already aware," Andrews says.

**FOR MORE INFORMATION** on the November/December 2005 special issue of *IEEE Power & Energy* magazine devoted to wind-power generation, visit <http://www.ieee.org/organizations/pes/public/2005/nov>.

An article in the February issue of *The Institute* describing the April symposium Wind Power: Technology, Economics, and Politics is at <http://www.ieee.org/theinstitute>.

In addition to wind power, the initiative will address such issues as the recycling of electronics hardware at the end of its life, monitoring the earth for changes in the environment, and the convergence of nanotechnology, biotechnology, and information technology.

The Discourse Initiative hit the ground running. The IEEE used a video crew to film the presentations at the April wind power symposium, and it conducted in-depth interviews with the presenters off the podium, in the style of a TV documentary.

"We want to capture good footage that can be turned into various products, such as a one-minute download from a Web site, or a one-hour video for college classes," Andrews explains. "We want to contribute something of quality to the public discourse. We want to get out of our specialties and better address what's going on in the world." ●

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John Vig

was going to do and how I was going to carry out the work," Vig says. "That was one reason I stayed, because it certainly wasn't for the money. Working for the government will not get you rich, but it will give a young person a stable environment."

Like many other IEEE members, Terman wasn't particularly interested in moving up the managerial ladder; what he really wanted was to climb the technical ladder. He joined IBM straight out of college and says staying technically current was the key to his long career.

"Your technical understanding should extend beyond the specific area you are working in today so that your knowledge becomes broader and you can move into a new area," he says. "Fortunately, in the IBM Research Division one could do that, but you have to make sure you are the best you can be technically. You don't have to start with a deep knowledge of the new areas—just be aware of what is going on."

He recommends reading *IEEE Spectrum* and similar publications, which are good sources of introductory information on new areas. He also says that IEEE conferences, workshops, and tutorials are great ways to find out what is happening outside of one's field, where technologies are heading, and what changes are in store.

**INVENTORS** Terman and Vig are both inventors. Terman holds 24 patents, most of which deal with semiconductor devices, circuits, and technology. Vig's 55 patents are in the areas of frequency control and sensors.

They both say that seeing their inven-

tions working in the field brings them the most joy. "I got a lot of enjoyment out of inventing new things, getting them patented, and then seeing them used," Vig says. Terman agrees, saying that "it is really great to see your ideas coming out in products." He adds that seeing his inventions inspire the technical work of other engineers is "the best feeling."

Who inspired these two to take up physics and engineering? For Vig, it was his father. A successful businessman in Budapest, Hungary, his father survived a German concentration camp during World War II and, later, 18 months of prison under the Communist regime. The family fled during the Hungarian Revolution in 1956 and immigrated to the United States in 1957, eventually putting down roots in New York City.

"My father survived a lot of adversity. He came to the United States without much and became a successful jewelry manufacturer," Vig says. "He was a very smart man, but in Hungary there was no chance for him to further his education, so when I had the opportunity, I took it."

For Terman, it wasn't his father, Frederick Terman—the legendary Stanford University electrical engineering professor, dean of engineering, and provost—who most motivated him. It was his 12th-grade physics teacher at Palo Alto High School, in California.

"My father would have been happy with anything I studied as long as it was technical," Terman says laughing. "He never pushed me or my two brothers toward engineering."

His high school physics instructor, Henry Martin, knew how to teach physics at the appropriate level to make it an interesting subject. "Physics was just a very fascinating thing," Terman says. "Back then, they didn't talk about engineering in high school, but I knew it existed because of my father. I went to college to study physics, took a class in electrical engineering, and never looked back."

When the two candidates were asked if there is another career they might have considered, Vig didn't hesitate: orchestra conductor. "That's the most powerful job in my opinion, because you give many people pleasure, and you don't have to do any harm to anybody," he says.

Terman says that in his early years, his dream job was sports broadcasting, but today being a historian and author has more appeal. He's fascinated by mysteries set in historical times. "It's interesting how writers can take historical facts, tell a story, and give readers insight into what it was like in a particular era," Terman says.

What will these two retirees be doing

## Both candidates for president-elect say that seeing their **INVENTIONS** working in the field brings them the most joy

with their time besides campaigning for office?

Whether or not Terman ends up as president like his father, who was president in 1941 of one of the IEEE's predecessor societies, the Institute of Radio Engineers, he says he will increase his



Lewis M. Terman

volunteer work with the IEEE. He'll also travel with his wife, Barbara, as well as continue as president of Twin Lakes Water Works Corp., the water system for his community. And he'll remain involved in environmental issues in his hometown of South Salem, N.Y., and may do some consulting for IBM, with which he holds an emeritus position.

Vig says he will continue with his volunteer activities, plus stay involved with the Colts Neck, N.J., Environmental Commission, on which he has served for the past 34 years. And he'll work on polishing his dance moves with his wife, Arianna. Both are avid ballroom dancers.

He'll also continue to earn wages. Systems Planning Corp., of Arlington, Va., has hired Vig as a consultant to provide technical advice about the applications of micro- and nanotechnology, especially in sensors, to the U.S. Defense Advanced Research Projects Agency. In addition, he is joining the technical advisory board of a start-up company that is developing miniature oscillators and clocks based on MEMS technology.

"I plan to enjoy myself," Vig says. "I'm retiring from my current position, not from life." ●

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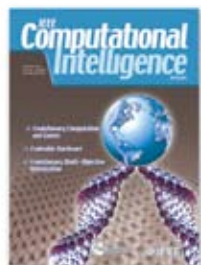
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# The IEEE Computational Intelligence Society

BY LINDSAY ELKINS

**T**O HELP YOU GET TO KNOW more about the IEEE's 39 societies, *The Institute* will feature a different society each quarter.

We'll give you a breakdown of the society's fields of interest, its publications, conferences, and awards, and its membership numbers. Here we spotlight the IEEE Computational Intelligence Society (CIS), which launched a quarterly magazine this year.



The premiere issue of the society's new quarterly magazine.

**FIELDS OF INTEREST:** Known as the society that "mimics nature for solving problems," the CIS is named for the concept that a machine can learn from experience. If the name of the society isn't familiar, perhaps

that's because until 2004 the CIS was called the IEEE Neural Networks Society. The old name covered only part of the society's areas of interest. The CIS also addresses natural computation, or computational systems that use ideas and get inspiration from natural systems, which include biological, chemical, economic, physical, and social systems. And the society deals with molecular, quantum, and ecological computation, as well as fuzzy systems.

**PUBLICATIONS:** One quarterly magazine, three monthly *Transactions*.

- *Computational Intelligence Magazine*, introduced in February, covers applications, design tools, technology reviews, computational intelligence education, and applied research. Articles also will consider how evolutionary computation is used in games and other systems.

- *IEEE Transactions on Evolutionary Computation*.

- *IEEE Transactions on Fuzzy Systems*.

- *IEEE Transactions on Neural Networks*.

**CONFERENCES:** Five sponsored or cosponsored annual conferences.

- IEEE Conference on Evolutionary Computation.

- IEEE International Conference on Fuzzy Systems.

- IEEE-International Neural Network Society International Joint Conference on Neural Networks.

- IEEE Symposium Series on Computational Intelligence.

- IEEE World Congress on Computational Intelligence.

**AWARDS:** Ten, including the IEEE Frank Rosenblatt Award, a technical field award established in 2004 that was presented this year for the first time.

The award honors Frank Rosenblatt, a founder of the field of artificial neural networks. It is presented for "outstanding contribution(s) to the advancement of the design, practice, techniques, or theory in biologically and linguistically motivated computational paradigms."

The first recipient is IEEE Fellow Lawrence J. Fogel, president of Natural Selection Inc., in La Jolla, Calif. He received the award for "extraordinary and pioneering achievements in computational intelligence and evolutionary computation."

**MEMBERSHIP:** More than 5470. Members receive discounts on conference registrations and access to the electronic versions of the society's *Transactions* through the IEEE Xplore digital library. The society also is developing online tutorials on a variety of subjects.

For IEEE student members, the society offers scholarships ranging from US \$1000 to \$4000 to help pay for research programs they conduct during summer vacation. Grants are also available to help student members pay for their travel expenses to the society's conferences.

**SOCIETY URL:** <http://www.ieee-cis.org>.

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# A Half-Century's Progress And a Look Ahead

BY IVAN BERGER

**T**HE IDEA OF ARTIFICIAL intelligence goes back millennia, at least to the ancient Greeks. But the phrase itself first surfaced 50 years ago, around the time of Dartmouth College's Summer Workshop on Artificial Intelligence, in Hanover, N.H. To celebrate the anniversary, the May/June edition of the IEEE Computer Society's *Intelligent Systems* magazine is a special issue devoted to the workshop (referred to as the first AI project), the field's development since then, and AI researchers' visions for the next 50 years.

The original proposal for the workshop (by John McCarthy of Dartmouth, Marvin L. Minsky of Harvard University, Nathaniel Rochester of IBM, and Claude Shannon of Bell Telephone Laboratories) "was awfully prescient about directions to go in, and what should be done, but didn't always guess the right ways to get there," says IEEE Affiliate Member James Hendler, *Intelligent Systems*' editor in chief and a professor of computer science at the University of Maryland, in College Park. "In some directions we have achieved far more than they expected because of the unbelievable growth in computing power."

In the 1950s, computers were the size of an office, and access was slow and limited. Now there is probably more computing power in one office than the world's biggest computers had back then.

"Still, the proposal's authors identified some of the really hard problems, like how we do so much with the relatively small computers in our heads—which remains among the main mysteries today," Hendler continues. "The surprise is not that the computer beat Kasparov, but that Kasparov can sometimes beat the computer."

In this special issue, such difficulties are discussed by Oliver Selfridge, an IEEE affiliate member who was at the Dartmouth meeting. He is often credited with creating the field of machine learning (probably now the biggest subset of AI).

But though past history and present progress will get some coverage, the issue's focus will be mainly on AI's future, Hendler says.

"For example, [Fellow] Raj Reddy, of Carnegie Mellon University [in Pittsburgh], writes on how bringing AI out into society to help the ills of the world is starting to pay back some of the support the world has given to our field," Hendler continues. "Luc Steel, a European researcher, discusses nouveau AI, approaching language understanding from a new, evolutionary perspective." These are supplemented by about a half-dozen more feature articles and a number of shorter items, including contributions on AI and its future in China, Europe, and Japan.

**LOFTY GOALS** The field of AI originally had three goals, according to Hendler:

- Getting computers to do things that humans perceive as intelligent, such as beating the world's chess champion (which happened in 1997) and having robots operate on their own (as they did in the Deep Space 1 probe and the Mars Rover).
- Modeling of humans and what they do—which gave rise to the field of cognitive science.
- Building computer systems that will be better at assisting humans. This is being done currently by every-

day applications such as search engines, grammar checkers, and tax-preparation software, all of which were projects in AI labs 15 to 20 years ago.

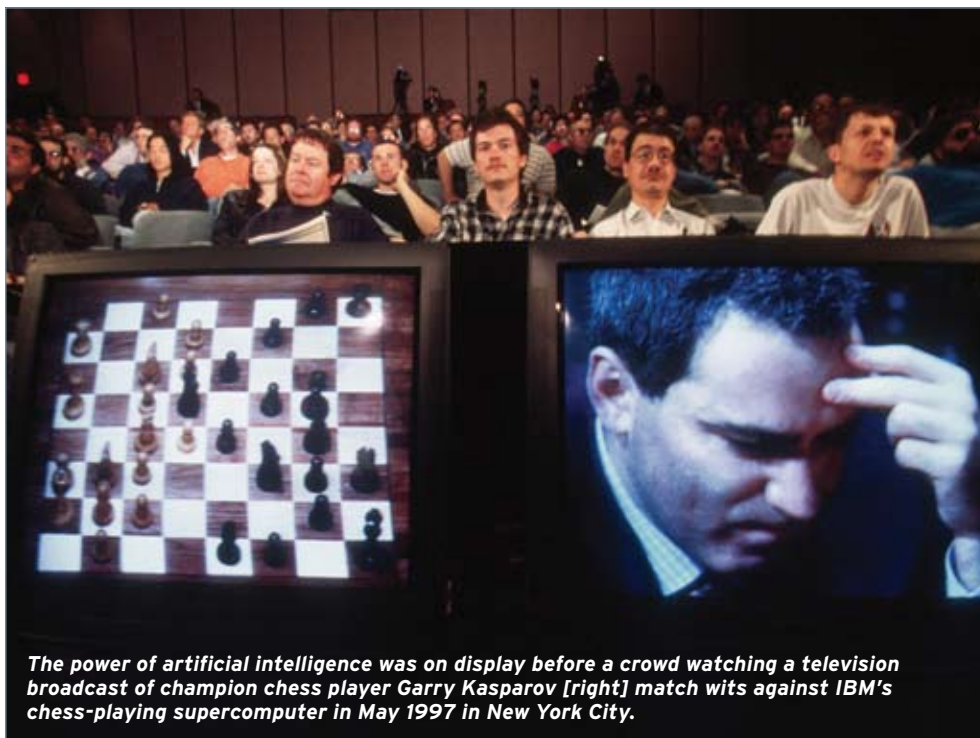
"There is still much that we have not achieved," Hendler says. "Artificial intelligence is basically the science of what intelligence is, what it means to be intelligent. And while we've obviously made progress, we need to go back and reassess the science in light of the incredible progress we've made. We seem to have devoted embarrassingly little effort to these fundamental questions."

Despite having achieved what Hendler calls "super-human capabilities" in various ways, such as in data storage and retrieval, researchers have not yet matched human capabilities in other areas, he says.

"We can fly faster than birds but not outmaneuver them with current technologies," he notes.

In their prospectus for that original Dartmouth workshop, the authors wrote: "We think that a significant advance can be made in one or more [artificial intelligence] problems if a carefully selected group of scientists works on it together for a summer." They were right—and still more significant advances came from scientists working on it together for the ensuing 50 years.

Yet there are still advances to be made and problems to be solved. Has a half-century's hindsight made the researchers writing in the May/June issue of *Intelligent Systems* as prescient as those who created the workshop 50 years ago? Time—and research—will tell. ●



The power of artificial intelligence was on display before a crowd watching a television broadcast of champion chess player Garry Kasparov [right] match wits against IBM's chess-playing supercomputer in May 1997 in New York City.

Hendler takes special pride in the issue's section on "IEEE Intelligent Systems—10 to Watch," which names the top 10 AI researchers who received their Ph.D.s in the past few years. The 10 were nominated as worth watching by top AI researchers and selected by a committee of senior members of the magazine's advisory board. The issue features papers by nine of them. An "In Memoriam" article is included for the 10th researcher, Push Singh of MIT, who died in February.

"It's about time someone recognized how good these people are, all very promising young scientists in all areas of AI," Hendler says. (For the top-10 list and additional information, see <http://www.tinyurl.com/p8fss>.)

## STUDENTS



*The IEEE Student Branch at the Pili-Dubai campus of India's Birla Institute of Technology and Science was able to boost its membership ranks with activities such as this tour in March of the central air-conditioning plant run by the M&E Division of the Emirates Trading Agency in Dubai.*

# Spirit Spikes Student Branch Membership

BY MIKE RIEZENMAN

SOME STUDENT BRANCHES have a knack for recruiting new members that is nothing short of amazing. Consider this: in 2004 there were 30 students in the IEEE student branch at Ecuador's Escuela Superior Politécnica del Litoral (ESPOL), in Guayaquil. A year later, that number had grown to 157. Meanwhile, halfway around the world, in India, membership in the student branch at the Siddhaganga Institute of Technology (SIT), in Tumkur, grew by nearly 100 members in three years. In 2003, there were 27 members; today there are about 125.

And impressive student membership increases were achieved last year at other schools around the world: Region 9 (Latin America) had a 29.3 percent increase, followed by Region 8 (Europe, Middle East, Africa) and Region 10 (Asia and Pacific), which posted gains of 14.9 percent and 14.2 percent, respectively.

How was such spectacular growth achieved? The answer seems to be enthusiasm and innovation.

Enthusiasm comes first because, as

American poet Ralph Waldo Emerson observed, nothing great was ever achieved without it. Nowhere is this more evident than at the Dubai campus of India's Birla Institute of Technology and Science, better known as BITS, in the United Arab Emirates. The IEEE Pili-Dubai Student Branch was founded in October 2004 with four members: Narayanan Aier, Prerit Goel, Mehul Jain, and Anant Oswal. Four months later, in February 2005, the branch membership rose to 200 members. How did they do it?

According to Jain, the branch's chair, the four founders started out by developing and then promoting a lecture, during which they explained the benefits of membership. They touted the free admission to branch activities (nonmembers pay a nominal fee), free access to a small collection of journals from the IEEE's digital library, and networking opportunities.

Right there they got 70 new members. With the newly expanded branch, they then formed a committee of six students and gave each of them the goal of personally recruiting 15 to 20 members. All of them exceeded their targets, recruiting

20 to 30 people apiece. And now they arrange interesting tours to technical facilities [see photo].

**IT'S ALSO FUN** A quick visit to <http://www.ieee.sit.ac.in> makes clear how the IEEE student branch at the SIT attracts members. In the branch's words, "IEEE is not just technical but it's also fun."

As chair Sanjay Prakash, a 20-year-old third-year student, explains, the branch, which is within the Bangalore Section of Region 10, conducts a lot of innovative technical demonstrations and contests to stimulate students' interest in its activities. Recent sessions have included: Genesis: A Technical Demonstration to Explain the Features and Assembling of a Desktop PC From Scratch; Seek & Destroy, a software debugging contest; and Judgment Day: Bring a Robot to Life, a seminar given by the students on the basics of building robots.

Prakash says it is the branch's emphasis on practical activities that has attracted the majority of its members. Proposed sessions for the upcoming year, gathered under the rubric "IdEEEas '06," include contests that cover technical

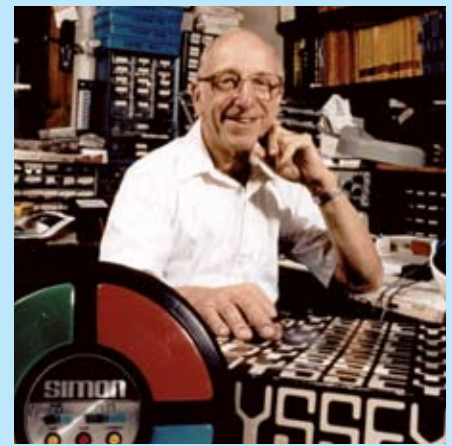
papers, gaming, programming, racing robotic cars, and designing systems.

At ESPOL in Region 9, university administrator Carlos Monsalve says that close coupling between the branch's steering committee and the school's administration is one of the main reasons for its growth. In fact, he points out, the first faculty counselor of the branch, Cristóbal Mera, was also dean of the electrical and computer engineering department. Monsalve himself currently holds those two positions; he is faculty counselor as well as dean.

Monsalve also cites a policy of involving "not only the volunteers of the current steering committee but also the people who were in charge in the past and the people who will be in charge in the near future." In addition, it doesn't hurt that, in his words, "So far, all of the people in charge of the branch have been very enthusiastic, self-motivated, and proactive. And they really, really love the IEEE and the branch." ●

**FOR MORE INFORMATION** about IEEE membership, see "2005 Membership Stats Show Mixed Picture," p. 4.

# Video Game Pioneer Plays On



Ralph H. Baer with two of his inventions, Odyssey and Simon.

BY ERICA VONDERHEID

**A**S THE CREATOR of one of the first home video games, IEEE Life Senior Member Ralph H. Baer isn't impressed with today's games and doesn't bother playing them. Sure, the graphics have improved by leaps and bounds since his early days, but *Grand Theft Auto* and *Halo* just aren't that much fun for him, he says. They're too fast, too complex, and too bloody to be enjoyed by anyone over a certain age.

He much prefers games such as those in the Magnavox Odyssey system, which he developed in 1967 and 1968. For that, and for some 40 years of creative involvement with interactive technology and video games, Baer received the U.S. National Medal of Technology, the highest honor given to innovators in the United States. President George W. Bush presented him with the award in February at a ceremony at the White House.

Back in the 1960s, the modern sense of the term "interactive" as applied to electronics hadn't yet entered the lexicon. But Baer wanted to do more with a TV set than just turn it on and stare at whatever fare the local stations presented. In September 1966, Baer wrote up his notes for a two-player, TV game system, an idea he had been pondering for 15 years. Baer calls this document the "Magna Carta of video games," and for more than two decades it was in evidence during many lawsuits, because other electronics manufacturers infringed Baer's patents. Baer won every lawsuit because his well-documented inventions form the basis of all other video games.

He started with ideas for a simple chase game played against an opponent; skill games such as checkers, chess, or dominoes; and a target-shooting game. Then Baer began building prototypes when he was between projects at his regular job as a division manager with defense contractor Sanders Associates Inc., in Nashua, N.H. His employer, however, did not initially endorse Baer's video game project. After all, Sanders was in business to develop and produce radar countermeasures for the military. But once management realized Baer's side project could eventually make the company big money, he was given a modest budget to develop the gaming technology.

**GAMES GALORE** In 1968, Baer's "Brown Box" was born. (Although the box was actually made of aluminum, it had a brown wood-grain vinyl finish.) This more-or-less final prototype featured seven games: ping-pong, handball, soccer, volleyball, target shooting, golf, and checkers. Two games, soccer and checkers, used clear plastic screen overlays with depictions of goals, field markers, and obstacles to make the game more realistic; the other games used only the images conjured up by Baer's software on the TV screen, such as the central "net" line needed for the ping-pong game.

Ping-pong, handball, soccer, and volleyball were played in much the same way: two opponents maneuvered on-screen rectangles or squares using handheld controllers to bounce a machine-controlled ball around the screen. In target shooting, the player shot at a stationary or moving target—depending on the skill level—with a light-sensitive toy rifle. When a beam of light radiating from the target spot on the TV screen met with the rifle's optical sensor as the trigger was pulled, the player scored a hit and the target disappeared.

Golfers used their own putters to tap a ball mounted on a joystick device placed on the floor. The joystick's movement controlled the ball; the player tried to roll over a target "hole." In a modified checkers game, the players tried to get to the other side of the screen first while avoiding their opponent, and they skirted obstacles represented on the plastic screen overlay.

In time, Sanders licensed the technology and the patent rights to Magnavox, then a U.S. radio and TV set manufacturer, and the Magnavox Odyssey video game system debuted in 1972. The then relatively high price of US \$100 (approximately \$475 today) for the basic system with 12 game cartridges (more games and accessories were also sold

separately) and ineffective marketing made the system a hard sell to the public, according to Baer. Nevertheless, close to 350 000 Odyssey systems were in homes by early 1975. By then, integrated circuits made production of lower-priced video games a reality.

Another innovator, Nolan Bushnell of Atari, played the Odyssey's ping-pong game at a Magnavox dealership demonstration in May 1972, and then he built an arcade version called simply *Pong*, which became hugely popular.

Surprisingly, playing the rudimentary video games of Baer's Odyssey—the forerunner of today's games where all 10 fingers fly over a controller—was really difficult. The player manipulated two knobs on a handheld device to control where the paddle was placed horizontally and vertically on the screen and used a third knob to put a spin on the ball during flight for those games that used balls. Versions of Baer's games are still popular today; you can play them on a cellphone, an iPod, or a computer.

After Odyssey was released, Baer continued to work at Sanders as an R&D engineer on military electronics and to provide technical support to video game manufacturers—such as Coleco—that licensed his technology. He also developed several generations of interactive video systems for game applications and military weapons simulation. In 1987 he retired as an engineering fellow from Sanders (now Lockheed Martin).

**GOING STRONG** Baer continued to invent, develop, and license video games. He helped develop *Simon*, a single-chip, microprocessor-controlled handheld memory game; it first appeared in 1978 and is still in production. Baer also designed a robotic teddy bear that interacts with a videotape played on a TV set. Speaking of innovations, he developed a line of products such as picture frames, greeting cards, doormats, and children's books that record and play back voices. In 2004 he put his perspective on the history of early video games in his book, *Videogames: In the Beginning* (Rolenta Press).

Although Baer has brought teenagers many hours of fun-filled video gaming, his own early years were traumatic. As a teenager, Baer and his family fled Cologne, Germany, in 1938, and arrived in New York City just months before World War II began. In 1939, he enrolled in the National Radio Institute, a correspondence school, after reading an ad in the back of a magazine promising "big money" as a radio serviceman. He then worked for three years fixing TV sets and radios in cars, homes, and businesses before being drafted into the U.S. Army in 1943. Baer served in an intelligence unit and became an expert in foreign small arms.

After the war, he earned a bachelor's degree in television engineering from the American Television Institute of Technology, in Chicago, in 1948. Baer then worked for a few electronics firms and started a defense electronics company in New York City before joining Sanders in 1958.

Now, at age 84, Baer still works on his ideas in his basement laboratory, in Manchester, N.H. He describes himself as a "walking idea-and-product-development machine."

"If I have a problem, I find a way to fix it," he says. In fact, Baer regularly files applications for patents; his most recent application is for a system that sounds an alarm if he leaves the house without his keys or forgets to take his laptop out of his car.

"The only regret I'll have when I die is that I won't see what innovations are coming next. Things are going to be utterly fantastic," he says. "We are on the steep slope of the exponential innovation curve, and dramatic advances in technology will happen at a breathtaking rate."

**FOR MORE** about Baer and to read a sample chapter from his book, *Videogames: In the Beginning*, visit <http://www.ralphbaer.com>.

# Edison Museum to Rise Anew

BY ERICA VONDERHEID

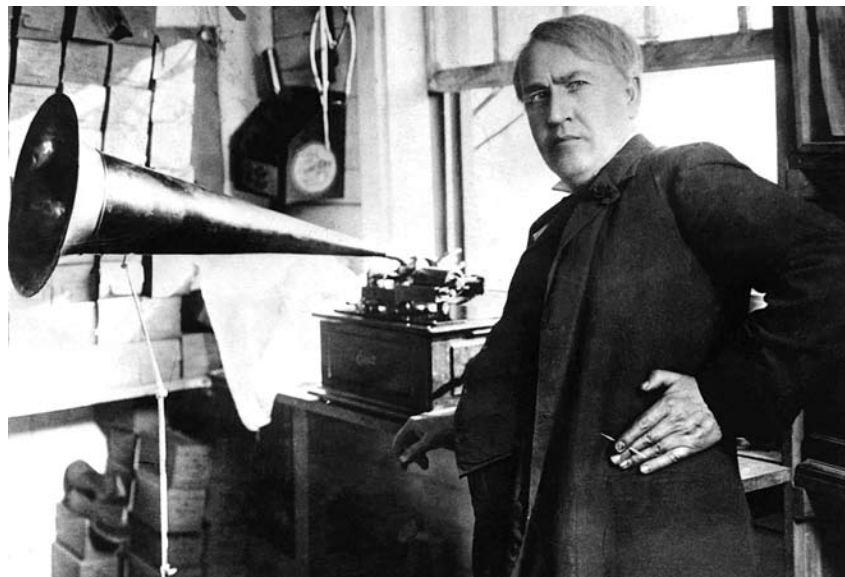
**D**EDICATED IEEE volunteers are working to raise US \$5 million to construct a new Menlo Park Museum building, refurbish a decaying tower, and bring the historic site the recognition they say it deserves. Their aim is to shine another light on the work of one of engineering's most prolific inventors: Thomas Alva Edison.

The new building is to replace the 65-year-old structure on Christie Street in Edison, N.J. With its Thomas Alva Edison Memorial Tower, the museum is located in a suburban area filled with tidy single-family homes.

Here Edison established what is considered to have been the world's first organized research laboratory. From 1876 to 1884, he applied for and received more than 400 patents on inventions such as the phonograph, a practical incandescent lightbulb, and an electric power distribution system. Also in the Menlo Park lab he discovered that an extra filament placed in a lightbulb absorbs electrons emitted by a filament connected to an external circuit. This phenomenon—later dubbed the Edison Effect—paved the way for vacuum tube technology and the entire field of electronics.

Unfortunately, as a result of age, neglect, and bad luck, none of the Edison-era buildings stand today. The inventor and his staff left in 1884 following the death of Edison's first wife, and the lab's nine wooden structures fell into disrepair. The main laboratory was used as a chicken coop for a time, and by 1925 the buildings had either burned to the ground or collapsed. In 1937, six years after Edison's death, a group of former Edison employees, called the Edison Pioneers, built a 40-meter memorial tower topped with a glass sphere resembling an incandescent lightbulb on the exact location of the original laboratory. The art deco-style structure is a U.S. National Historic Landmark and was intended to be a permanent monument, but the concrete edifice is now crumbling and in need of repair.

In 1941, a two-room, 74-square-meter cinder-block building was built on the Christie Street site to house Edison memorabilia. Some of the artifacts were gifts from private collectors, others are on loan from the state of New Jersey, and



While in Menlo Park, Thomas Alva Edison patented more than 400 inventions, including the phonograph, pictured with him in 1877.

the museum purchased a few from collectors. The museum houses 20 working Edison phonographs and displays a scale model of the original laboratory, old photographs, and an original bamboo filament lightbulb. The museum also has a hand-cranked Edison phonograph that can record sound on ordinary aluminum foil and then play it back.

Every year about 1500 visitors from around the world, including dozens of school groups, come through the museum, which is open five days a week, according to IEEE Life Member John Zemkoski, who is a museum trustee. (Of the museum's 12 trustees, two are IEEE members.)

The \$5 million being raised will pay for construction of a new, two-story museum to replace the old building by the end of 2008. Fortunately, the trustees don't have to start from scratch. The site is already a state park and a historical landmark, and the New Jersey legislature has set aside \$650 000 for restoration. This will help pay for an archeological survey of the site, a preservation plan, and an architectural design to be completed later this year.

Funds were also raised by the U.S. Mint, through sales of a commemorative coin issued in 2004 to celebrate the 125th anniversary of Edison's incandescent lightbulb. That year, the mint allocated \$377 000 to the museum, on the condition that the trustees come up with matching funds from private sources by this December. As of April, the trustees had raised only \$8000 and received a

pledge of \$25 000 in matching funds, but the group hopes that contributions from corporations and individuals, including IEEE members, will increase once the building design is completed.

The trustees also plan to request funds from the IEEE Foundation and the IEEE Life Members Fund. First, however, the trustees must make the case that the museum's exhibits and educational programs for school groups are in line with the foundation's goal of preserving the history of electrotechnology and fostering careers in electrical engineering.

**NOT ALONE** The Menlo Park museum isn't the only one dedicated to the inventor. Another museum sits on the site of Edison's research and manufacturing operation in West Orange, N.J., where he moved in 1886 and worked for the next 44 years. Edison did more marketing than inventing in the West Orange facility, which was much larger than the lab in Menlo Park. But in West Orange he perfected many of the ideas conceived in Menlo Park, according to Jack Stanley, curator of the Menlo Park Museum.

Over the years, other museums have popped up around the country. For example, American industrialist Henry Ford—a great Edison admirer—built a museum in Dearborn, Mich., in the 1920s to display replicas of Edison's inventions and items salvaged from Menlo Park. Similar museums operate at Edison's birthplace in Milan, Ohio; his homes in Fort Myers, Fla., and Louis-

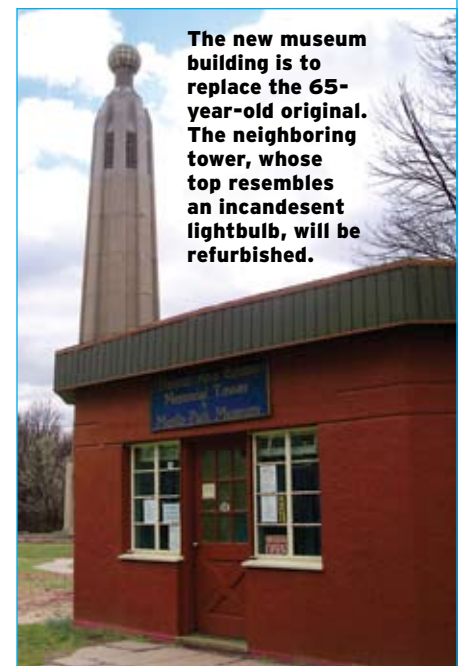
ville, Ky.; Port Huron, Mich.; and still other locations.

Supporters of the museum in Menlo Park say the site is significant because Edison conceived his greatest inventions there. And after all, they point out, Edison is known as "the Wizard of Menlo Park." Today, Menlo Park is a neighborhood within Edison Township in New Jersey, formerly known as Raritan Township and renamed Edison in 1954 to honor the great inventor.

The volunteers are working to build a more appropriate tribute to Edison on the site associated with his name, and restore the tower. Zemkoski, who lives across the street from the tower, is also working with the IEEE History Center and the IEEE Princeton/Central Jersey Section to dedicate an IEEE Milestone in Electrical and Computer Engineering at the site by the end of this year to honor the many inventions that originated there.

"This is where it all happened," says curator Stanley, gesturing to the area around the small building on a wooded lot on Christie Street. "This location was an atlas of invention, and the world has never been the same since." ●

**FOR MORE INFORMATION** on the museum, go to <http://www.menloparkmuseum.com>. To learn more about Edison, visit the IEEE Virtual Museum's exhibit, Thomas Edison: A Lifetime of Invention, at <http://www.ieee-virtual-museum.org>.



The new museum building is to replace the 65-year-old original. The neighboring tower, whose top resembles an incandescent lightbulb, will be refurbished.

# Ethics Is Serious Business

BY WILLIE D. JONES

**I**N THE WAKE of the well-publicized scandals at Enron, WorldCom, and Tyco, many companies are now recommitting themselves to educating their employees about acceptable business practices.

That awareness is evident in the ethics programs of organizations that employ large numbers of engineers, such as the U.S. Department of Energy's Sandia National Laboratories, in Albuquerque, N.M., and Tata Sons Ltd., the Indian conglomerate based in Mumbai. Although quite far apart geographically and organizationally, both are exemplars of programs that raise employees' awareness of ethics. Sandia and Tata have been emphasizing ethics for many years and have successfully woven the concepts into their day-to-day business.

IEEE Senior Member John Stichman, a chief engineer and deputy labs director at Sandia, says that within his organization, he has noticed "a renewed awareness and sophistication of thinking about the ethical dimension of all that we do."

One reason might be that new employees at Sandia—the United States' main nuclear weapons research facility—receive training about ethics on their very first day on the job. They attend a 75-minute presentation that provides a perspective on ethics in engineering and the ethical imperatives that engineers face.

But the training doesn't end there. Once a year, every Sandia employee must attend an hour of ethics training that zeros in on actual ethical dilemmas that could cause them to run afoul of the company's written code of ethics. Discussion involves such subjects as being asked to falsify time cards, accepting—or not accepting—inappropriate gifts and gratuities, dealing with violence in the workplace, and situations that could lead to charges of sexual harassment.

"Each person is led through the training by his or her manager, so from the laboratory director on down, each of us is trained by our boss," Stichman says. Also, it becomes clear to all employees that the call to ethical behavior permeates the laboratory. Sandia has even set up its own ethics organization to which employees can go if they have concerns about unethical behavior.

"Employees can discuss issues that might have an ethical dimension or that might deal with inappropriate relationships among people," Stichman says.

Stichman has become somewhat of an expert on ethics himself. He regularly presents a talk titled "An Ethical Imperative for Engineers" at meetings, including the IEEE Student Professional Awareness Conferences and various IEEE section and chapter meetings.

**FROM THE TOP DOWN** At Tata, ethics training starts with the senior management, according to IEEE Member Anthony Lobo, a senior manager for human resources at the conglomerate's Consultancy Services in Mumbai.

The top-ranking executive at each of the 93 companies

under the Tata umbrella is designated as its principal ethics officer. Each subsidiary also has a specially trained staff member who acts as an ethics counselor. This person is in the front line of dealing with ethical dilemmas brought to him or her by employees.

Assisting the counselors is a team of on-site personnel who help ensure that each employee reads and understands the company's code of ethics. The code states that "every employee shall deal on behalf of the company with professionalism, honesty, and integrity." The document also explicitly outlines

what is and isn't acceptable regarding financial reporting, employment practices, gifts and donations, political activity, and conflicts of interest. Serious breaches can warrant penalties, including termination.

Tata also regularly organizes ethics training and awareness sessions.

"In my own subsidiary," Lobo says, "we have an excellent online awareness program in the form of screen savers that pose simple business dilemmas, plus posters that can be downloaded."

Other subsidiaries rely on simple skits performed by employees that act out ethical dilemmas to bring home the message of correct behavior.

Lobo notes that, most important, the company follows the Malcolm Baldrige Quality System for business excellence, a U.S. government-created effort aimed at improving productivity that includes ethics among its criteria for doing business. Each Tata subsidiary is scored on how well it weaves ethics into its organization.

**CODE OF ETHICS** While Sandia and Tata have gotten a fix on what their ethical standards should encompass, many companies are still struggling with theirs, according to IEEE Life Fellow Ted Bickart, who is the chair of the IEEE

## HONORING THE HONORABLE

**TO SUPPORT MEMBERS** who act to uphold the IEEE Code of Ethics, the institute's Ethics and Member Conduct Committee has created the IEEE Award for Distinguished Ethical Practices. To be given for the first time in 2007, the award will recognize exemplary ethical behavior or persuasive advocacy or promotion of ethical behavior or practices exhibited by an IEEE member or by an organization employing IEEE members.

The deadline for the IEEE to receive nominations is 1 July. All IEEE members are eligible for the award except members of the Board of Directors, the Awards Board, and the Ethics and Member Conduct Committee. Any member of the institute or IEEE staff can nominate or support a candidate for the award. Self-nominations are not permitted.

"We want to celebrate IEEE members [or companies employing IEEE members] who are exemplars of ethical behavior or who encouraged ethical behavior in others," says IEEE Life Fellow Ted Bickart, who championed the creation of the award. "We're not just trying to celebrate whistleblowers but to promote good ethics."

To further publicize the award and spread the word about other EMCC activities, Bickart says members of the committee will attend half a dozen regional meetings each year, where they will deliver the message of ethical behavior to representatives of regional groups and local sections.

For nomination forms, visit <http://www.ieee.org/ethics> or contact the IEEE Ethics and Member Conduct Committee, 445 Hoes Lane, Piscataway, NJ 08854 USA; tel: +1 732 562 6898; e-mail: [ethics@ieee.org](mailto:ethics@ieee.org).

Ethics and Member Conduct Committee. One thing he recommends is that organizations write a code of ethics and distribute it to their employees.

Bickart says such codes should be as broad as possible but not be as thick as possible. He points to the IEEE's code as a good example. The 10-point code can fit on one typewritten page.

"The IEEE has one of the slimmest codes of ethics of any of the professional groups I've looked at," says Bickart. "As a transnational organization crossing many community, cultural, ethnic, and geopolitical boundaries, the IEEE code has to start from common ground if we're going to have people adhere to it across our entire membership."

**FOR MORE INFORMATION** To view a copy of the IEEE Code of Ethics, visit <http://www.ieee.org/ethics>.



# Nominations Sought for Technical Field Awards

**IEEE SECTIONS, SOCIETIES,** and members are invited by the IEEE Awards Board to submit nominations for the 2008 IEEE Technical Field Awards. The deadline for the board to receive nominations is 31 January 2007.



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For outstanding contributions to electric transmission and distribution.  
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For outstanding contributions in the field of consumer electronics technology.  
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For exceptional contributions to the advancement of Internet technology for network architecture, mobility, and/or end-use applications.  
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# RETURN OF THE MENTOR

BY MIKE RIEZENMAN

**Y**OU'RE A YOUNG ENGINEER working in a modern, fast-paced engineering firm and you have questions about your career—how to advance, what projects to take on, whether to take more classes, and so on. What do you do? You could ask your boss for suggestions, but that might be seen as evidence of being dissatisfied, even of considering another job. What you need is disinterested, unbiased advice from a more experienced person who has been in a similar position. In other words, you need a mentor.

Trouble is, in today's world of engineering, mentoring is largely a lost art. As recently as 20 years ago, companies often trained new engineers by assigning them (either formally or informally) to more experienced colleagues for guidance. But sometime in the late 1970s and through the 1980s, the ranks of middle managers who made up the bulk of the mentors were drastically depleted in many industries. As a result, according to Bill Ratcliff, director-elect of Region 3 (southeastern United States) for 2006 and 2007, "mentoring networks got broken and have never since been repaired." That's the bad news.

The good news, Ratcliff says, is that mentoring techniques can be taught, even though in the old days they were most often simply passed along informally from mentor to protégé. The even better news is that the IEEE is now experimenting with two initiatives for rebuilding mentoring networks—and that preliminary results look promising.

**DEVELOPING LEADERS** The older of the two initiatives was started in Region 3 as part of the region's Leadership by Developing Others program, which seeks to create leaders within the IEEE. LDO includes training that encompasses such skills as team building, conflict resolution, project management, and interpersonal communications—all key elements of true leadership.

About two years ago, according to Charles Lord, the region's leadership devel-

opment chair, the Region 3 leadership realized that it would be beneficial to add mentoring to the mix of tools used to turn IEEE volunteers into IEEE leaders. So a pilot project was started to do just that. The first task was to determine what skills were needed to be an effective mentor. Then a



beginning course was developed, which Lord uses to teach those skills. Training sessions can take anywhere from 90 minutes to most of a day.

The mentoring project began at the regional level, where the leadership helped pair up mentors and "mentees," as protégés in the program are called. "After the success of that pilot project, we started approaching this at the area and council levels," Lord says. More recently the Region 3 leadership has started to take the training to the section level.

Sessions are supplemented by two textbooks on mentoring, both by Gordon Shea. *Mentoring*, naturally enough, is aimed at mentors; the other, *Making the Most of Being Mentored: How to Grow From a Mentoring Partnership*, is, as its name implies, for mentees.

So far, Lord tells *The Institute*, feedback from everyone has been positive. As the program expands down to the section level, however, its instruction-intensive nature may limit its growth. "Like any other soft skill, mentoring tends to be

a lab course rather than something you can get from a textbook or a lecture," he says. "It takes person-to-person, hands-on training to truly learn the skills."

Lord hopes that as the benefits of mentoring become increasingly apparent to more members, the concept will spread from the ground up without the need for special training by the regional leadership. Most questions he gets from participants in the program relate to taking the skills they've learned back to the workplace, so the motivation needed for grassroots propagation appears to be there.

And no wonder. As New York psychologist Jeffrey Rudolph explains, mentoring is beneficial not only to the mentee, but also to the mentor, since it helps satisfy a basic human desire to pass on the fruits of experience and help others.

Mentoring is valuable, he says, not so much for passing on specific technical knowledge, but for teaching approaches to problem solving, which are hard—if not impossible—to get from a textbook.

**SELF-HELP PROGRAM** In an effort to come up with a less labor-intensive way to sow and reap the benefits of mentoring, in May 2005 the IEEE Mentoring Program Pilot in Region 1 (northeastern United States) was rolled out. Unlike Region 3's program, this one is not aimed at developing leaders but is intended to help members—especially young professionals—manage their own careers. It aims to help them with such issues as handling meeting dynamics, setting up agendas, juggling priorities, working well with other people, and setting realistic expectations at various stages in their careers. It also helps them find mentors on their own.

The mentoring pilot is set up so that mentees do most of the work in selecting their mentors using a Web-based software program. Potential mentors

answer questions about their location, job title, IEEE member grade, technical competencies, management skills, and more. Would-be mentees fill out applications and profile forms about themselves and then select a mentor based on such criteria as geographic location, familiarity with a specific industry, and position within an organization. The first contact is then made via e-mail.

Basic training is delivered via an Internet conference by a trainer to both mentors and mentees, explaining their roles and responsibilities. In addition, a Web-based resource called *The Library*, which includes a mentoring guidebook, is also available to mentors and mentees.

The pilot program does not require face-to-face meetings. Communication is generally by phone and supplemented by e-mail. If both mentor and mentee have access, videoconferencing can be used. The program can easily cross geographic boundaries and has, in fact, been extended to members within Region 2 (eastern United States) and Region 3. At present, there are about 30 mentoring partnerships in the program, and initial feedback indicates that they are working well.

George Dobbins, an engineer at an electric utility in the Atlanta area, for example, is very happy with his mentor, Linda Wilbanks, chief information officer at the National Nuclear Security Administration, in Washington, D.C. He chose her in 2005 specifically because she is *not* in his industry and because she spent 20 years as a teacher. What Dobbins values most about the relationship is his mentor's knowledge of and perspective on the world, which are different from his.

For her part, Wilbanks is a strong believer in mentoring: she participates not only in the IEEE program but also in a similar arrangement at her organization. "Anytime you have a mentoring program, you have a good program," she says. Her mentoring style is not so much to give advice as to offer insights based on her experience.

The one-year evaluation surveys for the pilot program are to be conducted in the third quarter of this year. The next step is to roll out the program to higher-grade IEEE members. ●

**FOR MORE INFORMATION** about mentoring or to share your experiences, consider joining the new IEEE mentoring online community at <https://www.ieee.comunities.org/ieee.mentoring>.

Those living in Regions 1, 2, or 3 who may be interested in being part of the pilot program should visit <http://www.ieee.org/organizations/rab/gold/mentoring.html>.

# The IEEE Foundation's Top Donors

**C**ONTRIBUTIONS TO THE IEEE Foundation totaled more than US \$1 million in 2005. The money helps the foundation promote its goals of fostering technological literacy and an understanding of how technology is created, as well as how technology affects society, individuals, and the environment.

Space constraints prevent listing all donors, but here are the names of those in the Leadership Association—who gave \$1000 or more.

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## MAKING A DIFFERENCE

Donors to the IEEE Foundation have a variety of reasons for giving, as do three members of the foundation's Leadership Association, who told us why they give.



**IEEE MEMBER SARAH FISCHELL** contributes to the foundation's General Fund because it supports pre-university engineering education.

"I'm impressed that the IEEE Foundation supports students' participating in science fairs, such as the Intel International Science and Engineering Fair, and provides scholarships such as the IEEE Presidents' Scholarship," she says. She also likes the grant-giving programs that recognize worthy projects being

done by students and schools. However, Fischell adds that much more can be done to deliver exciting programs in math, science, and technology education to preuniversity schools.

"We need to give all students an opportunity to see whether a science or engineering career is right for them. Even if they aren't going to pursue it, we don't want students to fear technology and science," she says.

### FELLOW RICHARD V. "DICK" SNYDER

has learned many lessons in microwave engineering from his friend, Kiyo Tomiyasu, who was president of the IEEE Microwave Theory and Techniques Society in 1960 and 1961. But one lesson stands out: the importance of supporting students studying microwave engineering to ensure a continuous flow of competent engineers. For some students, however, finding the funds for college is not always easy. So when the Microwave Education Fund, administered by the foundation, was established to grant scholarships and fellowships to deserving students studying microwave engineering, Snyder found the perfect cause to support.



### LIFE FELLOW ROBERT M. WALP

says the IEEE's emphasis on bringing technological literacy to the general public can be the bellwether for increasing interest in engineering throughout society. Because members of the institute can help make a difference, he contributes to the foundation's General Fund.

"IEEE members can help develop, review, and select educational materials that are correct, clear, and concise," Walp says. The former member of the Alaska State Board of Education says he believes that both learning and understanding develop when students' curiosity and interests are stimulated by solid teaching and proper instructional materials, and "not when showmanship and hype are used to make unexplained facts appear fascinating."



**FOR MORE INFORMATION** about the IEEE Foundation, visit <http://www.ieeefoundation.org>. For more information on charitable contributions, contact the IEEE Development Office at +1 732 562 3915 or [supportieee@ieee.org](mailto:supportieee@ieee.org).



# Reaching Out to Industry

BY ERICA VONDERHEID

**L**AST YEAR VOLUNTEERS at the IEEE Saudi Arabia Section saw average attendance at their meetings soar to 130, from 50 in 2002. The great change came after volunteers appointed two industry relations officers to promote the benefits of the IEEE to local companies.

According to one of the officers, Senior Member Rami al-Mushcab, he and Member Sameer al-Hussain visited 10 companies around Saudi Arabia to tout the benefits of the IEEE, invited engineers from industry to lecture at section events, and asked the companies to sponsor dinner meetings at which a technical topic of interest to the company would be discussed.

The section is not the only one to reach out to nearby companies. Other sections, regions, and student branches have been championing the IEEE cause as well.

It's a two-way street. The IEEE aims to attract new members and hopes that companies will look favorably upon their employees who attend IEEE conferences and workshops, as well as the institute's business meetings. Looking favorably on the IEEE could mean giving employees time off to attend the meetings and even paying travel expenses. In this quid pro quo, companies get a more sophisticated workforce. Not only do IEEE members have access to the latest technical information from IEEE publications and workshops, but they can also become better managers as they take on organizational tasks as institute volunteers.

"The employer has to see that the employee is gaining valuable skills and, in turn, the company is benefiting," says William Walsh, an IEEE senior member and former industry relations chair in Region 2 (eastern United States). "It's up to us to demonstrate the value of the IEEE."

A really good IEEE-company relationship could mean that the organization makes its conference rooms available for section meetings—and encourages its employees to join. In time, volunteers hope that companies may see enough value in IEEE membership to pay their employees' dues. For example, Walsh's company, BCI Inc., in Moorestown, N.J., pays its employees' membership dues and gives them time off to attend meetings for their IEEE volunteer activities. And



the IEEE Southern New

Jersey Section—Walsh's group—often holds executive committee meetings at the U.S. Federal Aviation Administration's William J. Hughes Technical Center, near Atlantic City. Many other companies, such as Pacific Gas and Electric Co., in San Francisco, and Alcatel Bell Telephone, in Antwerp, Belgium, host section meetings on their premises.

**WHOM DO YOU KNOW?** The first step to building a relationship with industry is to make a list of target companies in your area. Section members can help, of course, because they work at these businesses or have friends who do.

The next step is to identify the right person at the company to speak to about the IEEE. Ideally, this person should be able to make decisions about the use of company facilities for meetings and give employees time off to attend IEEE meetings. Often this is the engineering manager or chief technical officer, according to Senior Member Rolf Remshardt, former member of the Region 8 industry relations committee. Region 8 covers Europe, the Middle East, and Africa. Section members who work at the company can provide the manager's name and phone number. If no section members work at the company, the human resources department can supply this information. Then a member should call this manager—Remshardt says e-mail and letters are usually not effective—to set up a meeting to explain what the IEEE

can do for the organization.

The member should emphasize that employees who are IEEE members have access to leading technical information, and they can take advantage of additional training through the IEEE's continuing education programs. In addition, the IEEE section can offer to organize lectures or workshops on topics based on the technology the company is involved in.

**REGION INVOLVEMENT** Volunteers from Region 8 took a wide view and asked all its sections to appoint an industry relations officer. So far, 23 out of 50 sections have done so. The officers are charged with meeting with engineering managers at local companies to champion the IEEE. To kick-start these efforts, the region provides section officers with a yearly workshop on making contacts with companies, as well as a guidebook with tips for sustaining those contacts. The guide includes a sample letter inviting companies to send their employees to an IEEE conference and letters of appreciation to send to generous corporations. The guide also has a list of questions that industry relations officers can ask company representatives.

Region 8 created an e-mail alias and online community for its industry relations officers, who are scattered across three continents, to share what approaches worked and what did not. For example, from the online community's dos and don'ts, offi-

cers from the IEEE Saudi Arabia Section learned they could reach more engineers when they held technical sessions during conferences targeted to local industries' needs, according to al-Mushcab. Volunteers in Norway shared how they increased cooperation with local industries by holding planning sessions for workshops with company representatives.

**SCIENCE PARK SUMMIT** Student branches also are getting in on the industry relations game. Volunteers from approximately 30 student branches in Turkey recently established a program with a goal similar to that of Region 8: improve collaboration between industry and the IEEE. A student committee is meeting with company representatives, hosting workshops targeted at company interests, and organizing tours to nearby technical facilities.

The students are off to a good start, according to Student Member Ferhan Ozkan, a senior studying electrical engineering at Middle East Technical University, in Ankara, and chair of the region's student branch industry relations committee. In 2005, students from METU and Eastern Mediterranean University, in Mersin, organized Turkey's first summit for science parks. The summit brought together representatives from the science parks—which host labs, research centers, and businesses connected with universities—to meet with their colleagues and hear lectures given by experts on technical topics. Students got the chance to network with representatives from all the organizations.

Certainly, a strong relationship with companies won't boost membership in student branches, but it will introduce students to companies they might work for some day, as well as teach budding engineers organizational skills. So far, the project has not reached beyond Turkey, but committee members hope to expand it to other countries. A workshop on how student branches can get involved in industry relations is being organized at the Region 8 Student Branch Congress, to be held 31 August to 3 September in Paris.

And there is an added benefit when students get to know local companies: finding a job once they graduate can be a lot easier, says Ozkan.

**FOR MORE INFORMATION** about the Region 8 student branch industry relations project, visit <http://www.turkieee.org>.

## MEMBER RECOGNITION

# Meldrum Appointed Dean of Arizona State's Engineering School

BY NANCY SALIM

IEEE FELLOW DEIRDRE MELDRUM doesn't think engineering should be an isolated discipline. As the new dean of the Ira A. Fulton School of Engineering at Arizona State University in Tempe, she plans to integrate engineering with space exploration, environmental sciences, and genomics.

"It is an exciting time to be at ASU," Meldrum says. "This position offers a challenge and an opportunity to contribute to the mission of ASU: providing outstanding programs in instruction, research, and creative activity."

Meldrum, who was appointed in February, is scheduled to take over as dean in January. She'll be leaving her post as professor of electrical engineering at the University of Washington, in Seattle.

Meldrum says she wasn't actively looking for a new job, but she was intrigued by the position when she learned of ASU President Michael Crow's vision for a "new American university." According to Meldrum, his idea is to introduce educational innovations that will turn out creative students able to work across disciplines, contribute to society, and compete in the global economy.

As dean, Meldrum plans to carry his concept forward by increasing the number of research projects and integrating engineering programs with ASU's School of Earth and Space Exploration, its Global Institute of Sustainability, and its Biodesign Institute. She says she will encourage engineering students to take classes in business and the arts.

Meldrum has also been appointed director of a new center within the university's Biodesign Institute. The center focuses



Deirdre Meldrum

on ecogenomics, the science of applying genome technologies to aquatic environments to discover what types of microbes live there in order to study how they respond to environmental change. The center hopes this research will lead to applications that can be used in the medical field.

Meldrum comes to her new appoint-

ments well prepared. In 2001 she helped establish the University of Washington's Microscale Life Sciences Center—a National Institutes of Health Center of Excellence in Genomic Science. The center is researching cell proliferation and cell death as they relate to health problems such as cancer and heart disease. As the center's principal investigator and codirector, Meldrum has played a key role in developing new tools that measure multiple parameters in living cells to correlate cellular events with genomic information, such as gene expression and genomic rearrangements.

Meldrum earned a bachelor's degree in civil engineering from the University of Washington, a master's in electrical engineering from Rensselaer Polytechnic Institute, in Troy, N.Y., and a doctorate in electrical engineering from Stanford University, in California. ●

## IN MEMORIAM

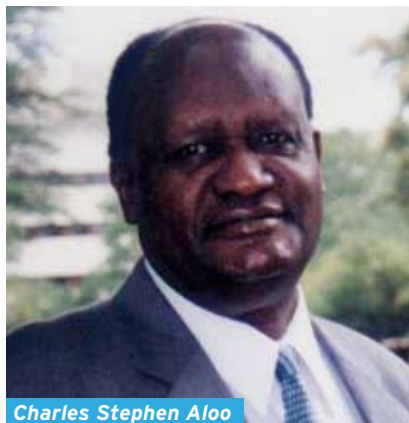
# Charles Stephen Aloo Kenyan Educator, Leading Communications Engineer

BY BRUCE OWALO, JOE ODERO & CHARLES K. NGETHE

CHARLES STEPHEN ALOO WAS a dedicated father, friend, and engineer. His vast experience in the communications industry spanned nearly 40 years.

An IEEE member, Charles grew up in Nyawara Village, North Gem, Siaya District, in western Kenya. Not only was he a brilliant student, he was also a good actor who landed leading roles in school plays. He once played the character of Cinna, a poet, in Shakespeare's *Julius Caesar*. The performance was so well done that it earned him the nickname "Cinna the Poet."

He was offered a job as an assistant teacher right out of high school, and he taught mathematics and physics at Maranda Secondary School, in Kenya's Bondo District. Charles took his work seriously, and many of his students went on to have great careers. He left the school for the University of East Africa, in Nairobi, where he earned a bachelor's degree in electronic engineering. Charles was a kind and sociable person who was always happy to help fellow students solve intricate mathematical problems.



Charles Stephen Aloo

He received a scholarship to continue his studies and attended Philips International Institute of Technological Studies, in Eindhoven, the Netherlands, where he earned a master's degree in electrical and computer engineering. Charles returned to Kenya, and in 1969 he joined the University of Nairobi as an assistant lecturer in the department of electrical engineering. He left the university two years later to become the chief training officer at EAP&T Corp., the country's leading telecommunications company. His responsibilities included developing hands-on training programs for the company's engineers in a variety of subjects.

In 1977 he became principal of the company's Central Training School, which today is called the Kenya College of Communications Technology. Three years later, he became assistant head of corporate planning research and development, and he later served as the assistant head of telecommunication services.

Charles joined Kenya Broadcasting Corp., the country's leading broadcaster, in 1988, as manager of technical services. He was responsible for engineering and technical functions. A year later he left to become the chief executive of Electrocom System Services, a Nairobi company that specializes in supplying, installing, and maintaining telecommunications equipment. He oversaw a number of projects involving broadcasting and civil aviation.

From 1998 until his death, Charles was the director of the Communication Commission of Kenya, which is the independent regulatory authority for the country's communications industry. He also was a director of Sheer Logic Management Consultants Ltd., in Nairobi, which provides consultancy services to the telecommunications industry.

Charles remained interested in education, serving as chair of the board of governors of the girls high school in his

**CHARLES STEPHEN ALOO 66**

**DIED** 17 February 2006

**MEMBER GRADE** Member

**EDUCATION** Bachelor's degree in electronic engineering from the University of East Africa, Nairobi, Kenya, 1967; master's degree in electrical and computer engineering from Philips International Institute of Technological Studies, Eindhoven, the Netherlands, 1969

**FIELD OF INTEREST** Communications

**VOLUNTEER ACTIVITIES** Chair of the Board of Governors of Nyawara Girls Secondary School, Nyanza Province, Kenya; chair of the Central Gem Development Society

hometown of Nyawara. He also was chair of the Central Gem Development Society, which works on Kenya's economic development issues.

Charles was well read and he traveled widely to satisfy his voracious appetite for knowledge. He was a very principled person who espoused honesty and integrity.

*Bruce Owalo was Aloo's business partner, Joe Odero is a longtime friend, and Charles K. Ngethe is a former student.* ●