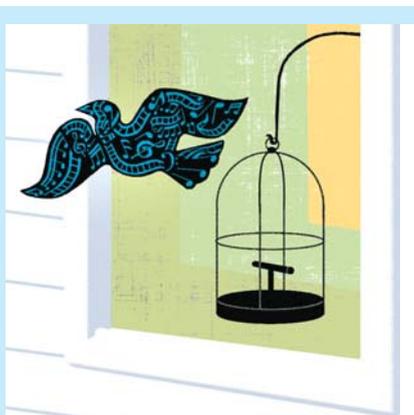




The Institute

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

DECEMBER 2004 VOL. 28, NO. 4



IEEE Urges Changes to Online Piracy Bill

BY TRUDY E. BELL

DOWNLOADING A SONG or a video over the Internet may seem inconsequential to the person doing the copying, but over the years the costs of such copyright infringement have added up to a staggering sum—US\$19 billion worth of purloined work, according to U.S. entertainment industry groups. Up to 97 percent of music, movies, and games on the Internet are illegally traded via peer-to-peer (P2P) file-sharing services, estimates the Recording Industry Association of America (RIAA). And the RIAA and other entertainment groups have been complaining loudly.

No wonder, then, that the U.S. Senate is working to punish infringers by amending sections of U.S. copyright law to broaden the definition of who might be liable for infringement. The aim of a new bill is to penalize those who intentionally influence others to infringe—even if the inducers themselves do not. Why? So it's possible to nab companies whose business plan calls for manipulating customers—often children or teens—into “doing the ‘dirty work’ of breaking the law” by making illegal copies of copyrighted works, said Senator [Continued on page 14]

Dan Senese Leaves Electronic Legacy

BY KATHY KOWALENKO

FROM ELECTRONIC LIBRARIES and online membership renewal to improving the IEEE's finances, executive director Dan Senese reflects on his accomplishments with *The Institute* as he prepares to retire at the end of 2004 after nine years with the IEEE.

As the chief staff officer, he oversees the daily operations of the IEEE and its more than 800 employees. The IEEE Board of Directors sets the policies of the organization, and the executive director's job is to implement them and to provide input about how best to plan the association's future.

Senese might be remembered most for the array of electronic services and products created during his tenure—which was his primary mandate when he took on his job.

“We've really focused on doing business electronically. It's one of the things that I'm very proud of,” he says. “We looked at where it was cost-effective, where we thought there were useful services, and we now are delivering very efficient and effective electronic products.”

Those include what he calls membership administrative tools. Members can renew, add services, join a society, update their contact information, purchase a product, or subscribe to a publication—all over the Web, totally without human intervention.

But that doesn't begin to cover the spectrum of offerings that the IEEE rolled out during his tenure. Senese points to an expanding line of electronic libraries, from the IEEE Member Digital Library for individuals and the IEEE [Continued on page 13]



Executive director Dan Senese is set to retire at the end of this month.

Don't Forget

Renew your membership today | www.ieee.org/renew

[knowledge](#) | [community](#) | [career](#)

You enjoy these exclusive benefits as a member of the largest technical professional society:

- Access to essential technical information – more than one million online document abstracts, plus your subscriptions, through IEEE Xplore®
- Networking at IEEE-sponsored technical conferences, workshops and local meetings, worldwide
- Insurance, financial, business and home services – for you and your family
- IEEE Personal Email Alias with optional anti-spam filter
- Career and employment resources, including the IEEE Job Site and Consultants Database
- Savings on IEEE products, conference registration, and much more!

IEEE Society membership is an integral part of IEEE membership. As you renew, consider membership in one or more of **39** IEEE Societies.

REVIEW PROJECT RESULTS

STAFF MEETING PREP 9 AM

NEW TIRES?

RENEW IEEE MEMBERSHIP

ASK TOM ABOUT TODAY'S GAME

REVIEW SADHANA M PAPER

IEEE SECTION AWARDS DINNER

The best time to be an IEEE member is now.
Renew today! www.ieee.org/renew



CONTENTS



18

NEWS

- 4 **LIGHTNER IS PRESIDENT-ELECT**
IEEE RESUMES SERVICES FOR EMBARGOED COUNTRIES
DIGITAL ARCHIVES EXPANDED

DEPARTMENTS

- 5 **LETTERS**
- 5 **MARKETPLACE OF IDEAS**
- 8 **MEMBER PROFILE**
- 10 **BEST PRACTICES**
- 12 **PRODUCTS & SERVICES**
- 16 **EDUCATION**
- 21 **FINANCIAL ADVANTAGE**
- 22 **MEMBER RECOGNITION**
- 22 **IN MEMORIAM**
- 23 **AWARDS**

Art & photo credits: Page 1: Trevor Dixon (top right); Mick Wiggins (top left); Jordan Hollender (center); Page 3: Robert Severi; Page 4: Trevor Dixon; Page 6: Jordan Hollender; Page 8: Dan Krauss/The New York Times; Page 10: Hulton Archive/Getty Images; Page 12: Ryan McVay/Getty Images; Page 13: Jordan Hollender; Pages 14 & 15: Mick Wiggins; Page 16: Peter Horvath; Page 18: Robert Severi; Page 20: KRT; Page 21: Steve Allen/Alamy; Page 22: The Maureen and Mike Mansfield Foundation (top); John Volakis (bottom).

1 Dan Senese Leaves Electronic Legacy

BY KATHY KOWALENKO

After nine years at the IEEE's helm, executive director Dan Senese will retire at year's end. During his tenure he implemented innovative electronic products and services, changed the corporate culture, and helped get the IEEE's finances in order.

1 IEEE-USA Urges Changes To Online Piracy Bill

BY TRUDY E. BELL

Up to 97 percent of music, games, and movies online are traded illegally, raising the ire of entertainment industry groups and prompting a bill in the U.S. Congress to crack down on trading. But IEEE-USA says, "Not so fast."

PRESIDENT'S COLUMN

6 A Year in Review

BY ARTHUR WINSTON

In 2004, Winston embraced globalization and expanded the IEEE's global family. But big challenges regarding intellectual property and membership value remain for W. Cleon Anderson, the next IEEE president.

17 Members Rate IEEE's Value

BY KATHY KOWALENKO

In a landmark study, IEEE members report why they value their membership. They like networking with their peers at conferences and local meetings, but want more continuing education programs and online access to technical resources.

18 Helping Build Bridges To Policymakers

BY PEG GALLOS

Few IEEE members get to rub shoulders with the movers and shakers of government and politics, but three from India, Malta, and the United States tell how they advise their legislators on science and technology matters.

20 How to Handle Plagiarism: New Guidelines

BY PAT JANOWSKI

With so many technical articles now online, plagiarizing is easier than ever. To reduce the number of incidents in its publications, the IEEE approved new guidelines to define the different levels of plagiarism and the corrective actions to be taken.

THE INSTITUTE ONLINE

Find information on these topics and more at www.ieee.org/theinstitute on 7 December.

PLUS NEWS Read the complete results of the 2004 IEEE election.

CAREER GUIDANCE Advice for successfully navigating the office trenches with better communication, from the IEEE Professional Communication Society

FEATURED CONFERENCE IEEE Industry Applications Society Electrical Safety Workshop, 8–11 February, Denver, USA

THE INSTITUTE (ISSN 1050-1797) is published quarterly by The Institute of Electrical and Electronics Engineers, Inc., 3 Park Ave., 17th Floor, New York, N.Y., 10016-5997; tel. +1 212 419 7900. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Canadian GST#125634188. Annual subscription rate: US\$26.00. The editorial policies for IEEE's major publications are determined by the IEEE Board of Directors. Unless otherwise specified, the IEEE neither endorses nor sanctions any positions or actions espoused in THE INSTITUTE. Major IEEE boards review items within their purview prior to publication. When published in THE INSTITUTE, individual viewpoints of elected IEEE officers are labeled as such. They are reviewed by the individuals to whom they are attributed, unless they are a matter of record. The editorial staff is responsible for selection of subject matter and its placement within the issue. Copyright © 2004 by The Institute of Electrical and Electronics Engineers, Inc. THE INSTITUTE is a registered trademark owned by The Institute of Electrical and Electronics Engineers, Inc. POSTMASTER: Send address changes to THE INSTITUTE, IEEE Operations Center, Coding Department, Box 1331, Piscataway, N.J. 08855-1331, USA.

NEWS

FROM AROUND THE IEEE & THE WORLD

Electronic Communications Resume for Embargoed Countries

LAST MONTH, THE IEEE reestablished electronic communications for its members in the U.S. trade-embargoed countries of Cuba, Iran, and Sudan. Members in these countries were given access to communications channels that the IEEE had suspended in January 2002 while it investigated the effect of the trade regulations administered by the U.S. Department of the Treasury's Office of Foreign Asset Control. The resumption of electronic communications coincides with the start of the 2005 membership renewal period.

With normal communications resumed, members in Cuba, Iran, and Sudan can once again create an IEEE Web account and use it to access the publications they subscribe to through IEEE

Xplore. They are also able to renew their membership, update their contact information, establish an IEEE e-mail alias, and subscribe online to IEEE publications. Members in the three countries can also be considered for elevation of their member grades. And anyone wishing to become an IEEE member may join online.

The IEEE continues to be limited by U.S. government restrictions, however, in two areas: it cannot send funds to the embargoed countries to support IEEE activities, nor can it formally establish new local units like sections and chapters.

For more information on this issue, visit <http://www.ieee.org/ofac> or send questions to ofac@ieee.org.

—Kathy Kowalenko

Lightner Selected for Top Spot

MICHAEL R. LIGHTNER has been selected the 2005 IEEE President-Elect by members of the IEEE. He will begin serving as IEEE President on 1 January 2006 (pending acceptance of the Teller's Committee election-tally report by the IEEE Board of Directors in late November).

Lightner is a professor of electrical and computer engineering and computer science at the University of Colorado, Boulder, USA. He will succeed 2005 IEEE President W. Cleon Anderson, who takes office on 1 January 2005.

An IEEE Fellow, Lightner joined the IEEE as a student member in 1971. He has served on the IEEE Board of Directors and IEEE Executive Committee, and is the current vice president of Publication Services and Products.

Of the members who voted, 16 735 selected Lightner. James M. Tien received 11 940 votes, and Levent Onural received 5412.

—Lindsay Elkins



Full Run of *IEEE Proceedings* To Be Online by the End of 2005

THE FIRST 75 YEARS' worth of issues of *Proceedings of the IEEE* will soon be digitized so they can be accessed through IEEE Xplore, the document delivery system. *Proceedings* appears monthly and publishes research, tutorials, and reviews of electrical and com-

puter engineering technology.

The 1963 through 1987 editions will be available in the first quarter of 2005, while the rest of the collection going back to 1913 will be online by the end of 2005. Issues from 1988 to the present are already in IEEE Xplore.

—Lindsay Elkins

IEEE Introduces Global Med-Net

NEW PROGRAM
FOR IEEE MEMBERS
WORLDWIDE

Saving Lives, Protecting Children, Easing Minds

This new member benefit program provides secure storage for important family documents, child vital statistics, medical information and more. With Global Med-Net, your most valuable records are available at a moment's notice – anywhere in the world.

**Your information, when and where
you need it – worldwide.**

Learn more, or enroll now, at: www.gwls.com/ieee

**The IEEE Financial Advantage Program®
Tools to Secure Your Tomorrow**



IEEE
FINANCIAL
ADVANTAGE
PROGRAM®

Med-Net: Life saving information is transmitted within minutes through Med-Net. Past medical history, medical images, emergency contacts, insurance information, prescription drug usage, allergies and more are sent to you or medical authorities anywhere in the world.



Child-Net: Be prepared in a medical emergency or missing child emergency. A photograph is stored for immediate distribution, along with fingerprints, medical records, authorization to treat, multiple contacts, insurance information, and more.



Travel-Net: Protect yourself from identity theft, and never again worry about losing your Passport, Travel Visa, Birth Certificate or Credit Cards. Service is secure, and fast.



Docu-Net: Living will, home documents, Power of Attorney – can you find it when you need it? Call us 24 hours a day, we'll give you the information by phone, or send you what you need.



The Final Frontier

The builders of *SpaceShipOne*—the first workable “space tourist” vehicle—say that in a few years travelers could rocket at least to the edge of Earth’s atmosphere, approximately 100 kilometers up. Would you be willing to go if cost was no object? Why?

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. Your answers will appear in the March issue of *The Institute* and are subject to editing for brevity.

E-MAIL: institute@ieee.org

MAIL: The Institute, IEEE Operations Center, 445 Hoes Lane, Piscataway, NJ 08855-1331 USA
Fax: +1 732 235 1626

RESPONSES TO SEPTEMBER’S QUESTION

What Must be Done Before E-Voting is Safe, Secure, and Reliable?

Paper Trail Is Crucial

There is no reason to expect that electronic voting machines are any more reliable than the ATM that won’t let you withdraw your money, the corporate Web site hijacked by hackers, or the supermarket bar scanner that rings up the wrong price for frozen orange juice. Yes, well-designed e-voting systems will work correctly most of the time, but to assume a total absence of real-world failures is irresponsible engineering and disastrous social policy. The odds that we will have to

do a recount are too high to ignore. A voter-verified paper audit trail is critical to gaining the public’s trust.

MICHAEL L. SCOTT
Rochester, N.Y., USA

A Knockout Punch

Our fascination with a new tool or toy never goes away. E-voting falls into this category because it is dazzling, flexible, quick, and self-checking.

I recommend an alternative: the same punched-paper, single-card ballot that we

Californians have used for years and that has been the subject of numerous complaints. This system needs only one small addition to make it a viable replacement for e-voting: the card reader should be able to record the punched preferences as they are made and then deliver a printout for the voter to review and verify. Once it is seen that the choices were recorded properly, the punched card could be placed in the ballot drop-box.

DOR H. HESSELGRAVE
Los Altos, Calif., USA

Slot Machines Are Better

It’s clear that electronic voting is not ready for prime time. The problem is not that the technology is inherently faulty but that there is no federal requirement to do any auditing. Yet this would seem to be a minimal requirement to earn the voters’ trust.

As a recent *New York Times* article pointed out, slot machines for gambling undergo much more stringent requirements and testing than do electronic voting machines.

TOM RYAN
Tucson, Ariz., USA

Would a Lottery Machine Do?

Electronic voting is a use of technology for technology’s sake, not to solve a problem. Election officials who see a high-tech

solution to a problem as easier to sell politically are bolstering the e-voting niche that several manufacturers have created for themselves.

Many e-voting machines do not leave a paper trail. The truth is that electronic data in any type of system cannot be absolutely guaranteed without a paper trail, despite what the IEEE and engineers creating standards would like us to believe.

We need the same level of technology as the lottery. Everyone understands it, and everybody trusts it. Lottery machines provide a paper trail and an easy mechanism for a recount.

JOEL A. MUSSMAN
Coral Gables, Fla., USA

Requesting Authentication

Talk about electronic voting immediately brings up a debate about whether or not we have a secure system. But the system is foolproof only if it offers a voter-authentication process, and databases for this authentication have not yet been developed. We also must develop an e-voting intranetwork so that the system is secure.

Unless we take these factors into account, e-voting is not yet ready for prime time.

PRADEEP CHATTERJEE
Jamshedpur, India

LETTERS

Consider Nuclear Energy

Although Clint Andrews and Saifur Rahman in “Getting a Handle on Hydrogen” [September, p. 1] are correct in their statement that switching to hydrogen energy today would increase pollution, they err in their contention that using renewable energy “is the only way to reduce total emissions.”

Nuclear power offers a more obvious solution, especially at the production levels necessary to displace petroleum-based transportation fuels. As people are coming to realize, hydrogen is an energy conveyance medium, not a primary energy source. How you make hydrogen is the best measure of whether the fuel has a positive or negative impact on the environment. And yes, nuclear has issues, as do all renewable energy sources. Carbon dioxide emission, however, is not one of them.

MARK STRAUCH
Livermore, Calif., USA

The article presents the prevailing view that only renewable energy sources, meaning wind, solar, or biomass, could provide the fuel needed to split water molecules into hydrogen and oxygen atoms while reducing total emissions. A few calculations reveal that there might not be enough real estate on Earth to provide the sites needed for these renewable energy

sources. At best, using these energy sources exclusively would cause enormous dislocation and an economic burden on our overpopulated planet.

The fundamental theorem of all environmental and energy policies ought to be that limiting the human population to Earth’s carrying capacity is the only long-term solution to the planet’s livability problems. Accepting this reality is unpleasant and therefore unlikely.

SIDNEY W. LEWINTER
Redondo Beach, Calif., USA

The article states “using renewable energy ... is the only way to reduce total emissions.” Excluding nuclear energy from the list of emission-reducing sources is incorrect. Nuclear energy, because of cost and output characteristics, probably has the best chance of making hydrogen an economical and nonpolluting energy source.

G.C. BAKER
Kentville, N.S., Canada

Paper Ballots Are Better

We need to start considering the importance of counting votes in a democracy [“Standing Up for a Better E-Ballot Box,” September, p. 1]. The only option to ensure fairness and accuracy is hand-cast and hand-counted paper ballots. Everyone understands the

process of hand-counting paper ballots. Very few know what is going on in a black box with electronic ballots and electronic counting.

I have read that electronic voting cannot be simultaneously secret and fraud-free. As technologists and engineers, we have an obligation to society to explain the limitations of this technology to those with less understanding than ourselves. We need to take a stand for what’s right, not for technology for technology’s sake.

ANN TULINTSEFF
Seattle

A Step in the Wrong Direction

I was surprised to learn that the IEEE stopped using approval voting for its annual elections. Basically, approval voting allows members to approve as many of the candidates as they wish. It is a good solution for three-way races and for choosing multiple members for at-large positions.

When I inquired at the IEEE Operations Center, I was told the organization stopped using approval voting because surveys showed this option was rarely used, and it complicated the election verification process. The IEEE used to be a beacon of enlightenment in elections. Rejecting approval voting was a step backward.

JOHN HERBSTER
Houston

Corporate Activities responds: Based on voting statistics gathered for a multiyear period through 2001, the IEEE Board of Directors removed the requirement for approval plurality voting in IEEE elections beginning with the 2002 Annual Election. As Herbster was told, the decision was made because 80 percent of IEEE members were not using approval voting. However, if it is deemed appropriate, approval plurality voting may be used for committee elections.

Not only did the statistics show that an overwhelming majority of voters did not use approval voting, but also their comments indicated that most disapproved of it; some even refused to vote because of it. On the recommendation of both the IEEE Tellers Committee and the IEEE Executive Committee, the IEEE Board of Directors approved revisions to the IEEE Bylaws that removed the requirement for approval plurality voting.

CORRECTION

“Dues Increase” [September, p. 4] misstated students’ dues for 2005. Dues remain unchanged at US\$30 for students in Canada and the United States and \$25 for all others.

A Year in Review

It seems like just yesterday that I wrote my first column as your 2004 IEEE President. Today I write my last. How quickly the year has passed. The experience of the past 12 months has been most rewarding. I have made many new acquaintances, while also renewing some from days previous.

I have visited with members all over the world at regional meetings and conferences—which has reinforced that we truly are part of an extended global family, ably committed to the advancement of our profession. It has been an honor to serve you. Thank you for this once-in-a-lifetime opportunity.

LOOKING BACK I would like to conclude the year by sharing a few thoughts on our progress with globalization, which has been the theme of my presidency.

Perhaps our most important global achievement has to do with the IEEE's steadfast belief in free, open scholarly exchange of information and the worldwide membership we serve. In early April, the U.S. Department of the Treasury's Office of Foreign Assets Control (OFAC) confirmed the position we had argued for more than a year: that our entire publishing process should be exempt from OFAC regulations. That enabled us to resume normal publishing processes for all authors, regardless of where they live. Further, we have now reestablished electronic communications for members in countries currently under U.S. trade embargoes [see p. 4]. After setting up an IEEE Web Account, these members can access their subscriptions through IEEE Xplore. They can electronically renew their membership, change subscriptions, and update contact information.

Despite continued world tensions and a stagnant global economy, the IEEE global family continues to grow. Almost 38 percent of the IEEE's more than 360 000 members are citizens of countries other than the United States. As of October, higher grade membership levels in Region 10 (Asia and the Pacific Rim) had 5.5 percent more mem-

bers than in December of last year, and both Region 8 (Europe/Middle East/Africa) and Region 7 (Canada) have experienced growth, with increases of 3.1 and 2.1 percent, respectively.

The U.S. National Engineers Week is arguably our profession's most successful outreach effort. The IEEE was the co-leader of this year's program, along with Fluor Corp. in Aliso Viejo, Calif., USA. Through our influential efforts, this year marked the first global celebration of Engineers Week outside the United States. Based on its success, the global theme will be expanded for Engineers Week in 2005, which will be supported by the first non-U.S.-domiciled lead corporate sponsor, British Petroleum in London.

LOOKING AHEAD We all are wrestling with the changing world around us. The economy continues to globalize. The interdisciplinary nature of our work is making our jobs more complicated. Technology continues to change the way we communicate. Time remains at a premium as we seek to strike the right balance between our professional and personal lives. Just as these conditions affect us individually, they also affect the IEEE. To continue to thrive, the IEEE must adapt.

Challenges lie ahead. Strategic questions include: how will engineers accomplish their work in the future, and how will this new style of working affect the way the IEEE enables members to network and to exchange ideas? How will this change the way the IEEE disseminates its intellectual property? And perhaps the most pressing question is of the overall value of the IEEE to its members. The IEEE must meas-



ure the value of what it delivers to you for your dues not only in terms of useful products but also in terms of service to, and advancement of, the engineering profession.

The IEEE's Board of Directors is studying these and related strategic questions. I encourage you to get involved, provide your insight into these important questions, and shape the future of our organization. Doing so ensures a prosperous and secure future for the IEEE and the engineering profession.

In closing, I want to thank Dan Senese, who is retiring on 31 December [see "Dan Senese Leaves Electronic Legacy," p. 1] after ably serving as IEEE's executive director for nine years. We greatly value Dan's many contributions in guiding and shaping our staff, as well as his work with the IEEE Board of Directors. We wish him well.

I also wish to thank the 2004 IEEE Board of Directors, and more volunteers and staff than space here permits me to acknowledge. I know that Cleon Anderson, who possesses exceptional leadership skills, will move the IEEE forward as your 2005 president. ●

The Institute

Editorial offices:

IEEE Operations Center,
445 Hoes Lane, Piscataway, NJ 08855-1331 USA
Telephone: +1 732 562 6825
Fax: +1 732 235 1626 **E-mail:** institute@ieee.org
Web: http://www.ieee.org/theinstitute

Editor: Kathy Kowalenko

Assistant Editor: Erica Vonderheid

Editorial Consultant:

Alfred Rosenblatt

Copy Editors: Sally Cahur, Joseph N. Levine

Editorial Intern: Lindsay Elkins

Editorial Board:

Jim Anderson, A.M. Bhagwat, Jan Brown, Anthony Durniak (IEEE Staff Executive of Publications), Murray Eden, Gus Gaynor, Abhi Gupta, Susan Hassler (*IEEE Spectrum* Editor), Eric Holdrinet, Michael Lightner (IEEE Vice President—Publication Services & Products), Harry McDonald, and Roland Saam

Senior Art Director: Mark Montgomery

Editorial Production Director: Robert Smrek

Editorial & Web Production Manager: Roy Carubia

Graphic Design: Bonnie Nani

Web Production Assistant:

Jacqueline L. Parker

IEEE MEDIA

Publisher: James A. Vick

Associate Publisher, Sales & Advertising

Director: Marion Delaney

Business Manager: Robert T. Ross

Marketing & Promotion Manager:

Blanche McGurr

Advertising Sales: +1 212 419 7760

Advertising Production Supervisor:

Felicia Spagnoli

Advertising Productions: +1 732 562 6334

IEEE Quick Guide

INQUIRIES ABOUT YOUR MEMBERSHIP

For service and expertise specific to your region, contact your dedicated Member Services representative via e-mail, phone, or fax.

If you live here

Northeastern USA

Eastern USA

Southeastern USA

Northern Midwest USA

Southwestern USA

Western USA

Canada

Europe, Middle East, Africa

Latin America

Asia/Pacific, Australia

use this e-mail address

member.services.1@ieee.org

member.services.2@ieee.org

member.services.3@ieee.org

member.services.4@ieee.org

member.services.5@ieee.org

member.services.6@ieee.org

member.services.7@ieee.org

member.services.8@ieee.org

member.services.9@ieee.org

member.services.10@ieee.org

To reach your representative by telephone, call +1 800 678 IEEE (4333) toll-free in the U.S. and Canada only, or +1 732 981 0060. Fax: +1 732 981 9667.

Members may change their address, obtain information about section activities, learn about student resources, and more at the IEEE's Member Services Web site, www.ieee.org/membership.

Contact Points:

IEEE Operations Center
445 Hoes Lane
Piscataway, NJ 08855-1331 USA
Tel: +1 732 981 0060
URL: <http://www.ieee.org>

IEEE Corporate Office
3 Park Avenue
New York, NY 10016-5997 USA
Tel: +1 212 419 7900

IEEE-USA
Tel: +1 202 785 0017
E-mail: ieeusa@ieee.org
URL: <http://www.ieeeusa.org>

Conference Information
Tel: +1 732 562 3878
URL: <http://www.ieee.org/conferencesearch>

IEEE Financial Advantage Program
Tel: +1 800 438 4333
URL: <http://www.ieee.org/services/financial/fap>

Ombudsman

Tel: +1 800 678 4333
E-mail: ombudsman@ieee.org

Technical Societies Information

Tel: +1 732 562 3900
E-mail: society-info@ieee.org
URL: <http://www.ieee.org/organizations/tabociety.html>

To Order Products

Tel: +1 800 678 4333
Fax: +1 732 981 9667
E-mail: customer-service@ieee.org
URL: <http://shop.ieee.org/store>

Travel Services

Tel: +1 800 TRY IEEE (Outside U.S., call +1 732 562 5387)
Fax: +1 732 562 8815
E-mail: ieee-travel@ieee.org

Get the Advantage

The IEEE Financial Advantage Program Offers Exclusive Benefits to IEEE Members

For over ten years, the IEEE Financial Advantage Program® (FAP) has provided IEEE members with great services at exclusive great rates.

Now with more than 30 programs, the IEEE Financial Advantage Program offers something for everyone:

Insurance Programs

- Auto/Homeowners Insurance
- Canadian Retiree Insurance
- Cancer Expense Insurance
- Catastrophe Major Medical Insurance
- Catastrophic Disability Insurance
- Comprehensive Health Care Insurance
- Dental Plan
- Disability Income Insurance
- Global Med-Net ◀ **New!**
- High-Limit Accident Insurance for France
- Identity Theft
- International Accident & Medical Insurance
- Level Term to Age 65 Life Insurance
- Life Line Screening
- Long Term Care Insurance
- Medical Savings Account Program
- Member Assistance Plan
- Permanent Whole Life Insurance
- Prescription Plan
- Professional Liability Insurance
- Small Employer Group Insurance
- Term Life Insurance
- Short Term Medical
- Short Term Recovery
- 10-Year Level Term

Business Services

- Hardware/Software Purchasing Program
- Office Supplies
- Express Delivery Service

Travel Services

- Car Rental
- IEEE Global Travel Services

Financial Services

- IEEE Credit Card for Canada
- IEEE Credit Card for Puerto Rico
- IEEE Credit Card for the United Kingdom
- IEEE Credit Card for the USA ◀ **New Program Coming Soon**

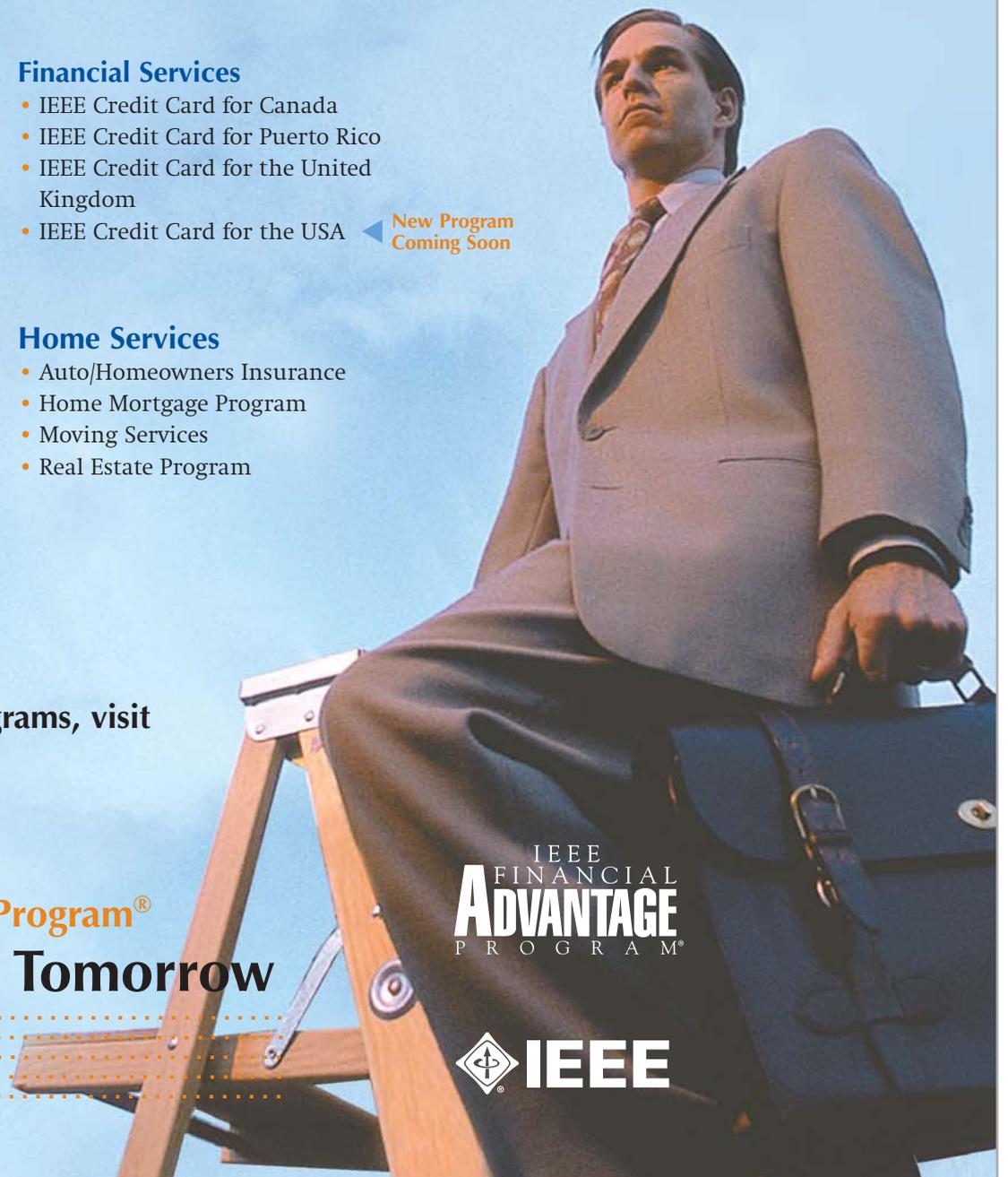
Home Services

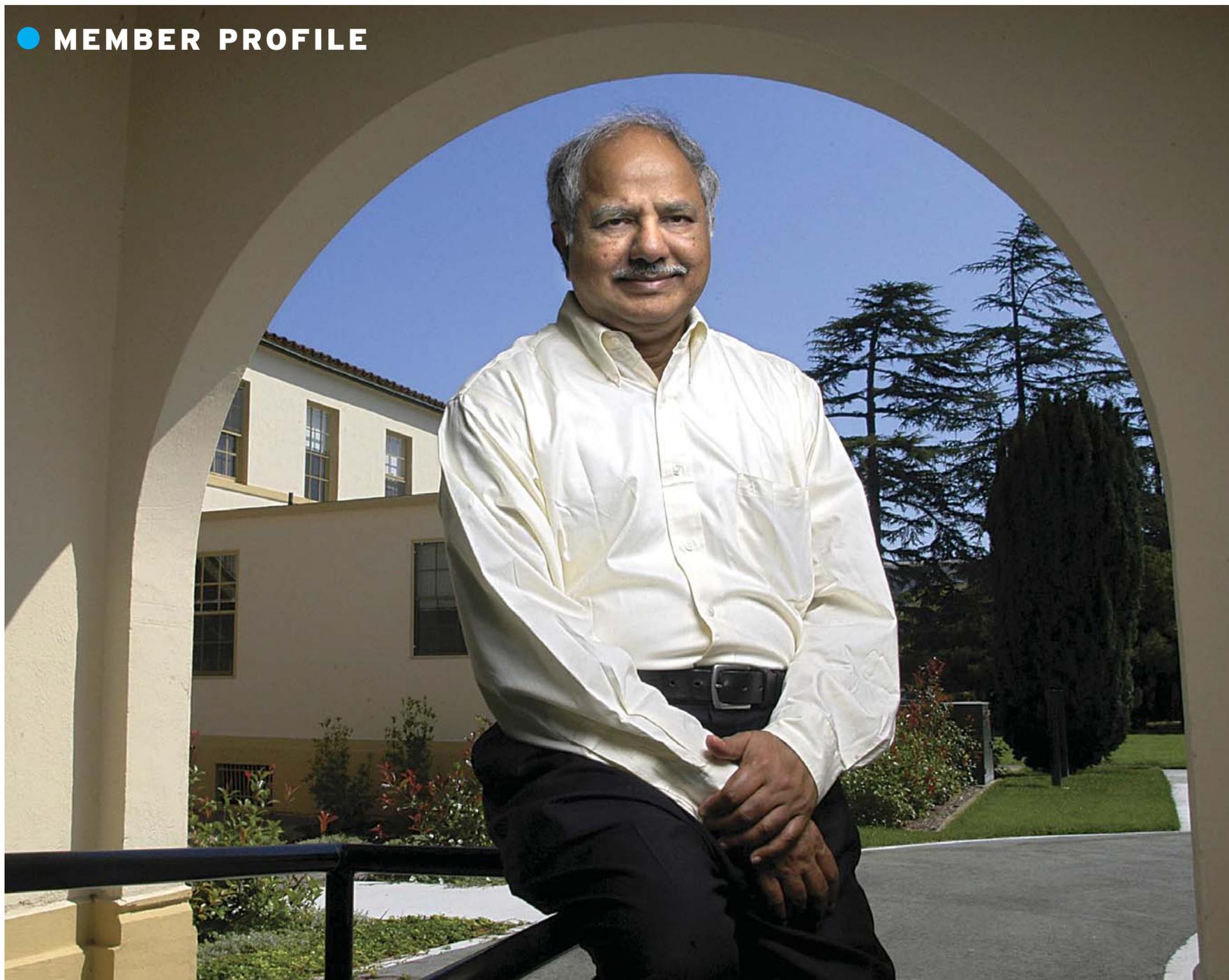
- Auto/Homeowners Insurance
- Home Mortgage Program
- Moving Services
- Real Estate Program

For information on all of these programs, visit www.ieee.org/fap

The IEEE Financial Advantage Program®
Tools to Secure Your Tomorrow

IEEE
FINANCIAL
ADVANTAGE
PROGRAM®





Reddy Applies Technology To Help Ordinary Folks

BY ERICA VONDERHEID

AS A GRADUATE STUDENT IN 1959 at Stanford University in California, USA, IEEE Fellow Raj Reddy specialized in the burgeoning field of computer science. “Even then I knew that the computer would have a profound impact on society,” Reddy says, “but I never thought computers would be as cheap and widespread as they are.”

Now a professor of computer science at Carnegie Mellon University, in Pittsburgh, Reddy is working to exploit the ubiquity of computers to improve the lives of ordinary people. In particular, he tries “to bring the benefits of technology to the poor and the illiterate and see if it can improve the quality of their lives,” he says.

His most recent effort is the Pctvt, an information “appliance” that combines a personal computer, television,

telephone, and videophone. He hopes to build it in quantity for about US\$250 per unit. The project has been financed to the prototype stage by Microsoft Corp. in Redmond, Wash., USA, and TriGem, a South Korean computer manufacturer. It was developed with individuals at the Indian Institute of Science in Bangalore, the Indian Institute of Information Technology in Hyderabad, and the University of California, Berkeley, USA. The device is mostly for entertainment—watching television, downloading movies, or playing games—but it could also be used to send e-mail, set up videoconferences, or download school lessons.

“With so many advances in technology, the time is ripe now for thinking of a low-cost multifunction infor-

mation appliance,” Reddy says. “The only thing stopping us from building it is that bandwidth to the home would have to be much wider than it is now.” And for the developing countries Reddy hopes to serve, bandwidth must be much, much cheaper.

But Reddy has a proposal to solve that last problem. He would like to see information superhighways funded in the same way that traditional modern highways are: by government. The way it is now, he points out, telecommunications companies build Internet infrastructures of their own, resulting in several similar networks in the same area.

“It’s like building 10 parallel highways right next to each other,” he says. “You’d look at it and say, ‘How foolish.’ Besides, no one is making any money.”

GOVERNMENT-BUILT Instead, Reddy would like to see governments build Internet infrastructures for their citizens and then turn them over to operating companies to provide not only telecommunications but services such as telemedicine, online learning, or access to expert advice. For this, the companies would be allowed to charge an affordable amount. Such an arrangement would make high-speed bandwidth available even for the average villager in a developing country and still allow the companies to make a profit, according to Reddy.

"If I go to average villagers [in a developing country] and say 'You have to pay US\$30 a month to get this connection,' they're not going to do it," Reddy says. "They'll say they earn only \$30 a month and can't spend more than 5 cents per day on entertainment and applications such as education and telemedicine. Granted, that's not a lot of money, but when 5 cents a day is distributed over millions of people [living below the poverty line], that income can become a sizable chunk of change for the provider."

LAUNCHING A CAREER Reddy began his academic career in 1966 as an assistant professor of computer science at Stanford University. He went there after earning a bachelor's degree in civil engineering from the Guindy Engineering College in Madras (now called Chennai), India, and a master's of technology degree from the University of New South Wales, in Sydney, Australia. In 1969, Reddy joined the Carnegie Mellon faculty as an associate professor of computer science. Later he became founding director of the university's Robotics Institute and then dean of the School of Computer Science, from 1991 to 1999. Now he's back to teaching, as the Herbert A. Simon University Professor of Computer Science and Robotics.

I could have published papers for the sake of publishing papers. Instead I wanted to have an **IMPACT ON PEOPLE**

In 1994, Reddy received the Association of Computer Machinery's Turing Award—considered the Nobel Prize of computing—for his work on large-scale artificial intelligence systems. He served from 1999 to 2001 as co-chair of the U.S. President's Information Technology Advisory Committee, which has advised U.S. Presidents Bill Clinton and George W. Bush. He has also testified before Congress on issues dealing with technology, such as Internet security.

He has been a university professor since 1984; the best part of his position, Reddy says, is that he doesn't have to report to anybody and can do whatever he wants. Which for him raised the question: what should he be doing?

"When I came back to being a professor [after serving as dean], I could have done research and published papers for the sake of publishing papers," he says. "Instead, I wanted to do something that would have an impact on people."

So he started thinking big, really big—specifically, a million books big. Reddy launched the Million Book Digital Library, with the goal of scanning a million books of all kinds into a database. They would be the books one normally finds in a library, including scientific texts and works of literature and history, and they would be in several languages. Reddy wants to post them on the Internet for anybody to read at no charge. So far, more than 50 000 books have been scanned and made available.

"More than 90 percent of the time I spend on the Million Book project, worrying about who's going to pack what books into what boxes to be shipped and scanned by whom," Reddy says. "This has nothing to do with scientific research, but simply scanning the books and making them accessible to anyone in the world is what is needed to make the whole thing happen."

Another project Reddy is involved with is 100x100 Networks (pronounced 100 by 100). It aims to network 100 million U.S. homes wirelessly with 100-megabits-per-second bandwidth. That would make the wireless Internet as ubiquitous in the United States as the telephone, he notes. Such high-speed networking would change the way people communicate and do business, just as the telephone did a century ago, Reddy says. ●

FOR MORE INFORMATION

To read about the PCtvt, go to <http://west.cmu.edu/executive/pdc/projects/pctvt/pctvt.htm>.

For the Million Book project, go to http://www.library.cmu.edu/Libraries/MBP_FAQ.html.

For the 100x100 Networks, go to <http://100x100network.org>.

Four Easy Steps to Home Ownership

Let IEEE Help You Every Step of the Way

1 Real Estate Service

IEEE members and their families can receive up to \$2000 cash back (based on sale price) with the excellent home selling/purchasing assistance of Weichert Relocation Company.

3 Moving Services

Let the professionals at North American Van Lines provide the quality and worry-free service that you and your family deserve.

2 Mortgage Program

Great mortgage rates from Wachovia Mortgage Corporation. Discounted rates, easy processing, professional guidance, fast approval.

4 Auto/Homeowners Insurance

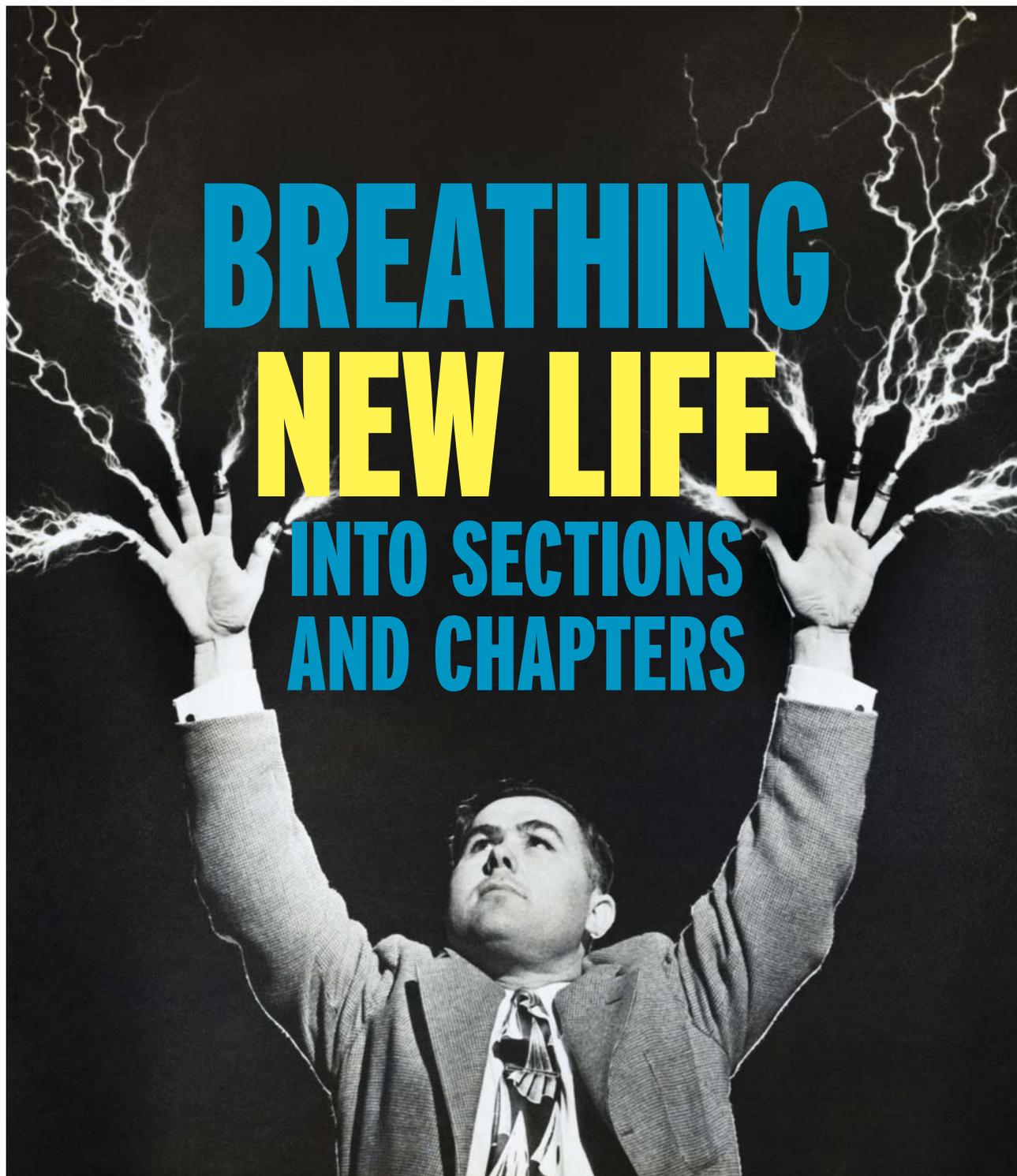
Affordable, convenient automobile and homeowners insurance for IEEE Members. Insure both your car and home — you may save up to 10% on premiums!

Don't put it off another day!
Call +1 800 GET IEEE (438 4333)
or visit www.ieee.org/fap

Programs available in U.S. only. May not be available in all states. Please check with carrier.



IEEE
FINANCIAL
ADVANTAGE
PROGRAM®



BREATHING NEW LIFE INTO SECTIONS AND CHAPTERS

BY ERICA VONDERHEID

BRINGING A DORMANT IEEE section or chapter back to life is not as difficult as it may seem, say volunteers who have done it. Mostly it requires a few dedicated members willing to brainstorm ways of attracting others back to meetings and enticing people to join.

For its part, the IEEE remains dedicated to any section or chapter even if it becomes dormant.

“Wherever we have dues-paying members, we want to keep them as an active and healthy part of the IEEE,” says Senior Member Robert Scolli.

Scolli is chair of a group of what you might call troubleshooters, organized to help moribund groups get back on their

feet. A joint effort of the Regional Activities and Technical Activities boards, Scolli’s Section/Chapter Rejuvenation Committee is made up of volunteers from several IEEE regions and societies.

A group can become dormant for any of several reasons, says Scolli. Active members may move or pass away, get burnt out, or no longer wish to play a major role in the group. Sometimes a big company relocates, taking IEEE members along with it. Some sections cover vast geographical areas, and members may no longer feel like traveling long distances for meetings.

A section is a small, local sub-unit within one of IEEE’s 10 regions, while a chapter is formed around interest in a specific technology represented by one of IEEE’s 38 societies. A section forms the

backbone of the chapters in its area and serves as an additional source of help. Sections provide funding for local activities, as well as management oversight for the chapters. “The section is really the most important element in keeping societies active and healthy,” Scolli says. “The networking among sections and chapters ties us all together as an organization.”

FINDING THE PROBLEM Before the Rejuvenation Committee can offer help, it must be made aware of groups showing a weak pulse. Often this calls for a little sleuthing. Paperwork, or the lack thereof, can provide important clues. Every section and chapter must file paperwork regularly with IEEE Regional Activities. For example, all groups send reports of regular meetings. Another clue is

whether the group sends its regional board a roster of newly elected officers; no elections signals little or no activity.

Following these leads, the committee may then gather more information from Regional and Technical Activities staff and volunteers to diagnose the problem. Past meeting reports can help. Maybe there are not enough volunteers to fill committees, or members need help planning events—which can also be attributed to a lack of leadership. Or perhaps the members are there but they need a little encouragement.

The Siouxland Section covers parts of Iowa, Nebraska, and South Dakota, in Region 4 in the central United States. The section became dormant in 1999 when it ran out of active volunteers and stopped holding meetings. It took a while to determine that the section was indeed inactive, but that fact was firmly established by 2002. The Rejuvenation Committee then got on the case, contacting section members and recruiting volunteers from among IEEE members at local technology companies. Region officers met with section volunteers to brainstorm and develop a plan to resurrect the section. Siouxland resumed its activities slowly. It has held five meetings since 2002.

“Don’t try to get off and running right away,” Section Chair Jeff White advises. “Build off the interest generated from the first few meetings.”

One of the section’s first meetings, in April 2003, has become quite popular: an annual daylong workshop covering “soft skills” management topics for the workplace. In April of this year, attendance at the meeting doubled to some 25 people.

Workshop organizers got help from the region for that first big event. Senior Member Don Bramlett, chair of the eastern area of Region 4, ran the workshop. The section chose workshop themes—such as adopting a leadership style and increasing productivity through better communication—that would interest most engineers and perhaps attract new members to the section. Also, to make membership more attractive at this year’s workshop, a discount on the US\$200 registration fee for the workshop was offered to IEEE members and to nonmembers pledging to join the IEEE.

The Siouxland Section has been growing and now has 177 active members. It also interacts with two IEEE student branches, has a Graduates of the Last Decade (GOLD) affinity group, and is establishing a chapter of the IEEE Power Engineering Society.

FOCUS ON STUDENTS Other groups have resurrected themselves on their own. The Turkey Chapter of the IEEE Engineering Management Society (EMS), for example,

went dormant in 1998 for the same reason as the Siouxland Section: not enough volunteers to run things. The chapter now boasts 22 active members, up from zero in 1998, thanks in part to workshops that bring engineering management concepts to students.

Member A. Cihat Eryilmaz, who was named chair of the Turkey EMS Chapter in 2002, took control. He focused on student members because, as he puts it, they are a ready pool of people already interested in

universities to conduct the sessions—which gives him time to visit additional student branches, organize more workshops, and recruit more members.

As a newly graduated engineer working at a U.S. Air Force base in Ankara, Turkey, in 1991, Eryilmaz discovered a glaring gap in his university education: he had never had any courses on project management. This led him to join EMS and learn more about the topic, and eventually to offer his workshops to students. He laments that many

ing slowly, with a strategy that begins with students and is designed to eventually include working engineers.

“This year we are walking; next year we’ll be running,” Eryilmaz says.

FOCUS ON NONMEMBERS Another chapter that gained new life on its own is in Region 9 (Latin America), the Western Puerto Rico Signal Processing/Circuits and Systems (SP/CAS) Chapter. It had stopped holding meetings in 1998, despite a large pool of members in its area and one of the largest IEEE student branches (with more than 300 members), at the University of Puerto Rico at Mayaguez. The chapter lacked a leader to plan meetings, manage volunteers, and recruit members.

In late 2003, Member Rogelio Palomera, now the chapter chair, started organizing activities and found he had a lot of support from local members, the region, and other IEEE chapters in the area.

“It was easy for us to reactivate the chapter because we had a lot of support,” Palomera says. The chapter has agreed to host the 2006 IEEE Symposium on Circuits and Systems, which is expected to bring more than 1000 engineers to western Puerto Rico and earn recognition for the chapter.

To entice nonmember engineers to meetings, the chapter holds several workshops and technical lectures every year on

signal processing. These sessions are given by professors at local universities and by working engineers. The chapter is also teaming up with the local IEEE Computer Society Chapter to bring in a distinguished lecturer—one of a host of IEEE society members who have volunteered to travel to chapter meetings to deliver technical presentations on topics of interest.

Like the Turkey EMS Chapter, the Western Puerto Rico SP/CAS Chapter plans several activities for students. Palomera says students often come up with ideas for activities, which the more senior student advisors can implement. Palomera also hopes, like Eryilmaz, that he can involve student members who will become active volunteers once they graduate. ●

Wherever we have dues-paying members, we want to keep them as an **ACTIVE AND HEALTHY** part of the IEEE

the IEEE who could be encouraged to become active members. He earned the students’ interest by holding workshops on project management at a pair of student branches in 2003. He bumped up the number of branches to eight this year, and next year hopes to visit and hold meetings at all 20 IEEE student branches in Turkey. Eryilmaz has been asking professors at the

new engineers in his country still aren’t familiar with project management tactics.

“They don’t have any idea what project management is,” Eryilmaz says. “They think it’s Microsoft Project software.” He sees this state of affairs as a detriment to the profession, a handicap for students, and a situation he hopes to fix.

The Turkey EMS Chapter is proceed-

FOR MORE INFORMATION

Visit the Siouxland Section at <http://www.siouxland.org>.

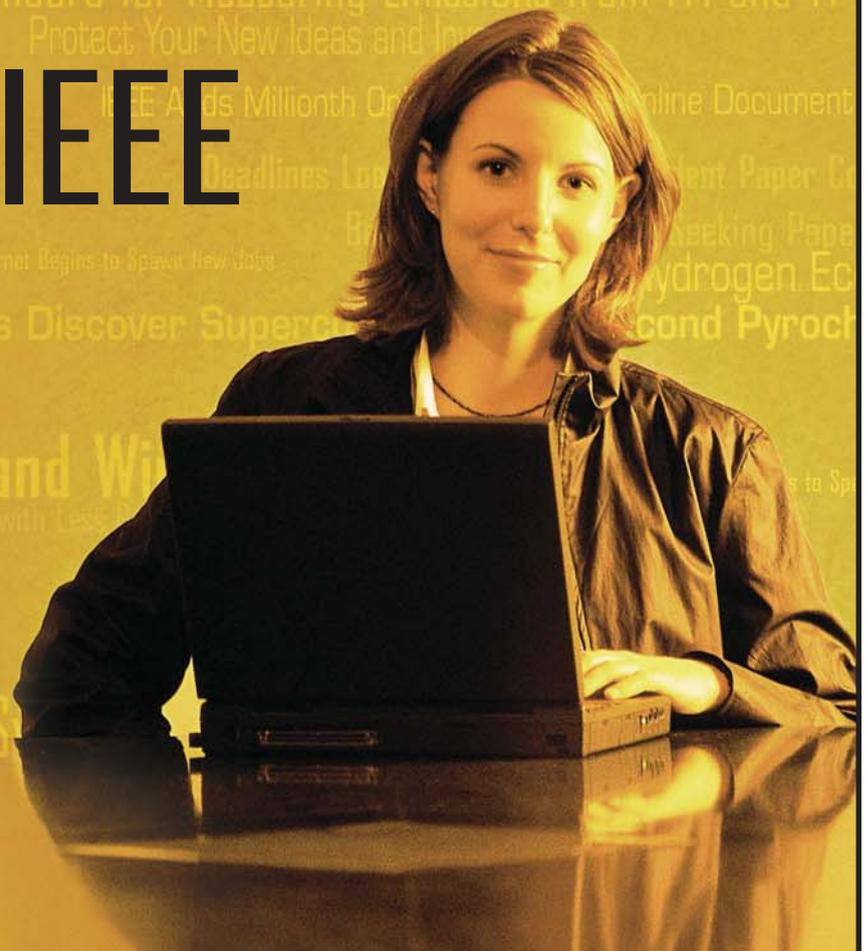
Learn about the Western Puerto Rico SP/CAS Chapter at <http://www.ieee.org/organizations/society/sp/chapterchairs9.html> or <http://www.ieee-cas.org>.

Find out more about the Turkey EMS Chapter at <http://www.ieee.org.tr>.

For more section/chapter rejuvenation strategies from Robert Scollis’s committee, visit <http://www.ieee.org/rejuvenation>.

What’s New @ IEEE

Read it Here First



Choose the FREE newsletters that are right for you.
SIGN UP TODAY: www.ieee.org/whats-new

First Aid for Mobilizing Volunteers

The IEEE Volunteer Recruitment Toolkit helps leaders find and enlist members to serve as officers, editors, and conference organizers

BY PAT JANOWSKI

WOULD YOU DO YOUR job if you didn't get paid? Many members might be surprised to know how much of the organization's work is done by volunteers who do it while they also hold down their "day" jobs. Finding possible volunteers and then encouraging them to sign up can be a job all on its own. That is why an IEEE Volunteer Recruitment Toolkit was developed. It offers ideas that can make it easier for section and sub-unit leaders to find and recruit members needed to serve as officers, editors, reviewers, conference organizers—the list of volunteer jobs just goes on and on.

IEEE volunteers not only help run the organization, they profit from the experi-

ence as well. "I have benefited tremendously from my volunteer affiliation," Linda Weaver says. Weaver, an IEEE member for 24 years, is chief technology officer for the Smart Systems for Health Agency, a company in Toronto that specializes in electronic communication among health-care providers. "Through the IEEE I have gained a series of mentors, met very interesting and exciting people, traveled to fascinating places, and enhanced my life, as well as the lives of my children and husband.

"The IEEE has provided me with the opportunity to learn many skills that I have carried into my career, including leadership, meeting management, negotiation, and communications," she adds. "Through the IEEE network I have also landed new

jobs and contracts for the companies I worked for."

When IEEE Past President Michael Adler published a column on volunteering ["Wanted: Greater Relevance to Industry," September 2003, p. 6], "we got so many responses," says Cathy Downer, IEEE Regional Activities project manager. "But while some people knew they wanted to contribute, they didn't always have an idea about what they wanted to do."

Downer and her colleagues in Regional Activities who were charged with fielding the inquiries began to create what would become the Volunteer Recruitment Toolkit, which they posted on the Web.

Included in the kit are descriptions of different jobs, from executive section positions—such as chair and secretary—to committee and sub-unit (chapter and affinity group) chairs. "I was impressed with the job descriptions provided on the Web site," says John Meredith—a 40-year IEEE veteran, longtime volunteer, former U.S. naval officer, and current employee of Agilent Technologies in Colorado Springs, Colo., USA. "It is important for people to know what they are getting into."

Linda Weaver agrees. "The toolkit makes it easier to understand the best ways to contribute," she says, adding that it "consolidates much of the knowledge gathered from successful volunteers, sections, and other IEEE organizational units into a format that can be used by any volunteer. It gives them materials and tools to explain what volunteering for the IEEE means—what you will do, what you will learn, and how you will benefit. It takes away some of the administrative workload built around constantly training and educating new recruits."

Removing this load is especially important, considering that those who run the various IEEE units are typically working engineers with little time to seek help. The time-saving tools in the kit include a customizable recruitment brochure and a one-page flier for posting on bulletin boards.

The kit also provides tips for recruiting, plus a list of the 12 needs shared by all volunteers, starting with the assignment of a specific, manageable task that the person is interested in, a defined beginning and end to the task, and written instructions.



Volunteers typically appreciate the freedom to complete the task where and when it is convenient, once the recruiter has provided adequate training.

It also is important to recognize volunteers' contributions, so the toolkit provides suggestions on how to acknowledge someone's hard work.

FITTING PEOPLE TO THE JOB It isn't always easy to find people and then connect them with the right jobs.

"Finding people to volunteer their time is one of the biggest issues," Meredith says, adding that he likes the one-on-one approach suggested in the toolkit. "When I'm at a meeting and I see someone I've seen before, I always say, 'Hey, would you like to do something with the section?'" The toolkit's brochure—customizable for words and graphics and presented in simple text in Microsoft Word that is suitable for translation into other languages—can be handed immediately to such a person. The details on volunteering and specific contact information help solidify the personal connection that leads to a successful volunteer.

That kind of personal contact can become a critical part of career development. Meredith looks at volunteering as an extension of his job as an engineer. "I look over my years in practice and I look at things I designed and did, and people I helped to grow," he says. "I have a lot of pride in that. It's motivating. Engineers like to make things happen, to grow things, and I think you can build people skills just like you build other things.

"I try to mentor all the volunteers who I work with," he adds, "helping develop them for further service to the profession. We must give something back to those we associate with, just as our parents, teachers, colleagues, and friends have mentored and developed us along the way." ●

FOR MORE INFORMATION

To view the toolkit, visit <http://www.ieee.org/vol-recruit>.

Great IEEE Credit Cards Around the World

The MBNA Credit Card for IEEE members
in Canada, Puerto Rico and the UK

- Low annual percentage rates
- No annual fees
- High credit limits
- Every purchase helps support ongoing IEEE initiatives!
- And many other great benefits!

Sign up today:
www.ieee.org/fap

The IEEE Financial Advantage Program®
Tools to Secure Your Tomorrow



We expect people to demonstrate **INNOVATION** and **CONTINUOUS IMPROVEMENT**. We strive for open, honest **COMMUNICATION** and feedback

Enterprise library for small- and medium-size businesses to the IEEE/IEE Electronic Library for large organizations. The three collections make more than one million articles (some dating back to 1950) available through the IEEE Xplore document delivery system.

"These libraries are helping our members and customers around the world conduct their R&D efforts more efficiently because information is readily available to them anytime, anywhere," he says.

He also points with satisfaction to the host of new online e-publishing tools for authors and editors. Journal, transactions, and magazine editors can create articles, format them using templates, proofread the work, and submit annotations, all online. But the publications are only as good as their content, he notes, so there's also the Manuscript Central online peer-review system developed for editors and reviewers.

Senese also made note of several other online programs introduced in the last several years, including the e-mail alias service with virus protection, secure access for volunteers to members' personal data, and a more efficient way for developing IEEE Standards.

CULTURAL CHANGES None of the electronic services developed during his tenure would have been possible without changing the corporate culture that Senese found in 1995. He joined the IEEE staff after nearly a decade with Bellcore, now Telecordia Technologies, in Piscataway, N.J., USA, where he held a number of positions, including his last as vice president of quality. When he came on board, he encountered a newly installed member database system fraught with problems, few automated processes, and inadequately trained staff using outdated computers.

"The IEEE was a reactive organization back then—the culture wasn't to propose new and innovative ideas," he says. "And the company wasn't investing in its future. Budgeting for information technology systems was modest and relatively flat until the new membership system was put into place. Spending money to train staff on the latest technology was low, too. Some of the computers our employees were using were castoffs donated by other companies."

Senese changed all that by implementing process and project management techniques, introducing the Malcolm Baldrige



Senese is proud of the IEEE's Data Center, which supports myriad electronic services for members.

quality approach to IEEE activities, and putting a priority on employee training.

"We've deployed many educational programs for the staff," he says. "That's important because these training tools help us provide better service."

The IEEE also started surveying its members, customers, and volunteers annually to gauge their satisfaction with the institute's activities. The findings are used in a variety of ways.

"We established metrics based on these survey results and other information, and we use them to monitor our performance," Senese explains. "And we tie staff compensation to these metrics. That's something that has really helped the organization improve."

Senese says another change that has served the IEEE well was to alter the staff's work culture. "Our culture now includes things like putting the member and customer first and respect for employees and volunteers; it's helped us become more responsive to our members, our customers, and our volunteer partners," he says.

"We in management try to lead by example," he continues. "We try to get people involved in decisions of the organization that affect them—which we call participatory management. We hold people accountable, and we expect that their word's going to be their bond. We also expect people to demonstrate innovation and continuous improvement as part of our culture. And we strive for open, honest communication and feedback."

One of the hallmarks of the IEEE today is that cross-organizational teamwork is much improved, he says.

"We now have teamwork across the entire organization," he says. "Not too many things of any significance get done by one group alone. There are usually partnerships between various parts of the IEEE. I'm very proud to say that's part of the culture we changed."

FINANCES All the new programs and services came with a hefty price tag, which meant the IEEE had to get its financial house in order.

"We've grown to become a US\$240 million organization, yet until recently, the financial model we used for budgeting was designed for an organization that was very centralized," Senese says. "That meant costs were not being charged to the units that used those services; today the model is consistent with the highly decentralized organization that we are."

He says revamping the IEEE's budgeting process was difficult "because it changed the total underpinnings of how we did our finances. But it's really made a big difference because it created much better business behavior. These changes led to better decisions being made throughout the organization relative to setting priorities and the prices for products and how we deal with expenses."

He notes that a comparison of the net operating budget results from 2002 to those from 2001—after the new financial

model was implemented—showed an improvement of more than US\$17.5 million.

There were tough economic times shortly after the new financial model was put into place in 2001, but "we didn't sacrifice service," he says. "And we didn't eliminate many of the altruistic, good things that we do for the public that makes the IEEE the great organization that it is."

He also notes that the IEEE did well during recent difficult financial times. "We weathered the SARS outbreaks in 2003 that affected our conference attendance and the economic downturn that occurred worldwide," he says. "And we've continued to be a very viable organization financially."

CHALLENGES AHEAD Senese says he feels he is leaving a financially healthy, well-run organization

positioned favorably for the future, but he sees challenges ahead for his successor. These include competitive threats from for-profit publishers, open access to information, and getting more young professionals to join.

"There's a movement in the publishing arena of open—or free—access to information, which could have a significant financial impact on the IEEE," he says. "Also, people coming out of school today aren't as apt to join professional associations as a way to give back to their profession. They are looking more, as they should, at what's in it for them; what's the value added?"

Senese reports that the IEEE Board of Directors is getting much more engaged in strategic issues. As it becomes clearer how the IEEE should respond, "we can turn these issues and threats into opportunities," he notes. "I believe the organization that's in place today is well positioned to respond with the right types of talent, skill, and mind-set. It's the right time for a new person to come in and, partnering with the volunteers, take the IEEE to the next level."

Senese has made no firm plans about what activities he'll take up in retirement, other than to spend more time with his wife and two daughters. He also looks forward to enjoying his hobbies, which include model railroading and flying radio-controlled airplanes.

"I'm just going to do some reflecting before moving forward," he says. "But I will be keeping a close eye on the IEEE as a member." ●



Orrin G. Hatch (R-Utah), when he introduced the bill in June. Such a business model underlies recent copyright suits against such companies as Aimster, Grokster, Napster, and others relying on P2P technology.

But IEEE-USA says the bill is far too broad, that its wording could implicate not just the bad actors persuading others to steal copyrighted music but also manufacturers of the equipment used to make the illegal copies. Such companies could include those that make file servers and DVD recorders as well as suppliers of the P2P file-sharing software, assert IEEE-USA and other engineering groups. They see the risk as so significant that they fear the bill, if passed into law, could chill investment in the development of innovative equipment.

In July, representatives of IEEE-USA's Intellectual Property Committee (IPC) voiced their opposition before the Senate Judiciary Committee. And in September, more than 40 other organizations joined IEEE-USA in sending a letter to the Judiciary Committee protesting the bill. Signers ranged from electronics trade associations (such as the Consumer Electronics Association and the Telecommunications Industry Association) to individual hardware manufacturers (such as RadioShack and Texas Instruments) to telephone and Internet service providers (such

as BellSouth Corp., Earthlink, Verizon, and Yahoo Inc.). In early October, the Judiciary Committee tabled the issue for the current year, but many speculate that Hatch will reintroduce the bill in the new session of Congress in early 2005. Meanwhile, here is a rundown of the key issues:

Some would like legislation to be as **PRECISE** as a **PROGRAMMING MANUAL**, but if rules are overly precise, you're telling **INFRINGEMENTS** how to get around them

THE "INDUCE ACT" The title of Senate bill S.2560 is the "Inducing Infringement of Copyrights Act of 2004," but it is known as the "Induce Act." Sponsored by Hatch and a bipartisan group of nine other senators, the act tries to add the concept of "inducement" into copyright law, which could hold liable any party whose products or services facilitate the infringing of copyrights—and the making of illegal copies—even if the inducer does not infringe directly, and even if the product or service has legitimate uses.

The purpose of copyright law is to grant a copyright owner a temporary monopoly over several powerful rights, in exchange for making public a "highly expressive work" that contributes to culture. That monopoly includes exclu-

sive rights to duplicate, distribute, or perform the work—which the copyright owner may license to earn royalties. Copyright law also imposes stiff penalties, a minimum of US\$750, for each infringement. Explicitly adding inducement would make copyright law parallel to the U.S. Criminal Code, whose first sentence declares that whoever aids, abets, advises, commands, or tempts another to commit a crime—say, stealing—is as guilty as the thief who physically runs off with the goods. Codifying inducement would put teeth into copyright law and "confirm that creative artists can sue corporations that ... now seem to think they can legally profit by inducing children to steal ... with false promises of 'free' music," Hatch stated.

Thus, Hatch and his cosponsors propose to modify copyright law to declare that "whoever intentionally induces any violation ... shall be liable as an infringer."

Despite what equipment and software manufacturers fear, Hatch states that his bill "does not target technology," nor does it "demonize certain software It will not impose liability on the manufacturers of copying technology merely because the possibility exists for abuse The law only penalizes those who intentionally induce others to infringe copyrights."

IEEE-USA'S CONCERNS "What Hatch says and what the bill actually does are two different things," Andrew C. Greenberg, vice chair of IEEE-USA's Intellectual Property Committee, told *The Institute*. Greenberg is an attorney specializing in intellectual property and technology law with Carlton Fields, P.A., of Tampa, Fla., USA. "The language has more in common with complicity in an illegal-drug bill than with patent law," he says. In practice, he declares, S.2560 as drafted "is so broad it could even implicate e-mail."

Instead, Greenberg and others want to see S.2560 modeled after a landmark 1984 U.S. Supreme Court decision in the copyright-infringement case of *Sony Corp. v. Universal City Studios Inc.* Back then, the movie studio sued Sony for inventing the Betamax VCR, which could record copyrighted movies and other programs off broadcast or cable TV. In its famous 1984 ruling, however, the Supreme Court held that Sony was not liable for copyright infringement even though some consumers would use Sony's machines to make illegal copies of copyrighted TV programs. In legal terms, the Supreme

Court declared Sony did not have "secondary liability" simply for inventing a technology that was capable of infringing copyrights.

The court reached that decision by importing a rule from the U.S. Patent Act: that a company is immunized from secondary liability if a product it makes has substantial noninfringing use. The Betamax VCR could also be used, for example, to play prerecorded tapes of movies that consumers could legitimately purchase from movie producers, or that they themselves had made. In effect, "the court recognized that a company can't control what users do with a product," Greenberg explains. "Secondary liability would hold a company responsible for the sins of its cus-

tomers." In a paraphrase of the slogan of the National Rifle Association, Greenberg summarizes the ruling this way: "Technologies don't infringe copyrights. Users do."

But S.2560 "seriously undermines" the 1984 Supreme Court ruling, Greenberg continues, because the proposed law "creates meaningful liability for any technology having a mere capacity for infringing." Indeed, he asserts that under S.2560, a high-tech company would risk being prosecuted for "appearing" to induce infringement merely by inventing a copying technology—even without evidence of actual intent. "In my view, Sony might have lost 20 years ago under this standard," Greenberg concludes.

Greenberg says he fears that the wording of the proposed law is so vague that it would chill high-tech developments. Companies would not know what they safely could develop without risking a lawsuit. Nor would they have a good chance of winning a summary judgment—that is, a ruling in their favor by a judge before a lawsuit goes to trial, as is frequently done in cases where both the law and the facts seem clear-cut.

However, not everyone on the IPC shares Greenberg's fears. One who does not is Senior Member Lee Hollaar, former chair of the IPC, and a professor of computer law in the School of Computing at the University of Utah in Salt Lake City, USA. Hollaar wrote a paper on the Sony decision and inducement that influenced Hatch and others writing the Induce Act. "Liability for inducement of copyright infringement has been recognized in court cases since at least 1971," Hollaar recounts. During the Sony case in 1984, he says, the Supreme Court actu-

ally used a standard similar to that of the Induce Act to find that Sony had not induced copyright infringement.

Because of that precedent, he says he feels that today no additional legislation is necessary, but he adds that discussion of inducement would focus the courts' attention away from technology and toward bad conduct. According to Hollaar, people have made similarly dire predictions when copyright law has been changed in the past, but the dreaded outcomes have rarely occurred.

Hollaar told *The Institute* that, "while some would like legislation to be as precise as a programming manual, if you write rules that are overly precise, you're actually telling infringers how to get around them. And because fair use [a right granted to users to make limited copies for certain purposes] doesn't have a clear definition, any company will face uncertainty if a noninfringing use of its product is to depend on a finding of fair use.

"The fact is, whenever a company invents a new technology, it's never sure whether it's going to get sued or not," Hollaar continues. "Well, that's life. Manufacturers want to live in an era of complete certainty and for the law to be as prescriptive as a programming manual, so it's really easy to scare them. And they want to impose an incredibly high standard so a case will be tossed out of court no matter how unfavorable the facts are."

FAIR METHODS While legal eagles wrangle over legislative language, engineers are proposing Internet file-sharing methods that might prove acceptable to both the entertainment and high-tech communities. Just one example

is a proposed protocol called Music2Share (M2S) for copyright-compliant music sharing in peer-to-peer systems. It is described by IEEE Fellow Ton Kalker of Philips Research, Eindhoven, the Netherlands, and four coauthors in the June 2004 issue of *The Proceedings of the IEEE*. The decentralized M2S protocol allows downloaders to pay for music with prepaid software tokens. The protocol integrates the identification, tracking, and sharing of music with licensing, monitoring, and payment.

"Essentially, there's a need for balance between the needs of the creative artists and the needs of entrepreneurial high-tech industries," says Senior Member Glenn S. Tenney, current chair of the IPC and president of Fantasia Systems Inc., a consulting company in San Mateo, Calif., USA. "We feel the Induce Act is lopsided toward the content providers, and we want assurance that IEEE members are engineering in good faith." ●

FOR MORE INFORMATION

Links to the Induce Act and statements by the IEEE and other organizations are found at <http://www.ieeeusa.org/policy/issues/INDUCE>.

The letter signed by IEEE-USA and 40 high-tech organizations is available at <http://www.ieeeusa.org/policy/POLICY/2004/092804.pdf>.

Hollaar's discussion of inducement and the Supreme Court's Sony decision is at <http://digital-law-online.info/papers/lah/sony-revisited.htm>.

Have you used your IEEE Member discount today?

IEEE members save on every product in ShopIEEE – often as much as 50% off list price.

From conference proceedings to standards to CD-ROMs, ShopIEEE is your definitive source for what you need – and the most affordable way to get it!

shop.ieee.org

Shop **IEEE**

 **IEEE**



Worldwide Workshops Boost University Accreditation

BY WILLIAM LEVENTON

FOR THE PAST 15 YEARS, IEEE Fellow Lyle Feisel and his institute colleagues have been spreading the word about an important but sometimes neglected issue in university-level technical education: the process of accrediting a school's engineering and science programs. Accreditation signifies that an institution maintains standards that qualify its graduates for professional practice or for admission to higher institutions.

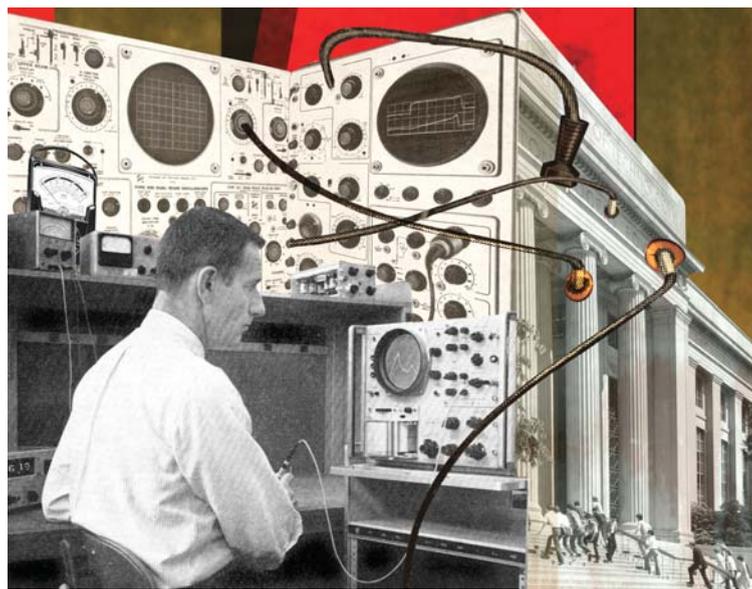
Feisel chairs the IEEE Educational Activities Board's Committee on Global Accreditation Activities (CGAA), which has carried its message to 17 countries. The committee sponsors workshops to educate the IEEE's many regional groups on the criteria that academic programs must meet to qualify for accreditation. For example, graduates of an engineering program should be able to design and conduct experiments and analyze and interpret the resulting data. Courses in the curriculum must teach these and other specified skills. The workshops also encourage IEEE members to get involved in their country's establishment of an accreditation process, if there is none, or to play a role in making or keeping an existing process successful. Feisel estimates that engineering schools in more than half of the countries with IEEE members have no accreditation process, relying instead on less stringent government certification.

During Feisel's tenure on the CGAA, the committee has taken its accreditation message to such widespread locales as Bangalore, India; Buenos Aires, Argentina; and Bratislava, Slovakia. A CGAA workshop in San Salvador, El Salvador, was the catalyst for developing an accreditation system in Peru, Feisel reports. In addition, he notes, a workshop in Germany had "a significant influence" on the move toward accreditation in that country, as well as on the features of the system that was eventually established. The IEEE has also influenced accreditation activities in Austria and Mexico, he notes.

ONE OF THE FIRST The CGAA held some of its earliest workshops in Mexico. Those in 1991 and 1992 "made engineering deans in Mexico aware of the benefits of having an accreditation system," recalls IEEE Fellow Teofilo Ramos, dean of institutional effectiveness at Mexico's Instituto Tecnológico y de Estudios Superiores de Monterrey. Two years after the 1992 workshop, Mexican officials launched the country's first accreditation organization, known as CACEI (based on its initials in Spanish). Since its inception, CACEI accredited 215 engineering programs throughout Mexico, according to Ramos.

At the Mexican workshops, the focus was on U.S. accreditation programs. "Back then, there were very few accreditation systems in the world," Feisel says. "People wanted to hear about what was going on in the United States."

The Accreditation Board for Engineering and Technology (ABET) sets standards by which U.S. undergraduate programs are judged. The IEEE is one of 30 professional engineering and technical societies that



make up ABET, which accredits nearly 2500 engineering, engineering technology, computing, and applied science programs at more than 550 colleges and universities in the United States. (Accreditation of university programs is not a one-time-only process but is repeated every few years.)

As accreditation systems sprang up around the world, Feisel and his colleagues realized that ABET-style accreditation wasn't appropriate for every country. So their workshops adopted what Feisel describes as a more general approach, presenting information about various accreditation systems, not just those used in the United States.

The new approach made its mark at a workshop last year in Espoo, Finland. "I was surprised that so many different [accreditation] systems exist in Europe," says Member Vello Kukk, a professor at Tallinn University of Technology in Estonia. Kukk was also interested to learn that more volunteers in academia and industry are needed to become involved in accreditation.

THAILAND'S TURN One of the more recent accreditation workshops was scheduled for 6 to 8 November in Bangkok, Thailand, a country that does not yet have a formal accreditation process for its engineering schools. (The workshop had not yet taken place at press time.)

The workshop would be the first ever held in Region 10 (Asia and the Pacific Rim), according to IEEE Fellow

Akinori Nishihara, a member of its planning committee. It would be hosted by the IEEE Thailand Section and the International School of Engineering at Chulalongkorn University in Bangkok. The registration list included government officials, university leaders, and industry executives in the Asia-Pacific region. About 50 people were expected to attend.

Feisel and his team were to give an overview of accreditation fundamentals, as well as describe the various kinds of accreditation processes in use and in development around the world. But less time than usual was set aside for experts from outside the region to talk about their accreditation experiences. That was in response to feedback from past workshop participants who wanted more time to exchange information about accreditation programs pursued within their own regions.

Region 10 is diverse, with education and accreditation systems differing greatly from one country to another, says Nishihara, who is a professor at the Tokyo Institute of Technology. To give attendees a taste of this diversity, about 10 of Nishihara's Asia-Pacific colleagues were scheduled to talk about accreditation in their countries.

One of his colleagues is Renate Sitte, a senior lecturer on the Engineering and Information Technology faculty at Griffith University in Brisbane, Australia. Her presentation focuses on Australia's two approaches to accreditation. One recognizes the educational credentials of people who come to Australia from other countries; the other involves mutual recognition of an engineering degree by a number of countries.

Sitte says she hoped the workshop would be a step toward standardizing accreditation processes in her region. Standardization would ease the transition for engineering students traveling from one country to another, and it would help ensure an even level of excellence in her region's universities, she says.

According to recent surveys cited by Feisel, past participants value their workshop experience. Mexico's Ramos is no exception. The workshops in his country "made me and all the participants aware of the real essence of an accreditation system and how it can help improve the quality of institutions and programs," he says.

Looking ahead, Feisel sees the possibility of a workshop in 2005 in Region 9, which covers Latin America. "Our goals will remain the same," he says. "We want to help engineering education in other countries and help our members contribute to those education systems." ●

FOR MORE INFORMATION

To read about the Committee on Global Accreditation Activities and its workshops, visit <http://www.ieee.org/organizations/eab/apc/cgaa>.

MEMBERS RATE IEEE'S VALUE

Survey shows respondents like networking with peers but want more continuing education

BY KATHY KOWALENKO

Results were mixed when the IEEE surveyed its members last year to find out how satisfied they were with the organization's products and services.

Conferences, local meetings with other professionals, and online collaboration such as forums and newsgroups were important to them, and members liked what they were getting. Areas where members looked for improvement included online access to technical resources, continuing-education opportunities, and representation of their viewpoints on public policy issues.

The results of the recently released members' study were based on a 42-question survey of more than 3600 members from around the world (student and life members were not included). Wirthlin Worldwide of Reston, Va., USA, a well-known market research firm, conducted the study between September 2003 and January 2004 in coordination with the IEEE Membership and the IEEE Research groups.

"Members gave us data on a broad range of topics—which will help the IEEE assess both the importance of many of its products and services and their modes of delivery," says Mike Binder, director of IEEE Membership. "Through this study, we are able to see how our members feel about the IEEE, as well as what they value in their membership."

ROOM FOR IMPROVEMENT Nearly half the respondents indicated that continuing education was very important to them. Some 30 percent expressed that they were highly satisfied with the IEEE's current programs. More than 85 percent indicated they would probably or definitely take a continuing-education course if the IEEE offered it for free, and more than half said they would likely take a course for a fee.

Members also said they prefer continuing-education courses to focus on technical subjects instead of on so-called soft skills such as time management, leadership skills, and managing people.

Standards proved to be another area in which the IEEE could be doing better. More than 60 percent said online access to standards was very important to them, but

37 percent said they were highly satisfied with the IEEE's delivery of this service.

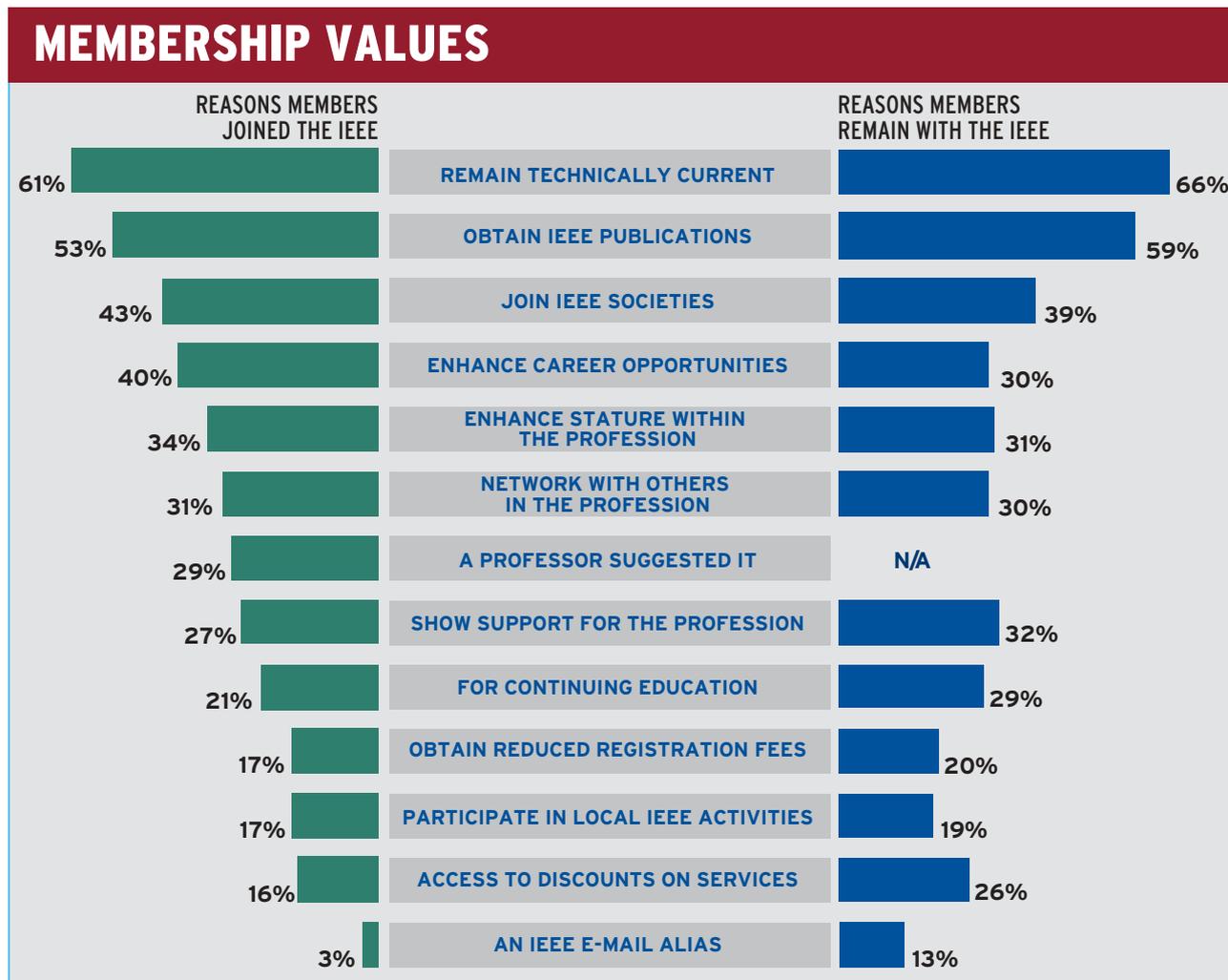
The survey also revealed that U.S. members are concerned that the IEEE is not adequately addressing threats to the profession's future. In particular, the rise in outsourcing of U.S. engineering positions to other countries is a major worry. On the other hand, members living outside the United States responded

sions, hopefully with certification, which would improve my technical knowledge and my competencies," one member wrote.

VALUE OF MEMBERSHIP The survey also explored the reasons why members belong to the IEEE [see chart "Membership Values," below]. Most said it's to remain technically current in their field or to obtain technical publications.

nearly 60 percent cited an online source, either a society Web site or the IEEE Xplore document delivery system, while 34 percent still chiefly turn to a print copy of a publication. The survey also showed that the most popular IEEE services are its conferences, products, and e-mail aliases.

For an organization that relies so heavily on members who volunteer their time,



that the IEEE is too U.S.-centric. In another area, some said the IEEE should take more action to elevate the profession's stature.

Members were able to add written comments, and many did. Some members called on the IEEE to lower the price of services, specifically for conferences and standards.

"Understand my professional needs and propose specific courses and training ses-

"The most important aspect of my IEEE membership is access to knowledge and information," one respondent said. "This enables me to communicate more effectively on business issues with my staff and peers."

Among other major reasons individuals join the IEEE are to enhance their career opportunities and to join technical societies.

When asked where they typically go first to get IEEE technical content,

the study revealed that some 80 percent of respondents said they have never volunteered, while only 7 percent said they currently hold a volunteer position.

Many members say they didn't realize the great variety of products and services offered by the IEEE until they took the survey. No wonder, then, that a number of members noted that the organization should do a better job of promoting the full range of its programs.

Members Help Build Bridges to Policymakers

BY PEG GALLOS

USUALLY IEEE MEMBERS have little influence or interaction with government officials. But a few are able to bridge that gap by taking on advisory roles to government.

Here's how three of our members have fared in India, Malta, and the United States:

Member Rahul Tongia, a research faculty member at Carnegie Mellon University, in Pittsburgh, Pa., USA, finds the time to give advice to the International Institute of Information Technology in India as well as to the United Nations. A member of the university's computer science department and its engineering and public policy department, he volunteers for "work that has value" and that concerns "rich real-world and relevant topics."

How did he become a government advisor? "To some extent, in developing nations like India, the chance of becoming a government advisor is based on either your position in society or your personal connections," explains Tongia, a citizen of India.

In Tongia's case, it was personal connections. His work during the last decade on information technology and telecommunications projects puts him in touch with colleagues who had been top advisors to the Indian government. E-mail and frequent visits make possible his role as, basically, a long-distance advisor.

Tongia, who does research at Carnegie Mellon, uses his volunteer work to extend his own understanding of his technical areas and to extend his networking opportunities with others. He notes that, as in other countries, government officials in India are not technology specialists.

"Government officials' lack of technical knowledge is especially an issue in high-tech or IT [information technology] policy, where the pace of change is so fast," he says. "The Indian government runs many telecommunications services, and so it must design and run networks and buy and install equipment.

"Unfortunately," Tongia says, "senior government officials who have begun to gain some technical understanding can be



Emily Sopensky, IEEE-USA Engineering and Diplomacy Fellow, advises the U.S. State Department on upgrading its information technology systems.

Policy often is determined without enough serious analysis by **HIGHLY SKILLED PEOPLE**

transferred quickly. They do their best to glean information from the Web and update their skills at training programs offered by equipment vendors. Nevertheless, policy often is determined without enough serious analysis by highly skilled people."

One advisory role was not enough for Tongia. He also took on the vice chairmanship of the United Nations Information and Communication Technologies

Task Force Working Group on Low-Cost Connectivity Access. This group is looking for inexpensive ways to bring the World Wide Web to less developed regions in Africa and elsewhere. A citizen of Chad, for example, would have to pay eight years' salary for one year of basic Internet connectivity. In the United States, by contrast, the service costs on average less than 1 percent of a year's salary.

Tongia also sees his advisory experiences with the U.N. and India as topics for research papers.

"Given my interdisciplinary fields at Carnegie Mellon, the work I do manifests itself in my research," Tongia says. "My advisory and discussion roles certainly mesh with the academic and research needs of the university."

REAL-WORLD GUIDANCE On a Mediterranean island, Member Charles V. Sammut is a senior lecturer in physics at the University of Malta in Msida. He teaches quantum mechanics, electromagnetic theory, and microwave physics, and supervises postgraduate students.

"I decided a few years ago to open up the prospect of work outside the university," he says. He was eager to break away from the "academic ivory tower"—as he puts it—and, like Tongia, apply his skills to real-world problems.

As a result, he is a salaried project manager for two of his country's agencies, the Ministry of the Environment and the Malta Communications Authority. He's working on a progress report on Malta's three-year plan to decrease the country's greenhouse gas emissions. The reduction is required under an agreement adopted in 1992 as part of the United Nations Framework Convention on Climate Change.

The framework was a forerunner of the Kyoto Protocols, which in 1997 established constraints on greenhouse gas emissions. Malta was one of 186 nations that signed on; the United States did not. Sammut and a colleague at his university, Alfred Micallef, supervised four working groups composed of 30 specialists—from climatologists to economists—who inventoried the output of greenhouse gas emissions in Malta, including those produced by burning fossil fuels in vehicles and methane from waste. Their research has helped find ways to reduce emissions. Sammut is also working on another project, identifying fuel cells and other technologies that could help reduce air pollution.

Sammut's second government advisory project is closer to his own area of specialization. For the Malta Communications

Authority, a semiautonomous government organization, he is monitoring electromagnetic emission levels from cellphone base-station antennas to establish exposure patterns. He is collecting data on 400 sites around the country and is measuring electromagnetic fields at 150 of them.

There is a downside to the work in that it takes him away from his family more than suits him. "I can't chip in and help at home as much as I would like," he acknowledges. But the payoff is that his expertise is helping his nation.

"For me, that is quite satisfying," he says, adding that his contacts sometimes help his students find jobs once they graduate.

GOVERNMENT FELLOW As an IEEE-USA Engineering and Diplomacy Fellow, Emily Sopensky's portfolio at the U.S. Department of State, in Washington, D.C., includes two major department-wide initiatives dealing with upgrading the agency's information technology systems. To do that, she is taking time out from running her own business, The Iris Co., in Austin, Texas, where, as a business consultant, she works on marketing communication projects for different companies. Sopensky performs such tasks as producing product and facilities brochures, planning special events, supervising training sessions, and writing and editing execu-

tive reports, news releases, white papers, and newsletters.

"At the State Department, I found my skills in communication were just as highly valued as in my business," Sopensky notes.

One IEEE-USA Engineering and Diplomacy Fellow is chosen each year to serve at the Department of State. The fellowship provides an opportunity for an engineer to lend technical expertise to the department and help raise awareness of the value of an engineer's input, while that person learns about the foreign policy process. Fellows receive a US\$55 000 stipend from IEEE-USA, plus US\$5000 in relocation assistance.

Sopensky has proposed several projects in her advisory role. One is a detailed record-keeping project for the State Department called the State Messaging and Archive Retrieval Toolset, known as SMART.

Diplomats still share documents with each other through hand-delivered diplomatic pouches that may have to travel from one side of the globe to the other. In a world of e-mail and instant messaging, that mode of communication is certainly outdated, notes Sopensky. SMART aims to revamp this archaic messaging system by upgrading the department's communications systems.

"There are certain innovations in management and procurement being used in

the SMART effort that might be useful in other areas of the State Department," Sopensky says. For example, being able to communicate electronically with State Department outposts means they can be brought quickly up to date on new policies—which improves the accuracy and timeliness of their information.

For the Office of eDiplomacy in the State Department's Bureau of Information Resource Management, Sopensky is working on setting up virtual consulates on the Web to improve communication between State Department offices in Washington and U.S. embassies and consulates abroad. The Web sites, which will be managed by the overseas outposts, will also help U.S. citizens find information about a country they may plan to visit or live in. The information ranges from adoption services offered in the country to driving regulations to residency requirements to the names and locations of language schools.

She also has been busy compiling a comprehensive list of the State Department's Internet, intranet, and classified Web sites. Ideally, Sopensky says, the department will update the list periodically to eliminate duplication, and through surveys, try to gauge whether its Web-based communications are as user-friendly as they can be.

Sopensky is also involved with upgrading the State Department's videoconferencing capabilities. She is supervising the testing of low-cost, low-bandwidth technology and 3-D equipment that could bring videoconferencing to the agency's more remote and less technologically sophisticated outposts.

Despite her full plate, Sopensky recently organized an IEEE-sponsored conference in Boston that brought in academics and professionals to update State Department officials on advances in the Internet and other communications technology.

"I feel it is important for those developing policy to understand what technologies are not only here but are around the corner," she says. ●

FOR MORE INFORMATION

Sopensky's report from the U.S. State Department to the IEEE-USA Government Fellows Committee details her progress so far. Read it at <http://www.ieeeusa.org/policy/GOVFEL/reports/sopensky1.html>.

IEEE-USA is accepting applications for Engineering and Diplomacy Fellowships beginning in January 2006. The deadline for postmarking your application is 21 February. Visit <http://www.ieeeusa.org/policy/GOVFEL>.

High-Limit Insurance Program

Now Available to IEEE Members in France

COMING TO MORE
COUNTRIES IN
REGION 8 SOON!

The new High-Limit Accident Plan from the IEEE Financial Advantage Program involves minimal underwriting, with basic eligibility requirements. There are no long forms to complete, no medical exam to take, and no health questions to answer. Look for additional insurance plans for Region 8 in the coming months!

For the latest updates, visit:
www.ieeeinsurance.com/int/international.asp

The IEEE Financial Advantage Program®
Tools to Secure Your Tomorrow



How to Handle Plagiarism: New Guidelines

BY PAT JANOWSKI

IF A BURGLAR MADE OFF with your stereo, you would know what to do. But what if a professional colleague stole your words? Plagiarism—the act of using someone else’s work without giving proper credit—is a crime of intellectual property, and one might argue that it is just as serious as a crime of real property. Yet the rules of what constitutes plagiarism and how it should be dealt with are not always clear.

With that in mind, the IEEE Publication Services and Products Board (PSPB) has approved new guidelines for the IEEE that define different levels of plagiarism and set corrective actions to be taken for misconduct [see sidebar, “The Five Levels of Plagiarism”].

It used to be much more difficult to plagiarize than it is today. Another person’s work might have been copied laboriously by hand or, later, more easily with a Xerox machine; now someone’s words can be lifted quickly with a couple of mouse clicks. Electronic dissemination of information during the past few years has been an important contributor to increased reports of plagiarism within the IEEE and elsewhere. The PSPB took action because of the dramatic increase in complaints.

Fortunately, there are two sides to the mouse-click equation. “What allows people to cut and paste others’ work into their own also allows offenders to be found, almost as easily,” says Bill Hagen, the IEEE’s intellectual property rights manager in Piscataway, N.J., USA. Authors can now use powerful search engines to find with relative ease unsanctioned use of their work—a nice way to say their work was plagiarized. “Authors were letting us know about more and more incidents of plagiarism,” says Hagen.

According to Michael R. Lightner, IEEE vice president, Publication Services and Products, and 2005 IEEE president-elect, “The IEEE publishes approximately 450 000 pages a year, under a hundred different editors, hundreds more associate editors and over 300 conference publication chairs. With this volume, you’re bound to have violations.”

Lightner notes that the IEEE has always had procedures in place to deal with plagiarism, but they weren’t uniform. “Some parts of the IEEE would impose a very harsh penalty, and others would have a milder one,” he says. The PSPB’s new guidelines address the disparities. “We felt it was incumbent upon us to examine what we were doing and come up with some uniform processes, definitions and principles throughout the institute,” he says.

Part of the inconsistency might have stemmed from confusion about the different levels of plagiarism. Some plagiarism is intentional, and some comes from sloppy work practices. Other times it results from a misunderstanding of what constitutes plagiarism. The guidelines now outline five levels of plagiarism, as well as the corrective action to be taken for each one. Actions can range from a written apology to the original author to the temporary suspension of the offending party’s IEEE publishing privileges.

MAKING THE RIGHT CITATIONS “So much of research and technology is based on work that preceded it,” Hagen says. “Authors should check that their own writing is original. They can incorporate what might have been done previously if they cite it properly.”

It’s not always easy to spot an incident of plagiarism, however, before it’s too late. “Conferences are a particular problem,” Hagen says, “because of the large number of papers usually involved. Papers get reviewed for quality, but since most conference proceedings have a faster review cycle than periodicals, reviewers may not have an opportunity to recognize plagiarism.”

And, when sections of a published conference paper are found to have been plagiarized, it may not always be easy to find the person to complain to. It’s much easier to complain to an editor of a regularly published journal.

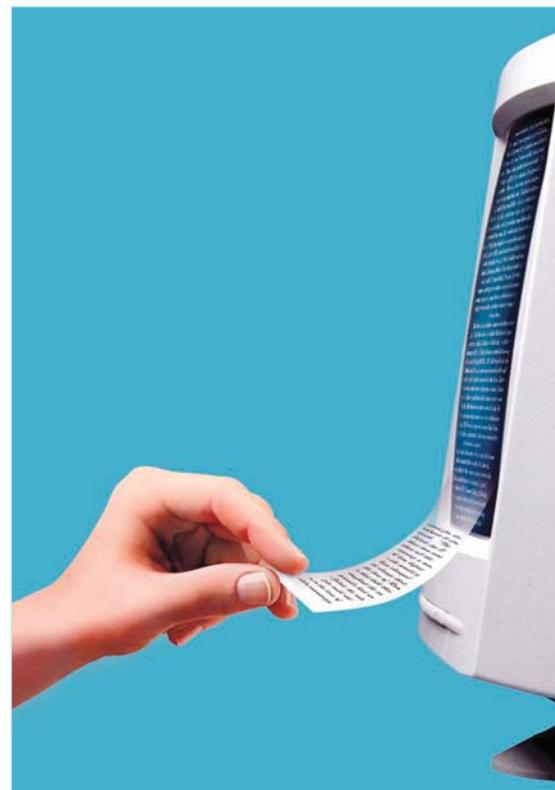
“The thing to do with a conference paper,” Hagen says, “is go to the next higher level, to ask the vice president for publications of the society sponsoring the conference, or the equivalent, to consider the situation.”

FITTING SANCTIONS By the time a decision is made that a paper has violated the plagiarism guidelines, it usually has already been printed. A key question is whether to permanently remove it from the electronic record—a policy recently adopted by one major for-profit publisher. “The IEEE’s decision was to permanently mark the online paper as being in violation of our plagiarism guidelines with a digital watermark [that remains with the paper permanently] but not to remove the document,” Lightner says. “We decided it was more important to preserve the historical record and to maintain consistency between what exists in print and online.”

According to Hagen, plagiarism is likely to become more of a problem, if only because in the past the practice may have gone unnoticed. “As search tools get more sophisticated the opportunity increases for more cases to be found,” Hagen says. “For example, the next version of IEEE Xplore will have a full-text search function that will allow users to enter longer strings of characters and words and increase the chances of finding duplicate or multiple instances of the same text in different papers by different authors.”

Lightner credits two volunteers, former PSPB Vice President Pete Morley and PSPB member Ken Dawson, as well as Hagen and Ken Moore, director of IEEE Book and Information Services, with taking leadership roles and doing a tremendous amount of research and work on the plagiarism guidelines.

The PSPB Operations Manual contains the new policy in Section 8.2 of Publication Guidelines, under the heading “Adjudicating Different Levels of Plagiarism.” It is posted at <http://www.ieee.org/organizations/pubs/pab>. ●



THE FIVE LEVELS OF PLAGIARISM

Uncredited verbatim copying of a full paper. Results in a violation notice in the later article’s bibliographic record and a suspension of the offender’s IEEE publication privileges for up to five years.

Uncredited verbatim copying of a large portion (up to half) of a paper. Results in a violation notice in the later article’s bibliographic record and a suspension of publication privileges for up to five years.

Uncredited verbatim copying of individual elements such as sentences, paragraphs, or illustrations. May result in a violation notice in the later article’s bibliographic record. In addition, a written apology must be submitted to the original creator to avoid suspension of publication privileges for up to three years.

Uncredited improper paraphrasing of pages or paragraphs (by changing a few words or phrases or rearranging the original sentence order). Calls for a written apology to avoid suspension of publication privileges and a possible violation notice in the later article’s bibliographic record.

Credited verbatim copying of a major portion of a paper without clear delineation of who did or wrote what. Requires a written apology, and to avoid suspension, the document must be corrected.

The guidelines also make recommendations for dealing with repeated offenses.

Benefits Gaining a Global Reach

BY WILLIAM LEVENTON

MORE THAN A third of IEEE members live outside North America, and the number is growing. But most of the organization's nontechnical benefits are available only in the United States and Canada.

Unfair? Members living in other countries say it is, and they regularly mention the lack of benefits. "If we pay the same dues, we would like to have the same services," says Christian Borgert, a member from Germany.

Spurred by their concerns, the IEEE is working on several programs meant to close the benefits gap. The aim is to expand the IEEE Financial Advantage Program (FAP), which offers a variety of benefits to members, including life insurance, financial services, and business products. The members' Individual Benefits and Services Committee (IB&SC), to which Borgert belongs, oversees FAP, which is managed by IEEE Member Benefits staff.

Accident insurance is offered already in France, and a life insurance program is coming to Germany. These products are part of a pilot program offering various low-cost group insurance plans to members in certain sections of Region 8 (Europe, the Middle East, and Africa). The program is being launched in two phases. In Phase 1, which began in July, a high-limit accident insurance policy that covers accidental death and dismemberment was offered to members in France. CNA Insurance Co. Ltd., an international firm with offices in Paris, underwrites the program. In Phase 2, the IEEE plans to introduce insurance programs in 2005 to Germany, Ireland, Italy, and the United Kingdom.

A likely product in Germany will be life insurance, says Borgert, who presented the idea to volunteers at a Region 8 conference in Stockholm, Sweden, in October. It was well received. "Tariffs are changing in Germany now to favor sales of life insurance, and we will be discussing this in greater detail with representatives of the German offices of the European branch of Marsh Affinity Group Service," Borgert says. Marsh, which is

the administrator of the IEEE's North American group insurance programs, has offices around the world.

LINKED VIA THE WEB There are reasons for optimism about the new programs, according to Markus Snowden, chair of IB&SC. For one thing, he notes that both CNA and Marsh already are well-known in France, Germany, and other European Union countries. And they have the experience of operating in those countries.

In addition, the pan-European project will take advantage of the Web. Links to the new French program have been posted on the FAP and the France Section Web sites. Members can click their way to a French-



language Web site for more information about the program and to submit an application. Similarly, literature for other IEEE sections will be in the country's official language or the customary language of business in that country.

Next on the agenda are group insurance plans for Ireland, Italy, and the UK. Snowden expects the FAP and Marsh to conduct member surveys soon to identify favorable products and price ranges. Plans likely will be launched in Ireland, Italy, and the UK sometime in 2005, Snowden says.

The FAP has also reorganized its Web site so that its programs are grouped according to IEEE region. Lynn Koblin, manager of IEEE Member Benefits, says she hopes that this change in format will help members find the products they qualify for. The new format also removes the visual emphasis on programs available only to U.S. members.

But the new programs are not the IEEE's

first efforts at offering FAP benefits outside North America. Several products already exist in some regions, and others have been tested, if unsuccessfully. For example, a credit card issued by MBNA is available in the UK as well as in Canada and Puerto Rico.

Another longtime product is the Gateway Insurance Program, which offers medical insurance for travelers and is underwritten by the Insurance Company of the State of Pennsylvania (USA), a part of the international insurance group AIG. Available to members in any country, four different Gateway plans cover medical expenses for accidents and illness that occur when members travel out of their home country.

LESSONS LEARNED IEEE's early offerings resulted in important lessons, albeit in some cases by trial and error, according to Koblin. For example, some members were critical of a UK credit card program that failed to include Ireland. Koblin explains that Ireland could not be included because that section was very small in terms of members, and the card provider's minimum membership requirements called for a much larger population.

In Mexico (Region 9) in 2001, lack of interest accounted for the demise of a group insurance program. In launching the program, Marsh and its Mexican-based insurance brokerage partner used an attractive direct-mail package written in Spanish to promote a group of plans similar to those offered in the United States. IEEE's section chairs in Mexico supported the program, even signing promotional letters endorsing it. Despite these efforts, fewer than 10 people bought the insurance, Koblin reports.

Why the difficulty in establishing such a program? Koblin says one reason may be the tendency for insurance providers to pull the plug on programs when demand doesn't immediately materialize. The Mexican group insurance program was available for just a few months before being discontinued, despite the considerable amount of development time that went into it, notes Koblin.

Another reason for the lack of success may be what Koblin calls "the U.S.-centric perspective" of program providers. As an example, Christian Borgert cites a short-lived Mexican credit card that was based on "a general misunderstanding of the needs of Mexican members. The approach was to have the program controlled by U.S. banks." Instead of working with Mexican banks, he says, the program dealt with an

American bank, which required Mexican members to transfer funds to the United States to get the card.

Today, Borgert and Koblin are working with Marsh in Europe to develop programs aimed at local populations. Koblin explains that local purchasing habits, payment preferences, and other factors are under consideration.

In other cases, benefit offerings have hit legal and regulatory roadblocks. For instance, the Canadian province of Quebec in Region 7 requires product literature to be provided in French as well as English. Such bilingual literature was not initially developed, owing mainly to the cost of translation.

At the behest of the IEEE Transnational Committee, the IEEE sought and recently received a waiver of the bilingual regulations because the organization has no physical presence in the country and does not own the content of the insurance literature posted on the FAP Web site. Sometime this month, therefore, members in Quebec will have access to all the same insurance plans as other Canadians.

Koblin describes two obstacles to developing insurance programs in Regions 8, 9, and 10: the lack of other affinity partnerships, like other engineering groups, that the IEEE can team up with to access programs, and the relatively small size of the IEEE membership in each separately regulated country. To boost the size of the insurance-purchasing group, Koblin hopes that some providers will be willing to pool IEEE members with those of other European trade and professional associations, a successful strategy for small group plans in the United States. A broader-based program would help create a sustainable and reasonably priced insurance product, she explains.

Koblin is optimistic about the future of the FAP outside North America.

"Unlike the operation in Mexico, in which the underwriter moved away from this business, Marsh has been investing heavily—in time and program development—to help make FAP successful in bringing nontechnical benefits to IEEE members," she says. The regional Web sites developed by Marsh and CNA Insurance (at their own expense) should prove attractive sources of information to members and become useful selling tools. ●

FOR MORE INFORMATION

To read about the Financial Advantage Program's offerings, visit <http://www.ieee.org/fap>.

MEMBER RECOGNITION

Carey in Japan on Mike Mansfield Fellowship

BY LINDSAY ELKINS

SENIOR MEMBER CAROLE CAREY can boast a long list of accomplishments at the IEEE. She has held several leadership positions including chair of the Baltimore (USA) Section and the liaison from the Regional Activities Board (RAB) to Women in Engineering (WIE). As liaison she attended WIE Committee meetings and kept the RAB informed of WIE activities. She is currently serving as the RAB liaison for 2004. She has also been the IEEE Engineering in Medicine and Biology Society liaison to the IEEE Standards Association Board.

Now as a Mike Mansfield Fellow, she is working full time in Tokyo at Japan's Min-



Carol Carey

istry of Health, Labor, and Welfare. The two-year Mike Mansfield Fellowship Program (named after the former U.S. ambassador to Japan and U.S. senator and congressman from Montana) was established by the U.S. Congress in 1994. The program's goal is to help U.S. federal government employees develop a better understanding of Japan and how its government works and to establish relationships with their counterparts in government, business, and academia. Carey went to Japan in July of this year from her job as an expert regulatory scientist with the U.S. Food and Drug Administration (FDA) in Rockville, Md.

"To participate in such a unique program where I can exchange ideas with colleagues in my counterpart agency in Japan is a rare opportunity," Carey says. "I feel the fellowship will help me build professional relationships and

improve the communication between the Japanese and U.S. governments."

Carey spent the first year of the program in the United States studying the Japanese language intensively and attending classes on the country's history, culture, politics, and economic policies. She also took seminars geared toward broadening her overall knowledge of the country.

She is now spending her second year in Tokyo. When she returns to the United States in July 2005 she will serve at least two more years in the FDA, likely working on projects involving Japan.

AN ENGINEERING START Carey has had a diverse career since she received a bachelor's degree in electrical engineering from Johns Hopkins University in Baltimore, in 1988, and her master's in computer engineering from Loyola College of Maryland, also in Baltimore, in 1998. With her bachelor's degree, she joined W.R. Grace Washington Research Center in Columbia, Md., USA, as a research assistant and application engineer. There she designed experimental laboratory setups and conducted experiments on catalyst requirements for methane oxidation for researchers developing synthetic fuels and materials for high-temperature superconductivity applications.

In 1988 Carey took an electrical engineering position with Energetics Inc., also in Columbia, where in support of government

programs she handled duties related to the mitigation of electromagnetic fields on power lines. She also performed technology assessments of new alternative sources of electric power for various applications, including batteries for electric vehicles.

Carey went to the FDA in 1990 to join the medical device program and participate in national and international standards development programs for medical equipment. She worked in various sectors there, most recently as a regulatory scientist responsible for reviewing the safety and effectiveness of complex cardiac devices, such as implantable pacemakers, before they are allowed to reach market.

Under the Mansfield fellowship, a typical day finds her at meetings to learn about the medical device regulatory processes and procedures of the Japanese government. She recently visited the National Institute of Advanced Industrial Science and Technology in Tsukuba to get an overview of its functional and organizational structure, and she has toured the labs at the Institute for Human Science and Biomedical Engineering, also in Tsukuba.

"I hope to bring back enough technical knowledge and regulatory expertise to assist in future collaborations between the U.S. and Japan that might help us reduce the time to market safe and effective medical devices to benefit the public in both countries," she says. ●

IN MEMORIAM

John Daniel Kraus, Antenna Pioneer

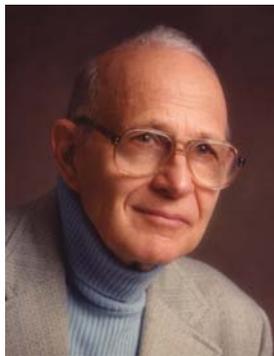
BY RONALD J. MARHEFKA
IEEE FELLOW

JOHN DANIEL KRAUS was a hands-on inventor, an antennas researcher, an insightful theoretician and, most important, an inspirational educator. I co-authored with John the third edition of the textbook *Antennas* [McGraw-Hill, 2002].

He studied physics at the University of Michigan in Ann Arbor, USA, where he conducted research on atomic particle accelerators. He received his Ph.D. in physics there in 1934. However, early on he developed an interest in subjects related to electrical engineering. For example, he was an avid amateur radio operator who used the call sign W8JK. It was during the long hours spent at his ham radio station that he became fascinated by the discovery of radio noise emanating from space, and how radio waves, rather than visible light, might someday improve exploration of the universe.

During World War II, John lived in Washington, D.C., where he worked for the U.S. Navy as a civilian scientist responsible for demagnetizing steel ships to protect them from magnetic under-sea mines. He also worked on radar countermeasures at Harvard University's Radio Research Laboratory in Cambridge, Mass., USA.

John began developing innovative and widely used antennas in 1937. Among his first designs were the W8JK closely spaced array, named after his amateur radio call sign, and the corner reflector. The W8JK antenna is used today by amateur radio operators, while the corner reflector is used extensively for television antennas.



John Daniel Kraus

His most famous design is perhaps the helical antenna, used widely in space communications and other applications. It allows waves passing through the upper atmosphere not to be affected by Faraday rotation, which occurs when the upper-atmosphere plasma causes a linearly polarized electric field to be rotated as it passes through.

John joined the faculty at Ohio State University in Columbus, USA, in 1946, where he concentrated his research on electrical engineering and radio astronomy. He designed and supervised the construction of the 110-meter-wide "Big Ear" radio telescope built in 1951 in Delaware, Ohio, USA. With the Big Ear, John and his team discovered some of the most distant objects at the edge of the universe and produced a nearly complete survey of the sky using radio waves. The now famous WOW signal, a one-time radio sequence possibly of extraterrestrial origin, so called because the researcher analyzing the data printout wrote "Wow" next to the signal, was detected in 1977 by Big Ear.

John also was closely identified with projects related to the Search for Extraterrestrial Intelligence (SETI). He edited and published *Cosmic Search* [Cygnus Quasar] in 1979, the first magazine on SETI.

JOHN DANIEL KRAUS: 94

DIED 18 July 2004

MEMBER GRADE Life Fellow

EDUCATION Bachelor's, master's, and doctorate—all in physics from the University of Michigan, Ann Arbor, USA

FIELDS OF INTEREST Electromagnetics, antennas, and radio astronomy

CAREER MILESTONES Civilian scientist with the U.S. Navy during World War II.

Worked at Harvard University's Radio Research Laboratory in the 1940s. Took a faculty position at Ohio State University in 1946

VOLUNTEER ACTIVITIES IEEE Detroit Section chair, 1940. Member of the Editorial Board of *IRE Proceedings* for 15 years. Founded the John Kraus Antenna Award from the IEEE Antennas and Propagation Society in 2004

AWARDS IEEE Centennial Medal, 1984; IEEE Edison Medal, 1985; IEEE Heinrich Hertz Medal, 1990; IEEE Antennas and Propagation Society Distinguished Achievement Award, 2003

John wrote hundreds of technical articles, and his textbooks made complex subjects accessible to students. In addition to *Antennas*, his books include *Electromagnetics with Applications* and *Radio Astronomy*.

John retired from Ohio State in 1980, but continued to work at his Big Ear facility until the late 1990s. ●

Nominations Sought for IEEE Awards

IEEE Sections, Societies, and individual members are invited by the IEEE Awards Board to submit nominations for medals, recognitions, and prize papers to be presented in 2006. The deadline for the Board to receive nominations is **1 July 2005**.

For nominating information, visit the Awards Web site at <http://www.ieee.org/awards> or contact: IEEE Awards Activities, 445 Hoes Lane, Piscataway, NJ, USA 08855-1331; telephone: +1 732 562 3844; fax: +1 732 981 9019; e-mail: awards@ieee.org.

■ **IEEE Medal of Honor**

For an exceptional contribution or an extraordinary career in the IEEE fields of interest.
Sponsor: IEEE Foundation

■ **IEEE Alexander Graham Bell Medal**

For exceptional contributions to the advancement of communications sciences and engineering.
Sponsor: Lucent Technologies

■ **IEEE Edison Medal**

For a career of meritorious achievement in electrical science, electrical engineering, or the electrical arts.
Sponsor: Samsung Electronics Co., Ltd.

■ **IEEE James H. Mulligan Jr. Education Medal**

For a career of outstanding contributions to education in the fields of interest of IEEE.
Sponsor: The MathWorks Inc., National Instruments Foundation, Pearson Prentice Hall, and Xilinx, Inc.

■ **IEEE Founders Medal**

For outstanding contributions in the leadership, planning, and administration of affairs of great value to the electrical and electronics engineering profession.
Sponsor: IEEE Foundation

■ **IEEE Richard W. Hamming Medal**

For exceptional contributions to information sciences, systems, and technology.
Sponsor: QUALCOMM, Inc.

■ **IEEE Jack S. Kilby Signal Processing Medal**

For outstanding achievements in signal processing.
Sponsor: Texas Instruments, Inc.

■ **IEEE Jun-ichi Nishizawa Medal**

For outstanding contributions to material and device science and technology, including practical applications.
Sponsor: The Federation of Electric Power Companies, Japan and the Semiconductor Research Foundation

■ **IEEE Robert N. Noyce Medal**

For exceptional contributions to the microelectronics industry.
Sponsor: Intel Foundation

■ **IEEE Dennis J. Picard Medal for Radar Technologies and Applications**

For outstanding accomplishments in advancing the fields of radar technologies.
Sponsor: Raytheon Co.

■ **IEEE Simon Ramo Medal**

For exceptional achievements in systems engineering and systems science.
Sponsor: Northrup Grumman Corp.

■ **IEEE John von Neumann Medal**

For outstanding achievements in computer-related science and technology.
Sponsor: IBM Corp.

■ **IEEE Honorary Membership**

For meritorious service to humanity in IEEE's designated fields of interest.
Sponsor: IEEE

CORPORATE RECOGNITIONS
■ **IEEE Corporate Innovation Recognition**

For outstanding and exemplary contributions by an industrial entity, governmental or academic organization, or other corporate body, which have resulted in major advancement of electrotechnology.
Sponsor: IEEE

■ **IEEE Ernst Weber Engineering Leadership Recognition**

For exceptional managerial leadership in the fields of interest to the IEEE.
Sponsor: IEEE

IEEE SERVICE AWARDS

■ **IEEE Richard M. Emberson Award**

For distinguished service to the development, viability, advancement, and pursuit of the technical objectives of the IEEE.
Sponsor: IEEE Technical Activities Board

■ **IEEE Haraden Pratt Award**

For outstanding service to the IEEE.
Sponsor: IEEE Foundation

IEEE PRIZE PAPER AWARD

■ **IEEE W.R.G. Baker Award**

For the most outstanding paper reporting original work in any of the IEEE transactions, journals, magazines, or proceedings.
Sponsor: IEEE W.R.G. Baker Prize Paper Award Fund

■ **IEEE Donald G. Fink Award**

For outstanding survey, review, or tutorial paper in any of the IEEE transactions, journals, magazines, or proceedings.
Sponsor: IEEE Life Members Committee

We Have the Answers!

The IEEE Financial Advantage Program®

One phone call connects you to everything the IEEE Financial Advantage Program offers.

- Insurance Programs
- Financial Services
- Home & Business Services
- And more

Call +1 800 GET IEEE (438 4333) or +1 732 981 0060

The IEEE Financial Advantage Program®
Tools to Secure Your Tomorrow

IEEE is RESEARCH.

Scott has the freedom to conduct research his way, thanks to IEEE.

The IEEE Member Digital Library was designed for individual researchers like Scott. With easy access to the best current technology publications – including top-cited journals and cutting-edge conferences – Scott can find the research he needs, at a price he can afford.

Updated weekly, and with over 1 million online IEEE documents to explore, the IEEE Member Digital Library brings Scott the ability to succeed on his own. He also found papers from three new conferences to help support his research.

To Scott, IEEE is research. Discover what IEEE can be for you.



Go here.

www.ieee.org/ieeemdl

**SUBSCRIBE BY 31 DECEMBER,
GET YOUR FIRST MONTH FREE**



IEEE MEMBER DIGITAL LIBRARY

IEEE INFORMATION DRIVING INNOVATION