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Augmenting Your Reality

A look at IEEE members' work on smartening up your mobile phone

PAGE 6

IEEE

BRIEFINGS

IEEE AROUND THE WORLD

REGION 1 NORTHEASTERN UNITED STATES

☐ **Schenectady (N.Y.) Section** establishes IEEE Signal Processing Society chapter.
☐ **Worcester County (Mass.) Section** establishes IEEE Robotics & Automation Society chapter.

REGION 3 SOUTHEASTERN UNITED STATES

☐ **East Tennessee Section** celebrates 75th anniversary.
☐ **Hampton Roads (Va.) Section** celebrates 50th anniversary.
☐ **Palm Beach (Fla.) Section** celebrates 50th anniversary.
☐ **Jamaica Section** establishes Consultants Network affinity group.
☐ Student branch formed at **Georgia State University, Atlanta.**
☐ **Orlando (Fla.) Section** establishes Women in Engineering (WIE) affinity group.

REGION 4 CENTRAL UNITED STATES

☐ **Southeastern Michigan Section** celebrates 100th anniversary.
☐ **Siouxland Section,** which covers South Dakota, Iowa, and Nebraska, celebrates 50th anniversary.

REGION 6 WESTERN UNITED STATES

☐ Student branch at **Santa Clara University, California,** establishes chapter of IEEE Electron Devices Society.
☐ Student branch formed at **ITT Technical Institute–Spokane, Spokane Valley, Wash.**

REGION 7 CANADA

☐ **Vancouver Section** celebrates 100th anniversary.
☐ **Montreal Section** celebrates 75th anniversary.

REGION 8 EUROPE, MIDDLE EAST, AND AFRICA

☐ **France Section** celebrates 50th anniversary and also establishes IEEE Aerospace and Electronic Systems chapter.
☐ **United Arab Emirates Section** establishes IEEE Circuits and Systems Society chapter.
☐ **Oman Section** establishes IEEE Power & Energy Society chapter.
☐ **Iraq Section** establishes Graduates of the Last Decade (GOLD) affinity group.
☐ **Texas A&M University at Qatar, Doha,** establishes WIE affinity group.
☐ **Sfax (Tunisia) Subsection** is formed.
☐ Student branch at the **National Engineering School of Sfax** establishes chapter of IEEE Industry Applications Society.
☐ Student branch formed at **University of Greenwich, London.**
☐ Student branch formed at **University of Bedfordshire, England.**
☐ **Italy Section** establishes IEEE Industry Applications Society chapter.
☐ Student branch at **Sapienza University of Rome** establishes chapter of IEEE Industry Applications Society.
☐ Student branch formed at **Gydnia Maritime University, Poland.**
☐ Student branch formed at **Pentecost University College, Accra, Ghana.**

REGION 9 LATIN AMERICA

☐ **Chile Section** celebrates 50th anniversary.
☐ **Costa Rica Section, El Salvador Section,** and **Guatemala Section** all celebrate their 25th anniversaries.
☐ **Argentina Section** establishes joint chapter of IEEE Electron Devices and IEEE Solid-State Circuits societies.
☐ Student branch formed at **Universidad Nacional del Noroeste de la Provincia de Buenos Aires.**
☐ **Centro Occidente (Mexico) Section** establishes GOLD affinity group.
☐ Student branch at the **Universidad del Sol, Cuernavaca, Mexico,** establishes IEEE Industry Applications Society.
☐ **Guadalajara (Mexico) Section** establishes IEEE Robotics & Automation Society chapter.
☐ **South Brazil Section** establishes IEEE Signal Processing Society chapter and WIE affinity group.
☐ **Universidad Tecnológica de Bolívar, Cartagena, Colombia,** establishes WIE affinity group.
☐ Student branch at **Tecnológico Pascual Bravo Institución Universitaria, Medellín, Colombia,** establishes chapter of IEEE Robotics & Automation Society.
☐ Student branch at **Universidad Nacional de San Antonio Abad del Cusco, Peru,** establishes chapter of IEEE Robotics & Automation Society.
☐ Student branch at **University of San Martín de Porres, Lima, Peru,** establishes IEEE Robotics & Automation Society chapter.
☐ **Paraguay Section** is formed.

REGION 10 ASIA AND PACIFIC

☐ **Islamabad Section** establishes IEEE Communications Society chapter.
☐ **New Zealand Central Section** establishes IEEE Power & Energy Society chapter.
☐ **Beijing Section** establishes GOLD affinity group.
☐ **Beijing (Changsha) Section** establishes IEEE Components, Packaging, and Manufacturing Technology Society chapter.
☐ **Beijing (Guangzhou) Section** establishes IEEE Signal Processing Society chapter.
☐ **Nanjing (China) Section** establishes GOLD affinity group.
☐ **Nanjing (Hefei) Section** establishes IEEE Computational Intelligence Society chapter.
☐ Student branch formed at **Tianjin University, China.**
☐ **National University of Singapore** establishes WIE affinity group.
☐ Student branch formed at **Thammasat University, Pathum Thani, Thailand.**
☐ Student branch formed at **Kansai University, Suita-Shi, Japan.**
☐ Student branch formed at **Universiti Tenaga Nasional, Kajang, Malaysia.**
☐ WIE affinity groups established in India at **College of Engineering–Karunagappally, Pydah College of Engineering & Technology, Rajasthan College of Engineering for Women, College of Engineering Adoor, G.H. Raisoni College of Engineering,** and **Vignana Bharathi Institute of Technology.**
☐ Student branches formed in India at **St. Joseph's College of Engineering and Technology, Royal College of Engineering & Technology, Lingaya's Institute of Management and Technology, Sudharsan Engineering College, Charotar University of Science and Technology, Pandian Saraswathi Yadav Engineering College, DMI College of Engineering, Maulana Azad National Institute of Technology,** and **Haryana College of Technology and Management.**

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Available 7 March at www.ieee.org/theinstitute.

BOOKS
A sample of e-books available for free to IEEE members.

MEMBER RECOGNITIONS
Read about IEEE members recently honored for their work.

NEWS

Day Wins Race for President-Elect

IEEE LIFE FELLOW Gordon W. Day is the 2011 president-elect, having received 27 615 votes in the 2010 IEEE election. The runner-up, Senior Member Joseph V. Lillie, garnered 17 341 votes.

Day begins his term as IEEE president on 1 January 2012, succeeding 2011 president Moshe Kam.

Day, who had been the 2009 IEEE-USA president, is retired. He was a researcher and manager at the U.S. National Institute of Standards and Technology (NIST), in Boulder, Colo., for 33 years, until 2003. His research there focused on optoelectronics, including fundamental physical measurements, standards for optical fiber, and the development of new types of instrumentation. In 1994, he founded and became the first chief of the NIST Optoelectronics Division.

Gordon W. Day

After leaving NIST, Day served as science adviser to Senator Jay Rockefeller (D-W.Va.) on an IEEE-USA congressional fellowship, and later he was director of government relations for the Optoelectronics Industry Development Association. He also worked as a consultant, specializing in optoelectronics technology and science policy. Day has held various IEEE positions, including president (in 2000) of the IEEE Photonics Society.

For all the election results, see "And the 2010 Winners Are…" [p. 17].

IEEE Medal of Honor Goes to Morris Chang

IEEE LIFE MEMBER Morris Chang is the recipient of the 2011 IEEE Medal of Honor for his "outstanding leadership in the semiconductor industry." Chang is chairman and CEO of Taiwan Semiconductor Manufacturing, the world's first dedicated semiconductor foundry, in Hsinchu.

Morris Chang

Chang founded the company in 1987. As its CEO for more than two decades, he did much to advance the foundry and fabless semiconductor industries. Among his accomplishments was pairing chip companies with independent manufacturers in order to produce integrated circuits, which helped establish Texas Instruments' transistor-transistor logic as the standard logic family. He helped create new business models, including a dedicated one for silicon foundries. This led to the creation of the multibillion-dollar foundry industry around the world.

Previously, Chang was president and chief operating officer of General Instrument Corp., in Horsham, Pa. Prior to that, he worked for Texas Instruments in Dallas for 25 years, spending six years there as group vice president for TI's worldwide semiconductor business. His work helped make the company an IC leader. With Chang at the helm, the company introduced Speak & Spell, one of the earliest electronic handheld educational toys. It had a visual display and relied on interchangeable game cartridges.

LEFT: MAY TRUONG; RIGHT: TAIWAN SEMICONDUCTOR MANUFACTURING CO.

From 1985 to 1994, he served as president and chairman of Taiwan's Industrial Technology Research Institute, a government-sponsored nonprofit that aims to strengthen the country's technological competitiveness. At the institute, he helped shape technology policy that led Taiwan to become a powerhouse in the semiconductor industry.

The Medal of Honor is sponsored by the IEEE Foundation. Chang is to receive the award on 20 August at the annual IEEE Honors Ceremony being held in San Francisco.

Two Vie for 2012 President-Elect

THE IEEE BOARD of Directors has nominated Roger D. Pollard and Peter W. Staecker as candidates for 2012 IEEE president-elect. The two men, chosen by the Board in November, will face off in the annual election this year. The winner will serve as 2013 IEEE president.

Pollard, an IEEE Fellow and the 2011 IEEE secretary, recently retired as dean of engineering at the University of Leeds, in England. He had been a faculty member there for 35 years and also headed the School of Electronic and Electrical Engineering. Pollard continues as a consulting engineer for Agilent Technologies, in Santa Rosa, Calif., a position he has held since 1981.

Roger D. Pollard

Pollard has held numerous IEEE positions, including vice president for Technical Activities last year and vice president and president of the IEEE Microwave Theory and Techniques Society in 1997 and 1998, respectively. He was chair of the strategic planning committee of the IEEE Publication Services and Products Board from 2002 to 2004 and again from 2007 to 2008, and he previously chaired the committee that led the creation of the IEEE Xplore digital library.

Peter W. Staecker

Staecker, a Life Fellow, is retired and has 26 years of experience in microwave design. He joined MIT Lincoln Laboratory, in Lexington, Mass., in 1972, where he designed microwave devices and circuits and developed measurement techniques for their application to satellite communications. He left in 1986 to join M/A-COM in Burlington, Mass., to develop microwave and millimeter-wave technology, retiring as director of R&D in 1998.

Like Pollard, Staecker was vice president of Technical Activities, in 2007. He was director of IEEE Division IV from 2001 to 2002, as well as vice president and president of the IEEE Microwave Theory and Techniques Society, in 1992 and 1993. He also was IEEE treasurer from 2009 to 2010 and a member of several IEEE committees, including Governance and Investment. He currently chairs the Individual Benefits and Services Committee.

Membership Now More Than 400 000 Strong

IEEE MEMBERSHIP last year reached 407 541. That represents an increase of 10 540, or 2.7 percent, compared with 2009. Higher-grade membership grew to 304 746, an increase of 4920, or 1.6 percent. Undergraduate student membership totaled 62 349, a gain of 3435, or 5.8 percent, over 2009. Graduate student membership rose to 40 446, 5.7 percent more than the previous year.

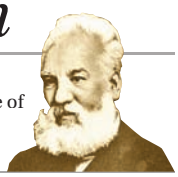
CORRECTION

An item in "IEEE Around the World" [December, p. 2] reporting that an IEEE student branch had recently been formed at the College of Engineering Chengannur in India was incorrect. Rather, this student branch, formed in 1996, established a chapter of the IEEE Computer Society.

CLOCKWISE FROM LEFT: TONY GLOSSOP/THE UNIVERSITY OF LEEDS; ROBERT BACHRACH; SMITHSONIAN INSTITUTION LIBRARIES; HENRYK SADURA/ISTOCKPHOTO; SCIENCE & SOCIETY PICTURE LIBRARY/GETTY IMAGES; PHILIPS; ISTOCKPHOTO(2)

CALENDAR

March



3 1847: Birth date of Alexander Graham Bell.

5-6 Region 10 meeting in Yogyakarta, Indonesia.

6 1886: The world's first central AC power plant begins operation, in Great Barrington, Mass.

12 Region 1 meeting in Newark, N.J.

18-19 Region 6 meeting in Phoenix.

18-20 Region 3 meeting in Nashville.

21 1991: Leo Fender, inventor of the widely popular Telecaster and Stratocaster electric guitars, dies.

25 1954: RCA announces the production of home color television sets.

26-27 Region 8 meeting in London.

31 1880: Wabash, Ind., becomes the first U.S. town to completely replace gas lamps with electric lighting.

April

4 1972: The first large-scale use of garbage as a fuel for generating electricity occurs when the Union Electric Co., in St. Louis, fires the boilers in its Meramec Plant with shredded refuse.

6-9 Region 9 meeting in Salvador, Brazil.

13 1888: Birth date of John Hays Hammond Jr., inventor of a radio remote control for missiles.

16 1956: Admiral Corp. sells the first solar-powered radio, which used six transistors instead of vacuum tubes.

16-17 Region 2 meeting in Erie, Pa.

27 1981: Xerox Palo Alto Research Center is first to sell a computer mouse with a computer system, the 8010 Star Information System.

28-1 May: Region 7 meeting in Mississauga, Ont., Canada.

May

1 1909: The first hydroelectric power plant to be built by the U.S. government, the Minidoka Dam on the Snake River in Idaho, begins producing electricity.

2 1800: English chemist William Nicholson separates water molecules into hydrogen and oxygen using electricity in a process that is called electrolysis.

5 1861: Birth date of Peter Cooper Hewitt, inventor of a mercury-vapor lamp used in photo studios.

16 1960: Birth date of Ida Rhodes, a pioneer in the field of computer programming.

22 1973: Robert M. Metcalfe develops the idea for a local area network that went on to become the Ethernet standard.

24 1892: Thomas A. Edison is issued three patents for an "electric locomotive" and a fourth for an "electric railway."

30 1987: North American Philips Co. introduces the Video CD, designed to store full-motion video and CD-audio tracks.

Historical events provided by the IEEE History Center. IEEE events indicated in red.

TECHNOLOGY

Augmenting Your Reality

IEEE members are changing the way we look at the world

BY **ANNA BOGDANOWICZ**

IMAGINE ALL SORTS of data—videos, news articles, images, and podcasts—about your surroundings being presented to you over your smartphone. Point your phone in one direction and you see a video about breaking news happening right around the corner. Aim it at the museum you're passing and read about the Vermeer exhibit featured that day. Point it in another direction and read Twitter dispatches sent by passersby.

That isn't the distant future—it is already happening, thanks to the work of IEEE Member Blair MacIntyre and other developers of mobile augmented reality (AR). "Mobile AR" refers to the concept of overlaying media (graphics, pictures, video, and sounds) from the world around you onto a device such as a smartphone.

MacIntyre, an associate professor of interactive computing and director of Georgia Tech's Augmented Environments Lab, has spent more than a decade there working on AR. He established the lab to advance the technology in 1999 with funding from Motorola, Qualcomm, Turner Broadcasting, and others.

For the past few years he has been focusing on two key AR areas: smartphone apps and gaming.

MacIntyre and his team at the lab, including IEEE Member Alex Hill, developed an open-source mobile AR browser called Argon, which is sponsored by Alcatel-Lucent and expected to be released in the Apple app store soon. Downloaded on a smartphone, Argon organizes the surrounding information for display. That information comes from app developers who create channels—basically streams of location-coded content, delivered from a Web server, that users can view on their smartphones. Argon's software relies on the phone's location, tracking it using such technologies as GPS, accelerometers, orientation sensors, and compasses. Other tracking technologies, based on computer vision, will be added soon, MacIntyre says, and services supporting the discovery of nearby channels can be provided by Web service creators.

"As faster and more powerful phones with amazing processors were developed, it has made AR applications possible," he says.

One of the first widely available AR apps was Google Sky Map, which overlays information about the stars, constellations, and planets when you point your phone at the sky. Another, called Layar, brings up information about local stores, restaurants, and businesses.

Argon is different from Layar because it "is the first real AR browser, in analogy to a Web browser," MacIntyre says. "Layar requires developers to specify AR content in a fixed format. Argon's use of Web standards gives the channel developers much more control and possibilities.

"Developers create much of the content, including the interface, just like Web developers create everything that appears on a Web page," he adds. "All the data resides on the channel owner's server. It is stored and manipulated by the content developers just like other Web data, and because Argon relies on a rich combination of HTML and JavaScript, developers have complete control over the way the user interacts with the data, which can be updated— as can Web sites—in real time."

Several channels have been created that show such content as nearby tweets and Flickr images.

AUGMENTING GAMES

MacIntyre is also focusing on products that merge the creative virtual environment of a video game with the social aspects of a board game.

"Instead of each player staring at a screen, the players can sit around a table, running an AR app on their smartphones that overlays computer graphics on a game board that sits on the table, letting them interact with the game—and each other," MacIntyre says.

He and his students are working on AR games in the lab's Qualcomm-supported Augmented Reality Game Studio. They're collaborating with Tony Tseng, a professor at the Savannah College of Art and Design, in Georgia, and his students from the Interactive Design and Game Development program. MacIntyre is also working on AR games at his start-up, Aura Interactive. One game recently developed in collaboration with Mattel and Qualcomm is an AR version of Mattel's *Rock 'em Sock 'em Robots* game, in which players control little boxers.

The AR games rely on a smartphone app and a physical game board designed with trackable features. The app uses the image-based targeting implemented in Qualcomm's free SDK for Android phones,

Blair MacIntyre demonstrates the zombie-killing AR game ARhrrrr! *to two students in his lab.*

GEORGIA TECH

an AR technique in which the pattern of small high-contrast corner features determines the position and orientation of the phone's camera relative to the image on the game board. The app analyzes the corner features on the board and then overlays graphics, such as the robot boxers, in the smartphone display. Players can then control the robots by touching options on their screens.

MacIntyre and his researchers have developed a variety of AR board games over the years, including *ARhrrrr!* (in which players kill virtual zombies) and *Arf* (which allows people to play with a virtual dog on a table). Recently the AR Game Studio created *Spintopia*, which lets kids create three-dimensional dynamic spiral patterns.

LOOKING AHEAD

One of the key challenges in advancing AR applications is to improve the tracking so smartphones can more accurately pull up geographically related content.

"The GPS in your smartphone can tell you in the best case where you are within 1 to 10 meters," MacIntyre says. "But in a city with tall buildings, the accuracy can drop to 40 meters because the device can't 'see' enough GPS satellites for a reasonably accurate position fix. If the phone only knows where it is within 40 meters, it's pretty much impossible to point it across the street and expect to overlay information about the buildings there."

Until tracking technology improves—something MacIntyre says can be done by combining the image-tracking technology he is using for games with GPS and orientation sensors in the phones—users won't see apps that overlay content directly on the buildings in front of them.

MacIntyre says he is confident such apps will be only the beginning. "As with many technologies, it's often difficult to imagine the possibilities for the future," he says. "Back when the Web was only for sharing documents and pictures for scientific research, no one could have predicted Facebook, Twitter, and Amazon. AR has an exciting future."

To see a video on MacIntyre's AR work, visit http://ieeetv.ieee.org/ieeetv-specials/georgia-tech-augmented-reality-lab. ■

DANIEL HERTZBERG

IEEE BUSINESS

Five-Point Plan to Address Open Access

New publishing model for authors unveiled

BY KATHY KOWALENKO

AFTER STUDYING how best to address open access to its publications, the IEEE Board of Directors approved a five-point approach in November.

Open access is a movement in scholarly publishing to make content available via the Internet at no cost to users.

Here is the formal plan:

- ☐ IEEE will engage in a public dialogue to ensure that the publication of high-quality, peer-reviewed, financially sustainable journals remains an essential part of its mission as a learned society.
- ☐ Open access is best accomplished using IEEE's existing approach to publishing. This preserves the peer-review process that ensures the integrity of the research presented.
- ☐ Open access can coexist with traditional publishing. IEEE will continue to allow authors to post manuscripts of their articles accepted by IEEE journals on their own Web sites or those of their employers.
- ☐ IEEE will continue experimenting with open access and monitor its impact on the organization.
- ☐ Any open-access approach must respect the intellectual property rights of authors and publishers.

"I am very pleased that IEEE has a position on open access after several years of discussion," says Jon G. Rokne, 2010 vice president, IEEE Publication Services and Products. "IEEE's vision for open access responds to the open-access movement's desire for clarity and also protects IEEE and its societies from the financial erosion of their abilities to support their programs."

Rokne adds that IEEE will examine commercial sponsorship through advertisements or sponsorship by individuals or companies as possibilities for helping to make open access sustainable. He notes, however, that any such sponsorship would need to preserve the editorial independence and integrity of the publishing process.

OPTION TO DEBUT

As part of IEEE's experiment with open-access publishing models, the IEEE Board of Directors in August endorsed a so-called author-pays option. IEEE says that option will test the viability of the approach in supporting publishing costs. Authors of accepted manuscripts will be able to choose later this year to pay a processing fee of US $3000 per article so their work is available free of charge to all when it's published in the IEEE Xplore digital library. Traditionally, IEEE's journals and magazines have relied on charging members, research libraries, and other organizations a subscription fee.

In IEEE's experimental approach, known as hybrid open access, subscriptions will continue to support the overall publishing program, but articles supplemented by author fees will be made available at no cost to anyone through IEEE Xplore.

A handful of IEEE journals are already experimenting with hybrid open access. They include *IEEE Photonics Journal* and *IEEE Magnetics Letters*.

IEEE Transactions on Learning Technologies uses another model, called delayed open access, which makes papers available for free one year after they've been published.

The different models resulted from several policies instituted by the Board of Directors during the past few years to encourage organizational units to experiment with new ways for distributing their information. The initial policy, approved in June 2007, set the direction by encouraging societies and other units to explore new business models. Another policy, approved in November 2007, provided a set of guidelines for units wishing to develop publishing models [see "Principles of Scholarly Publishing," *The Institute*, September 2008, p. 11].

Whatever model is developed must be self-sustaining, because operating costs must be recouped. These costs include paying for content management systems, article submission and review systems, bandwidth, editorial and typesetting services, and marketing and other business investments.

"IEEE recognizes that no single business model will fit the needs of its various scholarly communities," Rokne says. "Therefore, it will continue to experiment with various approaches to open access." ■

QUESTION OF THE MONTH

Web-User Tracking

Several countries are considering new policies to give individuals more control over the information that Web sites collect and share about them. In November, the European Union announced plans for updating its privacy regulations to give consumers more control over online tracking. And in December, the U.S. Federal Trade Commission proposed a "Do Not Track" mechanism that would let people prevent Web sites from sharing details about their online activities.

Critics of tracking are concerned that companies can record users' online activities, often without their knowledge. Others say tracking is necessary because it helps keep Web sites cost-free; advertisers pay for the information gathered about users' browsing or purchases so they then can run targeted ads.

Do you think a Do Not Track mechanism should be imposed? Are tracking services helpful, invasive, or necessary evils?

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. Responses will appear in the June issue of The Institute *and may be edited for brevity. Suggestions for questions are welcome. Mail: The Institute, IEEE Operations Center, 445 Hoes Lane, Piscataway, NJ 08854-4141 USA; fax: +1 732 562 1746; e-mail: institute@ieee.org*

RESPONSES TO DECEMBER'S QUESTION

Smart-Grid Speed Bumps

Proponents of the smart grid point out that because smart meters could allow customers to find out how much energy they're using, they could lower their electricity bills by turning off power-hungry appliances or use them at off-peak times. But that good news could come with a rate increase. The Maryland Public Service Commission in June rejected an increase sought by Baltimore Gas and Electric to pay for the installation of smart meters and a new communications network, and other states have taken a similar stance.

Would you be willing to help pay for the smart grid in your community? Do the proposed benefits of smart meters outweigh the costs?

CLOUDY CHARGES

I'm willing to pay a one-time charge and avoid a recurring fee, but the articles on the smart grid in *The Institute* [December] are chockfull of wispy proposals, making the payback less than clear.

Don't tell me my electric car—or any other home-based power source—is going to feed power back into the grid and make me money. My electric bill is already unreadable and loaded with opaque charges that the state government approved without asking customers. I'm guessing the coming smart-grid charges will be imposed the same way.

John Steve
Caledonia, Mich.

BAD MOVE

I would be leery of any move by power companies to promote energy conservation. Back in the 1980s, Public Service of New Hampshire was so successful at getting its customers to conserve energy that it later went to the Public Utilities Commission and obtained a rate increase to offset lost revenues due to reduced electricity consumption. So in the end, consumers did not reduce their bills. If the power companies want a smart grid, let them pay for it.

Nick Maselli
Beverly Hills, Fla.

NOT A DIME MORE

I would not want to pay for it unless there were more customer involvement and tangible benefits. We cannot even obtain real-time feedback now from our smart meter—only via a clumsy Web site and with a whole day of delay. Where I live, many opportunities were blown by rolling the meters out too early. I can assure you that there is zero willingness in my neighborhood to pay even one dime extra, despite the fact that a lot of engineers live here.

Joerg Schulze-Clewing
Cameron Park, Calif.

LACK OF PRIVACY

I am unwilling to pay for a smart grid in my community. It is questionable whether the benefits outweigh the costs. Smart grids can intrude on customers' privacy. If individual appliances are addressable, usage can be determined and lifestyle patterns deduced. Because some patterns represent unlawful conduct, such as the load cycle for lamps used to grow marijuana indoors, it is unlikely this information will be kept from government agencies. Based on past experience, access to such private data will be expanded.

Mark W. Bailey
Round Lake Beach, Ill.

WILLING TO UPGRADE

As technology has matured, the time has come to enable finer measurement and control over electricity use. Consumers will benefit from more reliability. However, I don't think consumers will pay much attention to smart meters that indicate the power consumption of various appliances, and they will complain about the cost of installing meters. At most, I would pay US $100 for installation.

R.A. Dehn
Schenectady, N.Y.

NOT GOING TO HAPPEN

I am more than willing to pay reasonable increases to advance the grid, but considering the fact that there has been little improvement in the grid infrastructure since the Northeast blackout of 2003, it's not going to happen. We need the people who have the means to pay more to build the power plants and new lines.

Alan Jennings
Dayton, Ohio

THOMAS JACKSON/GETTY IMAGES

You create a brighter future.

We work to protect it.

Let us help find the right Long-Term Care insurance plan for you, so you can spend time on things that matter the most.

People are living longer these days, but as life expectancies increase, so does the risk of serious health problems that could require long-term care. In fact, at retirement age, 70% of Americans will need long-term care and 40% will enter a nursing home.[1] And with the average cost for nursing home care in a semiprivate room equating to more than $67,500 per year, that could literally cost most or all of your life's savings.[2]

Long-Term Care insurance may not be for everyone. But with soaring healthcare costs, insurance restrictions and the need to stretch retirement savings through more years . . . it's a good idea to seriously consider this valuable coverage.

To learn more about how IEEE members in the United States can help protect their assets from the rising cost of long-term care, call us or go online today.

Long-Term Care Resources Network

IEEE is pleased to announce that IEEE members in the United States now have access to a new, interactive and educational Long-Term Care evaluation tool to help you make the best decisions for your specific situation. To learn more, visit www.ieeeinsurance.com/ieeeltc.

IEEE

Call 1.800.588.7421 or visit www.ieeeinsurance.com/ieeeltc.

[1]U.S. Department of Health and Human Services, National Clearinghouse for Long-Term Care Information, October 2008, www.longtermcare.gov.
[2]Genworth 2010 Cost of Care Survey, April 2010, www.genworth.com/content/genworth/us/en/products/long_term_care/long_term_care/cost_of_care.html.
The Long-Term Care Resources Network is only available for residents of the United States. Coverage may vary or may not be available in all states.
This program is administered by Marsh U.S. Consumer, a service of Seabury & Smith, Inc., d/b/a in CA Seabury & Smith Insurance Program Management. CA Ins. Lic. #0633005. AR Ins. Lic. #245544. IEEE prohibits discrimination, harassment and bullying. For more information, visit www.ieee.org/web/aboutus/whatis/policies/p9-26.html.

LETTERS

SMART-GRID PROBLEMS

How could an IEEE publication make such a general and unsupported claim as "A smart grid would help make everything better, thus improving reliability, security, and efficiency, which are of critical importance"? ["The Smart Grid: A Primer," December, p. 5].

What was the last technology that "made everything better"? It is shameful that a technical publication carrying the IEEE seal would make such a statement without providing an iota of corroborating evidence or even references to back up such a claim.

The article mentions that "the smart grid is expected to reduce or even prevent power outages by anticipating equipment failures and rerouting electricity transmission to compensate" but fails to explain how exactly it might accomplish that. Also, deploying sensors and communication systems to collect all the data from the sensors is comparable to deploying the nervous system of our bodies. Who is deploying this "brain," and what if there is a problem with it? Readers may wish to refer to the investigation of the 2003 Northeast blackout in the United States and the problems derived from a software problem caused by a system operator.

Leonardo Lima
Scotia, N.Y.

We regret our casual use of language. The many potential benefits of the smart grid were detailed in our article, however.
—Ed.

POWER UTILITY STANDARDS

As a follow-up to "Smart Standards for the Smart Grid" [p. 6], here are the power utility fiber-optic cable standards that attach the smart grid to a power utility's network operations center. Without them, there can be no smart grid: IEEE 1138 Optical Power, Ground Wire (OPGW); IEEE 1222 All-Dielectric Self-Supporting (ADSS) Fiber Optic Cables; IEEE 1591.1 Hardware for OPGW Cables; IEEE 1591.2 Hardware for ADSS Cables; IEEE 1591.3 Hardware for WRAP Cables; and IEEE 1594 Standard for Helically Applied Fiber Optic Cables.

William A. Byrd
Chapin, S.C.

The writer is chairman of the IEEE Power & Energy Society's communications subcommittee and is a member of the IEEE Standards working groups on 1138, 1222, 1591.1, 1591.2, 1591.3, and 1594.

PRESIDENT'S COLUMN

Life Sciences Spark IEEE Interest

RECENTLY SPENT TIME browsing the IEEE publication collection and was delighted to see how many new areas of interest IEEE is pursuing. We have certainly come a long way since we defined ourselves in 1963, as "directed toward the advancement of the theory and practice of electrical engineering, electronics, radio and the allied branches of engineering, and the related arts and sciences." While IEEE certainly continues to disseminate a lot of new and exciting work in traditional areas—including radio—we also publish many journals in new and divergent areas. Two prominent examples are *IEEE Transactions on NanoBioscience* and *IEEE Transactions on Autonomous Mental Development*.

IEEE also runs conferences on new and nontraditional subjects such as biosignals and biorobotics and conducts joint activities with associations of health-care providers and physicians. These activities can be reasoned to be part of "the related arts and sciences" in our self-description, but the truth of the matter is that they are not. In actuality, we have widened IEEE's fields of interest to include new areas in computing, life sciences, even psychology and linguistics (there are more than 6000 IEEE articles with "linguistics" in the title). IEEE in 2011 is quite literally not your grandfather's IEEE anymore.

THE QUIET REVOLUTION

One of the most interesting and important developments in recent years has been our increased focus on the life sciences and their applications. IEEE now regularly publishes eight refereed publications in this area and organizes conferences on subjects such as bioinformatics and clinical applications of medical image analysis. You can find more than 900 articles in our archives on tissue engineering alone, as well as hundreds of articles on regenerative medicine, cell engineering, and stem cells.

In spite of our growing interest in life sciences, IEEE is not yet known as a major player in this burgeoning field. While our prominence in areas such as wireless communications and electric power standards is widely recognized, IEEE still has a long way to go before biologists working on genomics or biomedical researchers working on an artificial pancreas would consider our organization their professional home (or at least their second professional home). This situation should worry us; the intersection between our traditional fields—electrical engineering, computer engineering, and computer science—and the life sciences is "hot." If we fail to capture this growing interest area, others will fill the gap and we will lose a major opportunity to maintain our leadership in advanced technology. Relying on the fields that made IEEE the leader in the second half of the 20th century will not by itself make IEEE the leader in the 21st.

Relying on the fields that made IEEE the leader in the second half of the 20th century will not by itself make IEEE the leader in the 21st

WHAT'S IN A NAME?

Making serious forays into the life sciences means that, in addition to the ongoing activities by current members and authors, we should invite researchers, developers, and academics from other relevant disciplines outside of engineering to join IEEE. This poses a challenge due to the strong engineering reputation of IEEE. We faced a similar dilemma when we started inviting computing professionals and information technologists into IEEE. At the time, some suggested that we abandon the use of "engineering" in our name, adopt a more general title, or use "IEEE" without ever spelling out the acronym. However, 75 percent of our members have at least one engineering degree, and we have many electrical and computer engineers among us. They are justifiably proud of IEEE's engineering heritage. Alienating them, our current core, in order to gain members elsewhere is unacceptable.

OUR ACTIONS

In 2010 IEEE formed a working group on life sciences led by Mathukumalli Vidyasagar, a professor of systems biology science at the University of Texas at Dallas. So far, the group has worked to create a portal where all IEEE activities in life sciences–related areas can be accessed. The portal is due to be released in the second quarter. In 2011 we will also augment this group with volunteers from IEEE societies that are active in the life sciences. We will seek a clearer mission statement for IEEE's life sciences activities, identifying specific areas where IEEE can make the most useful and highest-quality contributions in the next decade. We will then give these areas maximum visibility and support.

YOUR ADVICE IS WELCOME

If the role of IEEE in the life sciences is of interest to you, please share your thoughts and advice with me at kam@ieee.org.

Moshe Kam
IEEE President and CEO

KELLY & MASSA PHOTOGRAPHY

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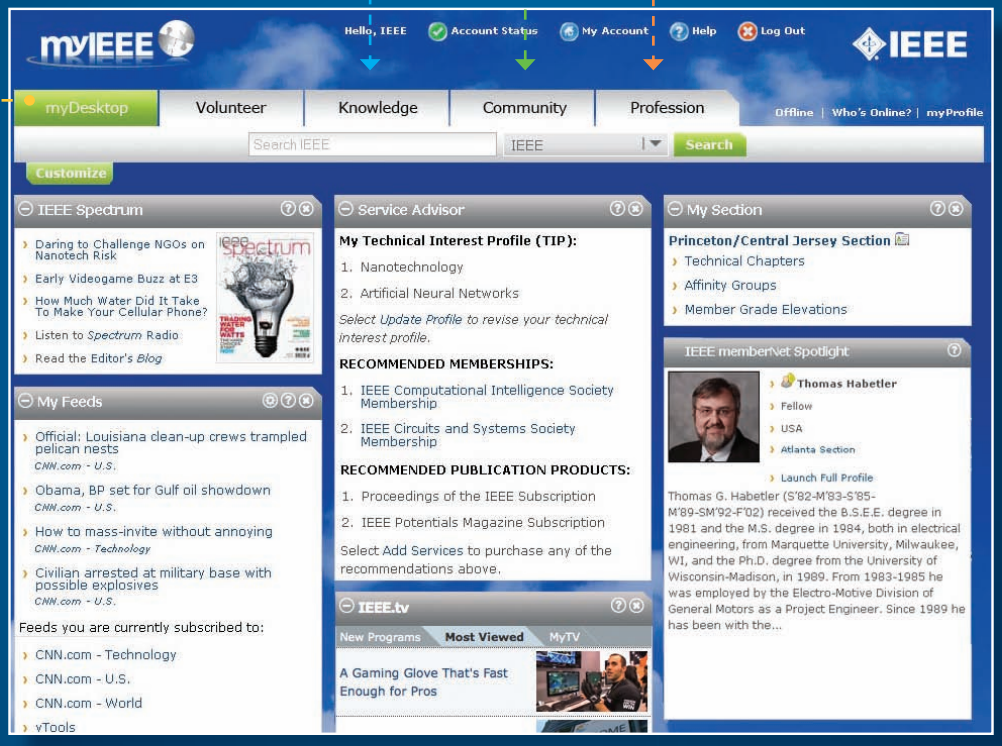

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PRODUCTS AND SERVICES

Online Tutorials Get Makeover

New name, different interface, and iTunes, too

BY KATHY KOWALENKO

THE WEB SITE that houses IEEE's collection of online courses has been completely overhauled. The former IEEE Expert Now has become the IEEE eLearning Library, and it uses a new software application for delivering tutorials. The site includes more than 200 courses and webinars from universities, training organizations, and IEEE units, instead of just tutorials from IEEE workshops and conferences. And to broaden access, there is now a section for IEEE content in iTunes, in the area where universities and nonprofits can post their content for users to download for free.

"Our efforts to improve and expand the library resulted in capabilities and content that were so markedly different from IEEE Expert Now that it made sense to rename the product," says IEEE Senior Member Maja Bystrom, editor in chief of the IEEE eLearning Library and chair of its editorial board. "The new name now accurately describes what's being offered."

The library contains short, online courses in core and emerging technologies such as biometrics, digital circuit design, fiber optics, and the smart grid. Each course is developed and peer-reviewed by experts. Users can choose among introductory, intermediate, and advanced levels. Courses are from one to three hours long and include downloadable notes and a searchable glossary of terms. The course notes are the transcripts of the tutorial's audio portion, and they allow students to read along while they listen—which is helpful for those whose primary language is not English.

The new software application, called a learning management system, translates the site into Farsi, Mandarin, or more than 100 other languages. The courses use multimedia elements such as animation and colorful diagrams and charts. Controls allow the student to repeat the audio portion, replay the slides, stop and later resume a tutorial, and skip ahead to another section.

There are also interactive discussion forums with instructors. And when you complete a course, you can take a test and immediately see your score. After successfully finishing a course, users can print certificates for professional development hours or continuing-education units, which IEEE issues.

"IEEE is accredited to award CEUs, something that is vital to many professional engineers," Bystrom says. "This ability is a further measure of our course quality, since we abide by international standards for continuing education."

Many courses are free, and IEEE members receive a 50 percent discount on others, which cost from US $50 to $150, depending on length. Once you sign up for a course, you have up to a year to complete it and can continue to access the content even after completion.

ADDITIONAL PROVIDERS

IEEE is expanding its collection with courses from other providers, notes Steve Welch, director of continuing education for IEEE. He is working with universities to make class materials available, as well as with training organizations such as the Microchip Design Institute for a series on designing ICs. There are also tutorials that cover IEEE's 802 suite of wireless standards and sections from the *U.S. National Electrical Safety Code* handbook.

The new e-learning system also gives IEEE societies, regions, and sections the ability to post their own educational content and host webinars, Welch points out. "A lot of organizational units have been struggling with how to bring such content to their members," he says. "They've been building their own platforms. But we've now built the capabilities for delivering courses to their groups that can be tailored to their needs."

The courses are aimed at IEEE members, but companies and universities can also purchase subscriptions to the IEEE eLearning Library. Options include access to all the courses, to a set of tutorials on a particular technology, or for a specific number of users.

In a classroom, the courses can supplement a lecture, help students prepare for a more advanced course, or be assigned as extra credit.

Employers can use the tutorials to update their workers' skills, provide them with insight into emerging technologies, or help them acquire the professional development hours their organizations require.

"What makes the IEEE eLearning Library different from other online tutorials is that the library contains peer-reviewed content with a focus on the practical, continuing-education needs of the engineering professional," Bystrom says. "The editorial board constantly reviews the tutorials for accuracy and timeliness."

IEEE eLearning Library courses can be accessed at http://www.ieee-elearning.org.

ITUNES ACCESS

To make its education content accessible to more people, IEEE is participating in the iTunes U Beyond Campus program. In addition to tutorials, IEEE plans to offer audio and video programs, PDFs, and e-books. The site currently features 5-minute overviews of longer IEEE eLearning Library tutorials on aerospace technology, biometrics, and engineering management, as well as leadership training for IEEE volunteers.

"Our content is now discoverable by up to 100 million iTunes users," Welch says. "We're able to reach people we would not ordinarily reach."

To access the iTunes content, visit http://itunes.ieee-elearning.org. ■

the institute

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CONFERENCES: MAY–JULY

International Conference on Rehabilitation Robotics

ZURICH, 29 JUNE–1 JULY

The focus is on clinical evaluation and promoting interaction among engineers, clinicians, and therapists. The conference includes sessions on standardization of rehabilitation robots, technology transfer, and assessment tools, as well as patient and caregiver testimonials. Other topics include assistive robotics, robotic wheelchairs, orthotics and prosthetics, and diagnostic and therapeutic robotics.

SPONSORS: IEEE Engineering in Medicine and Biology Society and IEEE Robotics and Automation Society
VISIT: http://www.icorr2011.org

IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS

RIO DE JANEIRO, 15–18 MAY

Covers analog signal processing, computer-aided network design, circuits and systems for sustainable environments, nanotechnology, sensor arrays, mobile processing, and energy-efficient systems.
SPONSOR: IEEE Circuits and Systems Society
VISIT: http://www.iscas2011.org

IEEE RADAR CONFERENCE

KANSAS CITY, MO., 23–27 MAY

Topics include radar systems, applications, phenomenology, modeling, and signal processing. This year's theme, "In the Eye of the Storm," focuses on the conference's tornado-prone location and the use of radar for severe weather analysis and tracking.
SPONSORS: IEEE Aerospace and Electronic Systems Society, IEEE Microwave Theory and Techniques Society, and the IEEE Kansas City Section
VISIT: http://www.ieeeradarcon11.org

IEEE INTERNATIONAL CONFERENCE ON POWER ELECTRONICS & ENERGY CONVERSION CONGRESS AND EXPOSITION, ASIA

JEJU, KOREA, 30 MAY–3 JUNE

Presentations cover power semiconductor devices and packaging, modeling, simulation, and electromagnetic interference. Other topics include reliability, machines, actuators, sensors, and motor controls and drives.
SPONSOR: IEEE Power Electronics Society
VISIT: http://www.icpe2011.org

PULP AND PAPER INDUSTRY TECHNOLOGY CONFERENCE

NASHVILLE, 19–23 JUNE

Sessions focus on changes in the field, maintenance, safety practices, standards and codes, and equipment upgrades in manufacturing plants.
SPONSOR: IEEE Industry Applications Society
VISIT: http://pulppaper.org

IEEE PHOTOVOLTAIC SPECIALIST CONFERENCE

SEATTLE, 19–24 JUNE

Covers all aspects of photovoltaic technologies. Topics include crystalline silicon technologies and thin-film solar cells made of copper indium gallium selenide, cadmium telluride, and related materials.
SPONSORS: IEEE Electron Devices Society, IEEE Power & Energy Society, and IEEE Photonics Society
VISIT: http://www.ieee-pvsc.org

IEEE-WORLD HAPTICS CONFERENCE

ISTANBUL, 22–24 JUNE

The focus is on human, machine, and computer haptics. Tutorials and sessions cover the design of haptic interfaces, tactile displays and sensors, haptic rendering and virtual environments, and haptic cognition.
SPONSOR: IEEE Robotics & Automation Society
VISIT: http://www.haptics2011.org

IEEE/AMERICAN SOCIETY OF MECHANICAL ENGINEERS INTERNATIONAL CONFERENCE ON ADVANCED INTELLIGENT MECHATRONICS

BUDAPEST, 4–6 JULY

Covers mechatronics, robotics, automation, and related areas. Topics include actuators, aerospace engineering, bioengineering, cognitive telemanipulation, data storage systems, and electronics packaging.
SPONSORS: IEEE Industrial Electronics Society, IEEE Robotics & Automation Society, and ASME Dynamic Systems and Control Division
VISIT: http://www.aim2011.org

PROFILES

IEEE Members Earn "Genius" Awards

BY JOHN R. PLATT

TWO IEEE MEMBERS were among the MacArthur Fellows named to the 2010 class. Commonly called the "genius awards," the fellowships honor "talented individuals who have shown extraordinary originality and dedication in their creative pursuits and a marked capacity for self-direction." The recipients—Michal Lipson and Dawn Song—each receive a US $500 000 no-strings grant during the next five years. The fellowships are awarded by the John D. and Catherine T. MacArthur Foundation.

Michal Lipson

Optics for Next-Generation Devices

"Are you sitting down?" That was the first question the representative from the MacArthur Foundation asked Lipson [left], an IEEE senior member, when she got the call last year letting her know she had been named a MacArthur Fellow. "It was a complete surprise," Lipson says. "I honestly thought it was a prank."

Lipson is an associate professor and founder of the Nanophotonics Group at Cornell University, in Ithaca, N.Y. She received the grant for her pioneering work in micrometer-size photonic silicon structures, which have become the building blocks for applications such as on-chip networking, routing, switching, and signal detection. Her research could lead the way to practical optical computer devices that are compatible with current microelectronics.

Much of Lipson's work focuses on developing optics for the next generation of computers and other devices while using low levels of power and remaining compatible with today's electronic workhorse, complementary metal oxide semiconductors (CMOS). "The idea is that if we use photonics to replace electrons with light, not for doing computation but for propagation of data from one side of a chip to another, it will increase their speed and processing capacity dramatically," she says.

Lipson's work in refining optoelectronic and optical circuits has decreased their size, increased their efficiency, and accelerated their switching speeds. The resulting silicon-based photonic ICs have the potential to dramatically improve signal transmission and processing.

Traditionally, optical devices have used optical materials such as gallium arsenide or lithium niobate, which are not compatible with CMOS-based microelectronics. Lipson has made breakthroughs in the design of such devices, using silicon-based fabrication methods. She and her research group have shown that ring modulators, or circular waveguides, can serve as switches for light passing through adjacent linear waveguides when the frequency of light going into the modulators is precisely tuned relative to the linear waveguide. Lipson and her group are creating chips that can slow down, enhance, or manipulate light in order to increase efficiency and performance while also reducing chip size. "Slow light" is a research area that would, among other uses, allow a chip to store a light signal, then retrieve it and send it along when it is needed.

Her efforts occasionally have more fanciful applications: Her team's "Cloaking at Optical Frequencies" paper, published in *Nature Photonics*, made headlines in 2009 for describing how to build a device similar to Harry Potter's famed invisibility cloak; Lipson's was composed of nanometer-size silicon structures rather than magical fibers.

AN EARLY INSPIRATION

Lipson was born in Israel, where her father taught physics at the Technion-Israel Institute of Technology. Her family moved to São Paulo when she was 8 years old, but she returned to Israel to attend the very college where her father had taught.

Lipson went on to earn bachelor's and master's degrees in physics in 1992 and 1994, as well as a Ph.D. in solid-state physics in 1998. She joined MIT as a postdoctoral associate in the materials science department in 1999, where she focused on silicon light emitters, the technology that made integrated optical processing on a nanoscale level possible.

Lipson moved to Cornell in 2001 to become an associate professor in the School of Electrical and Computer Engineering, where she founded the Nanophotonics Group, a research lab devoted to the physics and applications of nanoscale photonic structures. *Nanophotonics* refers to structures that are about 200 times smaller than a human hair.

As early as 2003, Lipson was publishing work showing that one of the first applications of nanophotonic circuits would be routers and repeaters for fiber-optic communication systems, research that quickly made the technology practical for home use.

"I think that's what I like about my work—it's applied physics," she says. "You take fundamental principles and apply them to real problems."

The Nanophotonics Group has grown enormously in the last few years. She says the group started "from scratch" with a completely empty lab. "Now it's very large, with 20 Ph.D. students," she says. "It's a very active group."

JOHN D. & CATHERINE T. MACARTHUR FOUNDATION

JOHN D. & CATHERINE T. MACARTHUR FOUNDATION

Throughout her career, Lipson has been active as an IEEE volunteer. She serves on the IEEE Photonics Society advisory board, has been on the advisory board of the *IEEE Photonics Journal*, and has served as a guest editor for the *IEEE Journal of Selected Topics in Quantum Electronics*. In addition, she is an active member of the IEEE Women in Engineering group. "As a senior person in my field, I have a responsibility to help other women in engineering," she says.

DRIVE AND DEVOTION

One of the best things about receiving the MacArthur Fellowship, Lipson says, is that her two sons, ages 6 and 13, finally understand what she does. "And they understand the importance of what I do, and how my success is all self-driven," she says. "If you're not excited about your work, no one else is going to get excited. This is a very competitive field, and there's not a lot of funding. Everyone is competing for the same pot of money."

The MacArthur grant will allow her team to do work that might not have immediate commercial application. "I want to add to my efforts and do some research that is a little more fundamental and harder to get funding for," she says. For example, she has started working on a project using photonics to simulate a black hole. The new project has a bonus for her: Her partner is her father, Reuven Opher, who is on leave from the University of São Paulo to work as a visiting scientist at Cornell.

Lipson says she was inspired to study physics because of her father's passion for the field. "He loves what he does. He gave me and my twin sister a great lesson: There is nothing more beautiful in this world than the fact that we can make an impact through science—and get paid for it," she says, laughing.

Dawn Song

Seeking Beauty in Computer Security

Is there something captivating in computer code? IEEE Member Dawn Song [above] contends there is.

"To me, life is about creating something truly beautiful, and I think there's a lot of beauty in science and engineering, beyond what people usually associate with the word *beauty*," Song says. "An elegant idea that solves a hard problem is to me—and I think to many others—something very beautiful."

Song was named a MacArthur Fellow for her work on computer security for software, hardware, and networks. She is an associate professor in the department of electrical engineering and computer science at the University of California, Berkeley.

A CHANGING FIELD

One of her main interests is developing technologies to analyze the security-related properties of program executables, extract the root cause of attacks, and build defenses against them.

Song's work in this area began in early 2000, when she was researching how to defend systems against malicious code as an assistant professor at Carnegie Mellon University, in Pittsburgh.

"For the first time, we were seeing Internet worms on a large scale," she says. At the time, most approaches to defending against such attacks involved looking for the symptoms, such as increased network traffic or anomalous signals, and trying to fight the problems that arose.

"That was effective in some cases, but it didn't help us understand what the problem really was," she says. She started considering how to preempt the attacks by, for example, uncovering vulnerabilities that worms could exploit. That way, security experts could "automatically generate defenses against the attacks, even when they morph," she says.

Song and her research group developed the BitBlaze binary analysis infrastructure, a suite of technologies to look deep inside the program executables—either benign but vulnerable programs or malicious code—and defend against malicious attacks.

By the time Song moved to UC Berkeley in 2007, the Web had grown, which meant additional security challenges. To address them, she started a sister project, WebBlaze, "to design and develop new technologies to enhance security in the Web space," she says.

Song's WebBlaze research group has developed tools for finding new classes of vulnerabilities in browsers and applications and has devised defenses against them. Some of the approaches have been adopted in industrial standards and mainstream browsers.

FROM PHYSICS TO SECURITY

Born in China, Song went on to receive a bachelor's degree in physics from Tsinghua University, in Beijing, in 1996. She was drawn to the field because "physics is the language of nature," Song says.

"You can really see the beauty in it. I think studying physics offered me great training."

Song began studying for a Ph.D. in physics at Cornell University, in Ithaca, N.Y. She had become intrigued by computer science, so while at Cornell she took a few classes and did some research projects. "I realized I was really interested in computer science research and decided to switch," she says.

After a year at Cornell, she transferred to the computer science Ph.D. program at Carnegie Mellon, where she obtained a master's degree in 1999. She moved to UC Berkeley to finish her Ph.D., which she received in 2002.

"I chose to work in computer security because I was fascinated by the problems and saw how important it would become in the future," Song says.

After graduating from UC Berkeley, she worked as an assistant professor in electrical computer engineering and computer science at Carnegie Mellon for five years. She returned to Berkeley to become an associate professor in computer science in 2007 and received tenure last year.

KEEP EXPLORING

Looking ahead, Song plans to develop tools to protect users' information and privacy on social networks and in the cloud.

"Technology is doing good by making people more connected and making society more open," she says, "but in many cases, people would like to protect their privacy. We are developing technology to do just that."

Song is also extending the BitBlaze approach to improve security in networked medical devices and embedded systems.

The MacArthur grant will allow her to explore other areas of computer security and computer science, she says, although she has not determined the nature of those ventures. "The grant will be of great help in enabling me to do work that I otherwise may not be able to do," she notes.

Song says she never wants to stop exploring new ideas: "From China to the United States, from physics to computer science, I always enjoy getting into new environments and new areas, because they propel my learning." ■

PART-TIME PASSIONS

Kevin Fu

Bringing In the Dough

PASSION
Making artisan breads

PROFESSION
Computer science professor

HOMETOWN
Amherst, Mass.

IEEE MEMBER Kevin Fu's hobby began with an offhand remark that led to a delicious obsession.

In his MIT graduate school days in the late 1990s, Fu was not known for his cooking skills. In fact, he once bragged to a friend when he made a simple lunch. "Hey, I made my own sandwich!" he said. "Oh yeah?" his friend retorted, "Did you make the bread, too?"

"I took that as a dare," Fu says, "and decided to learn how to bake bread." Shortly after, he bought some bread-making basics: a bowl, a mixer, a wicker *banneton* (a basket that helps rising bread maintain its shape), and a cookbook. Fu's kitchen soon doubled as a culinary lab, and fellow students became his tasters. "After a while, my apartment began to smell like a distillery from the continuous fermentation of dough," he says. "I'd wake up at 3 a.m. to turn the dough, and soon I developed a sleep pattern that fit with the fermentation schedule. It probably delayed the completion of my thesis."

Fast-forward a decade or so, and Fu, now a professor at the University of Massachusetts Amherst, has become quite the artisan baker. Artisan bread making involves creating homemade loaves with just a few old-fashioned ingredients (a store-bought loaf might have nearly 20, including preservatives), like flour, water, yeast, and salt. It also involves experimenting with different baking methods. For example, allowing the dough to rise overnight (from the fermenting yeast) at cool temperatures produces a feisty crust with tiny bubbles. "Bread varies according to how and when you combine the ingredients," Fu says. "It all comes down to time, temperature, and technique."

To get just the right ingredients, he has even milled his own flour and planted a small wheat field in his backyard. "My neighbor asked me what was wrong with my lawn," he says. "I was tilling a manicured lawn and planting wheat provided by a local bakery. It would have worked, too, if it weren't for the rabbits. They ate the wheat before we could harvest it."

To perfect his skills, Fu took courses at the Culinary Institute of America, in Hyde Park, N.Y., and the French Culinary Institute, in New York City.

He has even had to suffer for his hobby. "My dentist once raised concerns about unusual gum damage," he says, "until I explained that my latest bread experiment had a razor-sharp crust as a result of my forgetting to slice the loaf at a softer, 45-degree angle." —*Susan Karlin*

Peter Tarjan

Hubcaps in Bloom

PASSION
Scrap art

PROFESSION
Biomedical engineering professor, retired

HOMETOWN
Miami

ONE MAN'S GARBAGE can be someone else's art. During the last decade, IEEE Life Fellow Peter Tarjan has been gathering bottle caps, golf balls, and plastic hubcaps he finds along the road and transforming them into colorful flowers. In the past year alone, he has made 130 flowers out of the unusual materials. He uses them to decorate flowerpots, his yard, and the rooms of his house.

Tarjan also gives his art to friends, local charities that use it to raise funds, and a nearby high school, which now has 23 hubcap flowers sprouting in its yard.

"Making flowers serves as an antidepressant. When I feel down, I make a few flowers and feel better," says Tarjan, who retired as a biomedical engineering professor at the University of Miami in 2009. "I refer to them as *i fiori della strada*—Italian for 'the flowers of the road.'"

He finds the pieces for his flowers during weekly speedwalks and jogs and then applies a saw, paint, and screws to fashion his artwork. He has never sold his creations, but one did fetch US $65 at a charity fund-raiser.

Tarjan began by making toys and children's furniture from cast-off wood when his first child was born in 1968. Then it was funny animal sculptures made from coral rocks and debris. The flowers came after he found his first hubcap, figuring it would be good for *something*.

"At first I didn't quite know what to do with the hubcaps. They sat in the garage for many months before the muse of junk art got hold of me," he says. "Over the years I found ways to trim them with a band saw, sand them, paint them, and decorate them with bottle caps, golf balls, and whatever else made its way into my collection. The flower stems are usually of PVC pipes from discarded sprinkler systems."

His children are grown now, and the toys he made for them have been passed down to his grandchildren. But the flowers keep blooming, filling up the garage and several storage areas in his home. "I guess I'm a bit of a pack rat, but luckily my wife tolerates it," he says, chuckling. "I still have the first flower I ever made." —*S.K.*

TOP: KEVIN FU; BOTTOM: PETER VERTES

ELECTION COUNTDOWN

ON 1 MAY, the candidates to be placed on the 2011 ballot will be announced by the IEEE Board of Directors, including candidates for IEEE president-elect nominated by the board. The ballot will also include nominees for various delegate-elect and director-elect positions up for election this year, submitted by their respective regional and divisional nominating committees.

Also on the ballot will be nominees for IEEE Standards Association president-elect and Board of Governors members-at-large; vice president-elect for IEEE Technical Activities; and IEEE-USA president-elect and IEEE-USA member-at-large. The IEEE Board of Directors is also responsible for placing proposed constitutional amendments on the ballot.

IEEE members who are not nominated but wish to run for office may do so by submitting a completed petition in a letter to the IEEE Board of Directors, to be received at the IEEE Operations Center by 15 April 2011.

For members to be eligible for placement on the ballot, petitions must be accompanied by the necessary number of valid signatures of voting members. Prospective candidates must meet other requirements as well.

DEADLINES AT A GLANCE

15 MARCH

- ☐ IEEE divisional nominating committees submit candidates for the office of divisional delegate-elect/director-elect, as applicable.
- ☐ IEEE regional nominating committees submit candidates for the offices of regional delegate-elect/director-elect, as applicable.
- ☐ IEEE Standards Association submits candidates for the offices of IEEE Standards Association president-elect and Board of Governors members-at-large.
- ☐ IEEE Technical Activities submits candidates for the office of IEEE Technical Activities vice president–elect.
- ☐ IEEE-USA submits candidates for the offices of IEEE-USA president-elect and IEEE-USA member-at-large.

15 APRIL

- ☐ Deadline for drafts of petitions for candidates interested in a place on the ballot to be submitted to the IEEE Board of Directors.

1 MAY

- ☐ IEEE Board of Directors submits to the voting membership a list of nominees for IEEE president-elect; delegate-elect/director-elect, as applicable; and other positions to be elected by voting members for the coming term.
- ☐ IEEE Board of Directors announces whether it intends to put forward any constitutional amendments.

10 JUNE

- ☐ Petitions for constitutional amendments must be received by noon EDT USA/16:00 UTC.
- ☐ Petition nominations for candidates to be placed on the ballot and voted on by the membership must be received by noon EDT USA/16:00 UTC.
- ☐ Initial statements by principal initiators and opponents of constitutional amendments must be received.
- ☐ IEEE Corporate Activities must receive initial campaign statements from individuals to be nominated by petition.

27 JUNE

- ☐ IEEE Corporate Activities mails initial statements by proponents of proposed constitutional amendments to opponents and opponents' initial statements to proponents.

5 JULY

- ☐ Deadline for rebuttal statements from initiators and opponents of proposed constitutional amendments.

15 AUGUST

- ☐ IEEE annual election ballots are sent to all voting members on record as of 30 June.

3 OCTOBER

- ☐ Last day for receipt of marked ballots from voting members (by noon CDT USA/17:00 UTC).

10 OCTOBER

- ☐ Last day for ballots to be tallied by IEEE Tellers Committee.

12 OCTOBER

- ☐ Last day for announcement of vote tally to IEEE Board of Directors by IEEE Tellers Committee.

21 NOVEMBER

- ☐ IEEE Board of Directors acts to accept report of IEEE Tellers Committee. Annual election results are made official.

UP FOR ELECTION IN 2011

CHOSEN BY ALL VOTING MEMBERS

☐ IEEE president-elect

CHOSEN BY MEMBERS IN REGIONS 1-6

☐ IEEE-USA president-elect
☐ IEEE-USA member-at-large

CHOSEN BY MEMBERS OF THE IEEE STANDARDS ASSOCIATION

☐ IEEE Standards Association president-elect
☐ IEEE Standards Association Board of Governors members-at-large

CHOSEN BY MEMBERS OF THE RESPECTIVE TECHNICAL DIVISIONS

☐ IEEE Technical Activities vice president–elect
☐ IEEE Division II delegate-elect/director-elect
☐ IEEE Division IV delegate-elect/director-elect
☐ IEEE Division VI delegate-elect/director-elect
☐ IEEE Division VIII delegate-elect/director-elect
☐ IEEE Division X delegate-elect/director-elect

CHOSEN BY MEMBERS OF THE RESPECTIVE REGIONS

☐ IEEE Region 1 delegate-elect/director-elect
☐ IEEE Region 3 delegate-elect/director-elect
☐ IEEE Region 5 delegate-elect/director-elect
☐ IEEE Region 7 delegate-elect/director-elect
☐ IEEE Region 9 delegate-elect/director-elect

FOR MORE INFORMATION on election procedures, contact IEEE Corporate Activities, at corp-election@ieee.org.

AND THE 2010 WINNERS ARE...

The IEEE Tellers Committee tally of votes from valid 2010 annual election ballots, approved in November by the IEEE Board of Directors, is as follows:

IEEE PRESIDENT-ELECT, 2011

Gordon W. Day	27 615
Joseph V. Lillie	17 341

DIVISION DELEGATE-ELECT/ DIRECTOR-ELECT, 2011

DIVISION I

Cor L. Claeys	1176
Alfred E. Dunlop	1172
Irving Engelson	815

DIVISION III

Douglas N. Zuckerman	4049
Stanley L. Moyer	2273

DIVISION V

James W. Moore	3701
Jon G. Rokne	2599

DIVISION VII

Cheryl "Cheri" A. Warren	2428
Mohamed E. El-Hawary	1397
Saifur Rahman	877

DIVISION IX

José M.F. Moura	1681
Anthony K. Milne	1111
Robert "Bob" C. Rassa	946

REGION DELEGATE-ELECT/ DIRECTOR-ELECT, 2011-2012

REGION 2

Parviz Famouri	2084
Murty S. Polavarapu	1910

REGION 4

Karen S. Pedersen	1410
Robert C. Parro	913
Hamid Vakilzadian	399

REGION 6

Michael R. Andrews	3149
Roy E. "Gene" Stuffle	2824

REGION 8

Martin J. Bastiaans	5044
Gerhard P. Hancke	3908

REGION 10

Toshio Fukuda	4756
Ramakrishna Kappagantu	3105
Jose "Joe" B. Cruz Jr.	1196

STANDARDS ASSOCIATION BOARD OF GOVERNORS MEMBER-AT-LARGE, 2011-2012

Karen Bartleson	1047
Victor Berman	356

STANDARDS ASSOCIATION BOARD OF GOVERNORS MEMBER-AT-LARGE, 2011-2012

Glenn W. Parsons	814
Stanley L. Moyer	589

TECHNICAL ACTIVITIES VICE PRESIDENT-ELECT, 2011

Frederick C. Mintzer	10 261
William A. Gruver	9590
John T. Barr IV	7285

IEEE-USA PRESIDENT-ELECT, 2011

James M. Howard	12 821
Marc T. Apter	11 153

IEEE-USA MEMBER-AT-LARGE, 2011-2012

John R. Twitchell	13 596
Mauro G. Togneri	10 335

The 46 755 returned ballots represent 15.44 percent of 302 815 ballots mailed by IEEE.

Introducing the 2011 Fellows

The Institute *salutes the 321 IEEE senior members from around the world who have been named IEEE Fellows for 2011. They join an elite group of more than 6000 previously named IEEE Fellows who have contributed to the advancement or application of engineering, science, and technology.*

Mohamed S. Abdel-Mottaleb
Mohamed Deeb Hussni Abouzahra
Amr A. Adly
David Henry Albonesi
Mark G. Allen
Simon Saw-Teong Ang
Asen M. Asenov
Ricardo Baeza-Yates
Andrzej Banaszuk
Douglas Michael Baney
Mesut Ethem Baran
Ivo Barbi
Donald E. Barrick
Arya Behzad
Mark Robert Bell
Paul Raymond Berger
Pierre Berini
Francine Berman
Abderrahmane Beroual
Michael Rudolf Berthold
Ram P. Bhatia
Shuvra S. Bhattacharyya
Qi Bi
Janusz Witold Bialek
Holger Boche
Karl F. Bohringer
Stephen Allen Boppart
Gaetano Borriello
Bernadette R. Bouchon-Meunier
Klaus-Peter Brand
José António Brandao Faria
Wayne Peter Burleson
Jin-Xing Cai
Adriano José Camps
Guohong Cao
Gert Cauwenberghs
Jonathon A. Chambers
Naresh Chand
Ching-Ray Chang
John Newton Chapman
Goutam Chattopadhyay
Subhasis Chaudhuri
Shyi-Ming Chen
Shijie Cheng
Sandeep Chennakeshu
Marco Chiani
Albert Chin
Pak Chung Ching
Horia Chiriac
Bo Hyung Cho
Debabani Choudhury
Keith M. Chugg
Jen-Inn Chyi
Lori A. Clarke
Carlos Artemio Coello Coello
Patrizio Colaneri
Steve C. Cripps
Steven Andrew Cummer
Michael Donald Dahlin
Paul Cooper Davis
Vivek K. De
Kristin Maria De Meyer
Daniel Manuel Dias
Bernard Dieny
Xiaoqing Ding
Ajay Divakaran
Daniel R. Doan
Miwako Doi
Bruce Randall Donald
John Michael Dudley
Tolga Mete Duman
Pierre Edmond Dupont
Emad S. Ebbini
Tarek El-Ghazawi
Elza Erkip
Shanhui Fan
Veronique Ferlet-Cavrois
Andrea Ferrero
John Michael Fitzpatrick
Bob Frankston
Yoshihiro Fujita
Moncef Gabbouj
Paul D. Gader
Mark John Gales
Ian Galton
Gregory R. Ganger
David Gesbert
Dennis Lee Goeckel
Maria Sabrina Greco
Voicu Zamfir Groza
Piyush Gupta
Lino Guzzella
Mounir Hamdi
Dan W. Hammerstrom
Arun Hampapur
Yunghsiang Sam Han
Mary Jean Harrold
Craig Jay Hartley
Robert Wendell Heath
Joachim Viktor Rudolf Heberlein
Christopher John Hegarty
Jukka A. Henriksson
Digh Hisamoto
John York Hung
Yehea Ismail
Mark A. Itzler
Arun K. Iyengar
Douglas W. Jacobson
Luis Jofre-Roca
Kevin Jones
Laxmikant V. Kale
Hillol Kargupta
Stephen William Keckler
Karl Gene Kempf
Ronald Meek Keyser
Sergey N. Kharkovsky
Changhyun Kim
Eun Sok Kim
Kiho Kim
Shin'ichiro Kimura
Paul Eugene Kinahan
Peter Rene Kinget
Frederick A. Kish Jr.
Dirk Bernadus Marie Klaassen
Uming Ko
Hermann Koch
Johann Wolfgang Koch
Visa Koivunen
Thomas Joseph Kolze
Ioannis Kontoyiannis
Dwarakadas Pralhaddas Kothari
Ram Kumar Krishnamurthy
Thomas Francis Kuech
Kelin Jo Kuhn
Tei-Wei Kuo
Santosh Kumari Kurinec
Fujio Kurokawa
Niels Kuster
Sidney Bertram Lang
Jae Hong Lee
Jay H. Lee
Kwang Bok Lee
Te-Won Lee
Kwok Wa Leung
Bo Li
Han-Xiong Li
Kai Li
Shipeng Li
Wen Jung Li
Ying-Chang Liang
Chih-Jen Lin
Kwang-Lung Lin
Johan Paul Marie Gerard Linnartz
Juin J. Liou
Guoping Liu
Jiming Liu
Patrick Joseph Loughlin
Ahmed Louri
Nigel Hamilton Lovell
James Jian-Qiang Lu
Paolo Lugli
Joseph William Lyding
John Lygeros
Wei-Ying Ma
Jan Marian Maciejowski
Chris Alan Mack
Kofi Afolabi Makinwa
Erik Jan Marinissen
Rainer Martin
Andrew Charles Marvin
Maja J. Mataric
Luke James Mawst
Stephen John Maybank
Kathryn S. McKinley
Stephen McLaughlin
Nasir Memon
Lalit K. Mestha
Anthony Kinnaird Milne
Vladimir V. Mitin
Biswadip "Bobby" Mitra
Daniel M. Mittleman
Dharmendra S. Modha
S.O. Reza Moheimani
Eric Louis Mokole
John M. Moreland
Paul A. Morton
Peter Moulton
Charles John Mozina
Patric Muggli
Subhas Chandra Mukhopadhyay
Larry Akio Nagahara
Yoshinobu Nakagome
Yoshihiko Nakamura
Sanjiv Nanda
Asoke Kumar Nandi
Koichi Nara
Vijaykrishnan Narayanan
Evgenii E. Narimanov
Thomas E. Neal
Bradley J. Nelson
Hermann J. Ney
Michel M. Ney
Natalia K. Nikolova
Ali Nourai
Ken Kyongyop O
Yasutaka Ogawa
Joseph Olorunfemi Ojo
Allison Mariko Okamura
Sakae Okubo
Erik Ordentlich
Paul Ottinger
M. Tamer Ozsu
Christof Paar
Dorin Panescu
Shivendra S. Panwar
Ioannis "John" Papapolymerou
Nikos Paragios
Manish Parashar
Thomas Parisini
Raymond Sydney Pengelly
Eric René Pottier
Balaji Prabhakar
Robert Marcel Puers
Si-Zhao Joe Qin
Susanto Rahardja
Johann Peter Reithmaier
Gabriel Alfonso Rincon-Mora
James Alexander Ritcey
Kelly S. Robinson
Jose Rodriguez
Paul Alan Rosen
Elyse Rosenbaum
Catherine P. Rosenberg
Yuriy Rozanov
Thomas Patrick Ryan
William Eugene Ryan
John Scott Sadowsky
Jawad A. Salehi
Philippe Salembier
Gurtej Sandhu
Vincent John Saporita
Edward H. Sargent
Anna Scaglione
Tuviah Ehud "Ed" Schlesinger
Stephen Walter Schneider
Donatella Sciuto
Steven M. Seitz
Pankaj K. "PK" Sen
Wouter Anton Serdijn
Fred W. Sexton
Zheng John Shen
Frank Shi
Leyuan Shi
Masanobu Shimada
Yuriy S. Shmaliy
Neil Gilbert Siegel
Ray Simar Jr.
Jane Marie Simmons
Morris Samuel Sloman
Roy Smith
James Henry Stathis
Joseph Staudinger
Guy Lewis Steele
Yossef Steinberg
Andreas Stolcke
Ganesh Shastri Subbarayan
Hiroaki Sugiura
Akihiko Sugiyama
Gaurav Suhas Sukhatme
Qibin Sun
Myung Hoon Sunwoo
Tanveer F. Syeda-Mahmood
Dennis Michael Sylvester
Richard P. Taylor
Chinthananda Tellambura
Claire J. Tomlin
Isabel Trancoso
Mitchell D. Trott
Kunio Uchiyama
Masaru Uchiyama
Vinay A. Vaishampayan
Prabhat Varma
Manuela M. Veloso
Rama Venkatasubramanian
Anthony Vetro
Emanuele Viterbo
Vatche Vorperian
Petros G. Voulgaris
Lei Wang
Li-Chun Wang
Rodney Bruce Waterhouse
Jeffrey J. Welser
Chin-Long Wey
Louis Litchfield Whitcomb
Alice E. White
Stephen Bryant Wicker
Indra Widjaja
Thomas Wiegand
Alexander Wolf
Ke-Li Wu
Min Wu
Qing-Hua Wu
Xiaolin Wu
Xindong Wu
Guoliang Xue
Jie Xue
Quan Xue
Hirosuke Yamamoto
Yong Yan
Chih-Kong Ken Yang
Guang-Zhong Yang
Yu-Dong Yao
Roy D. Yates
Ellen Witte Zegura
Fan-Gang Zeng
Gengsheng Lawrence Zeng
Kevin Zhang
Liang-Jie Zhang
Tao Zhang
Song-Chun Zhu
Herbert Zirath

Nominees Sought for IEEE's Leaders in 2012

ONLY THROUGH DEDICATED individuals who volunteer their time and expertise can IEEE fulfill its core purpose of fostering technological innovation and excellence for the benefit of humanity. The IEEE Nominations and Appointments Committee is looking for people with the skill, passion, and perspective to serve in 2012 as IEEE corporate officers or on committees of the IEEE Board of Directors. The committee seeks nominees for the following:

IEEE PRESIDENT-ELECT

IEEE CORPORATE OFFICERS

- ☐ Vice President, Educational Activities
- ☐ Vice President, Publication Services and Products
- ☐ Secretary
- ☐ Treasurer

IEEE STANDING COMMITTEES

- ☐ Awards Board
- ☐ Employee Benefits and Compensation
- ☐ Ethics and Member Conduct
- ☐ Governance
- ☐ Fellow
- ☐ History
- ☐ Nominations and Appointments
- ☐ Public Visibility
- ☐ Tellers
- ☐ Women in Engineering

DEADLINES

Submit nominations for the standing committee chairs, as well as for a student member of the IEEE Women in Engineering Committee, by 1 March. The date for submitting nominations for IEEE president-elect, corporate officers, and the standing committees is 1 July.

ELIGIBILITY

Each position has eligibility and qualifications requirements on which the Nominations and Appointments Committee evaluates candidates.

WHO CAN NOMINATE?

Anyone may submit a nomination; you need not be an IEEE member. Self-nominations are encouraged. An IEEE organizational unit may submit recommendations provided that its governing body, or the body's designee, has endorsed the nominee.

HOW TO NOMINATE

Review the eligibility requirements and qualifications for the positions, and then complete the nomination form. Incomplete forms will not be considered.

PEER NOMINATIONS

Include the nominee's name and recommended positions, as well as a brief explanation of the person's qualifications and accomplishments specific for the positions.

A person may be nominated for more than one position. Nominators do not need to contact their nominees before submitting the form. The N&A Committee will contact eligible nominees to ascertain their willingness to serve and, if necessary, to obtain more information.

SELF-NOMINATIONS

Include your name, photograph, desired position or positions, qualifications and accomplishments that are specific for the desired position, and your biography. Use the template provided on the nomination form.

THE PROCESS

The N&A Committee is responsible for making recommendations for IEEE corporate officers to the IEEE Assembly, which then elects the officers. The committee also makes recommendations to the IEEE Board of Directors for IEEE president-elect, as well as for the chairs and members of standing committees. The Board then must ratify the recommendations. The Board also recommends the candidates for president-elect to be put on the IEEE annual election ballot, with IEEE's voting membership choosing the president-elect.

—John R. Vig, chair, 2011 IEEE Nominations and Appointments Committee

FOR MORE INFORMATION about the positions, including qualifications and estimates of the time each position requires during the term of office, and a nomination form, check the Guidelines for Nominating Candidates at http://www.ieee.org/about/corporate/nominations/nominations_guidelines.html.

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- Teacher In-Service Program
- TryNano.org

University Education
- Global Accreditation
- Accreditation.org
- Real World Engineering Project
- Technical English Program
- Standards Education

Continuing Education
- IEEE eLearning Library
- Certification
- Continuing Education Units
- IEEE Continuing Education Providers

Awards
- Eleven major awards recognize and honor individuals and companies for major contributions to engineering and technical education.

IEEE Women in Engineering
- International professional organization dedicated to promoting women engineers and scientists.

▶ **Accomplish more: www.ieee.org/education**

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