the institute

http://www.ieee.org/theinstitute VOL. 33 NO. 2 JUNE 2009

A LOOK BACK AT THE HISTORY OF IEEE AND THREE KEY TECHNOLOGIES THAT ITS MEMBERS HELPED DEVELOP. **P. 5**

IEEE
Celebrating 125 Years
of Engineering the Future

INSIDE

ANNUAL ELECTION

Meet the candidates for 2010 IEEE President-Elect: J. Roberto B. de Marca, Moshe Kam, and Joseph V. Lillie. **P. 8**

PART-TIME PASSIONS

A pair of IEEE members from the New York City area keep things rocking. An Alabama duo team up on the ice. **P. 16**

PRODUCTS & SERVICES

IEEE has made it easier to find resources that can help you with your career. **P. 12**

CONFERENCES

Upcoming IEEE conferences focus on the history of societies, automation, ultrasonics, and sensors. **P. 13**

ONLINE

AVAILABLE 8 JUNE AT WWW.IEEE.ORG/THEINSTITUTE

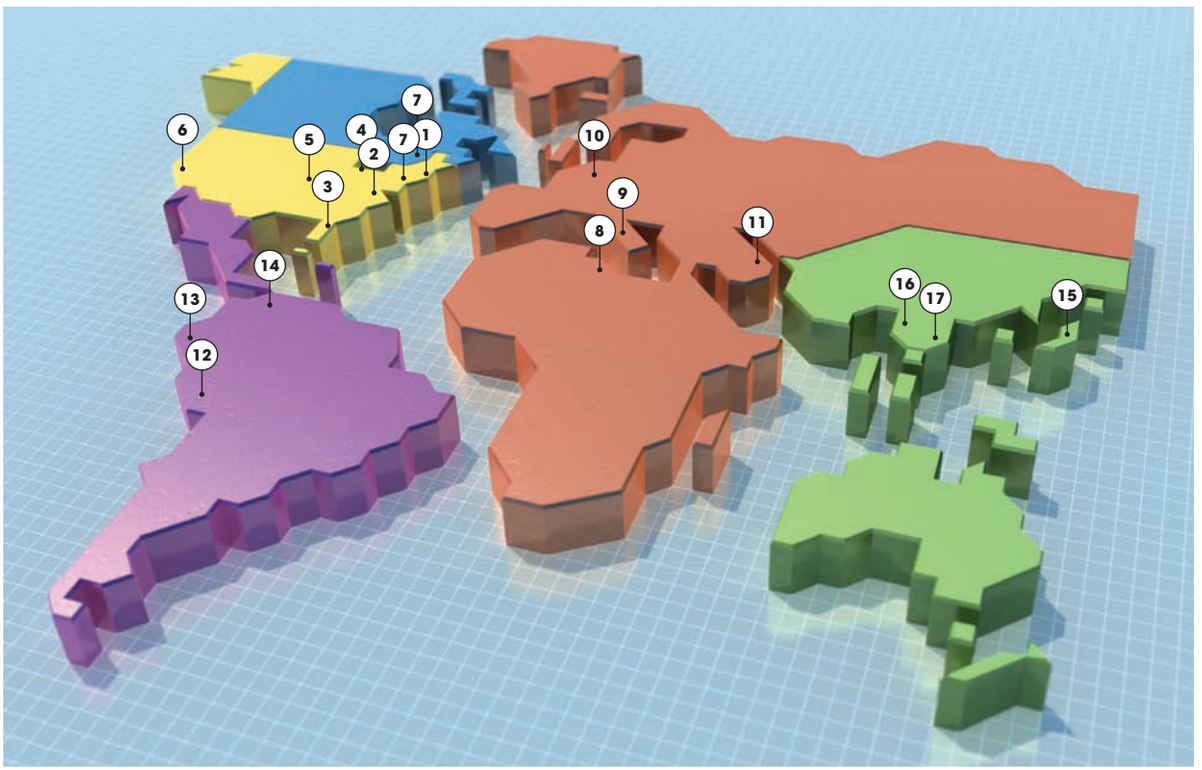
PUBLIC VISIBILITY 2007 IEEE President Leah Jamieson offers solutions to the problem of engineer attrition.

BOOKS OF INTEREST New Wiley–IEEE Press and Wiley–IEEE Computer Society Press releases.

NEWS

IEEE AROUND THE WORLD CALENDAR

IEEE AROUND THE WORLD



REGION 1: Northeastern U.S.

1. New Hampshire Section establishes Life Members affinity group.

REGION 2: Eastern U.S.

2. Northern Virginia and Washington sections establish joint chapter of IEEE Nanotechnology Council.

REGION 3: Southeastern U.S. and Jamaica

3. Jacksonville (Fla.) Section forms Women in Engineering (WIE) affinity group.

REGION 4: Central U.S.

4. Southeastern Michigan Section forms chapter of IEEE Nanotechnology Council.

REGION 5: Southwestern U.S.

5. Kansas City (Mo.) Section establishes chapter of IEEE Aerospace and Electronic Systems Society.

REGION 6: Western U.S.

6. San Fernando Valley (Calif.) Section establishes joint chapter of IEEE Computer Society and IEEE Communications Society.

REGION 7: Canada

7. Montreal and Boston sections become sister sections.

REGION 8: Europe, Middle East, and Africa

8. Tunisia Section establishes chapters of IEEE Circuits and Systems, Signal Processing, Computer, and Computational Intelligence societies.
9. Italy Section establishes chapter of IEEE Systems Council.
10. Benelux Section establishes chapter of IEEE Council on Electronic Design Automation.
11. United Arab Emirates Section establishes chapter of IEEE Engineering in Medicine and Biology Society.

REGION 9: Latin America

12. Peru Section establishes chapter of IEEE Electron Devices Society.
13. WIE affinity group formed at Catholic University of Santiago, Guayaquil, Ecuador.
14. Student branch at Nueva Granada Military University, in Bogotá, Colombia, establishes chapters of IEEE Industry Applications Society and IEEE Technology Management Council.

REGION 10: Asia

15. Kansai (Japan) Section establishes chapter of IEEE Consumer Electronics Society.
16. In India, WIE affinity groups formed at Vidya Academy of Science and Technology, Thrissur, Kerala, and Dhirubhai Ambani Institute of Information and Communications Technology, Gandhinagar, Gujarat.
17. Also in India, student branches formed at the Institute of Engineering and Technology, Alwar, and the Geetanjali Institute of Technical Studies, Udaipur, Rajasthan.

Send your region or section news to institute@ieee.org.

New Executive Director Named

E. James "Jim" Prendergast is IEEE's new executive director. He started on 6 April in Piscataway, N.J., succeeding Jeffry W. Raynes, who resigned last June.


PRENDERGAST

An IEEE senior member, Prendergast is serving as IEEE's chief operating officer, managing a staff of more than 1000 employees.

Prior to joining the IEEE staff, he was corporate vice president and chief technology officer of DuPont Electronic & Communication Technologies, in Wilmington, Del., a leading supplier of electronic materials, fluorochemicals, and imaging technologies. Previously, he was vice president and director of Motorola's Physical Sciences Research Laboratories. Prior to that, he worked for AT&T Bell Labs, where he led the development, installation, and support of process- and device-modeling tools for silicon and gallium arsenide technologies. He's been an IEEE member for 32 years.

Annual Election Gets Under Way in August

Look for your annual election ballot package to arrive in August via first-class mail. All eligible members are slated to receive a paper ballot and a postage-paid reply envelope. Included is information about how to access and return the ballot electronically.

New members as of 30 June, as well as those elevated to member or graduate student member on or before that date, may vote.

The usual booklet with the candidates' biographies will be mailed only to members who voted by paper ballot in last year's election and to those who chose to have the booklet mailed to them this year in their Web account member preference profile. The booklet will not be mailed to new members or to members who submitted their ballots electronically last year, did not vote in last year's election, or updated their Web account preference to not receive a booklet. Please review your contact information, preferences, and education information at http://www.ieee.org/go/my_account, and update them if need be to help ensure you receive the ballot package.

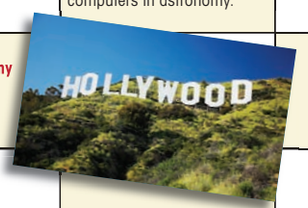
Deadlines

- **1 August** IEEE annual election ballots are sent to all voting members by this date.
- **1 October** Last day for members' ballots to be received by IEEE, by noon Central Daylight Time USA/17:00 UTC.
- **13 October** Last day for Tellers Committee to announce vote tally to IEEE Board of Directors. Unofficial results are reported.
- **22 November** IEEE Board of Directors acts to accept report of Tellers Committee. Annual election results are made official.

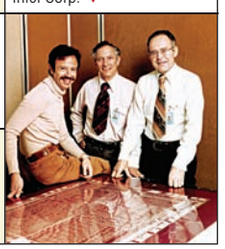
ON THE COVER, CLOCKWISE FROM LEFT: EMILY COOPER; JILL FROMER/ISTOCKPHOTO; JOSHUA DALSIMER; CHAD J. SHAFFER/GETTY IMAGES; ISTOCKPHOTO; THIS PAGE, CLOCKWISE FROM TOP: BRYAN CHRISTIE DESIGN; BONNIE NANI: IEEE

CALENDAR

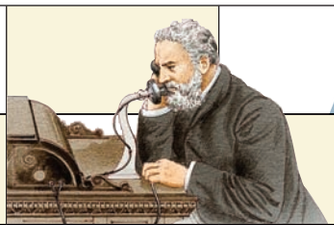
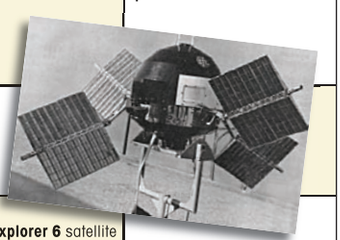
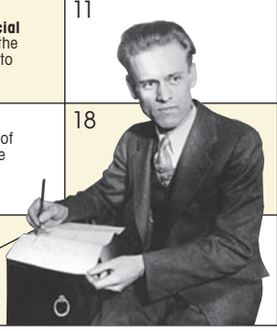
June

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		2	3	4 1931: **Hans Hermann Knoll** and **Ernst Ruska** demonstrate the first electron microscope.		6
7 1900: Birth date of **Frederick Emmons Terman**, 1941 IRE president, considered one of the founders of Silicon Valley.		9 ◀ 1891: **Thomas A. Edison** receives a patent for his improved wax-cylinder phonograph.	10 1700: Birth date of **Ewald Jürgen von Kleist**, inventor of a device used to store electric energy, later called the Leyden jar. ▼	11		13 1934: Birth date of IEEE Fellow **Leonard Kleinrock**, developer of the underlying principles of packet switching.
14	15	16		18 **Annual IEEE Candidates Night Q&A** in Philadelphia.	19 ▲ 1902: Birth date of **Wallace John Eckert**, pioneer of the use of computers in astronomy.	20
21 1781: Birth date of **Siméon Denis Poisson**, originator of mathematical theories of electrostatics and magnetism. ▶	 22	23 23–28 June: **IEEE Board of Directors Meeting Series** in Los Angeles.		25 **IEEE Honors Ceremony** in Los Angeles. ▶		
28		30 1948: Bell Labs announces **invention of the transistor**.				

July

				2 1974: IRE cofounder **Alfred Norton Goldsmith** dies in St. Petersburg, Fla.		4
5		7 1916: Thomas A. Edison becomes head of the **Naval Consulting Board**, which advises the U.S. Navy on new scientific inventions. ▶		9		11 ◀ 1979: **Skylab**, the first U.S. space station, disintegrates upon reentry, scattering debris over the Indian Ocean and Australia.
12	13 ▲ 1977: A **power blackout in New York City** lasts nearly 25 hours, affecting millions of people.	14	15 1965: NASA's unmanned spacecraft **Mariner 4** captures the first close-up images of Mars.	16 16–19 July: **IEEE 125th anniversary celebration** and **Region 10 Student Congress** in Singapore. ▼	17	18 1968: **Gordon Moore** [right] and **Robert Noyce** [center] (shown with early employee **Andy Grove**, later CEO) found Intel Corp. ▼
19	20 1937: Radio pioneer **Guglielmo Marconi** dies in Rome.	21 1970: Completion of the **Aswan High Dam**, whose hydroelectricity will supply half of Egypt's power needs.	22	23		
26 26-30 July: **IEEE Power & Energy Society celebrates its and IEEE's 125th anniversary** in Calgary, Alta., Canada.	27	28	29 1947: **ENIAC**, one of the first digital computers, is rebooted after receiving a memory upgrade.	30		

August

						1
2 1922: **Alexander Graham Bell** dies in Nova Scotia, Canada. ▶			5	6	7	
9 1892: Thomas A. Edison receives a patent for the **two-way telegraph** in the United States.	10 1885: **First commercial electric streetcar** in the United States goes into service in Baltimore.	11	12 1981: IBM announces **commercial 16-bit personal computer**. ▶		14 1959: The **Explorer 6** satellite conducts the first telecast of Earth from space. ▲	
16	17 1937: First test flight of **airborne radar** by the British Air Force.	 18	19 ◀ 1906: Birth date of television pioneer **Philo T. Farnsworth**.			22
23 30	24		26 1895: **The Adams Hydroelectric Generating Plant**, in Niagara Falls, N.Y., begins operating.	27 1910: The **first radio broadcast** sent from an airplane in flight is transmitted over Sheepshead Bay, N.Y.		29 ◀ **IEEE 125th anniversary celebration** in Bangalore, India.

Historical events provided by the IEEE History Center

IEEE events indicated in RED

Sharpen your technical edge at Drexel University Online

Drexel University Online is an internationally recognized leader in engineering, business and technology. Ranked among the best by *U.S.News & World Report*, Drexel delivers distinguished education in a convenient online format. Programs offered through Drexel Online incorporate cutting-edge technology and current industry trends, to keep you at the top of your game.

IEEE-Drexel Online Partnership Benefits for You:

- 10-25% tuition reduction for IEEE members
- Ranked among "America's Best Colleges 2009" by *U.S.News & World Report*
- Access classes conveniently online – anytime, anywhere!

TOP-RANKING PROGRAMS:

MS in Electrical Engineering
MS in Computer Science
MBA Anywhere™
MS in Information Systems
MS in Engineering Management
MS in Software Engineering
MS in Project Management
And more!

Contact Your Drexel-IEEE Partnership Liaison

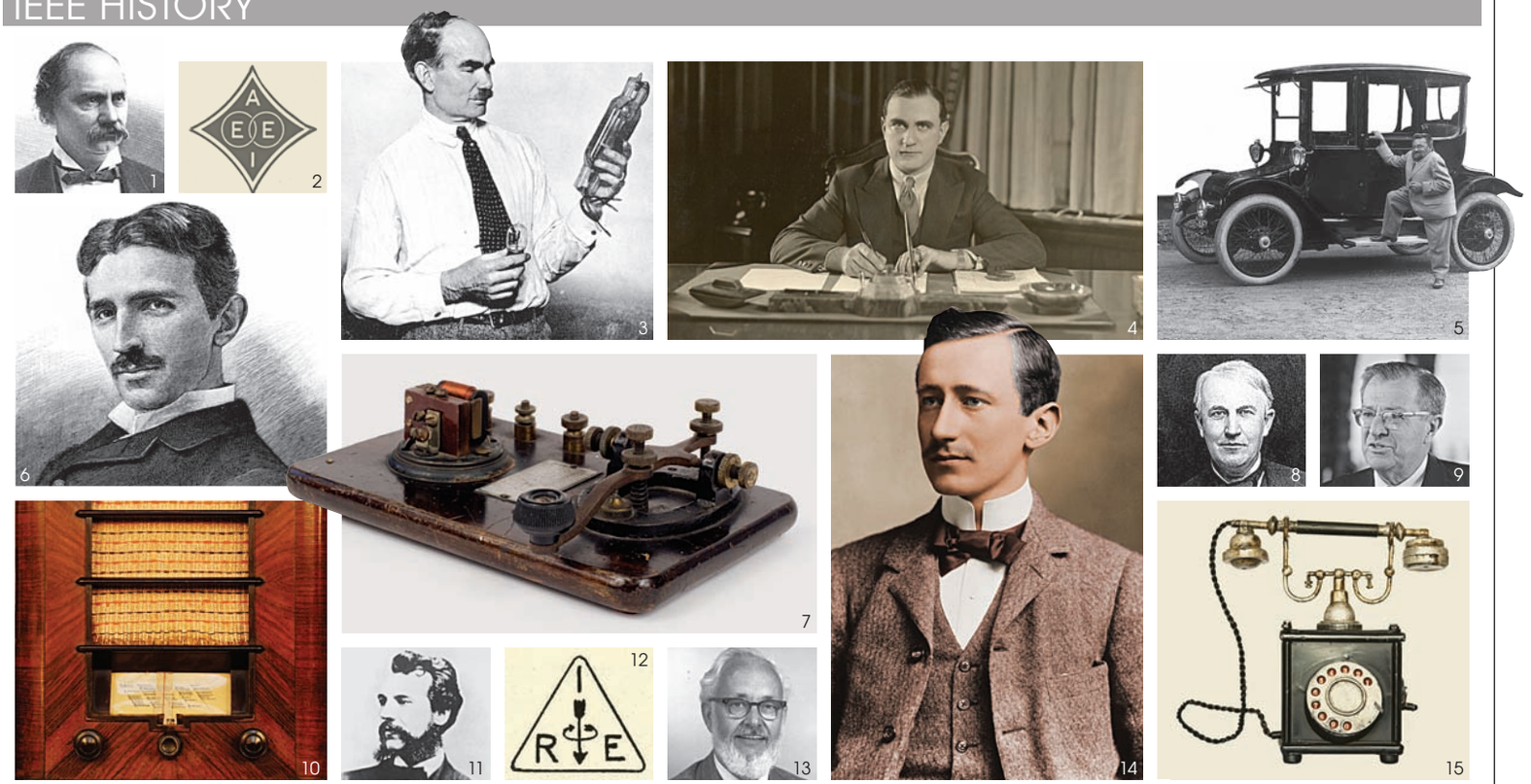
Valerie Malinowski
(215) 895-0915
vm97@drexel.edu

www.drexel.com/ieee
Learn about additional partner benefits

Drexel Online. A Better U.™

(215) 895-0915 | vm97@drexel.edu

Established 1981



1. Norvin Green. 2. AIEE logo. 3. Lee de Forest. 4. Alfred Goldsmith. 5. Charles Steinmetz. 6. Nikola Tesla. 7. The telegraph. 8. Thomas A. Edison. 9. Frederick E. Terman. 10. An early radio. 11. Alexander Graham Bell. 12. IRE logo. 13. Patrick E. Haggerty. 14. Gugielmo Marconi. 15. An early telephone.

Editor's note: To celebrate the 125th anniversary of the founding of the American Institute of Electrical Engineers on 13 May 1884, The Institute *dedicates this issue to those who set IEEE on the path of becoming what it is today: the world's largest technical professional association.*

We explore IEEE's development in "Looking Back 125 Years," (this page). In "Tracking Tech History," p. 7, we offer a brief look at three key technologies in which IEEE members played starring roles.

—Kathy Kowalenko

Looking Back 125 Years

BY ANNA BOGDANOWICZ

ON 13 MAY 1884 in New York City, a small group of electricity pioneers met to form the American Institute of Electrical Engineers. From its very start the AIEE had a lofty goal: to support the advancement of electrical technologies to improve people's lives. As electric power spread to all parts of the world—enhanced by large-scale power plants and inventions such as AIEE Member Nikola Tesla's ac induction motor—the organization's founders wanted its members to be at the forefront of whatever technologies emerged. In addition to electric power, the organization focused on wired communication tools such as the telegraph and the telephone.

Little could the founders—who included Thomas A. Edison, Alexander Graham Bell, and Norvin Green, president of Western Union Telegraph—have foreseen that they had sown the seeds for what is now the world's largest technical professional association.

This year IEEE celebrates the 125th anniversary of that New York City meeting. The AIEE merged in 1963 with the Institute of Radio Engineers (IRE)—which was founded in 1912 to deal with the up-and-coming field of radio—to form IEEE. Although much has changed over the years, one thing remains the same: IEEE retains the ambitious goal of fostering technological innovation and excellence for the benefit of humanity. As we look to the future, the IEEE History Center helped *The Institute* remember the important events marking the path taken by IEEE to become what it is today.

The AIEE held its first technical meeting in October 1884 in Philadelphia. Green was the AIEE's first president. Other notable presidents were Bell (1891–1892); Charles Proteus Steinmetz (1901–1902), who fostered the development of ac power; and Schuyler S. Wheeler (1905–1906), inventor of the two-blade electric fan.

Disseminating information among its members through technical meetings, standards, and publications was the primary way the AIEE went about its work. Accordingly, the organization had stringent procedures for approving papers for its three technical publications.

That wasn't the AIEE's only strict criteria. Its membership requirements recognized degrees only from the universities accredited by the Engineering Council for Professional Development, including Cornell, MIT, and the University of Wisconsin–Madison.

RADIO IS BORN At the turn of the century, a new industry arose out of IRE Honorary Member Guglielmo Marconi's wireless telegraphy experiments. What was originally called wireless became known as radio in some parts of the world. The technology was advanced by the electrical amplification possibilities of the vacuum tubes that evolved from John Fleming's diode and IRE and AIEE Member Lee de Forest's triode.

To focus on those technologies, a group of radio pioneers, including Alfred Goldsmith, inventor of the first commercial radio with two control knobs and a built-in speaker, established IRE in 1912 in New York City. Robert H. Marriott, who worked for the American Marconi Co., was its first president. The association was modeled on the AIEE, but it had a more international approach that included selecting officers from outside the United States. The IRE mission was "the advancement of the theory and practice of radio engineering and of the allied arts and sciences and the maintenance of high professional standing among its members."

Notable presidents included Goldsmith (1928), Frederick E. Terman (1941), and Patrick E. Haggerty (1962). The IRE's own list of "schools of recognized sciences" to qualify members included far more institutions than those recognized by the AIEE. The IRE's flagship technical publication, *Proceedings of the IRE*, became well respected in the technical community for its timely peer-reviewed articles. *Transactions of the AIEE* was also well respected, but it was slower to publish papers because it printed them only after they'd been presented at an AIEE meeting.

PLAYING CATCH-UP IRE lagged behind the older organization in membership for many years. It wasn't until after World War II that competition between the two organizations for members heated up. In 1947, the AIEE had almost 35 500 members, compared with the IRE's 21 000. By 1956, each society had about 50 000, and by the time of the merger, the IRE was far larger.

With the rise of electronics, the sharp distinction between the two societies' areas of interest blurred, leading to serious talks about a merger in 1961. The AIEE-IRE Merger Committee was formed to explore the challenges of uniting the two societies, both of which had student branches. Both shared a common objective—serving members—but there were hurdles to overcome.

It was a basic tenet that AIEE members—each one an electrical engineer—apply their scientific knowledge to serve humanity. The IRE did not have such a mission; it was more focused on theory. And unlike the AIEE, the IRE welcomed physicists, chemists, and others from related scientific disciplines, provided they were working in radio or electronics-related fields.

Two factors helped fuel the merger: the IRE's successful system of technical professional groups, and the growing numbers of students involved with joint AIEE-IRE student branches at U.S. universities. In effect, the students merged before the societies did.

The IRE's technical groups helped keep members informed about established and emerging fields. By 1955, there were 21 such groups; today all continue as IEEE societies.

College students had gotten a jump on the organizations' eventual merger because each association levied separate membership dues, and the generally penurious students wanted a more affordable way to participate in AIEE and IRE activities. In 1950 the AIEE and the IRE authorized colleges to establish joint student branches to which a member of either society could belong. By 1962, there were 130 joint student branches. Today IEEE has almost 1700 student branches.

TAKING A VOTE Also in 1962, merger talks between the two societies had gotten serious, and in the March 1962 issue of the *Proceedings of the IRE*, members were asked to vote on the merger. Articles in the issue explored the logistics of the 95 500-member IRE merging with the 57 000-member AIEE. (Nearly 20 000 people belonged to both societies.) AIEE members were also asked to vote.

AIEE and IRE formally merged in 1963. More than 60 percent of all eligible members voted, and 87 percent cast ballots favoring the merger. Today IEEE boasts 382 400 members, 324 sections in 10 geographic regions around the world, 38 societies, and 7 technical councils. ■

Tracking Tech History

A look at the evolution of three critical innovations

BY MICHAEL J. RIEZENMAN

IEEE'S 125TH ANNIVERSARY is intended not only to honor engineering's past but also to celebrate its future. Here we look at three technologies IEEE members have been involved with that have had a glorious past and still promise a shining future: the telephone, the integrated circuit, and the Internet.

MOBILITY RULES Who doesn't like mobile phones? But from 1946—when mobile telephone service (MTS) was introduced—until the mid-1980s—when cellular phones went into wide commercial use—only the wealthy could afford them. The MTS system was not sophisticated, having only a dozen two-way channels. And because it could not reuse frequencies within a metropolitan area, it served relatively few. The system covered its area from a single high-power base station, with each call taking up an entire channel.

Today, thanks to the cellular concept with its multiple low-power base stations and much broader frequency allocation, nearly everyone has a cellphone. Some developing countries might even skip installing landlines altogether and move right to cellphones.

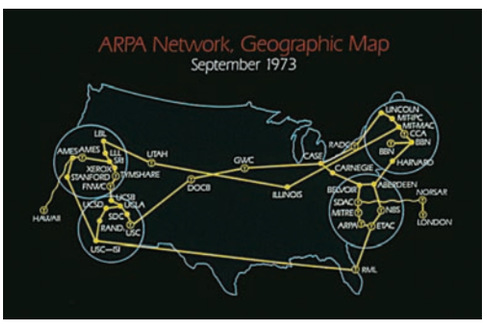
As cellphones became more popular, they gained features not traditionally associated with telephony. In fact, making a phone call seems almost a side issue today when you consider the number of functions provided by so-called smartphones. Basically, the tiny tykes are computers built on an open-source operating system. Their many applications come from the phone manufacturer, the network operator, and third-party software developers. Applications include e-mail, Web browsing, and the ability to take, display, and transmit photos. Users can play games, listen to music, watch videos, and read documents. Some phones include a GPS receiver—which is leading to a variety of location-based services, from simply finding an address to locating a movie theater or restaurant. Certainly, Alexander Graham Bell, the 1891–1892 president of the American Institute of Electrical Engineers, wouldn't know what to do first. Who can tell what else the future will bring?

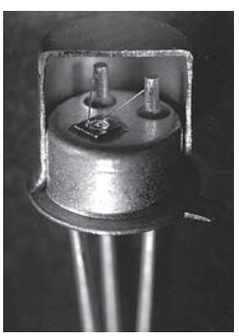
FROM PLANAR TO 3-D A manufacturing innovation, underappreciated at first, is behind the IC revolution that has driven the electronics industry for the past 30 years or so. The planar process covered sensitive silicon *p-n* junctions with a protective layer of silicon dioxide to guard against contamination, a source in some transistors of amplification instability. The immediate result was better transistors.

But that flat oxide layer also turned out to be an excellent substrate for depositing metal traces for interconnecting other components fabricated on the same piece of silicon. Thus the modern IC was born. In the early days, a typical IC, cut from a 50-millimeter-diameter silicon wafer, held a few dozen transistors. Today's ICs, fabricated on 300-mm wafers, can hold more than a billion.

The history of IC development is a series of victories over problems that arose as transistors kept shrinking. The number of transistors per chip has grown exponentially, doubling about every 18 months, following Moore's Law. Many times since Gordon Moore, an IEEE Life Fellow, first described the phenomenon in 1965, problems threatened to end the law's predictive sway. Most recently, two related issues were a threat: Chips had to dissipate too much power and signal transmission delays were too long. But chip designers solved those problems, and the validity of Moore's Law is poised to extend into the future.

The power problem was solved by gating off parts of the chip circuit that weren't being used at a particular time. And signal delays were trimmed by making chip interconnect lines shorter—with three-dimensional wiring that replaces long horizontal interconnects with short vertical ones, a technique described in February at the IEEE International Solid-State Circuits Conference. The technique involves stacking planar devices and interconnecting them with metal placed in through-silicon vias, or holes. (Through-hole vias have been used for years on dense printed circuit boards.) Other benefits of the construction include the ability to integrate in a single device circuit layers made of different—even incompatible—processes; to pack more functions into a given footprint; and to make it difficult to copy a device by reverse-engineering it.





Clockwise from top: Geographic map of the ARPANET; Fairchild Semiconductor's first commercial planar transistor; Motorola's Razr cellphone on top of the company's first cellphone, a DynaTAC 8000X.

THE INTERNET Beginning life as the ARPANET in the 1960s, the Internet was meant to allow scientists funded by the U.S. Department of Defense to run programs on widely separated computers and to share software. Its designers chose to implement the new network with then-untried packet-switching technology, which could carry data more efficiently than conventional circuit switching could.

Packet switching had been conceived a few years earlier, not in search of efficiency but for its efficacy in moving information across a distributed data network then being developed for the U.S. military. The network, which was never built, was to have had a distributed architecture to ensure that it could survive an enemy attack. This architecture, inspired by Cold War military concerns, became the Internet's bedrock.

But another factor, also of military origin, was perhaps even more important. Realizing that military field operations often relied on radio—and, increasingly, satellite—communications, the Department of Defense's Advanced Research Project Agency (then referred to as ARPA, and now as DARPA) built a pair of packet-radio networks: the terrestrial PRNET and the satellite-based SATNET. It quickly became clear that the two networks had to be connected. From the effort to link the dissimilar packet networks came most of the key ideas behind today's Internet, including the multilayered protocol stack in which computers at the end points of a communication path, rather than the network, take on responsibility for communications reliability.

The Internet has grown enormously in the decades since its birth, but its basic structure has remained unchanged. It has incorporated technical advances from other fields, including fiber-optic cables and other components, advanced computers, and faster semiconductors.

By far the Internet's most important application is the World Wide Web. Timothy Berners-Lee, the 2008 IEEE/RSE Wolfson James Clerk Maxwell Award recipient, developed the foundation for the Web while at the European Organization for Particle Research (CERN) near Geneva. Once the public realized what the Web could do, the Internet took its final step in moving from military project to the specialists' tool to everyone's principal communications medium.

Recently, marketers heralded the arrival of Web 2.0 as a way of describing the Internet's latest capabilities compared with what's now retrospectively called Web 1.0. Web 2.0 fosters innovation by making it easier for anyone to create Web sites and services by combining existing features. To learn the direction Web 2.0 will be taking, stay tuned. ■

—Compiled with the help of the IEEE History Center

CLOCKWISE FROM TOP: COMPUTER HISTORY MUSEUM; STANFORD UNIVERSITY ARCHIVES; M. SPENCER GREEN/AP PHOTO


DE MARCA


KAM


LILLIE

President-Elect Candidates: An Insider's Look

BY ANNA BOGDANOWICZ

WITH THE ANNUAL IEEE election coming up in August, it's time to get to know the candidates for 2010 President-Elect: J. Roberto B. de Marca, Moshe Kam, and Joseph V. Lillie. To help acquaint readers with the three, *The Institute* explored their personal sides. We'll cover their positions on important IEEE issues in our annual coverage of the Candidates Night Q&A in the September issue.

De Marca, an IEEE Fellow, has been a faculty member since 1978 at Catholic University in Rio de Janeiro, where he has held several leadership and administrative positions, including associate academic vice president. He is the founding president of the Brazilian Telecommunications Society and a member of the Brazilian National Academy of Sciences. He has held various visiting positions at universities and industrial laboratories in Asia, Europe, and North America. He served as 2008 vice president of IEEE Technical Activities.

Kam heads the electrical and computer engineering department at Drexel University, in Philadelphia. An IEEE Fellow, he has taught and conducted research in detection and estimation, robotics, and control at Drexel since 1986. Lockheed Martin, Motorola, and Honeywell have supported his research, as have the U.S. National Science Foundation, the Office of Naval Research, the Naval Surface Warfare Center, DARPA, and the Army Communications–Electronics Research, Development, and Engineering Center. He founded and directs the university's Data Fusion Laboratory, and he heads its Center for Excellence in Information Assurance Education. He was vice president of IEEE Educational Activities from 2005 to 2007 and currently serves as a member of the ABET board of directors.

Lillie, a senior member, has 35 years of experience in telecommunications engineering and management. He held several positions at BellSouth Telecommunications facilities throughout Louisiana from 1973 to 2002, including design engineer, planner, district support manager, engineering manager, and planning manager. When he retired in 2002 from BellSouth he was a member of the Louisiana BellSouth State Staff providing engineering and construction support in Louisiana. In 2003 he joined NorthStar Communications Group of Birmingham, Ala., as director of corporate quality, and in 2005 he returned to BellSouth (now AT&T) to work on restoration projects following Hurricane Katrina. He continues to provide engineering support to AT&T in Louisiana on a part-time basis. He has held various IEEE positions, including 2008 and 2009 vice president of Member and Geographic Activities and director of the IEEE Foundation.

WHY DID YOU GO INTO ENGINEERING?

DE MARCA Primarily because of my father, who was a civil engineer and owned a construction company. However, I soon realized I was attracted to modern technology fields—eventually my choice was telecommunications—that relied more heavily on math.

KAM There are two reasons. The first is ideology. My family strongly encouraged me to work in a productive field such as engineering or manufacturing. The second reason is individual taste. Since an early age I have been fascinated with radio and radar, which I saw at my father's workplace. I knew I wanted to play with those magic boxes when I grew up. I still do.

LILLIE When I was a child I went on service calls with my dad, who was an electrician and an appliance repairman. I've always been amazed at how things work. Studying engineering was a way to learn how to figure things out.

FAVORITE CHILDHOOD MEMORY?

DE MARCA Braving the high waves and bodysurfing at Copacabana Beach in Rio de Janeiro. My parents were very anxious for me to be on safe land again.

KAM Seeing the painting *The Great Last Judgment* for the first time. My parents took me to Munich one summer and left me for a few hours to wander around the Alte Pinakothek museum. I sat in front of this monumental painting of Rubens for more than an hour trying to understand it.

LILLIE Building things. I have three brothers and three sisters. The seven of us would tear apart junk appliances such as washing machines and refrigerators and build toys out of them. It was like playing with a giant erector set. The best thing we built was a go-kart. The neighbors were amazed.

HOW WOULD YOU DESCRIBE YOUR PERSONALITY?

LILLIE Outgoing.

DE MARCA An excellent observer, persistent, with firm opinions but willing to listen (and I am very good at it, too).

KAM Very focused and determined, yet deliberative and patient.

WHAT ARE YOUR HOBBIES?

LILLIE I collect various items of the three wise monkeys: hear no evil, see no evil, and speak no evil. I have almost 800.

KAM Visiting art museums and church treasury museums. I recently spent two days at the Russian Museum in St. Petersburg. Two years ago I spent two weeks in the treasuries of historical churches in Portugal.

DE MARCA My most time-consuming and gratifying hobby is being an IEEE volunteer, but I also enjoy walks on the beach, watching sports, and going to concerts.

IF YOU WERE STRANDED ON AN ISLAND, WHAT ONE THING WOULD YOU WANT TO HAVE WITH YOU?

KAM A solar-powered iPhone with truckloads of good books stored in its memory, including the Bible, Homer, *Dream of the Red Chamber*, *Dead Souls*, and *To Kill a Mockingbird*.

LILLIE A solar-powered laptop with Internet access.

DE MARCA I'm assuming that I am stranded alone and that the island has no electric power, so I would have to give priority to survival. I would like to have a Crocodile Dundee–size knife.

FAVORITE TYPE OF FOOD

LILLIE Anything with Tabasco.

DE MARCA Italian—I guess everybody in IEEE knows that.

CLOCKWISE FROM TOP LEFT: IEEE; KELLY & MASSA PHOTOGRAPHY; GRANT OAKES; SPIDERSTOCK/ISTOCKPHOTO; APPLE; KIESEL AND STEIN/ISTOCKPHOTO

KAM Vegetarian massaman curry [above] as prepared by the Sawadee Thai Restaurant in Salt Lake City.

MOST IMPORTANT ENGINEERING BREAKTHROUGH OF THE PAST 125 YEARS?

LILLIE The computer.

DE MARCA IEEE volunteers do a lot of traveling and spend a substantial amount of time using e-mail. These activities are related to two of my favorite engineering accomplishments that have dramatically changed how we live and do business: commercial aviation and the Internet (and its underlying worldwide telecommunications infrastructure). Since I had to pick one, I chose commercial aviation. The diversity of engineering fields that gave contributions to the current level of commercial aviation is amazing: mechanics, electronics, materials, logistics, reliability, etc.

KAM The alternating-current transformer by William Stanley Jr. in 1884. This technology allowed mass urban—and then rural—electrification, and it led to great improvements worldwide in human welfare, health, and economic well-being.

FAVORITE MOVIE

DE MARCA *The Man Who Knew Too Much* (when I was a child I was a Doris Day fan). Although if I were allowed to name a second movie, it would be *Gladiator*.

KAM *Rashômon* [below]. I must have seen it 50 times.

LILLIE *Serendipity*.

WHY DID YOU JOIN IEEE?

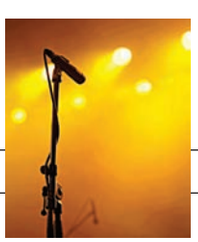
LILLIE When I was an undergraduate student I noticed a sign in the engineering building that announced the IEEE student branch was taking a trip to the Houston Space Center, a five-hour drive. You had to be a member to go, so I signed up. I think the dues were US $15. It was the best $15 I ever spent.

DE MARCA When I was an undergraduate, my professors introduced me to IEEE publications, and I was profoundly impressed by the caliber of the authors and editors. I decided I should join the organization that was able to attract so many luminaries. That was 38 years ago. Now I am extremely proud to be an IEEE Fellow and running for the highest office of the same organization I was in awe of as a young man.

KAM I joined IEEE just as soon as I was admitted to become an electrical engineering student. I held the simple belief that every professional must belong to the professional society that corresponds to his or her field of interest. It was the most natural and straightforward thing to do. I believed in this when I was 16, and I believe in this now.

FIRST JOB

LILLIE I've been told that I worked with my dad since I was able to walk, but my first real job was when I was 12. I sold candy at a movie theater and ran the projector.



DE MARCA Preparing the weekly payroll envelopes at my father's construction company. I was probably 10 years old when I started. My compensation was not much, but I felt very important.

KAM I was given the specifications to build a strobe light for an aircraft from scratch and get it to flash reliably. I was given three weeks and all the money I needed for parts. The deadline was 8 a.m. on a Tuesday, and it finally started flashing properly at 7:45 that morning.

MOST MEMORABLE CAREER MOMENT?

LILLIE In 1982 I was part of a team of what was then South Central Bell that deployed the first fiber-optic cable in Louisiana, Mississippi, Alabama, Kentucky, and Tennessee. We used the new fiber-optic technology to solve a problem that traditional technology could not. We didn't know much about fiber optics at the time, other than that the cables were very small. Of course, now the technology is used all over the place.

KAM As an entry-level communications engineer, I solved a technical problem that allowed about 50 of my colleagues to move from a very hazardous work environment to work remotely in a safe location. The solution I developed was not groundbreaking; it was a straightforward application of a textbook formula. Still, I was in awe of the indirect impact the formula had on the well-being of so many people. Suddenly engineering had a human face, and all the stuff I had read for school had a totally different purpose. I was glad I had paid attention.

DE MARCA Being elected president of the IEEE Communications Society in 2000.

WHAT'S SOMETHING OTHERS MIGHT NOT KNOW ABOUT YOU?

DE MARCA I collect art.

KAM I sing choral music. I was a second bass with the Philadelphia Choral Society in the 1990s, and now I sing with the Mendelssohn Club of Philadelphia.

LILLIE I was named the 1989 International Cajun Joke Telling Contest champion. The competition is an annual event in Louisiana. Contestants are each given 10 minutes to present good, clean, Cajun humor.

IF YOU COULD HAVE DINNER WITH ONE PERSON, DEAD OR ALIVE, WHO WOULD IT BE?

KAM Helen Suzman—the South African anti-apartheid activist and politician and one of the most courageous women to have ever lived. I met her once but unfortunately will not have the opportunity to dine with her again. She died this year. I miss her.

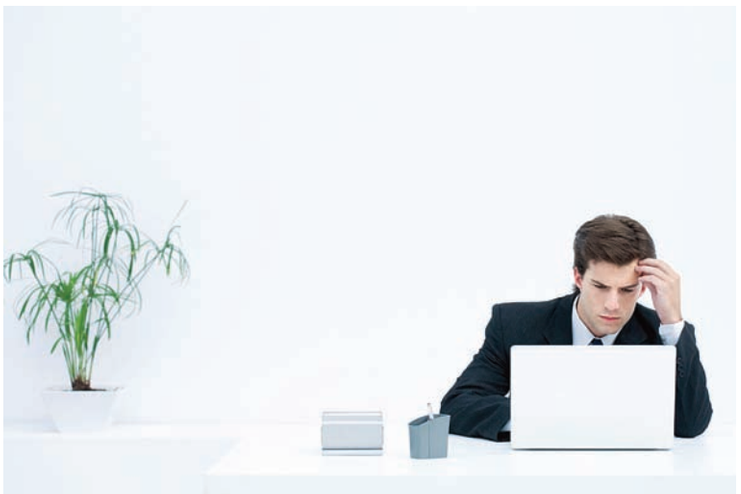
DE MARCA Given this very special opportunity by *The Institute*, I called a favorite restaurant and tried to reserve a table for three. The guests I had in mind were a Brit whose first name was Winston and an Italian born a few centuries ago in the city of Vinci. However, the restaurant had strict no-smoking rules, so I decided to go for a party of two and focus my undivided attention on the amazing personality and genius of Signore Leonardo.

LILLIE Neil Armstrong. I've always been fascinated with space exploration. When I was a kid the space program was just getting started, and I was glued to the TV. ■

CLOCKWISE FROM TOP LEFT: SAWADEE THAI RESTAURANT; DAIE/THE KOBAL COLLECTION; CAMBRIDGE JONES/GETTY IMAGES; THE BRIDGEMAN ART LIBRARY/GETTY IMAGES; NASA; ALEX NIKADA/ISTOCKPHOTO; STEPHEN STRATHDEE/ISTOCKPHOTO; COSTIN T/ISTOCKPHOTO

OPINIONS

MARKETPLACE OF IDEAS



THIS MONTH'S QUESTION

Is Your Job Secure?

News outlets in recent months have reported that IBM, HP, Microsoft, Panasonic, Nokia, and other high-tech companies laid off thousands of employees. But some observers call those reports exaggerated. One tech news publication wrote that layoff figures are deceptive because most refer to the elimination of already vacant positions or ones that are new and as yet unfilled. What's more, some engineers are in demand, such as those needed for smart power grids, alternative energy, and other green projects.

JUST HOW SECURE DO YOU FEEL ABOUT YOUR JOB?

MAIL: *The Institute*, IEEE Operations Center, 445 Hoes Lane, Piscataway, NJ 08854-4141 USA
FAX: +1 732 562 1746 **E-MAIL:** institute@ieee.org

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 September issue of *The Institute* and may be edited for brevity. Suggestions for questions are welcome.

RESPONSES TO MARCH'S QUESTION

Engineering the Future

Earlier this year, IEEE members chose dozens of engineering breakthroughs they regarded as No. 1—including the transistor, electric power, and the Internet—since IEEE's birth 125 years ago. In March we looked to the future. Experts and science-fiction writers have suggested that the next century could witness technology for controlling the weather, unlimited renewable energy, a space elevator, and the oft-predicted teleportation of human beings and the flying car.

What do you see as the top engineering breakthrough in the next 125 years?

Nuclear Fusion

I look forward to a practical, limitless, nonpolluting fusion-power capability. We could then eliminate or manage global warming and support limitless population growth with mile-high buildings. We also could pipe desalinated ocean water anywhere to make even the deserts bloom, launch hazardous nuclear waste to the sun, and avoid war because everybody would have enough of everything.

We should continue with other nations to fund an international effort to develop fusion energy, recognizing that it will probably take 50 to 100 years to make this technology a reality. Our great-great-grandchildren will need it.

Maybe the prospect of fusion power and the resulting wealth will also help us avoid a nuclear showdown.

JIM BALL
Sunnyvale, Calif.

Overlapping Theme

In the past, most innovation resulted from the convergence of various technologies and scientific discoveries, especially in the fields of electricity, energy, and material science. Planes, cars, computers, and even nuclear weapons are apt examples. Fields such as biology, information sciences, and the human-machine interface also will be combined to create technologies that work with a collection of societal, industrial, and possibly ecological grids.

In the future, the expansion and convergence of different technologies will accelerate.

ROB CAYZER
Bukit Jalil, Malaysia

Genes and Space Flight

A medical discovery in the understanding of biological processes would allow doctors to reprogram a human body to combat disease, cure allergies, and strengthen muscles.

Sadly, it probably will take a war to push scientists and engineers to come up with a breakthrough to defend against a biological attack.

A more likely breakthrough would be in the area of space propulsion. I also foresee the development of a regenerative fuel system that makes it possible to sustain a colony on the moon.

KENT HARRIS
Louisville, Ky.

Cosmological Approach

A very large, low-cost-per-square-meter, space-based solar collection system with efficient energy transfer back to Earth. The atmosphere blocking the sunlight would then not be a problem, and there would be no concern about using up real estate.

MICHAEL KORAN
Norton, Mass.

Free for All

An open-spectrum-access policy. The logical culmination of the current work being done on dynamic spectrum access and cognitive radio has the potential to create an Internet in the sky. We would finally have freedom to transmit what data we want, where we want it, and how we want it.

NIKHIL KUNDARGI
Minneapolis

Shifting Genes

Bio- and genetic engineering. Since the dawn of agriculture, man has domesticated plants and animals, thus leading to an enormous population increase.

However, traditional methods of bioengineering are slow and require generations to develop modified organisms. With a full understanding of the genetic mechanisms of life, humans will be able to design and engineer organisms to suit their needs. Organically grown products will replace man-made or man-modified products, and there will be a shift from the use of inorganic materials such as metals and silicon to grown carbon-based materials.

GUNNAR MAEHLUM
Oslo

Energy Efficiency

The field of inexpensive high-efficiency photovoltaics combined with an enhanced electric grid will be the top breakthrough in energy.

In the environment, the ability to use robotic elements to sort refuse and recycle will lower our dependence on raw materials and nonrenewable energy.

ALEX HOOD
Birmingham, Ala.

Corrections

Joseph V. Lillie worked for BellSouth Telecommunications in facilities throughout Louisiana, not in San Antonio ("Three to Vie for 2010 IEEE President-Elect," March, p. 4).

The five new officers elected to the Board of Directors join 26, not 27, colleagues on the Board ("Five Named to Board of Directors," p. 4).

The IEEE Region 8 meeting was held in Venice, not London (Calendar, p. 5).

PHOTOALTO/ALE VENTURA/GETTY IMAGES

the institute

Editor Kathy Kowalenko
Assistant Editor Anna Bogdanowicz
Editorial Consultant Alfred Rosenblatt
Copy Editors Joseph N. Levine, Michele Kogon, Mark Yawdoszyn
Editorial Intern Jeremy Kenter
Senior Art Director Mark Montgomery
Art Director Brandon Palacio
Photo Editor Randi Silberman
Graphic Designer Bonnie Nani
Director of Periodical Production Services Peter Tuohy
Editorial & Web Production Manager Roy Carubia
Web Production Coordinator Jacqueline L. Parker
Multimedia Production Specialist Michael Spector

Editorial Offices
IEEE Operations Center
445 Hoes Lane, Piscataway, NJ
08854-4141 USA
Telephone: +1 732 562 6825
Fax: +1 732 562 1746
E-mail: institute@ieee.org
Web: http://www.ieee.org/theinstitute

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 Manager Felicia Spagnoli
Advertising Production +1 732 562 6334

THE INSTITUTE (ISSN 1050-1797) is published quarterly by The Institute of Electrical and Electronics Engineers Inc., 3 Park Ave., 17th Floor, New York, NY 10016-5997; tel. +1 212 419 7900. Periodicals postage paid at New York, NY, 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, 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. POSTMASTER: Send address changes to THE INSTITUTE, IEEE Operations Center, Coding Department, Box 1331, Piscataway, NJ 08854-4141, USA.

Volunteers Are the Greatest

SO, WHO RUNS IEEE? The volunteers do, of course. The Board of Directors consists of volunteers, and our journals, conferences, standards, and educational activities are all run by volunteers. Sure, IEEE employs about 1000 staff members, who bring needed business and professional skills, but major decisions are made by volunteers. Without volunteers, IEEE could not be the "leading professional association for the advancement of technology."

A few months ago, I asked a fellow IEEE director to guess how many volunteers contribute to IEEE in a year. He answered, "Maybe 7000 to 8000?" My hunch was that the number was much higher, so I did a "back of the envelope" calculation and came up with **800 000 volunteers**. The result astounded me. Since then, I've shown various "experts" my calculation. No one has yet found a flaw in it.

Here's the arithmetic:

IEEE published more than 30 000 journal articles last year. Assuming a 50 percent acceptance rate and an average of five volunteers working on a single article—authors, reviewers, and editors—then **300 000-plus volunteers** must have contributed (some may have contributed more than once, but we'll correct for that later).

Another **300 000 volunteers** authored, reviewed, and processed the approximately 140 000 conference articles published in 2008.

It took an average of more than 100 volunteers to organize each of the 900-plus conferences held last year—yielding another **100 000 volunteers**.

Nearly 4000 organizational units—sections, chapters, student branches, societies, councils, and standards working groups—have at least 25 volunteers each. That yields another **100 000**.

The total comes to **800 000 volunteers**! But if each volunteer handles two assignments on average, and if my estimates are too high by a factor of two, there are 200 000 people volunteering for IEEE each year, still an incredible number. (Many volunteers are not IEEE members, but that is a topic for a future column.)

What motivates IEEE volunteers? The answer lies partly in the first-ever research of volunteerism in U.S.-based associations, done in 2007. The research—"The Decision to Volunteer"—was conducted by the American Society of Association Executives and the Center for Association Leadership. It surveyed more than 26 000 volunteers, including IEEE members.

The most cited reason for volunteering, according to the survey, is "helping others and creating a better society." That's powerful motivation and a primary reason why, for 125 years, volunteers have been helping IEEE and its predecessor societies foster "technological innovation and excellence for the benefit of humanity."

Without volunteers, IEEE could not be the "leading professional association for the advancement of technology."

Many volunteers surveyed also see their work as making them better professionals. For example, in IEEE they can gain leadership and organizational skills and the chance to network with the best from around the world. And volunteers' willingness to help the profession and humanity also gives them a sense of achievement. I know many consider the chance to volunteer for IEEE as a member benefit, and my personal observations are that the typical IEEE volunteer is enthusiastic, energetic, and passionate. Volunteers work diligently on behalf of others without being motivated by financial or material gain.

Finding meaningful ways to involve young professionals is important, the research pointed out. Participating in the IEEE Graduates of the Last Decade (GOLD) program, with its thousands of members, is an excellent way to engage younger members' volunteering. One place for them to begin is on committees, where they can network with more seasoned volunteers.

"Low profile" volunteering such as mentoring, membership recruiting, and writing articles for publication needs as much recognition as serving on boards and committees, the study found. There are tens of thousands of IEEE volunteers working in those areas.

Finally, there is also an unintended benefit to volunteering: Volunteers live longer and healthier lives. "The Health Benefits of Volunteering: A Review of Recent Research," published in 2007 by the U.S. Corporation for National and Community Service, summarized the findings from multiple reports during the past two decades. The studies found many correlations between volunteering and well-being. One study found that, in general, "volunteers report greater life satisfaction and better physical health than do non-volunteers, and their life satisfaction and physical health improve at a greater rate as a result of volunteering."

The poet Ralph Waldo Emerson expressed the benefits of volunteering aptly: "It is one of the beautiful compensations of life that no man can sincerely help another without helping himself."

For those of you who have volunteered or are volunteering now, a big thank you! For others, what would inspire you to volunteer for IEEE? Send me your ideas and any other comments to Vig.column@ieee.org.

John R. Vig
IEEE President and CEO

BILL CRAMER/WONDERFUL MACHINE

One-Stop Shopping for Career Help

BY KATHY KOWALENKO

IEEE CAREER SITE

http://www.ieee.org/web/careers/home

Finding IEEE services that can help you land a job or improve your skills just got a little easier. The Careers section of the IEEE Web site now lists 29 employment-related resources, including job listings, career advice, continuing-education programs, and networking opportunities.

"Our career and employment assistance services are probably IEEE's best-kept secrets, and most of them are free," says Senior Member Jean Eason, chair of the ad hoc IEEE Career Services Committee. Although many of the services have been set up by IEEE-USA, they're all available to every member.

You don't have to go through the entire list to find what you need. Two filters help narrow the resources into categories. The Life Cycle Filter sorts according to what stage you are in your career—a recent graduate, say, or in the late stages. The Benefits Category Filter zeroes in on services for career enhancement, education, employment, or networking.

Here's a sample of what is available.

JOB HUNTING

IEEE Job Site. Matches your skills with online job listings. Create a personal profile, and the site will e-mail you when a job listing matches your criteria.
IEEE Student Job Site. Leads college students and recent grads to entry-level jobs, internships, and other opportunities. View help-wanted listings, job fairs, and other announcements posted by employers, IEEE student branches, and the AfterCollege job network, which collects openings from its own national listings and from the IEEE Job Site.
Employment Navigator. Collects roughly 5 million leads from some 100 000 Web sites with job openings, and puts them in a searchable database. The information comes from corporate Web sites and job boards, as well as from job sites dealing with a particular industry, occupation, or geographic area.

Salary Service. Compares what you're earning, or what you're being offered, to what others are getting in similar circumstances.

CAREER ADVICE

Career Navigator. A career and job-search tool set for managing job transitions throughout one's career. It can manage network relationships and the complexities of a job search, as well as organize key career information such as résumés and reference letters.
Career Webinars. Offer advice for finding your next job, negotiating a salary, and understanding workplace ethics, as well as other helpful strategies.
Career Alert. Weekly e-mail newsletter publishes articles on jobs, education, management, and the engineering workplace culled from various news sources and compiled by *IEEE Spectrum* editors.

CONTINUING EDUCATION

IEEE Expert Now. Offers interactive courses based on tutorials and workshops presented at IEEE conferences around the world. Courses have been developed by experts in a wide range of engineering technologies, including computer engineering, power systems, biometrics, and vehicular technology.
Career Enhancement Courses. Teaches the soft skills needed for success in today's workplace. Topics include Giving and Receiving Constructive Feedback, Managing Your Priorities, and Proactive Listening.
Education Partners Program. Offers online degree programs, certifications, and courses at up to a 10 percent discount from universities and educational organizations including Drexel University, Purdue University, and Inquestra Learning.

NETWORKING OPPORTUNITIES

Employment & Career Strategies Community. Enables members to network and collaborate with one another on employment and career strategies.
IEEE Consultants' Network. An alliance of groups in Canada, India, Mexico, Pakistan, and the United States offers opportunities for members who are consultants to meet and learn from each other while promoting their availability to local businesses. The popular Consultants Database matches consultants with prospective clients.
IEEE-USA Entrepreneurs Village. Discussion forum brings together entrepreneurs and those thinking about starting a business. Topics deal with issues that arise from running and growing a small business, including best practices concerning organizational and legal issues, finance, venture capital, marketing, and human resources. ■

IEEE Quick Guide

THE IEEE CONTACT CENTER

Visit http://www.ieee.org/contactcenter for assistance with membership and nonmembership products and services and help with publication delivery.

For e-mail inquiries, the Contact Center is open from 4:30 p.m. ET (20:30 GMT) Sunday to 4:30 p.m. Friday.

To speak to a Contact Center representative, call:
Tel: +1 800 678 4333 (U.S. and Canada)
Tel: +1 732 981 0060 (worldwide)
Fax: +1 732 562 6380

Business hours: 8 a.m. to 5 p.m. ET (12:00 to 21:00 GMT), Monday through Friday

To renew membership:
http://www.ieee.org/contactcenter

To update your profile:
http://www.ieee.org/web/membership/join/update_profile.html

CONTACT POINTS

IEEE Operations Center
445 Hoes Lane
Piscataway, NJ 08854-4141 USA
Tel: +1 732 981 0060

IEEE Corporate Office (New York)
Tel: +1 212 419 7900

IEEE–USA (Washington, D.C.)
Tel: +1 202 785 0017
Fax: +1 202 785 0835
E-mail: ieeeusa@ieee.org

Ask*IEEE Document Delivery
Tel: +1 800 949 4333
Fax: +1 303 758 1138
E-mail: askieee@ieee.org

Conference Information
Tel: +1 732 562 3878
Fax: +1 732 981 1769

Elevation Forms
- Associate to Member: http://www.ieee.org/organizations/rab/md/memelv.htm
- Member to Senior Member: http://www.ieee.org/organizations/rab/md/smforms.htm

IEEE Financial Advantage Program
Tel: +1 800 438 4333
Fax: +1 732 981 0538
E-mail: fap-benefits@ieee.org

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

Section and Chapter Information
Tel: +1 732 562 5511
Fax: +1 732 463 9359
E-mail: sec-chap-support@ieee.org

Student Activities Information
Tel: +1 732 562 5527
Fax: +1 732 463 3657
E-mail: student-services@ieee.org

Technical Societies Information
Tel: +1 732 562 3900
E-mail: society-info@ieee.org

CHAD J. SHAFFER/GETTY IMAGES

IEEE Conference on the History of Technical Societies

Philadelphia, 5–7 August

This year's conference, organized by the IEEE History Center and the IEEE History Committee, celebrates IEEE's 125th anniversary by tracing the origins and development of professional technical associations worldwide. One theme is the role of professional groups in shaping technological advances and their contributions to society. Discussions of the history of IEEE and its technical societies are included. The conference is being held in Philadelphia to commemorate the founding meeting of the American Institute of Electrical Engineers, one of IEEE's two predecessor societies.
SPONSORS: IEEE Philadelphia Section, Drexel University, and the University of Pennsylvania
VISIT: http://www.ieee.org/go/historyconference

IEEE Conference on Automation Science and Engineering

Bangalore, India
22–25 August

Covers principal key areas: research; knowledge sciences and automation; sensors and sensor networks; manufacturing, logistics, and supply-chain management; life-sciences and health-care automation; and meso-, micro-, and nanoscale automation.
SPONSOR: IEEE Robotics and Automation Society
VISIT: http://www.ieee-case.org

IEEE International Ultrasonics Symposium

Rome
20–23 September

Topics include medical ultrasonics, sensors, nondestructive evaluation,

industrial applications, physical acoustics, MEMS, and transducers and transducer materials. Several short presentations on the latest research in ultrasonics are scheduled.
SPONSOR: IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society
VISIT: http://www.ewh.ieee.org/conf/ius_2009

IEEE Sensors

Christchurch, New Zealand
25–28 October

Topics include chemical and gas sensors; biosensors; optical, mechanical, and physical sensors; sensor/actuator systems; and networks.
SPONSOR: IEEE Sensors Council
VISIT: http://www.ieee-sensors2009.org

CLOCKWISE FROM TOP: ISTOCKPHOTO (3); WIN INITIATIVE/GETTY IMAGES

Gertjan van Stam

Macha's Link to the World

Thanks to this IEEE member, people in rural parts of Zambia now have Internet access **BY SUSAN KARLIN**

SOMETIMES CUTTING-EDGE engineering has as much to do with making technology happen in near-impossible conditions as it does with building something completely new. Last year, Member Gertjan van Stam transfixed an IEEE audience in Boston with tales of helping to build an information highway in the remote south Zambian village of Macha.

As CEO of LinkNet Zambia in Macha, van Stam helped build the first rural Zambian Internet cooperative, whereby users share costs of a local Internet connection and wireless infrastructure and maintenance.

INPUT FIRST He told 115 attendees in October at the first IEEE Humanitarian Workshop that instead of riding into town and announcing, "This is what needs to be done," he asks residents for their input. "The challenge is to find local talent, learn how they wish to improve their community, and then train and assist them in a community-driven solution," he says.

The landlocked southern African nation of Zambia is among the world's poorest, with a per-capita annual income of US $800. Many residents live on $1 per day. Compare that to the cost of Internet connectivity in the area: $1300 per month for a 128-kilobyte-per-second connection shared by the villagers. Van Stam helped set up the initial infrastructure with $50 000 in seed money from the Malaria Institute at Macha, a partnership of the Zambian government, Johns Hopkins University of Baltimore, and the nonprofit Macha Mission Hospital—plus funding from individuals. Today, LinkNet has 44 institutional subscribers, including companies, schools, hospitals, religious missions, and social organizations, that pay $30 per month for any village resident to have access to the shared connection.

"When I arrived six years ago, there were five computers in the entire village," van Stam says. "Now we have hundreds of them. We're trying to duplicate that in 10 other villages in Zambia. After that, we hope to expand to 200 sites."

It was van Stam's interest in radio transmission and long-distance communication that led him to attend Hogeschool Utrecht University of Applied Sciences, in the Netherlands, where he earned a degree in telecommunications, specializing in radio and antenna technologies. After graduating in 1989, he worked as a strategist for Nozema, the Netherlands' terrestrial broadcast system. When Nozema became part of KPN Telecom, the country's largest telecommunications operator, van Stam got involved in the company's expansion into Belgium and South Africa, and he developed relationships with African telecom companies.

During that time, his wife, Janneke, was working toward a degree in tropical medicine. Anticipating a move in 2000 to India for her work, van Stam left KPN in 1998 to set up his own telecom services company, Privacom, which enabled him to work from home. He developed Internet and GSM communication services that earned his company an award from the 2001 GSM Forum. Later that year, Janneke's work took them from India to rural Zimbabwe, where van Stam set up an Internet café for the community. In 2003, her work took them to Macha.

"Most of what is necessary for development—water, power, electricity, transportation, and education—were not fully in place in Macha," says van Stam, who receives no salary from LinkNet and lives off his wife's salary and private donations. "So I used a holistic solution based on what locals wanted first and then helped them build it, using the $50 000 seed money. With that momentum we were able to start up an Internet connection, a community center, a library, an airport, a primary school, and a radio station, among other projects." The airport, a nearly two-kilometer-long landing strip for small bush planes, is run by a three-person staff.

IEEE heard of van Stam's work through Adrian Pais, the Zambian-born, Netherlands-based 2009 chair of IEEE GOLD, who visited Macha and saw van Stam in action. Pais and van Stam, with others, wrote of their work in *Bringing Internet Connectivity to Rural Zambia Using a Collaborative Approach* for the 2007 IEEE/ACM (Association for Computing Machinery) International Conference on Information. Van Stam, who joined IEEE last year, is now vice chair of IEEE's Zambia Section and travels the world giving presentations about applying sustainable technology in rural areas.

COMMUNITY-CENTERED Western businesses could take a cue from what he has learned in Macha, he says: "Africans place a high premium on relationships and the community—instead of on individuals, as they do in the West. New technology has to benefit everyone, not just one group at the expense of another. That way everybody moves forward, not just a happy few."

Having seen Macha's progress, the Dutch government this year pledged $3 million over three years to LinkNet to expand its coverage and programs into other Zambian communities. Part of the money is earmarked for establishing engineering bachelor's and master's degree programs at the University of Zambia's satellite campus in Macha. ■

BRYAN WILSON

Peter Dilorio & Glenn Govier

Sony Rock Stars

EVERY FEW MONTHS, the ballroom at the Marriott Park Ridge, in New Jersey, turns into a concert hall. That's when the Variable Speed Band—VSB to its fans—delivers a four-hour concert of cover songs from the Beatles, Bruce Springsteen, the Grateful Dead, Eric Clapton, Tom Petty, and other rock icons. The musicians include engineers and product and marketing managers from Sony Electronics Broadcast & Business Solutions Co., located next to the hotel in Park Ridge.

Two IEEE members are integral parts of the five-member VSB: bassist Glenn Govier [left] and guitarist/vocalist Peter DiIorio [right]. The two New Yorkers have been playing music together since engineering school in the early 1980s. The VSB's jams, which have occurred intermittently since 1993, serve as a creative outlet and source of corporate camaraderie.

"We've created a thriving musicians' community at work," Govier says. "We're getting folks out to play who at one time might have played casually and now want to dust off their guitar or bass." The group sometimes plays backup for friends who are just starting their own band.

"Some people at the company have told me we have changed their lives," DiIorio says. "We've gotten our bosses involved by having them jam with us, and we've done a number of business events where we've been the featured entertainment." Those gigs include corporate functions, including Take Your Kids to Work Day, and sales meetings involving thousands of Sony employees.

VSB competed in the *Fortune* magazine 2005 Corporate Band Challenge and was invited to perform at the 2006 Summer National Association of Music Merchants pre–trade show party in Austin, Texas. The party features amateur musicians from the sponsors and attendees.

Last year VSB performed as part of a three-hour, 13-band concert Govier and DiIorio organized for a Sony sales meeting in Palm Desert, Calif.; recorded a song on the John Lennon Educational Tour Bus, a nonprofit mobile studio started by fans to commemorate Lennon and teach children to create audio and video media; and organized and headlined the Rockers Against Hunger charity event in Clifton, N.J.

HOUSE BAND VSB's stage antics and eclectic repertoire have won enthusiastic support from Sony employees who regard them as the company's house band. VSB unofficially began when Govier and another colleague jammed at a 1991 Sony regional sales meeting to break up the litany of presentations. It slowly grew in size and stature as word spread around the departments. But its seeds were sewn a dozen years earlier through IEEE.

PASSION Figure skating
PROFESSION Electronics engineers
HOMETOWN Huntsville, Ala.

Joel Booth & Janice Rock

Skate Mates

FRIENDS SINCE childhood, IEEE Members Janice Rock and Joel Booth have led nearly parallel lives.

They grew up 20 minutes apart, near Birmingham, Ala. Both attended the University of Alabama in Huntsville, volunteered at the National Weather Service, and earned bachelor's and master's degrees in electrical engineering—all at the same time. They now work as civilian electronics engineers at the U.S. Army's Redstone Arsenal, in Huntsville. And, in another notable coincidence, they survived brushes with cancer at nearly the same age.

So when Rock [left], 41, asked Booth [right], 35, to be her figure-skating partner four years ago, it seemed perfectly natural. No matter that Rock had been skating and competing since age 17 and Booth had tried it only a handful of times.

"Janice was a big influence on my picking up skating, because she had done it for many years," Booth says. "We needed to add physical activity to our lives of sitting at a desk all day." For the past four years, the two friends have performed as a pair representing the Point Mallard Figure Skating Club in Decatur, Ala., picking up numerous gold and silver medals in regional tournaments around the southeastern United States.

"He's a natural, and he works really hard," Rock says. "They call Joel 'Air Joel' because his jumps are so high." Rock is known for what's called an outside spread eagle: gliding on both feet with toes pointing in opposite directions.

The pair is working on a Zorro routine. "Joel is wearing a cape and mask, and I'm making a dress that's a little risqué, to say the least," Rock says.

"Skating is a great contrast from sitting at a desk or working in a lab," Booth says. Rock adds, "We're not competing at an Olympic level by any means, but it's an awful lot of fun."

It takes a lot of dedication. The pair practices 10 to 15 hours a week for two to three months in order to hone a two- to three-minute routine for a competition.

And skating doesn't come cheap. Custom

Govier and DiIorio—who grew up in Manhattan and Yonkers, N.Y., respectively, met through the IEEE student branch at the Polytechnic Institute of New York (now the Polytechnic Institute of New York University), in Brooklyn. Both were putting themselves through electrical engineering classes as "wiring jocks," maintaining audio equipment at several New York City recording studios. They crossed paths with the likes of Joan Jett, the Ramones, Talking Heads, Barry Manilow, and Keith Richards. Govier, who now lives in Bronxville, N.Y., and DiIorio, who lives once again in nearby Yonkers, began playing in bands in their early teens while also discovering the joys of taking apart appliances to see how they worked.

PASSION Playing rock 'n' roll
PROFESSION Marketing managers
HOMETOWNS Bronxville and Yonkers, N.Y.

"I took my passion for engineering and kept it aligned with music by redirecting it to something acceptable to my dad," DiIorio says. "He felt music was something you did only in your spare time."

"About 10 years ago," Govier says, "I realized I probably could have done music on a full-time basis. But it was a good thing I didn't, because it's really tough to make it as a pro. The cats who play in the studios and on Broadway are the best of the best. But playing nightclubs, weddings, bar mitzvahs, and one's own music is rough work. Musicians aren't well paid, and many of my professional musician friends are really struggling. Engineering work is more guaranteed and more satisfying."

After graduation, Govier and DiIorio both went into TV system design engineering and project management. Their career paths diverged until they both ended up, coincidentally, at Sony. They became best friends performing together in an '80s rock cover band, the Odds, that played in New York City.

Although VSB now performs for the public occasionally ("Getting musicians together is like herding cats," DiIorio says), the group religiously adheres to a weekly three hour–plus practice, despite having to balance work and family life.

"It's remarkable we've managed to do it as long as we have," DiIorio says.

"Somehow, it just works," Govier adds. "It clicks."

Check out VSB at http://www.myspace.com/variablespeedband.

—Susan Karlin

skates run US $1500 to $2000; rink time and private coaching cost $600 to $800 a month; and costumes go for as much as $300 apiece. Despite the expenses, the two say they couldn't imagine life without their hobby. "Skating is so much a part of who we are," Rock says—which might help explain their willingness to accept their share of bumps and bruises along the way. A tumble last summer knocked Rock cold and sent her to the hospital with a severe concussion.

"I don't want to do that again," she says, laughing it off. "But part of skating is learning how to fall."

SURVIVORS Rock moved from one dead-end job to another before melanoma derailed her at 26. She beat the 50-percent odds and enrolled in college at the same time as Booth. He was diagnosed with testicular cancer at 25, and he earned a clean bill of health three years ago.

"You really change your outlook on life. You don't let little things get to you as much," Rock says of their battles with cancer. "The fact that we both are cancer survivors solidified our friendship."

While at the University of Alabama, both got involved in amateur radio emergency communications with a storm responders group at the National Weather Service in Birmingham. Noting their enthusiasm and facility with radio, the meteorologists encouraged them to pursue electrical engineering. They took that advice and joined the university's IEEE student branch.

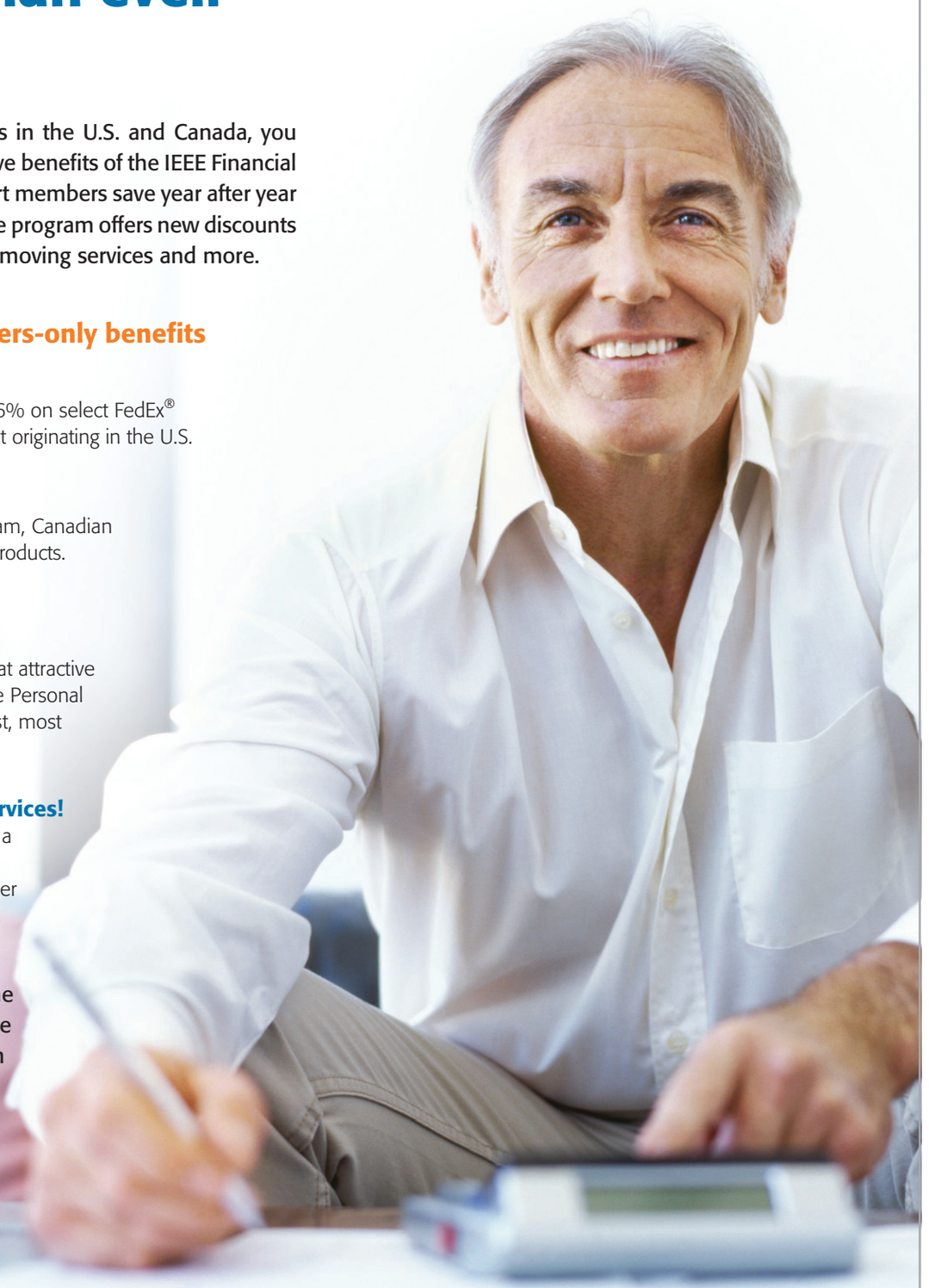
Math equations fit regularly into their practices. "Figure skating is about angular momentum," Rock says. "We analyze tracings on the ice and conduct vector analyses when our spins don't center."

When it all clicks, she says, "It's the most amazing exercise in the world. And being out on the ice as a pair…there's so much speed. The throws, jumps, and lifts are so powerful. When you're moving across the ice surface, there's a feeling of freedom and flying." *—S.K.*

If you have an interesting hobby you would like to share, e-mail the editors: institute@ieee.org.

TOP: JOSHUA DALSIMER; BOTTOM: JOE MATUS

Save money on the services you need most. Now more than ever.



If you're like most IEEE members in the U.S. and Canada, you already know many of the exclusive benefits of the IEEE Financial Advantage Program. It's how smart members save year after year when they buy insurance. Now the program offers new discounts on computers, office equipment, moving services and more.

Look at these NEW members-only benefits

Discounts on FedEx® shipping!

IEEE members can now save up to 26% on select FedEx® shipping services for any size shipment originating in the U.S.

Discounts on Dell computers!

With Dell's Employee Purchase Program, Canadian and U.S. members can save on Dell products.

Auto and home insurance for Canadian residents!

Get the essential coverage you need at attractive "members only" rates, direct from The Personal Insurance Company, one of the largest, most respected group insurers in Canada.

More moving and relocation services!

Exclusively for IEEE members, you get a one-stop resource for everything you need to move your home—faster, easier and more affordably than ever before.

So why wait? There's no better time than right now to check out all the IEEE Financial Advantage Program has to offer—at the savings you want, now more than ever.

Get the Advantage

Visit www.ieee.org/fap ▪ **Call** +1 800 438 4333

IEEE

Celebrating 125 Years
of Engineering the Future

Nominations Sought for Technical Field Awards

Candidates are being sought for the 2011 IEEE Technical Field Awards. Nominations for the 29 awards are due by 1 February 2010.

IEEE CLEDO BRUNETTI AWARD
For outstanding contributions to nanotechnology and miniaturization in the electronics arts.
SPONSOR: Brunetti Bequest

IEEE COMPONENTS, PACKAGING, AND MANUFACTURING TECHNOLOGY AWARD
For meritorious contributions to the advancement of components, electronic packaging, or manufacturing technologies.
SPONSOR: IEEE Components, Packaging, and Manufacturing Technology Society

IEEE CONTROL SYSTEMS AWARD
For outstanding contributions to control systems engineering, science, or technology.
SPONSOR: IEEE Control Systems Society

IEEE ELECTROMAGNETICS AWARD
For outstanding contributions to electromagnetics in theory, application, or education.
SPONSORS: IEEE Antennas and Propagation, Electromagnetic Compatibility, Geoscience and Remote Sensing, and Microwave Theory and Techniques societies

IEEE JAMES L. FLANAGAN SPEECH AND AUDIO PROCESSING AWARD
For outstanding contribution to the advancement of speech and/or audio signal processing.
SPONSOR: IEEE Signal Processing Society

IEEE ANDREW S. GROVE AWARD
For outstanding contributions to solid-state devices and technology.
SPONSOR: IEEE Electron Devices Society

IEEE HERMAN HALPERIN ELECTRIC TRANSMISSION AND DISTRIBUTION AWARD
For outstanding contributions to electric transmission and distribution.
SPONSORS: Robert and Ruth Halperin Foundation, in memory of the late Herman and Edna Halperin, and IEEE Power & Energy Society

IEEE MASARU IBUKA CONSUMER ELECTRONICS AWARD
For outstanding contributions in the field of consumer electronics technology.
SPONSOR: Sony Corp.

IEEE INTERNET AWARD
For exceptional contributions to the advancement of Internet technology for network architecture, mobility, and/or end-use applications.
SPONSOR: Nokia Corp.

IEEE RICHARD HAROLD KAUFMANN AWARD
For outstanding contributions in industrial systems engineering.
SPONSOR: IEEE Industry Applications Society

IEEE GUSTAV ROBERT KIRCHHOFF AWARD
For an outstanding contribution to the fundamentals of any aspect of electronic circuits and systems that has a long-term significance or impact.
SPONSOR: IEEE Circuits and Systems Society

IEEE KOJI KOBAYASHI COMPUTERS AND COMMUNICATIONS AWARD
For outstanding contributions to the integration of computers and communications.
SPONSOR: NEC Corp.

IEEE WILLIAM E. NEWELL POWER ELECTRONICS AWARD
For outstanding contribution(s) to the advancement of power electronics.
SPONSOR: IEEE Power Electronics Society

IEEE DANIEL E. NOBLE AWARD
For outstanding contributions to emerging technologies recognized within recent years.
SPONSOR: Motorola Foundation

IEEE DONALD O. PEDERSON AWARD IN SOLID-STATE CIRCUITS
For outstanding contributions to solid-state circuits.
SPONSOR: IEEE Solid-State Circuits Society

IEEE FREDERIK PHILIPS AWARD
For outstanding accomplishments in the management of research and development resulting in effective innovation in the electrical and electronics industry.
SPONSOR: Philips Electronics N.V.

IEEE PHOTONICS AWARD
For outstanding achievement(s) in photonics.
SPONSOR: IEEE Photonics Society

IEEE EMANUEL R. PIORE AWARD
For outstanding contributions in the field of information processing in relation to computer science.
SPONSOR: IEEE Emanuel R. Piore Award Fund

IEEE JUDITH A. RESNIK AWARD
For outstanding contributions to space engineering within the IEEE fields of interest.
SPONSORS: IEEE Aerospace and Electronic Systems, Control Systems, and Engineering in Medicine and Biology societies

IEEE ROBOTICS & AUTOMATION AWARD
For contributions in the field of robotics and automation.
SPONSOR: IEEE Robotics and Automation Society

IEEE FRANK ROSENBLATT AWARD
For outstanding contribution(s) to the advancement of the design, practice, techniques, or theory in biologically and linguistically motivated computational paradigms, including but not limited to neural networks, connectionist systems, evolutionary computation, fuzzy systems, and hybrid intelligent systems in which the paradigms are contained.
SPONSOR: IEEE Computational Intelligence Society

IEEE DAVID SARNOFF AWARD
For exceptional contributions to electronics.
SPONSOR: Sarnoff Corp.

IEEE MARIE SKLODOWSKA-CURIE AWARD
For outstanding contributions to the field of nuclear and plasma sciences and engineering.
SPONSOR: IEEE Nuclear Plasma and Sciences Society

IEEE CHARLES PROTEUS STEINMETZ AWARD
For exceptional contributions to the development and/or advancement of standards in electrical and electronics engineering.
SPONSOR: IEEE Standards Association

IEEE ERIC E. SUMNER AWARD
For outstanding contributions to communications technology.
SPONSOR: Alcatel-Lucent Bell Labs

IEEE NIKOLA TESLA AWARD
For outstanding contributions to the generation and utilization of electric power.
SPONSORS: The Grainger Foundation and IEEE Power & Energy Society

IEEE KIYO TOMIYASU AWARD
For outstanding early- to midcareer contributions to technologies holding the promise of innovative applications.
SPONSORS: Dr. Kiyo Tomiyasu, IEEE Geoscience and Remote Sensing Society, IEEE Microwave Theory and Techniques Society, and KDDI R&D Laboratories

TEACHING AWARDS

IEEE LEON K. KIRCHMAYER GRADUATE TEACHING AWARD
For inspirational teaching of graduate students in the IEEE fields of interest.
SPONSOR: Leon K. Kirchmayer Memorial Fund

IEEE UNDERGRADUATE TEACHING AWARD
For inspirational teaching of undergraduate students in the IEEE fields of interest.
SPONSOR: IEEE Education Society

FOR MORE INFORMATION, visit http://www.ieee.org/awards or contact IEEE Awards Activities, 445 Hoes Lane, Piscataway, NJ 08854-4141 USA; tel.: +1 732 562 3844; fax: +1 732 981 9019; e-mail: awards@ieee.org.

Group Term Life Insurance

Group 10-Year Level Term Life Insurance

Group 20-Year Level Term Life Insurance

The future is powered by the expertise and vision of professionals like you.

Let us help secure your place in that future, with personal and professional insurance exclusively created for IEEE members. IEEE Group Life Insurance plans are underwritten by one of the most financially stable insurance companies in America, while featuring affordable group rates and outstanding service. Plus, even if you move to other jobs, you can take your protection with you.

You know anything's possible. And that's the best reason to help protect your future and your family's security. More than 53,000 IEEE members just like you already use the IEEE Group Life Insurance Program. Want to secure your place in the future?

Call us or go online today!

IEEE

Celebrating 125 Years
of Engineering the Future

To learn more, visit www.ieeeinsurance.com or call 1.800.493.IEEE(4333).

This program is administered by Marsh Affinity Group Services, a service of Seabury & Smith, Inc., d/b/a in CA Seabury & Smith Insurance Program Management. Coverage may vary or may not be available in all states. The Group Term Life, 10-Year Level Term Life and 20-Year Level Term Life Insurance plans are underwritten by New York Life Insurance Company, 51 Madison Ave., New York, NY 10010 on Policy Form GMR.