

6 Meet the
President-Elect
Candidates

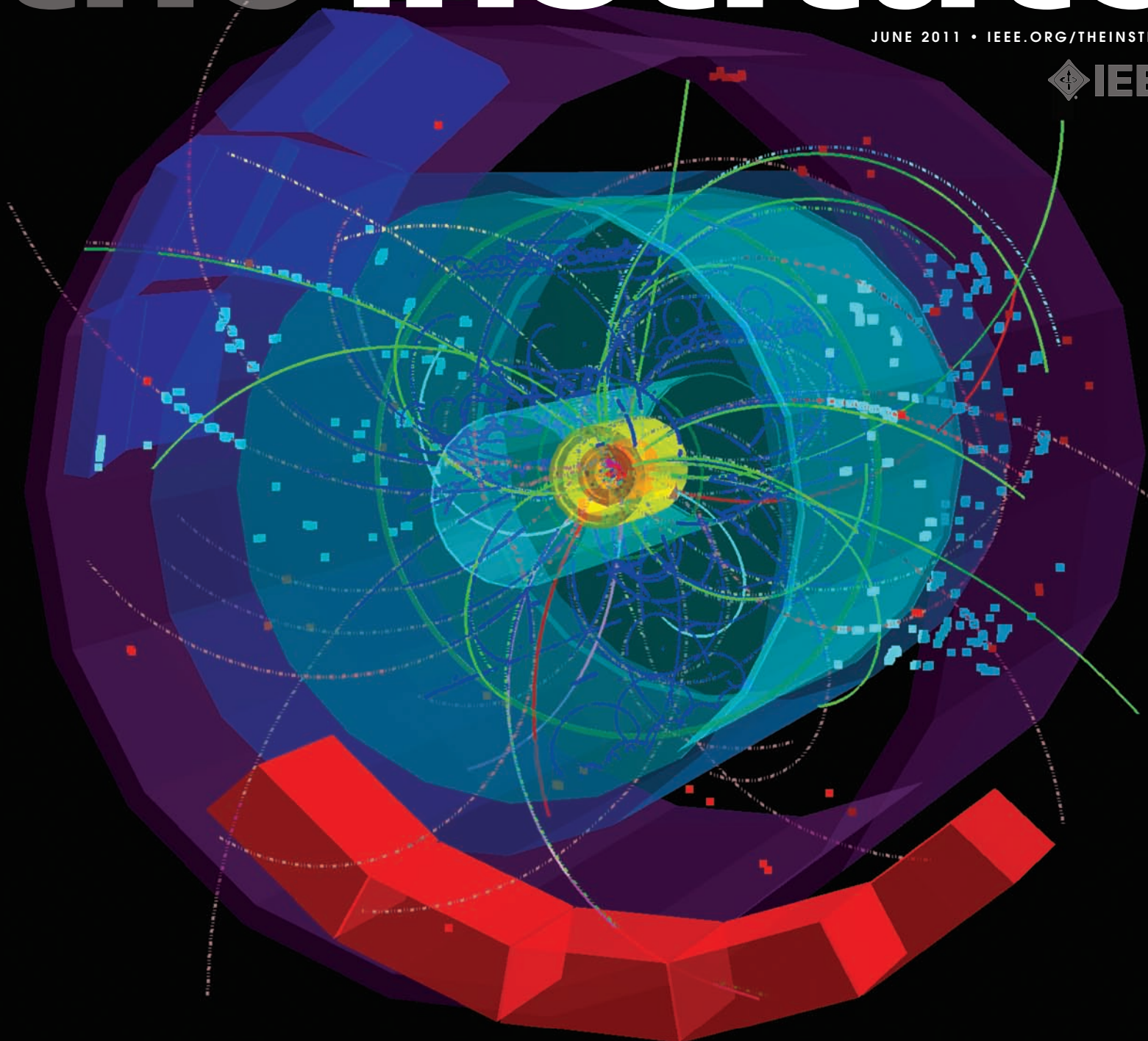
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the institute

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Colliding Particles

This year could bring big breakthroughs for CERN's Large Hadron Collider PAGE 5

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IEEE AROUND THE WORLD



REGION 1 NORTHEASTERN UNITED STATES

- New Hampshire Section establishes IEEE Robotics & Automation Society chapter.
- Student branch formed at **State University of New York Maritime College, New York City.**

REGION 2 EASTERN UNITED STATES

- Student branch formed at **Delaware State University, Dover.**
- Student branch formed at **Ohio State University Graduate School, Columbus.**

REGION 3 SOUTHEASTERN UNITED STATES

- Student branch formed at **Georgia State University, Atlanta.**

REGION 4 CENTRAL UNITED STATES

- **Southern Minnesota Section** establishes IEEE Consultants' Network (CN) affinity group.
- **Cedar Rapids (Iowa) Section** establishes IEEE CN affinity group.

REGION 6 WESTERN UNITED STATES

- **Alaska Section** establishes IEEE Geoscience and Remote Sensing Society chapter.
- Student branch formed at **Oregon Institute of Technology, Portland.**
- **San Francisco Section** establishes IEEE Life Members (LM) affinity group.
- **Santa Clara Valley (Calif.) Section** establishes LM affinity group.
- **Foothill (Calif.) Section** establishes chapters of the IEEE Power & Energy and Computer societies.
- Student branch formed at **DeVry University, Sacramento, Calif.**

REGION 7 CANADA

- Student branch at the **University of British Columbia, Vancouver,** establishes IEEE Power & Energy Society chapter.

REGION 8 EUROPE, MIDDLE EAST, AND AFRICA

- **Austria Section** establishes IEEE Power & Energy Society chapter.
- **Morocco Section** establishes IEEE Signal Processing Society chapter.
- Student branch at the **Technical University of Denmark, Lyngby,** establishes IEEE Photonics Society chapter.
- **Denmark Section** establishes IEEE Power & Energy Society chapter.

- Student branch formed at the **Technological Educational Institution of Serres, Greece.**
- Student branch formed at **Regional Maritime University, Accra, Ghana.**
- Student branch formed at **De Montfort University, Leicester, England.**
- Student branch formed at **FH Bielefeld University of Applied Sciences, Germany.**
- Student branch at the **Universidad Nacional de Educación a Distancia, Madrid,** establishes IEEE Education Society chapter.

REGION 9 LATIN AMERICA

- Student branch formed at the **Instituto Universitario Autónomo del Sur, Montevideo, Uruguay.**
- Student branches formed in Colombia at **Universidad de San Buenaventura, Cali,** and **Universidad de Medellín.**
- Student branch formed at **Universidad Nacional de Santiago del Estero, Argentina.**
- **Argentina Section** establishes joint chapter of IEEE Control Systems, Industry Applications, Industrial Electronics, Power Electronics, Robotics & Automation, and Vehicular Technology societies.

REGION 10 ASIA AND PACIFIC

- Student branch at the **Lovely Professional University, Delhi, India,** establishes IEEE Robotics & Automation Society chapter.
- Student branch at the **Amrutvahini College of Engineering, Ahmednagar, India,** establishes IEEE Circuits and Systems Society chapter.
- Student branches formed in India at **Sri Shakthi Institute of Engineering and Technology, Gyan Ganga Institute of Technology & Management, PSNA College of Engineering & Technology, GLA University Mathura, Motilal Nehru National Institute of Technology, Sachdeva Institute of Technology, Sagar Institute of Science & Technology, Government Engineering College, Maharashtra Institute of Technology, Central India Institute of Technology, Malla Reddy College of Engineering for Women, Devineni Venkataramana & Dr. Hima Sekhar MIC College of Technology, Vidya Vikas Institute of Engineering & Technology,** and **Cape Institute of Technology.**
- Student branch at the **Sachdeva Institute of Technology, Farah, India,** establishes IEEE Microwave Theory and Techniques Society chapter.
- Student branch at the **Vignana Bharathi Institute of Technology, Hyderabad, India,** establishes IEEE Power & Energy Society chapter.
- Student branch at the **Sri Venkateshwar College of Engineering, Bangalore, India,** establishes IEEE Robotics & Automation Society chapter.
- **Nirma Institute of Technology, Ahmedabad, India,** establishes Women in Engineering (WIE) affinity group.
- Student branch at the **IES College of Engineering, Chittilappilly, India,** establishes WIE affinity group.
- **Pune (India) Section** establishes WIE affinity group and chapter of IEEE Communications Society.
- Student branch formed at **King Mongkut's University of Technology, Thonburi, Thailand.**
- **Republic of Philippines Section** establishes IEEE Computational Intelligence Society chapter.
- **Indonesia Section** establishes IEEE Control Systems and Robotics & Automation Society joint chapter.
- Student branches formed in Pakistan at the **Karachi Institute of Economics and Technology and Air University, Multan.**
- **Wuhan (China) Section** establishes IEEE Control Systems Society chapter.
- **New South Wales (Australia) Section** establishes WIE affinity group.
- **Vietnam Section** establishes IEEE Computational Intelligence Society chapter.

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

Online

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

NOMINEES SOUGHT

Volunteers are being sought to serve on committees and as IEEE corporate officers.

MEMBER RECOGNITIONS

Read about members recently honored for their work.

NEWS

Annual Election Begins in August

LOOK FOR YOUR annual election ballot package to arrive in August via first-class mail. Included with the paper ballot and a postage-paid reply envelope is information about how to access and return the ballot electronically.

Those eligible to vote include new members as of 30 June and those elevated to member or graduate student member grades on or before that date. Associate members may not vote in the annual election.

To apply for transfer to member grade, complete the form at <http://www.ieee.org/organizations/mga/md/memelv.htm>. Member grade requires that the person be regularly employed in IEEE-designated fields and have a combination of education and work experience of at least six years.

Student members or graduate student members graduating between 1 January and 30 June should be sure to update their education information to avoid missing being elevated to member and the opportunity to vote in the annual election.

To help ensure you receive the ballot package, review your contact information, member preferences, and education information at http://www.ieee.org/go/my_account.

ELECTION DEADLINES

15 August IEEE annual election ballots are sent to all voting members by this date.

3 October Last day for members' marked ballots to be received by IEEE, by noon CDT USA/17:00 UTC.

10 October Last day for ballots to

be tallied by the Tellers Committee. **21 November** The IEEE Board of Directors acts to accept the report of the Tellers Committee. Annual election results are made official.

Board Sets Five New Goals

THE IEEE BOARD of Directors established five priorities for 2011 at its February meeting series, held in Miami. The priorities are:

- Establish IEEE's leadership in important technical areas, including smart-grid technology and specific areas within life sciences.
- Develop a plan to ensure that IEEE is at the forefront of digital publishing technology.
- Develop a strategy for IEEE conferences that focuses on protecting the quality of IEEE conference proceedings.
- Collaborate with other associations and publishers, including investigating joint membership agreements and adding their publications to the IEEE Xplore digital library.
- Create a plan for membership development that focuses on the needs of professionals working in industry and of young professionals in areas of the world where membership is declining.

Sections Congress Coming Soon

VOLUNTEERS ARE gearing up to attend this year's IEEE Sections Congress from 19 to 22 August at the San Francisco Marriott Marquis.

Held every three years, the congress gives IEEE volunteers and leaders of IEEE units such as regions, geographic councils, sections, subsections, chapters, and affinity groups the opportunity to network and learn how to increase member participation in IEEE activities.

This year's speakers include 2011 and 2012 IEEE presidents Moshe Kam and Gordon Day; Vint Cerf, Google vice president and chief Internet evangelist; and Sehat Sutardja, chairman of Marvell, a semiconductor manufacturer in Santa Clara, Calif.

Attendees can also witness the IEEE Honors Ceremony on 20 August and visit the Computer History Museum in Mountain View, Calif.

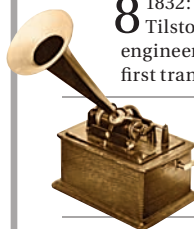
Information on the congress is available at <http://www.ieee.org/sc2011>.



June

2 1883: The first U.S. electric elevated train makes its inaugural journey in Chicago.

8 1832: Birth date of Sir Charles Tilston Bright, the telegraph engineer in charge of laying the first transatlantic cable.



9 1891: Thomas Edison is issued a patent for a phonograph improvement.

16 1949: The first gas turbine–electric locomotive is demonstrated in Erie, Pa.

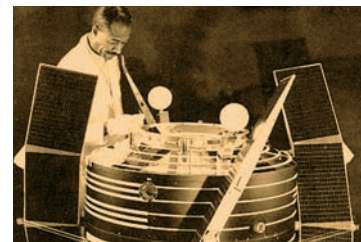
21 1781: Birth date of Siméon Denis Poisson, who came up with one of the first mathematical theories of electrostatics and magnetism.



22–27 IEEE Meeting Series in Bellevue, Wash.

30 1948: Bell Telephone Labs announces the invention of the transistor.

July



4 1968: Explorer 38, an unmanned U.S. spacecraft, is launched to measure galactic radio sources and study low frequencies in space.

10 1962: Telstar 1, the first active communications satellite, is launched.

13 1977: A New York City–area blackout lasting nearly 25 hours affects millions of residents and leads to more than US \$100 million in estimated losses from looting.



CALENDAR

17 1850: The Harvard Observatory takes the first photograph of a star.



21 1970: The Aswan High Dam in Egypt is completed.

31 1964: Ranger 7, an 8-foot-high unmanned spacecraft carrying 6 TV cameras, transmits more than 4000 pictures of the Moon before, as planned, crashing into its surface.

August

3 1926: The first traffic lights in Great Britain are installed at Piccadilly Circus in London.

4 1922: Two days after Alexander Graham Bell's death, all phones in the United States and Canada served by the Bell System go dead for one minute in his honor.

10 1885: The United States' first commercial electric streetcar goes into service in Baltimore.

15 1998: Apple begins shipping its iMac personal computer.



19–22 IEEE Sections Congress in San Francisco.

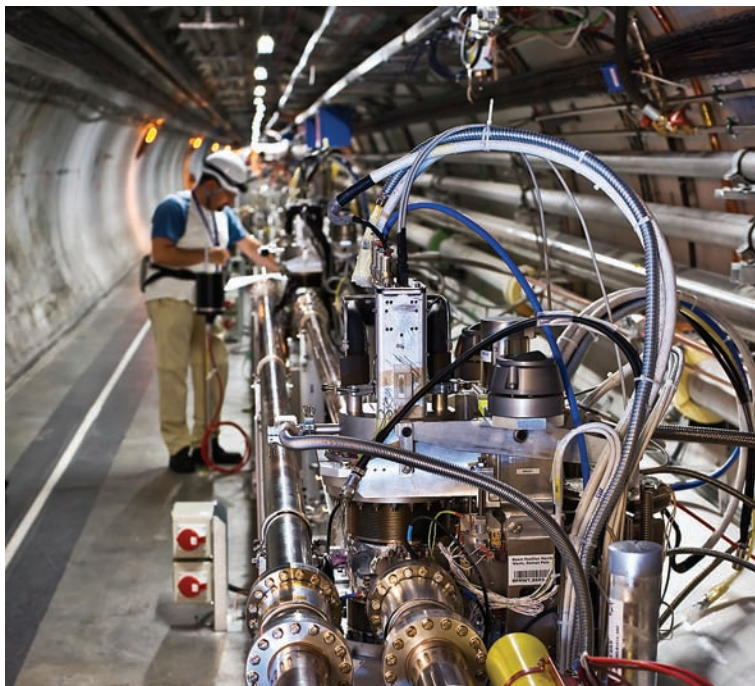


20 IEEE Honors Ceremony at Sections Congress in San Francisco.

21 1883: Installation of the first electric lighting on a U.S. Navy ship is completed on the USS *Trenton*.

28 1964: First weather satellite to transmit nighttime cloud photos is launched.

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



TECHNOLOGY

The Physics of Colliding Particles

Will 2011 be the big year for the biggest particle accelerator?

BY ANNA BOGDANOWICZ

ABOUT ONE HUNDRED meters beneath the border of France and Switzerland, scientists have been smashing protons together at the Large Hadron Collider, the world's largest particle accelerator, hoping to reveal the secrets of our universe. Built by CERN, the European Organization for Nuclear Research, the LHC studies the smallest known particles—the fundamental building blocks of all things. After being turned on in 2008, it soon began recording its first proton-to-proton collisions. But the LHC ran into technical problems that required it to be shut down and repaired before it was turned back on in 2009.

Now, following 10 weeks of downtime for maintenance, the collider has been up and running again since late February. And LHC researchers say they hope to make some major discoveries this year.

One of those researchers is IEEE Member Fernando Lucas Rodríguez, control system coordinator of an LHC experiment called TOTEM (short-hand for total cross section, elastic scattering, and diffraction dissociation measurement).

"Everyone at CERN is very excited about this year," Lucas says. "The LHC is fully stable now and will be running continuously."

Lucas is in charge of the control system of TOTEM [shown above]. "The TOTEM experiment detector-

control system runs 24 hours a day, 7 days a week," Lucas notes.

NUTS, BOLTS, AND PROTONS

The LHC sits in a circular tunnel 27 kilometers in circumference buried 50 to 175 meters underground. Inside, two beams of hadrons—either protons or lead ions—are accelerated in opposite directions at a velocity approaching the speed of light. The beams are steered into head-on collisions by powerful magnets at several points around the ring. The subatomic debris shot out of the collisions is recorded and analyzed by researchers.

The goal of the LHC is to better understand particle physics, validating or refuting theoretical models, finding new particles in collision debris, and revealing fundamental insights into the nature of the universe. This year researchers have a full wish list. They hope to find signs of dark matter, additional dimensions of space, microscopic black holes that evaporate and disappear, and the Higgs boson—the much sought-after particle, also known as the "God particle," whose existence was proposed by physicist Peter Higgs and others in 1964. It is thought to be the key to why some particles have mass and others do not.

The Higgs boson is the only standard-model particle that has never been observed in particle physics experiments. The physics standard model, which is composed of 16 particles, is the framework devised in the 1970s to explain how subatomic particles interact. The model has worked well for physicists thus far in understanding the laws of nature, but it cannot explain the best known of the four fundamental forces: gravity. It also describes only ordinary matter, which makes up a small part of the total universe; dark matter makes up a quarter of the mass in the observable universe.

TOTEM CONTROL

The LHC has four large detectors and two smaller ones, which gather collision data and conduct experiments. TOTEM, one of those smaller detectors, measures the size (total cross section) of the protons and how they scatter after a collision, as well as the LHC's luminosity, or the number of collisions in an area in a certain instant.

Luminosity is a means of evaluating the accelerator's efficiency.

TOTEM measures particles circulating in main beam lines using specially designed detectors housed in vacuum chambers known as Roman pots. TOTEM is one of the smallest experiments at the LHC, Lucas says, but its detectors are innovative in how they analyze proton collisions. "The exceptional characteristic of TOTEM is that the Roman pots are movable, and we can get them very close to the particles accelerating inside," he says.

In addition, they can measure proton collisions with very small angles over a long distance in the LHC. "Sometimes particles don't disintegrate during a collision, but their trajectories change, and we want to study the angle of those collisions," he adds. Getting such precise measurements is important because it allows the researchers who process the LHC's data to better analyze the theoretical model of a proton.

To keep TOTEM running, Lucas's group has to keep an eye on several key areas, like temperature and pressure probes, voltages and currents, and accumulated radiation doses. "Over time, in the radiation environment of the collider, the sensors used in the detectors to gather data degrade and become less sensitive," he says. "In our control system, we have a set of dedicated sensors to measure the accumulated dose. When radiation increases, the current and voltage needed for each sensor change and finally, at a certain point, we may need to replace those sensors." All those parameters are constantly monitored—alarms go off if something is out of its expected range.

One of the biggest challenges is making sure all parts of the control system are interoperating as expected. That means overseeing the high voltage applied to the sensors, the low voltage applied to the electronics, the cooling system, cybersecurity, and the user interface. "But also, from a project management point of view," Lucas says, "having a solid management to understand what the configuration of the system is at each moment is a challenge.

"We're using a combination of commercial products, as well as custom-made technologies. But the main challenge of the control system is not just to provide a fast and real-time system—it's making sure all the parts are well integrated and working together."



ELECTION

The Candidates Take On Top IEEE Issues

Roger Pollard and Peter Staecker vie for 2012 IEEE president-elect

BY ANNA BOGDANOWICZ

IN AUGUST, IEEE members will receive their ballots for the annual election for 2012 IEEE president-elect. To help you choose between candidates Roger Pollard and Peter Staecker [above, left to right], *The Institute* asked them to weigh in on important IEEE issues. Some of the questions

were submitted by IEEE members. Here, in their own words, are the candidates' e-mailed responses.

What would be your top two priorities if elected?

POLLARD The top priority for IEEE is full globalization, living up to our claim to be the world's largest

professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. We need to support our global community of members with equal access to IEEE services, career benefits, scholarships, and other resources as well as opportunities to participate in activities, to volunteer, and to receive awards and recognition wherever they happen to live. Furthermore, we should work to expand our technology base and take the lead in new topics which overlap or support our traditional disciplines.

STAECKER "Advancing Technology...": IEEE advances technology through its publishing, conference, standards, and educational businesses. Our product offerings provide focused professional value to members, volunteers, and customers. To serve the unique demands of each group, we must continue to invest volunteer, staff, and financial resources in these areas to improve the quality and increase the cover-

age of our product offerings.

"...for Humanity": IEEE will have maximum effect by choosing opportunities with sustainable technical solutions to the problem of improving the living conditions of locally disadvantaged segments of the population. These solutions must scale through replication to benefit increasingly larger populated areas. We must identify local members and volunteers who can act as champions for these activities and communicate their achievements and benefits to neighboring communities.

The impact of technology on our lives increases daily. IEEE has the capability and mandate to translate our professional articles for the layperson, creating a technically informed and technically curious public.

What do you see as the IEEE of the future, and as president, how would you influence that?

STAECKER IEEE 2027 will be:

- The globally trusted source of technical knowledge for practitioners, educators, and researchers.
- A respected provider of educational training for students and professionals.
- A collection of collaborative technical/humanitarian communities with common values and vision.

I would encourage strategic thought and tactical initiatives—with success metrics and deadlines—to build consensus and progress toward the above and/or related common goals shared by the whole of IEEE. With a 15-year time horizon, the key to success is continuity of purpose and succession planning.

POLLARD All of the world's major challenges—which include providing for sustainability, the energy needs of future generations, urban infrastructure, life sciences and health care, advancing communications, and information technology—are multidisciplinary. IEEE's future is to be the home for technical specialists in all of the increasingly wide range of technologies that will be the solutions to these problems. We already include engineering and computing, but we must make members from other disciplines—especially the life sciences, which are inherent in the big societal challenges—feel at home in IEEE. As president, I would work to build the necessary global collaborations between the

technology areas and with other like-minded organizations to help people find ways to solve the pressing problems of the future.

In which technical areas should IEEE be more involved?

POLLARD It is impossible to predict the emerging technologies of the next few years; we have seen large growth in opto- and nanoelectronics, robotics, medical and biological technology, energy, communications, and computing. The challenge for IEEE is to use its resources to respond quickly to support the initiation and sustainability of new activities and to nurture communities working in new technical areas.

STAECKER We are engaged in life sciences, the smart grid and its collection of energy source alternatives, and cloud computing. Through committees such as Future Directions (a committee under Technical Activities), we will formally identify more emerging fields in technology and computing. Our search toolkit should include an understanding of the grand challenges put forward by academies of engineering and science.

What new benefits do you think IEEE should offer?

STAECKER We must reengage and retain the practitioner by offering practical content that supports improvements in technical skill and technique each day and by recognizing the achievements and contributions of individual practical excellence to the same extent that we recognize academic excellence.

We must continue to improve the way we help members deal with career transitions in our increasingly mobile society, including continuing technical education, interpersonal and communication skills needed on the job, leadership training, and project management.

And we must continually reduce the cost of these member benefits to increase member value.

POLLARD We must recognize that members have needs that will differ as their careers develop and that IEEE needs to provide a full range of benefits. So we must continue to expand our support for technical information, networking, continuing education, and professional and career development. It is essential that we provide the widest possible range of benefits and offer members the opportunity to access those products and services they need at a particular time. We

can maximize the value of membership by offering the freedom to decide which IEEE activities they wish to pay for and participate in, and we should offer a choice of additional benefits that accrue with length of membership.

Should IEEE's membership model be changed?

POLLARD The IEEE membership model has been evolving. We now offer low-cost e-membership in countries where incomes are low. I have recently been leading an initiative to introduce a new multitier membership model. Most people join IEEE because of their technical interests, and membership in a technical society always comes high up on their list of priorities in every survey. The plan is to include membership at a basic level in a single society of your choice included with every IEEE membership. Members can join additional societies at the basic level or upgrade to an enhanced level with additional benefits and services. The objective is that every member will have a geographic home (their region and section) and a technical home (a society).

STAECKER It is important that the member model adjust to track changes in member needs and desires. We already know from member surveys, however, that members have distinctly personal views of member value. So if we embark on changes to the member model, we (senior volunteers) need to have some principles for proceeding. These include:

- Do no harm. Don't drive the members away just for the sake of doing experiments.
- Study methods of simplifying the offerings (and standardizing prices) from the IEEE side.
- Strive to provide personalized features and benefits to each member at minimal costs.
- Be relentless in measuring effectiveness and recustomizing as necessary. Listen to your tweets; think like Amazon.com.

What can IEEE do to attract more students to engineering?

STAECKER Begin outreach programs (using members and/or volunteers) at all preuniversity levels by exposing young students to the thought process and allure of science and technology. Continue and expand the Teacher In-Service Program [in which IEEE volunteers assist teachers in incorporating engineering lessons in the class-

room] and teacher-engineer partnership programs in the schools. Encourage increased linkage between our Graduates of the Last Decade (GOLD) members and university student branches and student branch chapters to smooth the transition from student to technology as a profession.

POLLARD Through TryEngineering.org, IEEE exposes preuniversity students to engineering and provides information and resources. We also encourage volunteers to work with schoolteachers helping to bring real-world engineering into the classroom through projects. We need to do a great deal more to harness the energy of our members (especially GOLD members and students) to provide role models and mentoring. The future of our profession depends on attracting the best and brightest; children need to be shown before their teen years that engineering is an exciting and rewarding career. At an early age, many children are being made aware of the global issues of the environment, energy, and sustainability, and they want careers that will help find solutions to the world's problems. We need to work to communicate that the answers lie in the development and application of the technologies that are supported by IEEE.

Should IEEE offer members free access to the IEEE Xplore digital library?

POLLARD The revenue from the IEEE/IET Electronic Library (IEL) delivered through the IEEE Xplore digital library represents a substantial proportion of IEEE income and is a major element in keeping membership dues at a reasonable level. IEEE already offers members access to IEEE Xplore articles at a fraction of the cost, and we should continue to develop low-cost member access models that will not result in increasing membership dues.

STAECKER Nothing free is sustainable. Free downloads of our intellectual property to any segment of the technical community imperil our customer business model. However, this question continues to be studied. *IEEE Spectrum* is experimenting with an offering that will periodically create a layman's version of an article from the IEEE Xplore database and is considering offering a free copy of the IEEE Xplore source article as part of the package. While the current

single IEEE Xplore article member price is US \$10, additional package discounts are being considered. Member prices have dropped considerably for IEEE Xplore articles and will continue to trend down.

How can IEEE improve the volunteer experience?

STAECKER Through outreach and mentoring from the nominations and appointments committees and senior volunteer leaders to help new volunteers discover their goals, and to explain the dynamics and degree of difficulty for the different paths. As the volunteer mentee progresses in leadership experience and lateral movement through different parts of the organization, the connection with mentors should continue to be available. Most of these thoughts are captured on the position descriptions of members of the IEEE Board of Directors but should be codified in procedures at the grassroots levels of the organization.

POLLARD One of IEEE's biggest assets is our volunteers, whose energy and enthusiasm are key to making all our activities vibrant and relevant. The opportunity to volunteer and participate is one of the most compelling reasons to join IEEE. I have always found volunteering to be the most rewarding part of my IEEE membership. It has allowed me to be a part of many successful conferences and other activities, and it has given me the opportunity to meet and work with other highly motivated volunteers from across the globe. However, we must improve the volunteer experience by providing better training and mentoring, and we must work hard to reduce the bureaucracy.

What do you consider IEEE's greatest strength and weakness?

POLLARD Our greatest strength is our people: our members who contribute their technical skills to publish and review papers, organize conferences, and serve as volunteers in every capacity in partnership with our highly professional staff. Our biggest weakness is that we are responding too slowly—both in terms of embracing and supporting the development of new technologies and their communities and in changing our organization to meet the needs and wants of our members.

STAECKER From outside to inside, the observer sees the IEEE brand, representing our intellectual

Continued on page 11



MEMBERSHIP

IEEE Membership Breaks Records

400 000 and counting

BY KATHY KOWALENKO

IEEE HAD ACHIEVED a couple of significant milestones in membership by the end of last year. For the first time in its history, it had more than 400 000 members, and student membership alone reached 100 000.

On average, total membership has been growing by about 2 percent annually for the past seven years. And after several years of decline, total society membership increased last year, with the Communications, Computer, and Power & Energy societies leading the way.

There has been growth around the world, particularly in Canada, India, Japan, the United Kingdom, and the United States. And despite the sour economic environment, from 2008 through 2010, total IEEE membership increased 7 percent and student membership grew 21 percent. Student membership grew the most in Australia, Canada, China, the United Kingdom, and the United States.

WHY THEY JOIN

The Institute asked members to tell us why they joined IEEE and why they stay.

Graduate Student Member Dody Ismoyo listed several reasons for signing up: the IEEE's many seminars, webinars, continuing training programs, and e-books, as well as the opportunity he has to meet senior engineers from industry. Dody became a student member in Malay-

sia at Universiti Teknologi Petronas, where he earned a bachelor's degree in power systems engineering. After a year, however, he dropped his membership because, he says, he "failed to see the benefit." But he rejoined last year when he began pursuing a master's degree in power engineering at the University of Sydney, in Australia, and he is glad he did.

"Joining IEEE has changed my life so much, especially in post-university life," he says. "I've found people who really understand what I'm talking about, since we generally have the same engineering-education background."

He also was introduced to Engineers Australia, an institution that holds joint activities with IEEE, including seminars and technical presentations, many of which Dody attends.

"Many classmates ask how I know about so many engineering-related events, and I tell them, 'Because I'm an IEEE member,'" he says. "I will renew my membership as long as I can!"

Mohammed Al-Donbok became a student member because he "wanted to become familiar with IEEE standards and get access to technical papers," he says. "IEEE also gives me the opportunity to take continuing education courses." Al-Donbok is an electrical engineering student at An-Najah National University, in Nablus on the West Bank, and is a student

member of the IEEE Communications and Power & Energy societies. He says he has had many great experiences with the student branch.

"I hope to make changes to my country's communications system, and IEEE will help me carry out my vision," he says. "To me, IEEE means being a hard-working, ambitious, and knowledgeable member."

Wilber Hernandez joined because his undergrad senior project professor recommended it. Hernandez is pursuing a graduate degree in technology management at Stevens Institute of Technology, in Hoboken, N.J. "From the very first moment I got access to the IEEE Xplore digital library at my school, I haven't been able to stay away from its journals, with their rich stories, research papers, and references," he says. "It has become a great source of ideas for me."

Student Member Suyong Vyawahare learned of IEEE in high school after reading an *IEEE Spectrum* article about energy. Later, Vyawahare began exploring technical magazines, which exposed him to IEEE standards. When he entered Atharva College of Engineering, in Mumbai, he joined the IEEE student branch and got involved in its activities. He has served as the branch's assistant secretary and its events coordinator. "As I learn more about IEEE's programs and offerings, I'm even more proud to be a member," he says. "I also want

to continue my membership because IEEE offers continuing education programs and professional certification programs."

MANY OTHER REASONS

Survey after survey conducted over the years by IEEE has shown that people join, and stay, because they want to remain technically current, obtain access to publications, and boost their career opportunities. Several members who responded directly to *The Institute* confirmed those reasons and echoed other survey findings, such as the value of networking and publishing opportunities, discounts on conference registrations, and the life insurance offered through the IEEE Member Discounts Program, formerly known as the IEEE Financial Advantage Program.

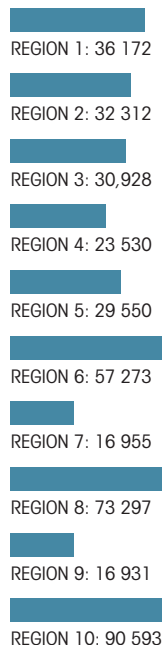
Paul DeAndrea of Franklin, N.Y., has been a member since he was an undergrad in 1974. Now he belongs to the IEEE Power & Energy and Industry Applications societies. "Papers published in the societies' transactions have helped expand my understanding of these areas, and have kept me current," DeAndrea says. "IEEE publications were excellent sources in my successful pursuit of a graduate degree in electrical engineering rather late in my career. I have also networked with other practicing engineers and was fortunate to have coauthored a paper published in the *IEEE Transactions on Industry Applications*."

Peter Tobias, a member from Minneapolis, says he stays "to support IEEE as my professional organization because of the many things it does." He listed the publication of scientific and technical journals, job-related assistance, local chapters, and IEEE-USA's representation of members' public policy interests.

"The consistent pattern of membership growth that IEEE has experienced lately is a testament to how valuable our publications, services, and membership benefits are for advancing the careers of current and future technical professionals," says Howard Michel, vice president, IEEE Member and Geographic Activities.

"As our membership grows," Michel says, "our peer-to-peer network expands, too, bringing more scope and depth to our already very diverse membership. I expect this membership growth to accelerate worldwide as IEEE continues to develop new products and services and as our members continue to spread the word to their professional colleagues."

2010 MEMBERSHIP BY REGION



Accomplish more. IEEE Educational Activities.



Whether you're a working technology professional, professor, teacher or student, IEEE Educational Activities offers you an extraordinary wealth of learning resources.

Pre-University Education

- TryEngineering.org
- Teacher-in-Service Program
- TryNano.org

University Education

- Global Accreditation
- Accreditation.org
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- 11 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.

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QUESTION OF THE MONTH

Open Source vs. Closed

Google recently pulled 21 free apps from its Android market after finding they were malware. Downloaded by at least 50 000 people, the apps were able to gain access to a user's device such as a smartphone, gather data including the owner's mobile-service provider and user ID, and secretly download more malicious code to the device. The news has added fuel to the debate on which type of operating system is better: Android's open-source model or Apple's closed one. Proponents of Android say app developers have more freedom and that the ability to customize a device's features outweighs the occasional piece of malware. Fans of Apple's system say it is more secure and prefer its more monitored system, despite the lack of customization.

Do the benefits of an open-source operating system outweigh the possible consequences? Which system do you prefer?

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. 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 MARCH'S QUESTION

Web-User Tracking

Several countries are considering new policies to give individuals more control over the information that websites 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 websites 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 websites 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?

PROTECT PRIVACY

I am in favor of a Do Not Track mechanism. I often search the Web for components and parts from suppliers when I am developing new products. Without this mechanism, people from other companies may be able to view my list of suppliers. Every company I've ever worked for has requested this type of information be kept private.

Bob Middlemiss
Toronto

DO NOT STALK

It is fundamentally wrong to track Web users, because it involves taking information from them without their explicit consent. That is known as stealing. Following a Web user's pattern of site visits and purchases is, in other environments, known as stalking.

Marek Klemes
Kanata, Ont., Canada

MORE HARM THAN GOOD

While I recognize the need for businesses to understand and market to a target demographic, I am opposed to unrestricted data tracking. Will my search and browser history be used to turn me down for a job? Will it alter my

medical or car insurance rates? Will the data be dumped in a database and reveal the financial institutions that I frequent, leaving my accounts open to social-engineering attacks? It is too difficult for many non-tech-savvy users to figure out the current methods used to reduce tracking. An easy-to-use opt-out method should be available for those who do not wish to be tracked.

William Krekeler
St. Louis

POLICY IS NOT ENOUGH

The problem with legal intervention is that policymakers rarely understand technology and the implications of regulating it. Allowing users to opt out of third-party tracking, assuring transparency of tracking methods, and letting the user know how the information will be used are important. But with cloud computing and the integration of services hosted on diverse domains, tracking will become more common, and it will be harder to manage with public policy.

Jim Isaak
Bedford, N.H.

GIVING AWAY YOUR IDEAS

Imagine you are using the Web to work on your patent application, business plan, or new product. If your activity is being tracked, then there's a chance you might be giving away information for free to a potential competitor who is willing to pay for it. Tracking is absolutely unacceptable. Your search activity is privileged information and not to be shared with others.

Radek Sobczynski
Orange, Conn.

PAR FOR THE COURSE

Unfortunately, Web tracking follows in the footsteps of the long-standing practice in the supermarket industry in which customers get discounted items if they use the supermarket's savings card. Customers who want that card must provide certain demographic information. The supermarket can then track their purchases and print out specific coupons right at checkout. This kind of practice goes too far, however, when the information obtained is used outside of the initial purpose for which it was collected.

Oliver J. Smith
Carlsbad, Calif.

From the Hands and Minds of Our Volunteers

ESPACIO CIENCIA is an attractive and well-maintained science and technology museum in Montevideo, Uruguay. It features traditional exhibits about Earth, the solar system, electrical and magnetic forces, and optics and perception. I visited the museum last year to unveil an exhibit developed by volunteers of the IEEE Uruguay Section.

The exhibit, E-Scientia, is directed toward preuniversity students through age 16 who have an interest in science. E-Scientia is a mock space station that “takes off” for 30- or 60-minute space tours several times a day, crewed by 8 to 10 student “astronauts,” local IEEE volunteers, and museum staff. Prior to the students’ becoming crew members, IEEE volunteers teach them the fundamentals of electrons, electricity, magnets, motors, and other topics.

Various adventures befall the space travelers during their journey, compelling the young people to build FM receivers and transmitters in a hurry, repair electrical networks, install solar panels, and write programs to recalculate the station’s orbit. They complete the tasks with guidance from the adults as well as from five interactive stations on board that deal with different aspects of electrotechnology: communications, energy, propulsion, defense, and biomedicine.

Once they “return” to Montevideo, the astronauts know much more about electrical engineering, engineering design, programming, and computing.

The magnificent and original exhibit is the brainchild of a small, dedicated group of volunteers. They identified a problem, namely a lack of opportunities for young people to experience electrical and computer engineering hands-on while still in

middle or high school. They then got to work on a solution and submitted a proposal to the IEEE New Initiatives Committee, which provides seed grants to help launch projects that have the potential to further the mission of IEEE. In addition to help from the committee, the IEEE volunteers drew on the assistance of local companies and universities and devoted hundreds of hours to developing and implementing their solution. Working long evenings and weekends, they created the whole show in less than a year from the first discussion of the concept.



E-Scientia is an example of what IEEE volunteers can do—it’s a representative activity of what we observe in multiple IEEE sections

around the globe. The volunteers recognize important challenges in their communities, devise original solutions, and use IEEE resources and staff to succeed. As is the case with E-Scientia, the results are often inspiring.

As of now, E-Scientia is a one-of-a-kind exhibit. But the IEEE Foundation recently announced funding for a second “station” to be installed in a science and technology museum in Hyderabad, India. And a conference planned for July in Montevideo will explore additions to the original design that aim to enrich the participant experience. Look for an E-Scientia exhibit in a museum near you, or make it happen faster by becoming part of the E-Scientia network. Write to me (kam@ieee.org) if you want to join.

Moshe Kam
IEEE President and CEO

Continued from page 7

property, conferences, communities, and their core values. The next layer is the staff/volunteer partnership that delivers its products, services, and public-imperative mandates. At the core are the members, our greatest strength. The members join for different reasons but share the appreciation for a central technical home from which they draw professional benefits and through which they join a network of more than 400 000 people with similar analytic curiosity and aptitude for technology and its applications. They deliver the volunteers.

Weakness: A volunteer organization such as IEEE that has short term limits for its leaders suffers a discontinuity of consensus and sometimes even purpose or core values at the beginning of each year. This, in turn, reduces agility in moving from discussion to consensus to implementation.

Does IEEE need to expand its global reach? If so, how?

STAECKER In order to fulfill our public imperative to advance technology for humanity, IEEE requires global relevance, namely the diversity of talent, opinion, and culture.

To be successful globally, IEEE must be successful locally. This requires networks that are rich in geographical diversity. Conversations will be initiated by the social media generation—our young professionals who are student members, graduate student members, GOLD members—collaborating with seasoned local business people, entrepreneurs, and practitioners. This collective has the diversity of skills, culture, and experience that will direct technology to humanitarian purpose locally and interact with similar locales to replicate their successes globally.

POLLARD IEEE is long overdue to “walk the talk” on globalization. Technology is transnational, and technologists are highly mobile. We

must offer our products and services to meet needs across the world but accommodate local needs with, for example, information (not least of which is the IEEE website) in multiple languages and open local offices where appropriate to serve our members.

How can IEEE use social media to engage members?

POLLARD The emergence of social media and professional networks (Facebook, LinkedIn, Twitter, YouTube, etc.) in the last five years or so has transformed society and the way we work. Many of our members already contribute to online communities using social networking tools, and there are already many groups carrying the IEEE logo, although without any official connection with IEEE. This activity is a natural fit with one of the most significant values of IEEE membership: a vast network of technical peers. This is an opportunity for us to engage members using an activity in which they are already participating and forms a loose structure that complements IEEE’s existing geographic and technical structure. IEEE should find ways to support members’ use of the social media and develop policies which encourage information sharing, trust, and professionalism.

STAECKER The easy answer is: Just ask a GOLDie; they know the mechanics, they know the members, and they know about engagement. Recent polls conducted by IEEE show significant increases in people joining IEEE:

- to participate in local IEEE activities
- to network with others in the profession
- for continuing education
- to enhance stature within the profession, and
- to remain technically current.

Social networks such as Facebook that have large IEEE populations offer easy opportunities to engage members on these issues and obtain useful feedback on other concerns they might have.

PRODUCTS AND SERVICES

New IEEE Xplore Subscriptions for Work Groups

BY KATHY KOWALENKO



IF YOU'RE RUNNING a smallish company with researchers who need access to a limited number of articles from IEEE's digital library, there's a new kind of subscription to consider. IEEE Xplore for Corporate Workgroups is for teams of 4 to 25 users.

Each user gets to download 50 articles per month from any IEEE magazine, journal, transaction, or conference proceeding, including their archives. Most of the archives date to 1988, and some go as far back as the 1880s. Each company's users have access to a shared online file cabinet dedicated to their company, where their downloads are stored and available to all of them. The annual subscription price of US \$795 per user includes an IEEE associate membership for each researcher.

"They don't just get the information but also most of the benefits of membership, such as a subscription to *IEEE Spectrum*, the chance to join any of our

38 societies, and discounts on conferences and other IEEE products," says Karen Hawkins, staff director of IEEE product design.

ONLINE FILE CABINETS

The availability of the online file cabinet, which allows members of a group to share downloads, ensures that subscribers get the most for their money. Anyone in the group can open an article in the shared file cabinet, and it won't count as another download. "Essentially, the subscription is 50 unique downloads per user per month, not just 50 views of a document," Hawkins notes. "This allows you to stretch your subscription and lets the group collaborate by sharing articles related to their project."

Another cost-saving feature of the subscription package allows users to pool each of their 50 monthly downloads. Say there are five subscribers, which combined gives the group 250 downloads. One person

can download 30 documents, another 200, and the third 20.

ANOTHER PACKAGE

IEEE also offers a subscription plan aimed at small firms and start-ups. With the IEEE Enterprise package, companies prepay for a certain number of downloads from IEEE Xplore. This approach lets them buy what they need, when they need it, and is significantly cheaper than buying the same number of articles one at a time.

There are three IEEE Enterprise options, each of which covers a 24-month period: 350 articles for \$5495; 800 for \$10 495; and 1900 for \$19 995. Subscribers can also access all the backfiles for IEEE journals, magazines, and conference proceedings. Each subscription option includes an online file cabinet created for each company. A link to the company's file cabinet appears whenever one of its employees logs on to the system; whatever articles are in the cabinet are available to anyone at the company for the subscription period. ■

FOR MORE INFORMATION, visit http://www.ieee.org/publications_standards/publications/subscriptions.

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CONFERENCES: AUGUST-OCTOBER

IEEE Conference on Computational Intelligence and Games

SEOUL, SOUTH KOREA, 31 AUGUST-3 SEPTEMBER

Topics include neural- and fuzzy-based approaches to the design of games, player/opponent modeling, computational- and artificial-intelligence-based game design, and multiagent and multistrategy learning. Also covered are applications of game theory, CI for player-affective modeling, and intelligent interactive narrative.

SPONSOR: *IEEE Computational Intelligence Society*
VISIT: <http://cilab.sejong.ac.kr/cig2011>

International Conference on Nanotechnology Portland, Ore. 15-18 August

Topics include photonics, electronic materials, biomedical devices, quantum computing, alternative energy, and environmental protection. In particular, present and future electrical and electronic applications of nanotechnology are explored.
SPONSORS: *IEEE Nanotechnology Council, IEEE Region 6, IEEE Oregon Section*
VISIT: <http://ieeenano2011.org>

International IEEE Symposium on Precision Clock Synchronization for Measurement, Control, and Communication Munich 14-16 September

Focuses on implementation design and performance issues, system- and device-level studies, conformance testing, and system integration issues. Also covered are design environments and tools for applications, components and embedded implementations, system man-

agement, and simulation studies.
SPONSOR: *IEEE Instrumentation and Measurement Society*
VISIT: <http://www.ispcs.org/2011>

Petroleum and Chemical Industry Committee Technical Conference Toronto 19-21 September

Focusing on technology and issues faced by electrical engineers, topics include American Petroleum Institute motor testing, protection of medium-voltage industrial synchronous generators, design of low-voltage distribution systems incorporating coordination and arc-flash hazard mitigation, and relay performance under saturated-current transformer conditions.
SPONSORS: *IEEE Industry Applications Society, IEEE Toronto Section*
VISIT: http://www.ieee-pcic.org/conferences/2011_toronto

IEEE Symposium on Industrial Electronics & Applications Langkawi, Malaysia 25-28 September

Topics include developments and technology trends in power and industrial electronics, industrial applications, and life sciences. Also covered are computer and network applications, measurement systems, and ocean applications.
SPONSOR: *IEEE Malaysia Section's Power Electronics, Industrial Electronics, and Industrial Applications Joint Chapter*
VISIT: <http://www.isiea.org/2011>

International Microwave and Optoelectronics Conference Natal, Brazil 29 October-1 November

Provides a forum for exchanging information on R&D in microwaves and optoelectronics. Topics include millimeter and nanometer waves, antennas, propagation, wireless communications, fiber optics, and photonic networks.
SPONSORS: *Brazilian Microwave and Optoelectronics Society, IEEE Microwave Theory and Techniques Society*
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STANDARDS

Spotlight on Four Products

IEEE Standards Wireless Dictionary App
Released: December 2010

The IEEE Standards Wireless Dictionary app contains more than 3200 terms and acronyms. Available for the iPhone, iPod Touch, and iPad, it can be downloaded for US \$4.99 from iTunes by searching for "IEEE Standards Wireless Dictionary."

The dictionary covers ad hoc networks, broadband wireless access, integrity/confidentiality, interference, low-rate wireless personal area networks, mobile broadband wireless access, quality of service, RF/microwave exposure assessment, specific absorption rate measurements, vehicular mobility, and local area and metropolitan area networks. The dictionary includes source citations.

IEEE 1901-2010
Released: December 2010

Electric power lines often reach places broadband does not. But using those lines to carry broadband signals has been hampered by line noise and other problems. The IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications covers all types of BPL devices, including those used in first-mile, last-mile broadband connections, in-vehicle applications, and other data distribution.

The standard allows for interoperability with BPL devices now widely used in buildings for local area networks, and it addresses the requirements of smart-grid sensing and control. The standard defines mechanisms for data security and provides for data rates of up to 500 megabits per second on AC or DC lines using a variety of orthogonal frequency-division multiplexing techniques.

IEEE 1775-2010
Released: January 2011

The IEEE Standard for Power Line Communication Equipment—Electromagnetic Compatibility (EMC) Requirements—Testing

and Measurement Methods covers EMC criteria and consensus test and measurement procedures for broadband over power line communication equipment and installations. It references other national and international standards for BPL equipment and installations, but it does not include specific emission limits, which are subject to national regulations.

The IEEE Wireless Dictionary, 2nd Edition, CD
Released: April 2011

Defines the acronyms and jargon used in the industry, with emphasis on commercial systems. It includes almost 3200 terms with source citations. Users can search for terms by keyword or standard number or browse alphabetically.

FOR MORE INFORMATION on these and other standards, visit <http://standards.ieee.org>.

CONTINUING EDUCATION

IEEE eLearning Library

The first three tutorials in the eLearning Library series on IC design, focusing on dual-port static random-access memory, are available. Doug Sheppard of Valence, which specializes in digital IC design with a focus on memory, developed the material.

Dual-Port SRAM Design: Overview
Compares dual-port SRAM to single-port SRAM.

Dual-Port SRAM Design: Memory Cell Read Write
Focuses on how the actions of one port affect what occurs in the cell.

Dual-Port SRAM: Memory Cell Layout and Array Coupling
Explores the impact that the layout of the memory cell has on bit-line coupling.

FOR MORE INFORMATION about the tutorials, visit <http://www.ieee-elibrary.org>.



IEEE SOCIETIES

Society Spotlights

Updates and news from
seven IEEE societies

IEEE Communications Society <http://www.comsoc.org>

Membership topped 50 000 at the end of 2010, and the society added an elected position: a vice president of standards to coordinate the group's greatly expanding activities in that regard. The society is active in newly established IEEE-wide RFID and cloud computing committees, and it began planning virtual conferences such as the 2011 IEEE Online Conference on Green Communications, to be held from 26 to 29 September. Its Facebook page is a hit, with "likes" approaching 20 000 and about 14 000 users who regularly post items. The society offers custom versions of its website for smartphones and tablet computers, and 45 different websites promote its programs and conferences.

IEEE Control Systems Society <http://www.ieeecs.org>

The society completely overhauled its website, which now includes an

online library that features plenary lectures from its conferences. Lecture topics include computational issues in IC design, extremum-seeking controllers, and predicting extreme events in finance, Internet traffic, and weather. A new outreach fund supports projects that could benefit the society and the controls community, including activities for preuniversity students and their teachers, workshops on control-related topics, and membership drives. Two new technical committees were formed: one on power generation, the other on smart grids. The society is working to promote the history of advances in control systems and influence the future direction of the technology.

IEEE Electron Devices Society <http://eds.ieee.org>

In the past year, EDS initiated several projects to enhance the value of society membership. It redesigned its website, adding features and promoting easier navigation. It also led

a multisociety effort to launch IEEE's first technical journal devoted exclusively to photovoltaics, the *IEEE Journal on Photovoltaics*, which is to debut this year. To attract and retain members, EDS offers products and services such as DVDs of selected short courses, a free copyediting service for accepted manuscripts in EDS's flagship publications, and QuestEDS, an online question-and-answer service. Working closely with IBM, the society launched the Snap Circuits program to help engage and educate high school students in electron device engineering.

IEEE Photonics Society <http://www.photonicssociety.org>

The society celebrated the 50th anniversary of the laser throughout 2010. One event recognized the first operating laser as an IEEE Milestone. Its invention was noted with a plaque in November at the site where the laser was developed: the building in Malibu, Calif., that housed the former Hughes Research Laboratories, now jointly owned by Boeing and General Motors. The society doubled the submissions to its new online-only *IEEE Photonics Journal*, which has achieved the fastest time to publication of any IEEE archival periodical: 5.3 weeks after an article is accepted.

IEEE Power Electronics Society <http://www.ieee-pels.org>

The society has revamped its website; established a presence on Twitter, Facebook, and LinkedIn; and launched an electronic newsletter, *IEEE PELS E-News*. The society is gearing up for its IEEE International Future Energy Challenge, a student competition to demonstrate innovation, conservation, and effective use of electrical energy. The contest addresses two broad areas: power electronics, and motors and their drives. This year's finals focus on low-cost lithium-ion battery chargers for automotive and renewable energy applications, and low-power induction-motor drives supplied from a single photovoltaic panel in an emergency water treatment device maximizer. The finals for the first area are to be held in Dearborn, Mich., and the second-topic finals are scheduled to be held in Rio de Janeiro, both from 20 to 22 July.

IEEE Signal Processing Society <http://www.signalprocessing.society.org>

A new workshop was introduced

last year: IEEE Thematic Meetings on Signal Processing (THEMES), which is to become an annual event. Its one-day program is devoted to a single topic; last year, the focus was on signal processing for social networks. The presentations on data gathered from social interaction, mobile phones, and peer-to-peer sharing networks were filmed by IEEE.tv. The focus of THEMES 2011, scheduled for 11 September in Brussels, is on video compression.

The society's *IEEE Signal Processing Magazine* ranked No. 1 among electrical and electronic engineering journals, according to the 2009 Thomson Reuters Journal Citation Report, released last year.

A new Leadership Visitors Program took society officers to Beijing, Guangzhou, Hefei, Shanghai, Xi'an, Shenzhen, and Hong Kong. Leaders spoke at chapter meetings, universities, and local conferences. They brought a 52-page publication of selected articles from *IEEE Signal Processing Magazine* that had been translated into Chinese. A second collection is slated to be published this year.

The visits resulted in the establishment of two new society chapters. Similar excursions were also made to cities in India last year. Visits are planned to Eastern Europe this year in conjunction with the International Conference on Acoustics, Speech, and Signal Processing being held in Prague.

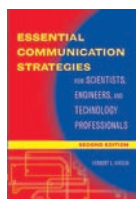
IEEE Solid-State Circuits Society <http://sscs.ieee.org>

The society is offering more than a dozen free 90-minute online tutorials and short courses to members. Starting this year, graduate student members will be eligible for five predoctoral fellowship achievement awards and a dozen student travel grants to attend society-sponsored conferences. The society also celebrated the 40th anniversary of the development of SPICE, the ubiquitous software tool that simulates ICs to aid in design, with a panel of the creators discussing the achievement at the Computer History Museum in Mountain View, Calif. An IEEE Milestone plaque was also placed at the University of California, Berkeley. The online IEEE Global History Network is featuring 20 first-person histories, originally published in the society's magazines and newsletter.

BOOKS OF INTEREST

HERE'S A SAMPLE of titles available for free to IEEE members from the IEEE eBook Classics collection. To find the e-books, log in to IEEE Xplore (<http://ieeexplore.ieee.org>) using your IEEE Web account. Click on Books in the left-hand navigation menu, then click on the Classics tab to browse the titles. Once you find a book of interest, click on the title to go to its home page, where you'll see an abstract, bibliographic information, the table of contents, and a cover image.

Essential Communication Strategies for Scientists, Engineers, and Technology Professionals
By Herbert L. Hirsch (2005)

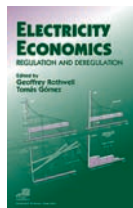


Learn how to become a great technical communicator. Pitching an idea, vying for a contract or grant, and presenting at a meeting involve skills that can be essential for

success. This practical guide, geared to technical professionals, covers the communication dynamics of writing, presentation delivery, and meeting interaction.

Also discussed are the fundamentals of communication, including how to grab the audience's attention from the start; how to maintain the connection while proceeding from topic to topic; how to substantiate your points; how to communicate with marketers, investors, and others; and how to overcome such obstacles as fear, boredom, and a lack of interest in your own material.

Electricity Economics: Regulation and Deregulation
By Geoffrey Rothwell and Tomas Gómez (2003)



Electric utilities have been undergoing profound changes. Nationally owned systems are being privatized, privately owned systems that were previously regulated are being deregulated, and national systems are becoming

international. This text was written as a manual for the Russian Federal Energy Commission to train regional electricity rate regulators in the principles of economics and finance involved in regulating electricity markets and deregulating electricity generation. The book, which requires no familiarity with economics and uses minimal mathematics, provides professionals in the power sector with the tools to face the new realities of electric utility operation.

Antenna Theory and Design
By Robert S. Elliott (2003)



First published in 1981, this revised book covers fundamental methods of analysis for predicting the electromagnetic behavior of nearly everything that radiates. After more than two decades, it remains a key resource for students, professors, researchers, and engineers who require a comprehensive understanding of the subject. The book

is part of the IEEE Press Series on Electromagnetic Wave Theory, which consists of new titles of contemporary interest as well as reissues and revisions of respected classics.

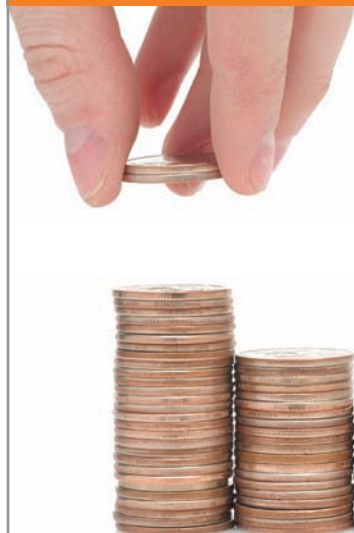
Writing in the Technical Fields: A Step-by-Step Guide for Engineers, Scientists, and Technicians
By Mike Markel (1994)



Reviewing the basics of good technical writing, this book provides a simple, effective system for writing different technical documents, including letters, memos, minutes, procedures, manuals, proposals, progress reports, and final reports. Readers learn how to improve the coherence of their writing, how to write better sentences, and more.

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PROFILE

Edward Tunstel

Space Robotics Expert

BY AMANDA DAVIS

P EOPLE OFTEN ASK IEEE Senior Member Edward Tunstel if he has ever seen signs of extraterrestrial life in his line of work. Tunstel, space robotics and autonomous control lead at Johns Hopkins University's Applied Physics Laboratory (APL), in Laurel, Md., says his answer is no—so far, that is. He has, however, seen plenty of space robots.

Tunstel has spent more than 20 years researching and developing technology for semiautonomous robots used by NASA to explore the surfaces of solar system

bodies, including Mars, the moon, and asteroids.

He recently explained his robotics work during a panel discussion at the Color of Science, an event sponsored by the HistoryMakers—an archival project documenting the achievements of African Americans who have made significant contributions to science, technology, literature, and other areas.

The panel, held in February at the Franklin Institute, in Philadelphia, attracted about 600 attendees. The event was designed to expose young people to career opportunities in science, technology, engi-

neering, and mathematics.

Tunstel told the audience that self-motivation, a knack for problem solving, and a curiosity about how gadgets work helped get him where he is today, despite having limited exposure to engineering as a child.

EXPLORING THE UNKNOWN

Some of the robots Tunstel has helped design have boldly gone where no human has gone before. As flight systems engineer for Mars rover navigation at NASA's Jet Propulsion Laboratory (JPL), in Pasadena, Calif., Tunstel was on the team responsible for designing and testing software that gave the twin rovers, Spirit and Opportunity, semiautonomous capabilities for navigating their own routes through the rugged terrain to their targets. From 2004 to 2007, he led the team responsible for tracking the robotic performance of the rovers, which had been sent to comb the surface of the Red Planet for signs of water.

Every sol—the Martian day—Tunstel analyzed how well they performed the previous day's tasks. He also collaborated with other scientists to program a command sequence that would instruct the rovers where to go and what to do on the following day.

One of the most rewarding parts of the job, Tunstel says, was being “the first or one of the first people to view images and data transmitted by the rovers as they drove to different locations on Mars.” Among the data were measurements of Martian rocks whose chemical composition was found to have been altered by water—leading to the conclusion that Mars once had surface water.

Although Tunstel admits there are many challenges ahead, he believes humans will be able to visit Mars, “perhaps within our lifetime.” If given the opportunity to visit the planet, he says he would rather stay right here on Earth, though. “I am content with seeing the planet through the eyes of robotic systems, and eventually, through the eyes of the first human visitors.”

After several years of exploration, Spirit stopped working in March 2010. Although Opportunity continues to roam the planet, Tunstel has moved on to other projects. He now works as a senior staff member at APL's Space Department, where he continues to

research and develop robotic technology for NASA surface missions.

ART IN MOTION

Tunstel didn't always dream of space exploration. As a youngster growing up in New York City, he had other plans.

“I had nontechnical aspirations—namely sports,” he says. “But when I realized that I had an affinity for analytical thinking and a healthy curiosity about the way things worked, I began to be drawn to technical things.”

He became interested in art at an early age, sketching designs with an eye toward becoming an architect. But a panel discussion he attended as a teenager at the New York Academy of Sciences, in New York City, led him in a new direction. As he listened to engineers and architects talk about their careers, he says, engineering seemed to speak more directly to his analytical side and piqued his curiosity about “how contraptions worked.”

Tunstel was first turned on to robotics, or what he calls “art in motion,” after taking a course as an engineering student at Howard University, in Washington, D.C. He received bachelor's and master's degrees in mechanical engineering from Howard in 1986 and 1989, respectively. In 1996 he earned a Ph.D. in electrical engineering from the University of New Mexico, in Albuquerque.

His master's thesis on computer modeling of automated robotic arms got the attention of JPL, and the lab recruited him in 1989 to join its Robotic Intelligence Group, where he started out supporting R&D for NASA planetary rover projects. In 2007 he joined APL, where he has focused on expanding a new area within the lab that is dedicated to developing robotics for exploring planetary and asteroid surfaces.

Many budding robotics engineers have reached out to Tunstel after meeting him at conferences or listening to him doing radio and TV interviews. He makes it a point to keep in touch with them via e-mail, offering encouragement, guidance, and occasionally even helping them with their homework.

“By reaching out and making myself available,” he says, “I hope to help students overcome small obstacles to keep them going rather than giving up on engineering.” ■



PART-TIME PASSIONS

Sinan AlSheikh
Adrenaline Junkie

PASSION
Skydiving

PROFESSION
IT consultant

HOMETOWN
Dubai

IT TOOK A BUNGEE-JUMP dare and an adventurous friend to turn IEEE Member Sinan AlSheikh into a skydiving enthusiast.

Since 2009, he has made three tandem jumps with an instructor toward the six he needs before he can jump solo.

"I'm proof that you can be a geek and still have fun!" says AlSheikh, an IBM IT consultant in Dubai. "I even went skydiving during my lunch hour. I jumped with my suit and tie on, but I didn't tell my coworkers."

He has also received an unexpected benefit. "Once you've had the rush of bungee jumping or skydiving, it's not a big deal to present in front of 300 people," he says.

AlSheikh's skydiving passion began in 2008 when a couple of

friends called him in the middle of the night, raving about a bungee jumping event at the Dubai Shopping Festival. "We have to do it!" they exclaimed. The next day, AlSheikh found himself peering over the edge of a 45-meter-high platform at the beach below, an elastic cord strapped around both his ankles, trying to get up his nerve.

"With three friends all pushing each other, you can't say no," he says. "Skydiving is more of an adventure, like sightseeing with a great view—bungee jumping is just scary. My mind was telling my legs to jump, but they weren't listening. When I finally did, I kept looking at the point where I was going to hit the ground, bracing for a bad situation, until the rope broke my fall two meters off the ground and I bounced way up. Then I started screaming.

"Once was enough. I was not going to do that again."

In early 2009, a friend visited from Lebanon so she could go skydiving. "I thought, 'If a girl can do it, why can't I?'" he teases. "It was also my 23rd birthday, and I wanted to do something crazy." His birthday present was his first jump—and he was hooked.

So what does it feel like to jump out of a plane? AlSheikh describes skydiving as more exhilarating than nerve-racking. "You're at a 4-kilometer altitude, free-falling for around 30 seconds before pulling your parachute," he says.

"You're doing Superman moves and screaming, but the wind is so loud you can barely hear yourself."

"The first few seconds after you jump, you're still going as fast as the plane and haven't accelerated downward, so you feel no pressure anywhere—like you're floating in a dream," he continues. "Then the acceleration starts, till you reach around 120 kilometers per hour.

"When the instructor pulls the parachute cord, you feel your stomach dislocating. It's like hitting the brakes at a very high speed," he says. "After that, you just relax and enjoy the view." It's a view that pushes AlSheikh out of his comfort zone.

"Now I'll have stories to tell my children, and they'll have to challenge me in how far they push themselves out of their comfort zones," he says. "Maybe one of them will jump from the moon!" —Susan Karlin

Michael Loui
In Perfect Harmony

PASSION
Directing a children's choir

PROFESSION
Professor of electrical and computer engineering

HOMETOWN
Urbana, Ill.

IEEE MEMBER Michael Loui had never conducted a choir when he took over the reins of his church's children's choir a few years ago. Since then, he has found directing the singers to be more than just a hobby. For Loui, it's a great way to bring harmony to his community, one note at a time.

"Choir singing is an engaging way to teach youngsters how to cooperate to achieve a common goal," he says. "Our planet would be much better if, as children, we learned to make music together."

Music has been a longtime passion of Loui's. An electrical and computer engineering professor at the University of Illinois at Urbana-Champaign, he studied piano from sixth grade through high school, took a music theory class in college, and sang in community theater productions in graduate school. At the beginning of his career, the demands of work reduced his

musical activities. When his own children learned to play oboe and saxophone, however, he became their piano accompanist. A few years after Loui joined his church in 1996, he answered a call for a children's choir pianist.

He arranged music and played piano for the choir, which is at the Unitarian Universalist Church of Urbana-Champaign. When the choir's director left in 2002 and no one filled the void, he volunteered despite having no formal background in choral conducting. "If I had not done so, we would not have had a children's choir," he says.

To prepare for the position, he read books on directing choirs. "The biggest challenge is teaching children how to sing on pitch," Loui says. "That's not something I've been trained to do. So we make a joyful noise. We sing in unison and two-part harmony, but sometimes we sing unintentionally in 18-part 'harmony.' There's no real technique other than getting singers to learn their parts and listen to each other as they sing."

Loui plans the year's repertoire during the summer. From September through May, the choir rehearses for 45 minutes each week and performs in the church's Sunday services twice a month. Over the years, the choir has varied from 8 to 18 children, ranging in age from 6 to 12. They sing a variety of music, spanning hymns, spirituals, folk, pop, and Broadway songs—as well as an original Thanksgiving anthem Loui composed called "Thank You, World."

At the end of the day, directing the choir is more than just a creative outlet, he says. "It's also my way of serving my community and making the world a more beautiful place." —S.K.



TOP: SINAN ALSHEIKH; BOTTOM: BEISY BERRY

DEADLINES AND REMINDERS

Call for Nominations: 2013 IEEE Technical Field Awards

CANDIDATES ARE BEING SOUGHT for the 2013 IEEE Technical Field Awards. Nominations for the 31 distinguished awards are due 31 January 2012.

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For outstanding contributions to control systems engineering, science, or technology.
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For outstanding contributions to electromagnetics in theory, application, or education.

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IEEE James L. Flanagan Speech and Audio Processing Award

For outstanding contributions to the advancement of speech and/or audio signal processing.
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For outstanding contributions to solid-state devices and technology.
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For outstanding contributions to electric transmission and distribution.
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IEEE Masaru Ibuka Consumer Electronics Award

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IEEE Reynold B. Johnson Information Storage Systems Award

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For outstanding contributions in electrical measurements.
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For an outstanding contribution to the fundamentals of any aspect of electronic circuits and systems that has a long-term significance or impact.
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For contributions in the field of robotics and automation.
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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 these paradigms are contained.
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