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the institute

OBSERVATIONS IN DEPTH

A number of countries are developing underwater observatories to monitor earthquakes, ocean climate change, and deep-sea ecosystems. P. 8

PART-TIME Passions

A BALLROOM DANCER AND A MODEL RAILROAD ENGINEER IEEE members don't just work all day. In their spare time many of them pursue some interesting hobbies. P. 22

Candidates Take On Six Key Issues

Learn what Marc Apter, Pedro Ray, and John Vig—the candidates for 2008 IEEE President-Elect—have to say about the issues that matter to members. P. 5

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BRANCHES SPUR GROWTH IEEE student branches helped bring student membership to an all-time high of 80 491 members last year. P. 21

online

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SOCIETY SPOTLIGHTS The latest on five of the IEEE's societies.

HISTORY There's a grass-roots effort under way to save the birthplace of radio astronomy.

NEW RECRUITS A group of volunteers made 2006 membership skyrocket.

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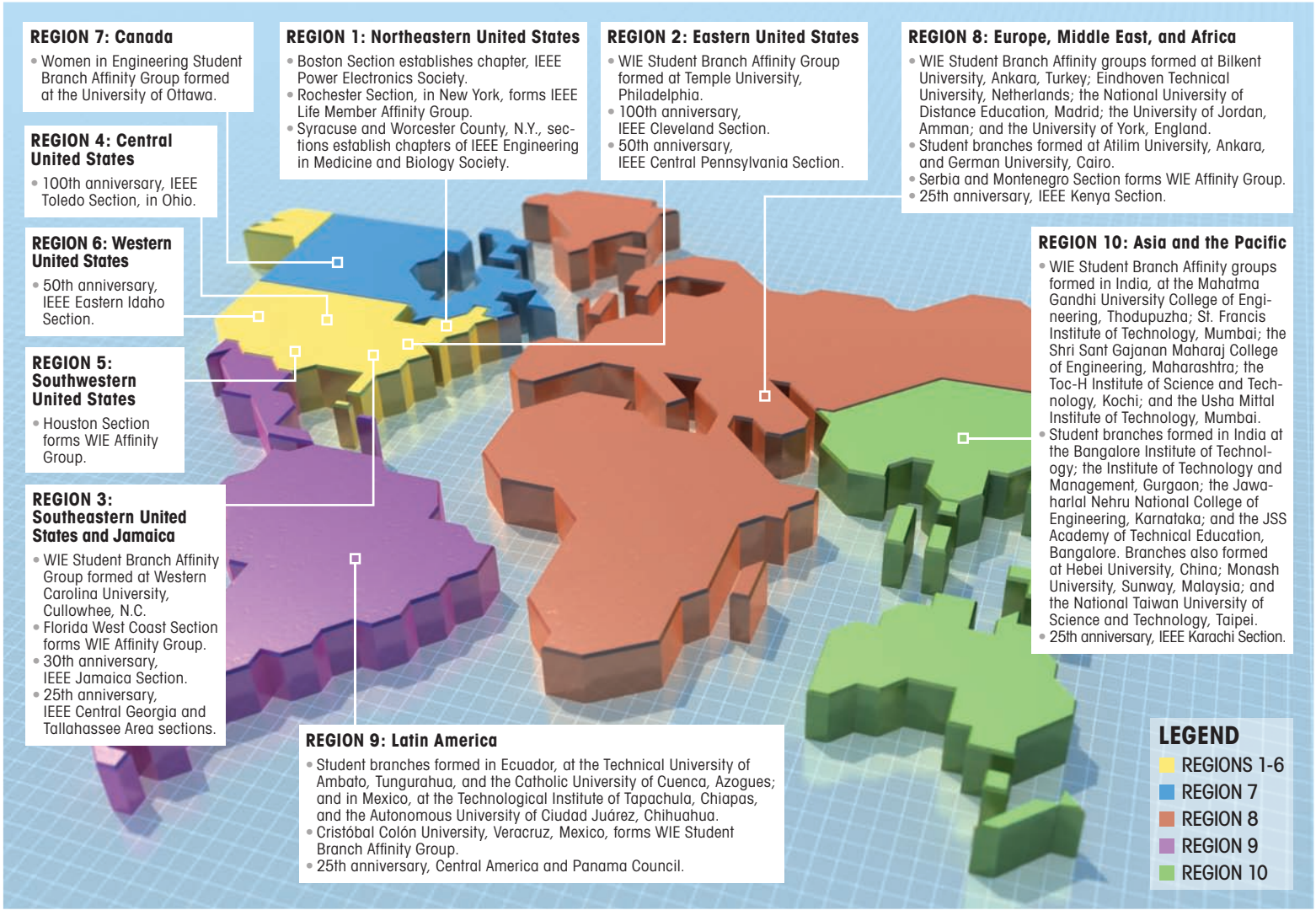
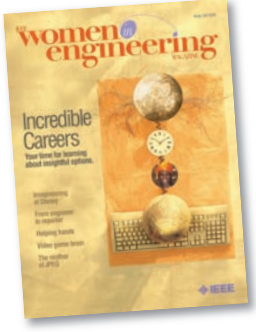


IEEE Women in Engineering Launches Magazine

The first magazine to focus on issues facing women who study or work in the IEEE's fields of interest is set to debut in December. Sponsored by the IEEE Women in Engineering group, the electronic *IEEE Women in Engineering Magazine* will be published twice next year and, if it's a hit, quarterly thereafter.

"Our most important goal is to encourage women from a diversity of cultures to pursue a career in engineering and stay with it," says



Karen Panetta, the editor in chief, who also chairs WIE's oversight committee.

The first issue will be about 40 pages, Panetta says, with articles covering the political and international issues surrounding technology, including cultural differences in the workplace. Also planned are profiles of women with successful careers in science, technology, engineering, or mathematics, as well as coverage of educational programs that attract young women to those disciplines.

The magazine will be available as part of WIE membership, which costs US $25 annually (http://www.ieee.org/women). A limited number of printed copies will be distributed to high schools and colleges.

Dues to Rise $3 Next Year

Basic IEEE membership dues for 2008 will rise to US $126. The $3 increase over this year's dues is based on the rate of inflation in the United States, as measured by the Consumer Price Index.

For U.S. members, the combined assessment for IEEE-USA and ABET will be $39, an increase of $1. Of that, $36 goes to IEEE-USA and $3 to the accreditation board.

No increases were made to any of the 10 Regional assessments, and dues for students remain at $30 in the United States and Canada, and $25 in other countries.

The fee for society affiliates, which is set at half the basic IEEE dues rounded up to the next dollar, is increasing to $63. Affiliates, who may belong to one or more IEEE societies but are not IEEE members, pay the affiliation fee for each IEEE society they join plus the member dues charged by that society.

IEEE TERMINATES MEMBERSHIP

At its 12 June meeting, the IEEE Executive Committee terminated the membership of an IEEE member on the basis of an application containing apparent material misrepresentations or false statements.

This action resulted from a complaint made to the IEEE Ethics and Member Conduct Committee, which referred it to the IEEE Executive Committee for investigation and action in accordance with IEEE Bylaw I-110.5.

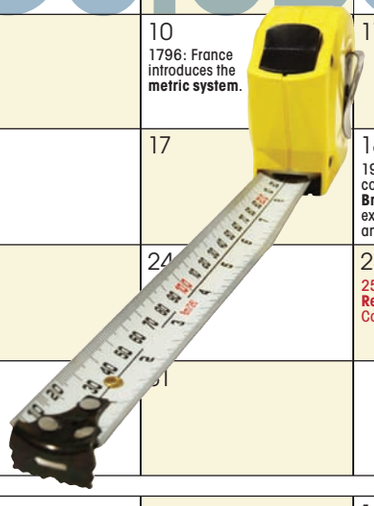
CALENDAR

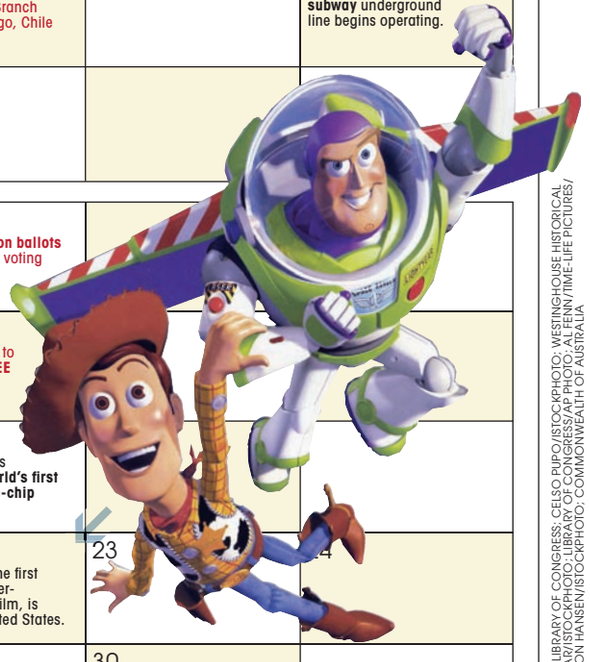
September

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
						1 **IEEE annual election** ballots go out to all voting members.
2	3	4 1995: **Pierre Omidyar** launches the first version of eBay.		6 6 to 9 September: **IEEE Women in Engineering Forum** at IEEE South Brazil Section meeting in Sao Paulo	7 7 to 8 September: IEEE Teacher In-Service Program training for **Region 2** in Baltimore	8
9 1926: The Radio Corporation of America creates the **National Broadcasting Co.**	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

October

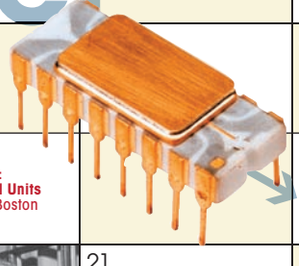
	1	2	3	4	5 **IEEE University Partnership Program Leadership Summit** in Piscataway, N.J.	6 1846: Birth date of **George Westinghouse**, founder of Westinghouse Electric Co.
7	8	9	10 1796: France introduces the **metric system**.	11	12 12 to 14 October: **Region 4** meeting in Chicago	13 13 and 14 October: **Region 8** meeting in Bucharest, Romania
14	15	16	17	18 1922: Six radio manufacturing companies form the **British Broadcasting Co.**, taking over existing stations in London and Manchester.	19 19 to 21 October: **Region 7** meeting in St. John's, Newfoundland	20
21	22	23	24	25 25 to 29 October: **Region 9** Student Branch Congress in Santiago, Chile	26	27 1904: The first **New York City subway** underground line begins operating.
28 1971: England launches the **Prospero satellite** from Woomera, Australia, to test solar cells.	29	30	31			





November

				1 Deadline for **election ballots** to be received from voting members		
4	5 1863: Birth date of **James Packard**, founder of Packard Motor Co. and cofounder of Packard Electric Co.	6	7	8 Last day for ballots to be tallied by the **IEEE Tellers Committee**	9	10
11	12	13 13 to 18 November: **IEEE Organizational Units Meeting Series** in Boston	14	15 1971: Intel releases the C4004, the **world's first commercial single-chip microprocessor**.	16	17
18 **IEEE election** results made public	19	20	21	22 1995: ***Toy Story***, the first full-length computer-generated feature film, is released in the United States.	23	24
25	26 1894: Birth date of **Norbert Wiener**, cybernetics founder and contributor to statistical theory of communications	27	28	29	30	



Historical events provided by the IEEE History Center

IEEE events indicated in RED

CLOCKWISE FROM TOP LEFT: LIBRARY OF CONGRESS; CELSO PUPO/ISTOCKPHOTO; WESTINGHOUSE HISTORICAL COLLECTION; BOGDAN LAZAR/ISTOCKPHOTO; LIBRARY OF CONGRESS/AP PHOTO; AL FENN/TIME-LIFE PICTURES/GETTY IMAGES; INTEL; CLAYTON HANSEN/ISTOCKPHOTO; COMMONWEALTH OF AUSTRALIA

Candidates Take On Six Key Issues

BY KATHY KOWALENKO

From left: John Vig, Marc Apter, and Pedro Ray.

What do the three candidates for 2008 President-Elect say about the key issues that are important to you and to the IEEE?

Marc Apter, Pedro Ray, and John Vig, the three candidates chosen by the Board of Directors, weighed in on the price of dues, publishing more practical articles, improving the image of engineers, and boosting employment opportunities for high-tech workers in answer to questions from the audience at the 19th annual Candidates Night. The IEEE Philadelphia Section hosted the event on 11 June at the Sheraton University City hotel in Philadelphia.

Other questions, some of which had been sent by e-mail to *The Institute*, asked each candidate what his leadership style and top priorities would be if he takes office in 2009 as IEEE President. Here's what each had to say about six key issues.

Membership in the IEEE has been seriously affected by the high dues. What are your thoughts on how to deal with this?

APTER said the problem isn't necessarily the cost of dues. He noted that for U.S. members who aren't recent graduates, the monthly cost "is the price of about three or four Starbucks coffees a month." The bigger issue, he explained, is that members receive the dues renewal notice as one large bill at the end of the year.

"One of the things I've been fighting for and have been told would become available in the 2009 renewal year is an option for dues to be charged monthly to your bank account or credit card," he said. "As a retiree I'm going to like having the bill spread over 12 months rather than having it as a single big hit at the end of the year."

Members outside the United States face a different issue with dues, he noted: they can't pay the bill in local currency. "Right now, with the conversion to dollars, it costs some of them more than 50 percent of what normal dues cost a U.S. member," he said.

RAY proposed offering alternative membership models for higher-grade members instead of the current benefits to "create a different value interpretation." He said, "We need to change the value perception of what members believe they are getting for their money. For the same price, we could offer a whole new package, which would include training programs by experts."

He also proposed a different set of offerings for a lower price for those in developing countries.

VIG hoped to clear up a few misconceptions about IEEE dues. "Contrary to popular opinion, our dues have not been increasing in terms of inflation-adjusted money," he explained. He noted that the IEEE Board of Directors has been raising dues by the rate of inflation in the United States, as measured by the Consumer Price Index. He also pointed out that IEEE dues are lower than the dues of most other professional societies and added he would like to see the IEEE subsidize dues for members in developing countries.

"With the IEEE having about US $210 million in reserves, I think we can afford to spend some of that money to help our colleagues in poor countries," he said.

He also supports experimenting with new membership models and trying to find ways to give members fewer benefits for a reduced fee. "We can make some offerings optional or, as some call it, 'pay by the drink,'" he said.

What should the IEEE do to be more relevant to practicing engineers and their employers?

RAY said that engineers in his organization read the IEEE's publications because the journals are relevant to their work. But he acknowledged that many of the IEEE journals are too technical for practicing engineers.

As for their employers, he said the IEEE doesn't have a relationship with any except for certain large companies. "We need to start communicating with companies to make them realize that they should have a bigger role in the IEEE," he said. He suggested partnering with companies to offer them corporate memberships and request their financing for IEEE's activities. He noted that the IEEE Corporate Communications area is developing a program to work more closely with

BILL CRAMER

companies and said that more support is needed for that activity.

VIG said he has proposed several new products for practicing engineers. One is to publish and certify application notes. "When I was a student, I learned a great deal from application notes, especially Hewlett-Packard's," he said. "But I sometimes wondered whether the notes were really objective. I think we would be doing a service to our practicing engineers to certify that application notes are technically correct and unbiased."

Another one of his proposals is to digitize Wiley-IEEE Press books and offer them as a benefit of membership.

"IEEE Press books generally contain a lot more practical information than journal articles," he said. He noted that the Press might be forced to close its operations next year unless it becomes profitable. "Instead of eliminating it, I think the IEEE should convert the Press into a membership benefit," he said.

He also wants to create a publication called *Technology News*, which would summarize the exciting research that appears in IEEE journals, and distribute it to members, high school students, and industry executives. As an example, he cited the weekly *Science News*, which publishes short overviews of new developments in science.

APTER said that there was a time when the IEEE did produce useful information in its journals and magazines for "those down in the trenches," but that hasn't been the case for many years, and more can be done.

He said he liked the ideas expressed by the other candidates. "We should start figuring out how we can achieve them today," he added, "and not wait until the election results are in."

As for relevancy to industry, "what we don't do is appeal to the medium- to small-size companies," he said. "Instead, we concentrate on Boeing, IBM, Lockheed Martin, and their equivalents in other countries. We don't show employees the benefits of participating in the IEEE. There are skills they can get, but are there enough classes being offered? No."

Apter said the IEEE should be offering its members programs in soft skills to make them more valuable to their employers.

How can we improve the engineering profession in the public's eyes?

VIG responded, "By emphasizing all the good the IEEE does for the world." He pointed to the National Academies report "Rising Above the Gathering Storm," which demonstrated that the vast majority of economic growth could be attributed to new technology.

"Who does technology? The IEEE," he said. "We improve quality of life around the world. Through our standards, for example, we make products safer and better. Our conferences permit 200 000 professionals a year to network with each other, and our publications are accessible to 2 million engineers because of the IEL [IEEE/IET Electronic Library]. Plus, there are the great inventions that came out of activities that the IEEE sponsored."

He also said the IEEE should put online, openly, the presentations and publications by well-known members such as Claude Shannon, Nobel Prize winners, and notable inventors so students can learn about some of the great engineers and important events in the institute's history.

APTER said there are several things that can be done today that don't have to wait until one of the candidates takes office. One would be to publicize that the top 20 inventions and developments of the last 100 years were in the IEEE's fields of interest.

"We need to get those kinds of messages out," he said. "We need to get the word out and tell the public."

He also noted that the IEEE honors many engineers the public never hears about who have created popular devices. "Two years ago at the IEEE Honors Ceremony in Virginia, one of the gentlemen we honored was the father of the Speak & Spell educational toy," he said. "We were honoring somebody like that, but the message never got out."

He noted that another ceremony honored the developers of the hybrid-car technology used today. "I don't think our members ever heard of them," he said. "Do I know what's the best way to promote our activities? No, not personally. But we need to figure it out. If we don't, people will just forget about us."

RAY said the IEEE does not spend enough money on public visibility. "It's hard to imagine any company in the world not spending money on improving its image," he noted. He called on the IEEE to take money from its reserve fund and the budgets of various projects and spend it on raising public awareness.

"We have a wonderful brand, and we should keep promoting it," he said.

The probability of a long-term position at a single employer is decreasing in the engineering profession. What do you see as the IEEE's interest in this phenomenon?

APTER said the IEEE must offer its members the training to build up the skills they need to stay employed in the global economy, wherever the employees are located. But he hastened to say that doesn't mean the IEEE will be developing all the courses. "We can arrange to get them from universities and other providers, and at a discount," he said. "But

BILL CRAMER (3)

we need to offer the skills—whether they're soft skills, hard skills, or certification—because we need to ensure that members know the one place where they can get all this, and that's the IEEE."

RAY said one has to differentiate between employment problems in the United States and those in other countries. "There are plenty of engineers in India going on the job market," he noted. "The United States has particular issues, and therefore the IEEE should really partner with the government to try to get companies to help promote the electrical engineering field."

He pointed to the IEEE's Try Engineering Web site as a great example of an effort that encourages students to get interested in engineering.

VIG stated that lifetime employment is a thing of the past, for better or worse. The IEEE can provide lifelong learning and, to an extent, it is doing that, he said, adding that the IEEE's publications and conferences offer an opportunity for members to participate in lifelong learning.

"We're offering tutorials and workshops at our conferences so members can keep up with technology," Vig said, "and that's the best thing we can do: offer the best possible publications, conferences, and educational products."

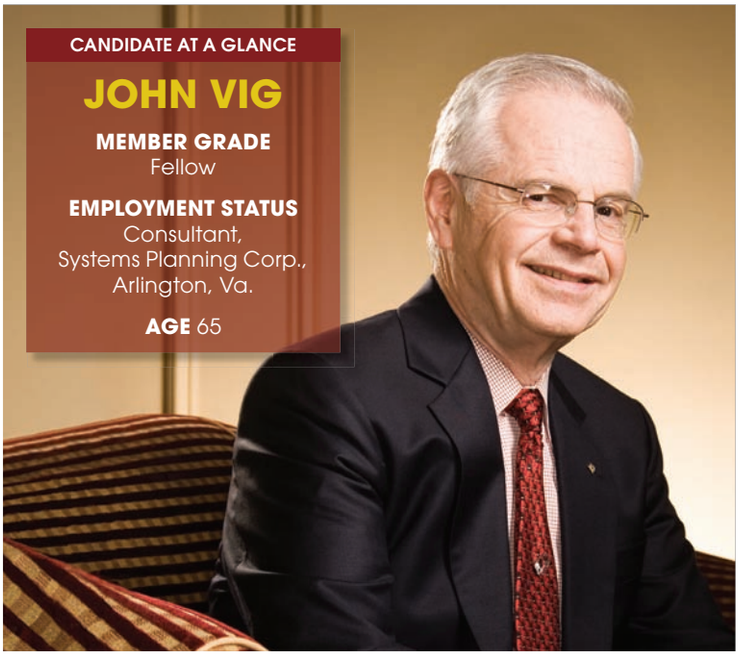
Do you think your style of leadership is a good match for the nonprofit, volunteer-driven IEEE?

VIG sees his leadership style as one that is assertive and one that seeks consensus. He pointed to his proposal to form the IEEE Sensors Council. "Initially, there was almost uniform opposition to the idea by the society presidents," he said. "I proposed the idea in June 1998, and by the following February the Technical Activities Board approved the council's creation. And I did that by being assertive, not taking no for an answer, and developing a consensus. Previously, the IEEE had no journal devoted to sensors. Now the council publishes the *IEEE Sensors Journal*, and it also has a successful conference devoted to sensors."

RAY said the IEEE Board of Directors chose him as a candidate primarily because of his leadership style. "I've proven myself in the last 10 years by serving at the highest volunteer levels, including as IEEE's treasurer during difficult financial times," he said.

"The Board of Directors put my name forward because it thinks that I'm a team builder and a consensus builder," he added. "I'm also a businessman. I know how to run a business, and I'll combine the two to create a good organization."

APTER pointed to his varied volunteer leadership positions—including director of Region 2 (Eastern United States), council chair, and numerous appointments to IEEE committees—which he feels show that he does whatever it takes to build a consensus and get things done. "And if it doesn't get done on the first try, I'll try again. I'm stubborn. But I am willing to adjust to accomplish the main mission," he said. "I try to deliver what is being asked and will do whatever it takes."



If you were to become 2009 IEEE President, what would be your top two priorities?

RAY called boosting membership his prime task. "We have a problem with membership in developing countries and in the United States, and with encouraging women to become engineers," he said. "I also would work to improve the perception of the value of membership."

His second priority would be finances. "I believe we are counting too much on IEL to bring in income," he said. "In the long term, we need to find a substitute for IEL, and we need to start looking for it today."

APTER'S first priority would be to reevaluate the distribution of the IEEE's revenue. "The IEEE reserves are growing and are in the hundreds of millions of dollars. Yet we have sections that barely survive from year to year and societies that claim to be losing money," he said. He would call for a complete review of the way the IEEE handles its finances. "We have all this money, but is it being distributed right? Is it being used correctly? What needs to be done?" he asked.

Addressing problems with membership would be his second priority. "I've been working in that area for the last few years," he said. "It's an important topic, and it can't wait until the election results are in. We need to continue pushing that issue right now."

VIG'S primary focus would be to invest more money in membership offerings, publications, conferences, and standards. "We have $210 million in the bank—which is a lot more than the experts tell us we should have," he said. "We can afford to experiment. We are not doing much experimenting in the IEEE, but we should be."

Next would be to deal with membership problems—specifically retaining student members once they graduate. "Four years after graduation, only 22 percent of these students are still members of the IEEE," he said. "That's a pretty bad statistic." His answer would be to change the IEEE's membership message.

"Our message is obsolete," he said. "We tell students the IEEE's about knowledge, but knowledge is going to be free in the future." Instead he would emphasize some of the intangible values of the IEEE, such as the fact that "the IEEE helps makes the world a better place and improves the quality of life," he said. ■

FOR MORE INFORMATION: A videotape of the 19th annual Candidates Night in June can be viewed from the IEEE Election Web site at http://www.ieee.org/elections. In addition, you can watch a tape of the candidates as they answer a separate set of questions posed by 1998 President Joseph Bordogna.

TIME TO VOTE

The annual election ballot is due to arrive in members' mailboxes this month. In addition to the three candidates for 2008 IEEE President-Elect, 39 people are running in 17 election categories in various IEEE divisions and regions, as well as in the IEEE Standards Association, IEEE Technical Activities, and IEEE-USA.

Those on the ballot represent a diverse group of candidates who are dedicated to serving the IEEE membership and, perhaps of equal importance, can afford to devote the time to their prospective responsibilities.

Members who paid their dues in full as of 30 June at member grade or higher are eligible to vote. Graduate student members also may vote.

Completed ballots must be received by noon U.S. Central Time (17:00 Greenwich Mean Time) on 1 November. Members can also access the ballot and related materials electronically. To learn more, visit the election site at http://www.ieee.org/elections. ■

Observations In Depth

BY IVAN BERGER

Think "observatory," and you probably visualize a telescope poking out of a white dome on a hilltop. But a new generation of observatories will be out of sight—beneath the seas.

Permanent, unmanned, underwater observatories—connected to shore by cables that will bring in electric power and instrument-control signals and carry data back in real time—are being developed by Canada, the European Union, Ireland, Japan, Taiwan, and the United States.

Two such projects, Neptune and ESOnet, were the subjects of papers at the IEEE Oceanic Engineering Society's two Oceans07 conferences. The first was held in June in Aberdeen, Scotland. The other takes place this month in Vancouver, B.C.

In some ways more is known about the surfaces of nearby planets and their moons than about the 70 percent of Earth's surface that lies beneath the sea. "Oceanographic research has been expeditionary, depending on ships and weather conditions and requiring periodic cruises to recover data from oceanographic instruments," says Chris Barnes, professor emeritus at the University of Victoria, in British Columbia. Canada's project director for Neptune, Barnes presented a paper on the topic at the June conference, and members of his staff plan to deliver papers in Vancouver.

There's been overfishing around the world "because we have a poor ability to monitor the fisheries," Barnes says. "Without a database of comparable observations taken over a long period of time, it's hard to understand such critical issues as global warming, acidification, and the collapse of fisheries, and to provide proper information to regulatory agencies."

For long-term measurements, scientists depend on satellites flying more than 32 000 kilometers overhead, but satellites are limited in their ability to see beneath the ocean's surface. That dependency is about to change—with the new cabled ocean observatories.

Europe's ESOnet (European Seafloor Observatory Network) is the most ambitious of the many underwater observatories being planned around the world. Funded by the European Union and several member countries, ESOnet comprises 10 permanent undersea observatories—from the Arctic Ocean to the landlocked Black Sea, including five in the Atlantic Ocean and three in the Mediterranean Sea. Closest to completion, though, is Neptune (Northeast Pacific Time-Series Undersea Networked Experiments), a joint U.S.–Canada project. Observatories being built by Canada should be operational in late 2008.

PLATE TECTONICS Neptune is more localized than ESOnet. It is designed to monitor only the Juan de Fuca tectonic plate in the northeast Pacific off the coast of British Columbia, Washington, and Oregon. The smallest of the 12 major plates that make up Earth's surface, it's compact enough [200 000 square kilometers] that most tectonic events can be recorded, Barnes says.

"Neptune will be the world's first regional cabled observatory, with abundant power [10 kilowatts] and high bandwidth [10 gigabits per second]," he says. The observatory, he adds, will monitor plate tectonics and earthquakes; the overlying water column, including changes in nutrients and other chemistry; fluids, microbes, and gas hydrates in the seabed; ocean climate change and its effects on marine life; and the diversity of deep-sea ecosystems.

There are potential applications to other sectors, Barnes notes. For example, temperature measurements at different depths, needed for analyzing the effects of climate change, could also affect how fisheries are managed. And data from some instruments could be used for port security.

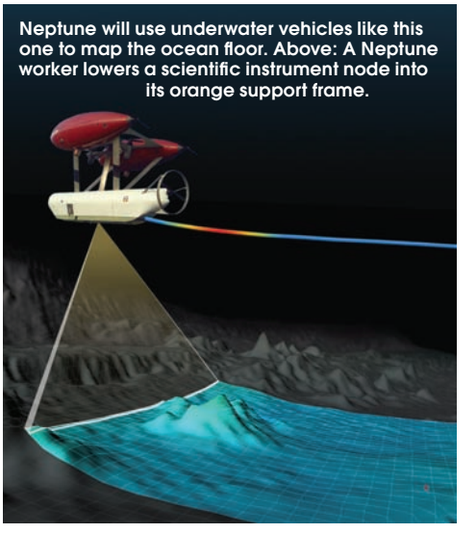
DATA IN 3-D Some of Neptune's instruments will sit on the seafloor, others in boreholes beneath it, and some will move up and down in the water. Underwater vehicles will investigate areas between fixed instruments, docking at the observatory to transmit data and receive new instructions from the onshore data center, and to recharge batteries. "Data will flow at gigabits per second to the Neptune Canada operations and data center at the University of Victoria and then on to scientists, industry, policy makers, and the public," Barnes says.

That's a big change from research-ship cruises, whose data doesn't reach shore until the ships dock, then is further delayed until results can be analyzed and published. "With regional cabled observatories like Neptune," says Barnes, "scientists will be able to respond to events as they occur. Teams of geological, chemical, physical, and biological oceanographers will receive the data simultaneously and work on interdisciplinary projects in real time." They'll also be able to control Neptune's instruments via the Internet, re-aiming cameras, for instance.

For some events, such as tsunami warnings, getting information in real time is vital. "Many oceanographic events—such as algal blooms, subsea volcanic eruptions, and tsunamis—are brief and difficult to record without a preexisting network of real-time instrumentation and communication," Barnes says. Of great utility, such networks will also help establish a database of normal measurements for comparison, he adds.

The northern part of the network is the responsibility of Neptune Canada (www.neptunecanada.ca), a consortium of 12 universities led by the University of Victoria. In the United States, the project is part of the National Science Foundation's Ocean Observing Initiative. The University of Washington, Seattle, will manage its installation, and the University of California, San Diego, will handle its data infrastructure. The U.S. component should be operational in 2013 (www.ooi.washington.edu).

"Without long-term regional cabled observatories we will not get the data we need in time for sensible planetary management decisions," says Barnes. "Neptune is just the beginning. We'll see the wiring of the oceans spread from Canada to the United States and eventually to Asia and Europe." ■



Neptune will use underwater vehicles like this one to map the ocean floor. Above: A Neptune worker lowers a scientific instrument node into its orange support frame.

TOP: L3 MARIPRO; BOTTOM: CEV/NEPTUNE CANADA

Related IEEE Fellows are (from left to right) Robert A. Jones, Colin M. Jones, and Joseph P. Campbell.

All in the Family

BY WILLIE D. JONES

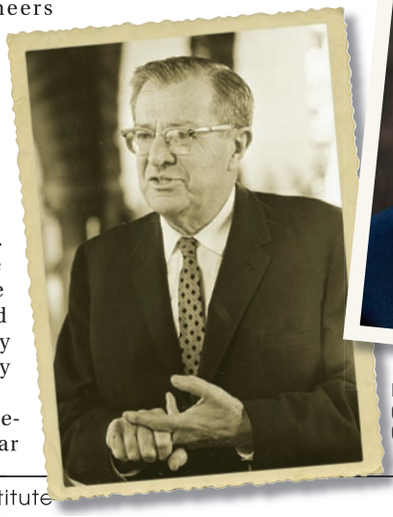
Shortly after his elevation to IEEE Fellow in 2005, Joseph P. Campbell, a senior member of the technical staff at MIT's Lincoln Laboratory, in Lexington, Mass., made a startling discovery. Flipping through an old IEEE membership directory one day out of idle curiosity, the speech processing researcher came across a familiar name. It turned out that Life Member Colin M. Jones, a retired U.S. Navy captain, was a relative with whom Campbell's family had lost contact.

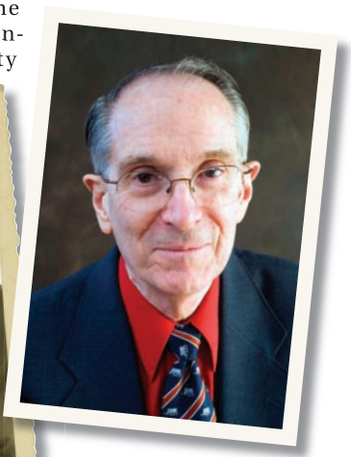
Campbell later learned that Jones's father, Robert A. Jones, was a Fellow of the American Institute of Electrical Engineers (Fellow 1951) who had worked with Edwin Armstrong on the invention of FM radio. The father and son, Campbell says, are his mother's uncle and first cousin, respectively. Campbell and the younger Jones have since reestablished contact, and they stay in touch by frequently exchanging e-mail.

When Colin Jones became a Fellow this year for his contributions to deep ocean exploration, search and recovery, and salvage, it got Campbell thinking: Are other families of Fellows out there? So he asked *The Institute* to do a little digging. With more than 6000 Fellows, there must be, we reasoned.

Although three generations of IEEE Fellows in a family is uncommon, there are other biological connections worth noting.

The first family of Fellows might be the Estrins. Deborah (2004) has followed in the footsteps of parents Gerald (1968) and Thelma (1977), both as an electrical engineer and as the inheritor of a family connection to the University of California at Los Angeles dating back to 1956. Gerald is best known for having led the development of WEIZAC in Israel—the first large-scale electronic computer built outside the United States or Western Europe. Thelma helped design WEIZAC, and went on to head the Data Processing Laboratory at UCLA's Brain Research Institute. Deborah, who holds a joint appointment in UCLA's computer science and electrical engineering departments, is the founding director of the school's Center for Embedded Networked Sensing.



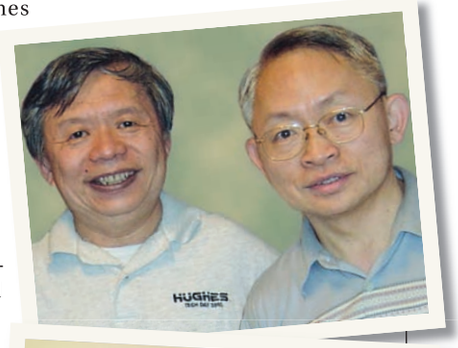


IEEE Fellows Frederick Terman (left) and Lewis Terman (above) are father and son.

Then there's the father-and-son combo of IEEE President-Elect Lewis Terman, elevated to Fellow in 1975, and his dad, Frederick Terman, an AIEE Fellow (1958) and the 1940 president of the Institute of Radio Engineers, remembered for, among other things, persuading his graduate students William Hewlett and David Packard to start the instrument company that bears their names.

SIBLINGS The IEEE has recognized significant contributions to technology by several sets of siblings. For instance, Lin-Nan Lee, a researcher at Hughes Network Systems (formerly part of Hughes Aircraft), in Germantown, Md., and his brother, Lin-Shan, who teaches at National Taiwan University, in Taipei, became Fellows in successive years (1992 and 1993, respectively). The humble Lin-Nan, who specializes in satellite communications, notes that he is four years older than his brother, "but [Lin-Shan] is smarter." Lin-Shan, who started out working on satellites and then became interested in signal processing for speech recognition, produced the first speech-recognition system for Mandarin Chinese.

"We're half a world apart," Lin-Nan says. "But we always keep up with what we're each doing." In addition to family gatherings, they meet a couple of times a year at IEEE conferences. Engineering seems to be in the family blood. Their father is a chemical engineer, and a younger brother just received a bachelor's degree in mechanical engineering.



Brothers Lin-Nan and Lin-Shan Lee (top) are IEEE Fellows, and so are husband and wife Vishwani and Prathima Agrawal (above).

COUPLES, TOO Another husband-and-wife pair has made the Fellows list. Vishwani D. Agrawal (1986) and Prathima Agrawal (1989), professors at Auburn University, in Alabama, are unusual among their colleagues. Prathima, the first Asian-born woman to be named an IEEE Fellow, says, "Wherever you go, there are not too many couples who are Fellows of any society." Prathima recalls that she and her husband, who were both honored for contributions to computer-aided design and testing of ICs, knew each other before they emigrated from India, but they cemented their relationship as colleagues at Bell Labs, in Murray Hill, N.J. "In the beginning, we collaborated frequently, but less so now that my focus has shifted to wireless networking," Prathima says.

Will members of the 2009 class join relatives already among the ranks of Fellows? It could be up to you. The deadline for nominations is 1 March 2008. Forms are available at http://www.ieee.org/fellows. ■

CLOCKWISE FROM TOP LEFT: COLIN M. JONES; U.S. NAVY; JON BARRON; LIN-NAN LEE; AUBURN UNIVERSITY; ALAN ORLING; JOSE MERCADO/STANFORD NEWS SERVICE

What Should Be the First Professional Degree in Engineering?

BY MOSHE KAM & ARNOLD PESKIN

We'd like your opinion. Should the first professional degree in engineering be at the Bachelor or Master level?

The IEEE is considering whether to follow the recommendations of several other professional bodies and declare that a Master of Science or Master of Engineering (rather than Bachelor-level degrees) should be an engineer's first professional degree. While electrical and computer engineers make up the IEEE's single largest group of engineers (with mechanical engineers forming the next largest contingent) the policy being worked on—in collaboration with other professional associations—will address all branches of engineering. To help guide the IEEE's position, we are soliciting our members' opinions.

THE BASICS Let us start with some background. The first professional degree in engineering is the customary degree needed for the practice of engineering. Practice is understood to be carried out in an industrial setting, and does not require much additional training.

However, it is widely accepted that in a field as large and diverse as engineering, some specialties require more training. For example, researchers and academics often need advanced degrees. Individuals who branch into sales and marketing often seek additional degrees in business administration. Still, the concept of the first professional degree is useful, since it informs the public (and licensing bodies) about the minimum requirements that qualify an aspiring professional for practice.

MORE SCHOOLING In many countries, the first professional degree in engineering is the Bachelor of Science or Bachelor of Engineering. In the last decade, some educational programs that required more schooling or practice (and awarded a title such as Diplom-engineer) have reduced their requirements to conform to the B.Sc./B.Eng. "standard." Nevertheless, the increasing complexity of engineering tasks motivated educators to add new topics and subdisciplines to the curriculum, increasing significantly the amount of study required. One of the consequences is that students take longer to complete their studies (in the United States the average is 4.8 years for a four-year program).

Although other professions such as medicine and law have organized their academic programs to require longer studies, and mandated a graduate degree as the first professional degree, most engineers still hold a Bachelor-level degree that required only four years of study.

Over the years, many advocates have encouraged the engineering profession to emulate the longer training of other professions, but their advice went unheeded. When the Bologna Process for higher education was proposed in 1999 by the European Commission, it called for engineering programs to have a "3+2+2" structure. The first three years are to be devoted to studies toward a Bachelor of Science degree, which would become a pre-engineering degree. The next two years are to be devoted to attaining the first professional degree, namely a Master of Science. A doctorate would

The Main Arguments

...for making a change

• The business demands placed on today's engineers have made the standard 120 semester-credit programs insufficient for an adequate education. Like physicians, lawyers, and other professionals, engineers have to develop specializations and undergo longer professional training before beginning their practice.

• The undergraduate engineering curriculum continues to expand, due to changes in technology and society. There is not enough time in the current system to cover all subjects that engineers must master. Most engineering students already take a longer time to get their Bachelor degrees compared with the time advertised by schools.

• The threshold for entry into engineering is significantly lower than that for medicine, dentistry, and law. This results in entry-level engineers of lower quality and lower status compared with these other professionals.

• Many companies overcome educational deficiencies by paying for on-the-job training and long apprenticeships. That creates engineers trained to be successful only in a specific environment, rather than being trained for a wide spectrum of tasks. Society would be better off if resources were invested in academic training focused on a wider range of job-related skills.

• Advancements in computing and information technology have transformed many traditional engineering disciplines. Meanwhile, the increasing complexity of support software and the dependency on computing tools have not yet affected the curricula as they should. Adequate engineering education programs require more pertinent coursework, which cannot be crammed into the existing four-year time frame.

...for the status quo

• Traditions of engineering practice are not only well established but also time-tested and successful.

• Significant dislocation would occur (with new regulations and grandfathering clauses) and added expenses would be incurred (the first professional degree would cost 20 percent to 30 percent more than it does today). There will be little or no benefit.

• The current system works well. Although some associations of engineers and educators favor longer study, the primary clients of engineering education, namely industry and the public, are unconcerned about alleged shortcomings of entry-level engineers. There are enough regulations and checks and balances to guarantee the public's health, welfare, and safety. "If it ain't broke don't fix it."

• Many parts of the world have already observed a decline in the propensity of young people who choose engineering as a career. What is the logic in making entry requirements even more difficult and costly?

• A new set of requirements is not likely to be adopted everywhere. Thus engineers in one jurisdiction might not be recognized in another. The question "Who is a real engineer?" would damage our community. It would confuse the public, and it would fragment the profession and reduce its stature.

• It is not clear that the additional education needed beyond the Bachelor degree should be in engineering disciplines (or in a university's engineering department). Perhaps engineers should be encouraged to acquire graduate-level knowledge in other areas, such as business. The proposal to "add 30 credits or another degree" shows that the matter has not been thought through. Proponents have not defined the benefits of the additional education.

SIMON SHAW

normally require two additional years of study and a dissertation.

In the United States, the National Academy of Engineering and the American Society of Civil Engineers have advocated that the Master of Science be declared the first professional degree in engineering. The U.S. National Council of Examiners for Engineering and Surveying recently discussed changes to its Model Law requiring a Bachelor of Science degree plus 30 semester credits as a prerequisite for candidacy for licensure.

The tables presented here [see "The Main Arguments" and "The First Professional Degree in Engineering"] summarize the issues and provide reasons for and against a change. Weigh in on the matter by answering this month's Marketplace of Ideas question [p. 12].

Kam is vice president of IEEE Educational Activities and Peskin is a staff member with the IEEE Educational Activities department in Piscataway, N.J.

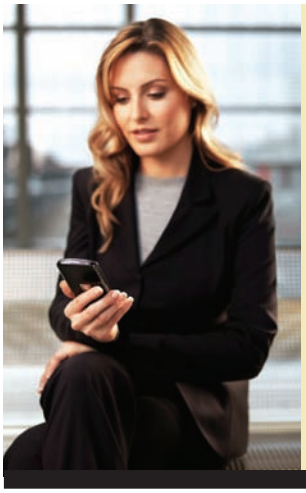
The First Professional Degree in Engineering

Question	Current Practice	Proposed
What should be the minimum requirement?	A **Bachelor of Science** in engineering (or equivalent)	A **Master of Science** in engineering or a Bachelor of Science in engineering plus 30 additional semester credits
What additional training would be required?	None	Holders of a B.Sc. or B.Eng. would have to acquire additional educational credentials such as a M.Sc. or M.Eng.
What changes in engineering education would be needed?	None	New accreditation procedures for graduate programs; development of new graduate curricula; changes in licensure procedures and laws
Who supports each position?	Inside the IEEE, several sections, including the Alaska Section. In the United States, several representatives of state licensing boards that do not intend to adopt new guidelines.	Several engineering associations including the American Society of Civil Engineers. In the United States, the National Academy of Engineering and National Council of Examiners for Engineering and Surveying. In Europe, the developers of the Bologna Process.

FOR MORE INFORMATION on the European Commission's Bologna Process, see http://ec.europa.eu/education/policies/educ/bologna/bologna_en.html. For the American Society of Civil Engineers's view on academic prerequisites, visit http://www.asce.org/pressroom/news/policy_details.cfm?hdlid=15.

OPINIONS

MARKETPLACE OF IDEAS



RESPONSES TO JUNE'S QUESTION

Does Your BlackBerry Chain You to Work?

A study released in February by the research group Digital Life America shows that people disagree over whether it's good to be constantly connected to work through wireless "smartphones" such as the BlackBerry. Although many smartphone users report they feel more productive, others find major drawbacks, including working longer hours and having less personal time.

IS ALWAYS BEING CONNECTED TO YOUR JOB A BLESSING OR A BURDEN?

Give Us a Break

Always being connected to your job is a burden. Allowing your work to infringe on your personal time is not healthy. It can affect both your personal life and productivity. The BlackBerry should be used to make our lives easier, not to be a burden.

DAREL D'SOUZA
Houston

Business With Pleasure

Using wireless technology makes it possible to converge our professional and personal lives. Being more connected to fun, enriching, and educational content can allow us to find a balance in our lives.

OZZIE DIAZ
Cupertino, Calif.

Keeping Your Cool

I didn't feel that my BlackBerry chained me to my workplace until recently, when I realized how much time I'd spent using it to check my e-mail. I use it only to send emergency messages now, and I feel like I have a lot more freedom. I don't think I realized it was weighing me down because the coolness associated with having a BlackBerry blinded me to its obvious drawbacks.

DUSAN BRESTOVANSKY
Ottawa

Do Not Disturb

When you're not working, you can shut the device off. If you are not well rested, you are not productive. Why work twice as long but half as effectively? I can be very productive in only 32 hours at the office. When I'm there, I'm there fully. When I leave, I have other things to do, like taking care of my two children.

If it is truly an emergency, my boss has my home phone number. I find that when he has to stop and think before dialing my number, he realizes it can wait until normal business hours.

RUTH ANN B. VALENTINE
Bedford, Mass.

A Stressful Situation

I believe it is a burden. Being connected to your job all the time increases your stress and decreases your focus. There is no doubt that, psychologically, you need your personal time to restore yourself, your body, and your brain. You may need to be connected to your work sometimes, but not all the time.

SAAD AL DOSARI
Jeddah, Saudi Arabia

Life Is for Living

Being connected to the office 24/7 makes for stale thinking. Extra work hours result in lower efficiency, and employees lose the free time that makes life worth living.

DAVID ACKERMAN
Princeton, N.J.

Cutting Ties

These products are nothing but electronic tethers. They impose on your personal life and intrude on time spent with family. We all need time to unwind to achieve a balance between work and home life.

BOB LA ROCCA
Lindenhurst, N.Y.

Deciding on the First Engineering Degree

The IEEE is considering following the recommendations of several other professional bodies by declaring that a master of science or master of engineering be an engineer's first professional degree. (See the full story, p. 10.)

SHOULD THE FIRST PROFESSIONAL DEGREE IN ENGINEERING BE A BACHELOR'S OR A MASTER'S?

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

LETTERS

Out With the Old

The Institute's new format achieves everything editor Kathy Kowalenko said she was trying to do. The improvements make the newspaper more useful, and it also takes less time to read.

COLIN KELEHER
Fairhope, Ala.

I found myself actually enjoying reading *The Institute*. All the sections look very good. The new format is great.

OWEN LICHTENWALNER
Norcross, Ga.

My compliments to everyone involved in the outstanding new design of *The Institute*. It is a real winner—well organized, easy to read, good choices of typeface and size, and obviously designed with the reader in mind. It is clear that lots of thought went into the design, with equal consideration given to both content and presentation.

DON CHRISTIANSEN
Huntington, N.Y.

IEEE Fellow Don Christiansen was editor in chief of The Institute *and* IEEE Spectrum *from 1972 to 1993.*

A Brilliant Reflection

Reading about the passing of Robert Adler [In Memoriam, June] brought to mind the following incident.

In the 1950s, I was an engineer at the Harry Diamond Labs in Adelphi, Md. One of our projects was to create an ultrasonic flowmeter to measure the flow rate of superheated water coolant in the nuclear reactor of a Navy submarine.

Halfway through the project, we found the design was flawed because the propagation of sound was much stronger through the wall of the pipe than through the flowing liquid of interest. The important data was obscured by extraneous interference.

During the project, Adler visited us because he was a close friend of our lab manager, Henry Kalmus. When Adler heard of the design flaw in the ultrasonic flowmeter, he suggested that, because the phase of the offending signal was almost certainly random with frequency compared with that of the desired signal, we try applying a linear frequency modulation and taking the average phase. The scheme completely suppressed the interference and preserved the desired measurement signal.

JIM MCDADE
Janesville, Wis.

Send your letters and Marketplace responses, which may be edited, to *The Institute*, IEEE Operations Center, 445 Hoes Lane, Piscataway, NJ 08855-1331 USA; fax: +1 732 235 1626; e-mail: institute@ieee.org.

Women in Engineering: Why It Matters

I recently received correspondence from some members about promoting engineering careers to women. Some asked why we can't do more to encourage girls and young women to pursue careers in engineering and technology. Others questioned why it matters that more women are not pursuing such careers.

It does matter. We all have an obligation to the profession and to society to encourage girls *and* boys and young women *and* men to pursue careers in engineering and technology to ensure we have a high-performance workforce. But why should we pay special attention to underrepresented groups such as women? One reason is the increasing evidence that, in the long run, heterogeneous teams outperform homogeneous teams when it comes to problem solving, innovation, and creativity. In addition, recruiting women will become increasingly important as large segments of the workforce retire in many countries and innovation grows in others, driving a global demand for more well-trained professionals. And finally, from a personal perspective, this is a great profession, so I want all bright and creative young people to feel they would find a welcoming environment in engineering.

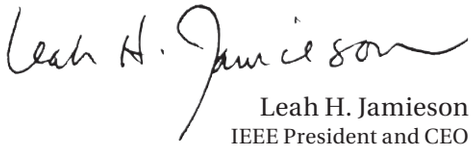
The reasons why girls and young women in some parts of the world show little interest in engineering haven't changed, despite efforts to address them. Among the most common are negative images of engineers, a lack of role models and mentors, and biases in the classroom. Looming largest is a disconnect between what girls cite as career attributes—something that is rewarding, enjoyable, flexible, where they can give back to society and make a difference—and the dominant messages about engineering, which are that you must love math and science and that it's challenging but if you work hard, you can do it.

To address those issues, there are programs ranging from industry-run technology camps to a 24-hour global marathon to help girls understand what it's like to be an engineer and what they need to study to be one. There is an awards program in Europe to highlight female engineers as role models. And in Australia, 2007 is the Year of Women in Engineering, which showcases how women in engineering fields advance technology and impact society.

The IEEE supports initiatives to encourage preuniversity students in general and girls in particular to tune into engineering and technology. One example for boys, girls, parents, and teachers is TryEngineering.org, a Web site created by the IEEE and IBM that enables visitors to ask experts engineering-related questions, play interactive games, and explore degree programs at institutions in 15 countries. Another is the IEEE Women in Engineering program, which was started in the mid-1990s to enable women in the IEEE to network. WIE has grown to nearly 10 000 members—women and men—with 150 groups in the IEEE's 10 regions. The groups offer activities to educate, mentor, and excite girls and young women about technology careers. Each year, WIE supports the annual Introduce a Girl to Engineering Day, an increasingly global event held during Engineers Week, which takes place in February in the United States.

Despite such endeavors, traditional approaches have produced only incremental results. So I am asking you to help. Each time you meet a student, be aware that you are interacting with a potential engineer. Convey a positive message about the field. Talk about the difference that engineers make in their communities and in the world. Pay attention to images you use in your presentations and publications with an eye toward diversity. Provide role models by celebrating the accomplishments of women in your field with recognitions, awards, and IEEE Fellow nominations. Watch out for gender-based barriers. Ensure that women feel as if they belong in your group in the workplace or in your IEEE activities, and encourage them to get involved and become volunteers. Do it for the profession. Do it for the global grand challenges that are going to require all the creativity we can bring to bear. And do it for your daughters.

Encouraging women to become engineers does matter. The future of technical innovation may depend on it. I invite you to share your thoughts with me on this topic at jamieson.column@ieee.org.



Leah H. Jamieson
IEEE President and CEO

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EJ CARR

Four Money Savers From the Financial Advantage Program

BY JOHN PLATT

IEEE GROUP TERM LIFE PLAN LOWERS PREMIUM

http://www.ieeeinsurance.com

IEEE members in the United States and Puerto Rico can now save a bit more on group term life insurance premium contributions. Underwriter New York Life Insurance Co. has increased its premium credit from 25 percent to 30 percent for the 1 September 2007 through 28 February 2008 insurance period. That means the insured's premiums will be reduced by 30 percent.

Members younger than 70 may apply for coverage in amounts ranging from $10 000 to $1 million. Non-smokers can also now save 25 percent over the standard rates. In addition, the child death benefit has been increased from $5000 to $10 000 at no additional charge.

About 40 percent of eligible members have the Group Term Life Plan, making it the most popular benefit of the IEEE's Financial Advantage Program.

PROFESSIONAL LIABILITY INSURANCE REVAMPED

http://www.ieeeinsurance.com

Several enhancements have been made to the IEEE's Professional Liability Insurance Plan, which offers coverage to U.S.-based members who are licensed engineers. The policy protects them and their firm against lawsuits for negligent acts, errors, and omissions made in the course of their work. The enhancements include:

- Removal of the upper limit on the number of engineers in the firm.
- An increase in the firm's annual billing limit to $3 million from $2 million.
- Elimination of the per-claim deductible for insureds who have not had frequent or severe professional liability losses.
- A technology endorsement has been added at no additional cost. It expands the definitions of computer systems and information-related professional services developed by the firm that will be covered under the policy.

These changes apply to new policies effective 1 August 2007.

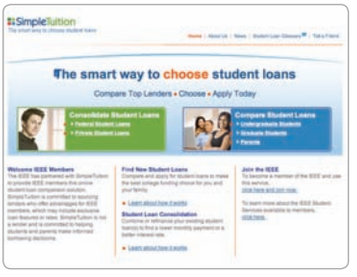
SHORT-TERM MEDICAL INSURANCE PROVIDES COVERAGE IN BETWEEN PERMANENT PLANS

http://www.ieeeinsurance.com

IEEE-sponsored short-term medical insurance is available in most U.S. states to members younger than 65, and offers major medical, temporary coverage for periods of 30 to 365 days. Members can design a plan that's right for them. Coverage includes services provided by physicians as well as prescriptions, X-rays, laboratory services, inpatient hospital stays, inpatient and outpatient surgeries, skilled nursing facility care, and rehabilitation up to a lifetime maximum of $2 million. Members are eligible for savings at participating doctors and hospitals when they use the Private Health Care Systems provider network. Spouses and dependents may also be insured.

Because the short-term policy is designed to cover the unexpected, it does not include coverage for preventive care, regular physicals, or dental or eye care. Policies are not automatically renewable, although one may reapply. Pre-existing conditions are excluded.*

*EXCLUSIONS AND LIMITATIONS ARE LISTED IN DETAIL IN THE POLICY YOU WILL RECEIVE.



CONSOLIDATING STUDENT LOAN DEBT

http://www.simpletuition.com/ieee

To help members who recently graduated college handle their student loan debt, the IEEE is working with SimpleTuition Inc., which offers a searchable list of lenders offering U.S. federal and private consolidation and student loans. SimpleTuition itself is not a lender, but the company helps match students and grads with suitable lenders. There is no fee for the service.

Users can find information about the different types of loans and consolidation plans, then submit their criteria and compare the lenders that meet their needs. Plans can be sorted by payment periods, payment amounts, total cost of the loan, or average annual percentage rate. Applications for loans can be made through the site, which is customized for IEEE members. Some of the loan offers come from well-known lenders such as Campus Door, NextStudent, and StuFund. One lender, Collegiate Solutions, offers an exclusive, low-interest rate to IEEE members.

Newsletter Offers Updates on FAP

F.Y.I. is a newsletter about the benefits offered through the IEEE Financial Advantage Program. It's available every other month at http://www.ieee.org/go/fapfyi.

FEATURED CONFERENCE

IEEE Global Telecommunications Conference

Washington, D.C., 26–30 November

Celebrating its 50th anniversary, this year's GlobeCom covers sensor networking, communication theory, the Internet Protocol, multimedia communications, optical networks and systems, performance modeling, reliability, signal processing, and wireless communications.

To commemorate the conference's Golden Jubilee, a video will highlight well-known presenters and leaders of the field from past conferences, detailing their achievements. There will also be live music and a color guard, and the political satire group The Capitol Steps will perform.

SPONSOR: IEEE Communications Society
VISIT: http://www.ieee-globecom.org

International Summit for Engineers and Educators

Munich
9–11 November

The conference will address the growing demand during the next decade for qualified engineers and their educators. The goal is to enable the educational system at both pre-university and university levels to meet the anticipated needs. Representatives from industry, government, and academia, and decision and policy makers are among those who will be participating.

SPONSORS: IEEE Educational Activities, European Association for Education in Electrical and Information Engineering, European Commission, Fraunhofer Gesellschaft, Siemens Inc., Verband der Elektrotechnik
VISIT: http://www.ieee.org/web/education/preuniversity/globalsummit

International Photovoltaic Science and Engineering Conference

Fukuoka City, Japan
3–7 December

The conference aims to encourage the introduction and commercialization of PV science to the rest of the world. Topics include crystalline silicon solar cells and their technologies, novel materials and devices, terrestrial systems, industries, and markets.

SPONSORS: European Commission, IEEE Electron Devices Society, IEEE Japan Section, Japan Society of Applied Physics, and Nagoya Industrial Science Research Institute
VISIT: http://www.pvsec17.jp

Asia-Pacific Microwave Conference

Bangkok
11–14 December

This year's theme is "Technology Convergence: Microwaves for Life Science." The conference is devoted to the research, development, and application of RF and microwave theory and techniques. The *IET Microwaves, Antennas & Propagation* journal plans to publish a special issue featuring extended versions of the papers presented.

SPONSORS: Institution of Engineering and Technology, IEEE Thailand Section, and the Thailand chapters of six IEEE societies: Antennas and Propagation, Circuits and Systems, Communications, Electron Devices, Lasers & Electro-Optics, and Microwave Theory and Techniques
VISIT: http://www.apmc2007.org

International Conference on Consumer Electronics

Las Vegas
11–13 January

ICCE is where new technologies, products, services, and architectures for consumer electronics and information delivery are first presented.

Topics include advanced applications of objective video quality metrics and methods; audio processing; encoding techniques and algorithms; gaming; health-care technology; human-computer interaction; image and video signal processing; image, video, and audio standards; noise and artifact reduction; and quality and sharpness enhancements.

Several awards will be presented during the conference, including the IEEE Masaru Ibuka Consumer Electronics Award.

SPONSOR: IEEE Consumer Electronics Society
VISIT: http://www.icce.org

International Conference on Health Informatics

Funchal, Madeira, Portugal
28–31 January

Part of the International Joint Conference on Biomedical Engineering Systems and Technologies, this conference covers databases, graphic interfaces, intelligent decision support systems, networking, and special programming languages. Issues of mobility and ubiquity in health-care systems, standardization of technologies and procedures, certification, and privacy also will be addressed.

The health informatics conference is being held in conjunction with the International Conference on Biomedical Electronics and Devices and the International Conference on Bio-inspired Systems and Signal Processing.

SPONSORS: IEEE Engineering in Medicine and Biology Society and the Workflow Management Coalition
VISIT: http://www.healthinf.org

—compiled by Amanda Davis

CLOCKWISE FROM TOP LEFT: JONATHAN LARSEN/ISTOCKPHOTO; KEVIN MILLER/ISTOCKPHOTO; INTERNATIONAL BUSINESS CENTER OF MADEIRA; PAUL MORTON/ISTOCKPHOTO; FUKUOKA CITY; MICHAEL BEHRENDT/ISTOCKPHOTO

Why We Joined...

Sameer Shriyan
IEEE Graduate Student Member

"IEEE Membership has instilled in me a sense of professionalism and leadership, and provides a platform from which I can network with fellow researchers and industry professionals."

Why We Stay...

Fritz Morgan
IEEE Member

"The half life of cutting-edge technology is only a few years and rapidly getting shorter. You need a way to ensure that your skills remain current and relevant. IEEE has always been that place for me."

IEEE Membership: Connecting Professionals, Advancing Technology

For more information, visit: **www.ieee.org/benefits**

IEEE

FEATURED AUTHOR

Steve Blume on the Fundamentals of Electric Power Systems

Founder and chief executive officer of Applied Professional Training Inc., in Carlsbad, Calif., Steve Blume has been teaching people about electric power systems for almost two decades. APT offers courses in electric power and telecommunications to workers in those fields.

Now Blume, an IEEE senior member, is spreading his knowledge to a wider audience with his new book, *Electric Power System Basics*. "Lawyers, lobbyists, manufacturers, and many other nontechnical professionals can all use a basic understanding of how electric power systems work," he says. His book is written in simple language, using hundreds of graphics to illustrate and simplify complex points.

Before he could teach others, Blume first spent years learning the basics himself. In 1978, with bachelor's and master's degrees in electrical engineering, he joined Sierra Pacific Power Co., in Carson City, Nev. In 15 years there, he rotated through many positions, learning the electric power business. Many of those jobs involved training co-workers, which became his favorite task. His passion for teaching inspired him to found APT in 1993.

APT has offered a basic course on electric power systems for a few years at conferences sponsored by the IEEE Power Engineering Society. In light of the course's success, IEEE Press asked Blume to write a book. He accepted the offer as another opportunity to teach. "I want to give newcomers the fundamental information about power systems that took me years to learn," he says.

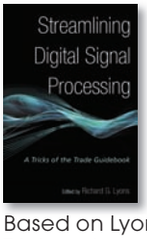
—Anna Bogdanowicz

Here is a selection of new books from Wiley-IEEE Press. Members receive a 15 percent discount by using the promotional code INSAL when ordering from http://www.wiley.com/IEEE.

Electric Power System Basics

By Steve Blume (October 2007, US $59.95, 240 pp.)

This book provides the fundamentals of how large interconnected power systems work. It explains how electricity is generated and transported over high-voltage lines, transformed to lower-voltage distribution lines, and finally made available for residential, commercial, and industrial use. Readers new to the operations of electric power systems can learn the key technical fundamentals, applicable issues, and regulatory aspects of regulated and deregulated power systems from engineering, operations, and reliability perspectives.

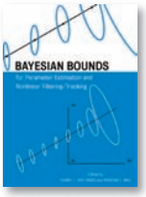


Streamlining Digital Signal Processing

Edited by Richard Lyons (September 2007, $74.95, 354 pp.)

Based on Lyons's DSP Tips & Tricks column in *IEEE Signal Processing* magazine, this book provides the tools of the trade, practical shortcuts, and engineering designs from professionals in DSP. It also describes how to reduce costs, increase processing speed, and improve the performance of DSP systems.

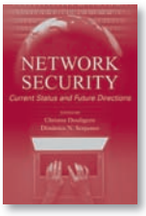
Other signal-processing topics include digital filtering, spectrum analysis, demodulation, the generation of special signals, and the approximation of high-speed functions.



Bayesian Bounds for Parameter Estimation and Nonlinear Filtering/Tracking

Edited by Harry L. Van Trees and Kristine L. Bell (August 2007, $110.95, 928 pp.)

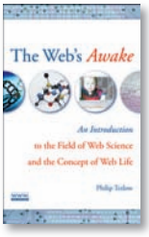
This title addresses problems related to the theory and application of Bayesian bounds. Included is a collection of papers dealing with topics such as the estimation of multiple parameters based on noisy measurements and the estimation of a waveform, either discrete or continuous, based on noisy measurements.



Network Security: Current Status and Future Directions

Edited by Christos Douligeris and Dimitrios N. Serpanos (July 2007, $84.95, 592 pp.)

This publication focuses on the status of security protocols, architectures, and policies, and also attempts to predict the future by analyzing research, proposals, and trends. It provides an extensive introduction to security issues and analyzes the state-of-the-art aspects of security, including denial-of-service and distributed denial-of-service attacks.



The Web's Awake: An Introduction to the Field of Web Science and the Concept of Web Life

By Philip Tetlow (May 2007, $49.95, 264 pp.)

Few people have studied the Web's fundamentals from a sociotechnical perspective, leaving the virtual anatomy of the Web relatively unexplored. Tetlow investigates that gap, citing a number of similarities from studies relating to both real-world and digital systems. The author concludes that the Web has the potential to take on a life of its own.

IEEE Quick Guide

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STANDARDS

Three Best-Selling Standards Products

IEEE Std. C2-2007 and handbook, released in August 2006

The 2007 National Electrical Safety Code standard covers basic provisions for safeguarding people from hazards arising from the installation, operation, and maintenance of equipment in electric supply stations, as well as of overhead and underground electric supply and communication lines. The standard applies to systems and equipment operated by utilities and industrial establishments.

Included with the standard is the *NESC Handbook*, which has facts, figures, and explanations that can help in implementing the code. It includes various NESC requirements, detailing important work rules and a historical perspective of the code.

FOR MORE INFORMATION, visit http://shop.ieee.org/ieeestore/Product.aspx?product_no=SH95515.

IEEE Std. 1672-2006, released in May

A panel of radar experts put together the IEEE Standard for Ultrawideband Radar Definitions for those who must know the radar terminology.

Among the keywords defined are *baseband, GPR, Harmuth orthogonal functions, impulse radar, nonsinusoidal radar, spread spectrum, ultrawideband radar,* and *video pulse.*

FOR MORE INFORMATION, visit http://shop.ieee.org/ieeestore/Product.aspx?product_no=SH95614.

IEEE Std. 1609.3-2007, released in April

The IEEE Trial-Use Standard for Wireless Access in Vehicular Environments (WAVE)–Networking Services belongs to a family of standards that will let motor vehicles communicate with each other and with roadside systems so they can access safety and travel information. The standard defines services at the network and transport layers that support wireless connectivity.

WAVE technology—also known as dedicated short-range communications—will allow for new on-the-road applications such as Internet access and ordering goods and services. It will operate in the 5.9-GHz band for intelligent transportation systems, the band authorized by the U.S. Federal Communications Commission.

FOR MORE INFORMATION, visit http://shop.ieee.org/ieeestore/Product.aspx?product_no=SH95687.

CONTINUING EDUCATION

Upgrade Your IT Skills

If you need to bone up on network security, Linux, or Web publishing, check out these providers of training in information technology–related topics. The organizations belong to the IEEE Education Partners Program (EPP), which offers IEEE members classes, seminars, and even graduate-degree programs, online or on campus, at a 10 percent discount.

Capitol College: Master's degree programs on network security and computer science, as well as a certificate program in IT.

InQuestra: Courses for business and systems analysts as well as IT project managers. The company also has a certificate program in business systems analysis.

Learning Tree International: Certificate programs in security, networks, operating systems, and SQL.

TrainingCity: Advanced technical training programs in VoIP/SIP, IT security, embedded Linux, and XML/Web services.

FOR MORE INFORMATION on these four partners and other organizations that participate in the EPP, visit http://www.ieee.org/partners.

PROFILE

ROBERT LANG

The Physics of Folding Paper

How a physicist became a leading origami artist

BY ANNA BOGDANOWICZ

Nature has always inspired Robert Lang's designs, such as this origami hawk. Three more of his creations are seen on this page.

Trains, trees, boats, bees. IEEE Member Robert Lang can make just about anything out of paper. The 46-year-old physicist turned artist has designed and folded some of the most difficult origami in the world. And he's developed software that figures out folding patterns for all sorts of animals, plants, and objects.

"Origami" is the Japanese name for the art of folding one sheet of paper into objects, usually without cutting. Paper cranes are perhaps the most familiar examples of the pastime. But Lang's creations have taken the art to the next level, breaking the boundaries with designs once thought too difficult to make. He has become well known for his intricate work—especially for his collection of insects and arthropods, including all sorts of spiders and winged bugs. "I believe anything can be represented in origami," he says.

His creations have even left the world of paper and made their way into cars, outer space, and medical devices. Lang worked with an automotive software company to design the folding pattern needed to make air bags fold efficiently. And he designed a folding lens for a space telescope. Because a large flat lens can't be blasted into space, it had to be folded, inserted into a rocket, and unfolded once the telescope was in orbit. He also designed the folding pattern for a medical implant that unfolds in the body and wraps around the heart, preventing it from swelling. The implant is used in patients with congestive heart failure.

Lang is surprised at the variety of ways origami is used. "When I started out I made little paper animals," he says. "The enormous range of real-world applications is amazing."

The media has caught on to Lang. *The New Yorker* ran a profile of him in February, and he was interviewed in May on the CBS News "Sunday Morning" TV show. The publicity has garnered him new clients, including private art collectors, advertising agencies that want to use his designs in their commercials, and companies interested in the use of folding in industrial design.

Although Lang's path to becoming an origami master was unconventional, his interest in the art began with a basic how-to book.

When he was 6 years old and living in Atlanta, a teacher gave him an introductory book that had four origami figures. "I made those designs over and over again, and my parents bought me more books when they saw how interested I was," he recalls. Eventually he wanted to create designs of his own.

"I wanted to make an eagle, so I decided to design it myself," he says of an early creation. By his teens, making his own designs came naturally.

MATH MEETS ORIGAMI Math also fascinated Lang. "I went to college thinking I'd study math, but then I got hooked on electronics because I could build real objects and make them do things," he says. "With origami I made things out of paper, with electronics it was chips and wire." He later became interested in lasers and photonics.

Lang earned a bachelor's degree in electrical engineering in 1982 from Caltech, a master's in electrical engineering the next year from Stanford, and a doctorate in applied physics in 1986 from Caltech. In 1988 he became a research scientist at NASA's Jet Propulsion Laboratory, in Pasadena, Calif.

But he continued with origami. In 1990 he began writing software he called TreeMaker, which computes folding patterns for designs. "You draw a stick figure of the shape you want and enter the length of the limbs and the topology of how they're connected," Lang explains. The program then plots the coordinates for the crease pattern for a shape that has the same structure as the stick figure. A few years later he created Reference Finder, a program that takes coordinates from TreeMaker and generates the order of steps for folding the points and lines in the pattern. Both programs were the first of their kind.

In 1992 he joined the fiber optics company SDL, in Silicon Valley, as a manager and later vice president of research and development. In his spare time, he also wrote six origami books. His first, *Origami Insects and Their Kin* (Dover, 1988), has instructions for various objects and animals, including the insects that are Lang's specialty and are considered particularly challenging because of their many narrow appendages.

FULL-TIME FOLDER Lang enjoyed his physics job, but he had plans to write another book, one that would teach people how to design their own origami. In 2001 he quit his job to devote himself to his art. *Origami Design Secrets* (AK Peters) came out in 2003.

Lang hasn't completely dropped science and technology. He's been active in the IEEE Lasers & Electro-Optics Society for years and recently became editor in chief of the *IEEE Journal of Quantum Electronics*. He's also a consultant for various optoelectronics companies.

Now he's writing a book that details the connection between origami and math, science, and technology. Lang also continues to invent new origami designs, because that's what makes him tick. "There are things I don't know how to do yet, and that's what drives me to keep pushing the art of origami forward," he says. ■

TIMOTHY ARCHIBALD

Higher Education Help is Here

New Programs Help with Preparing for College

The IEEE can provide student resources, help finance your child's college education or consolidate college loans thanks to three new programs from the IEEE's Financial Advantage Program.

College Parents of America*

Provides a one-stop shop of information, resources, and guidance for parents preparing their children for college and through the complex admissions process.

Education Financial Services (EFS)*

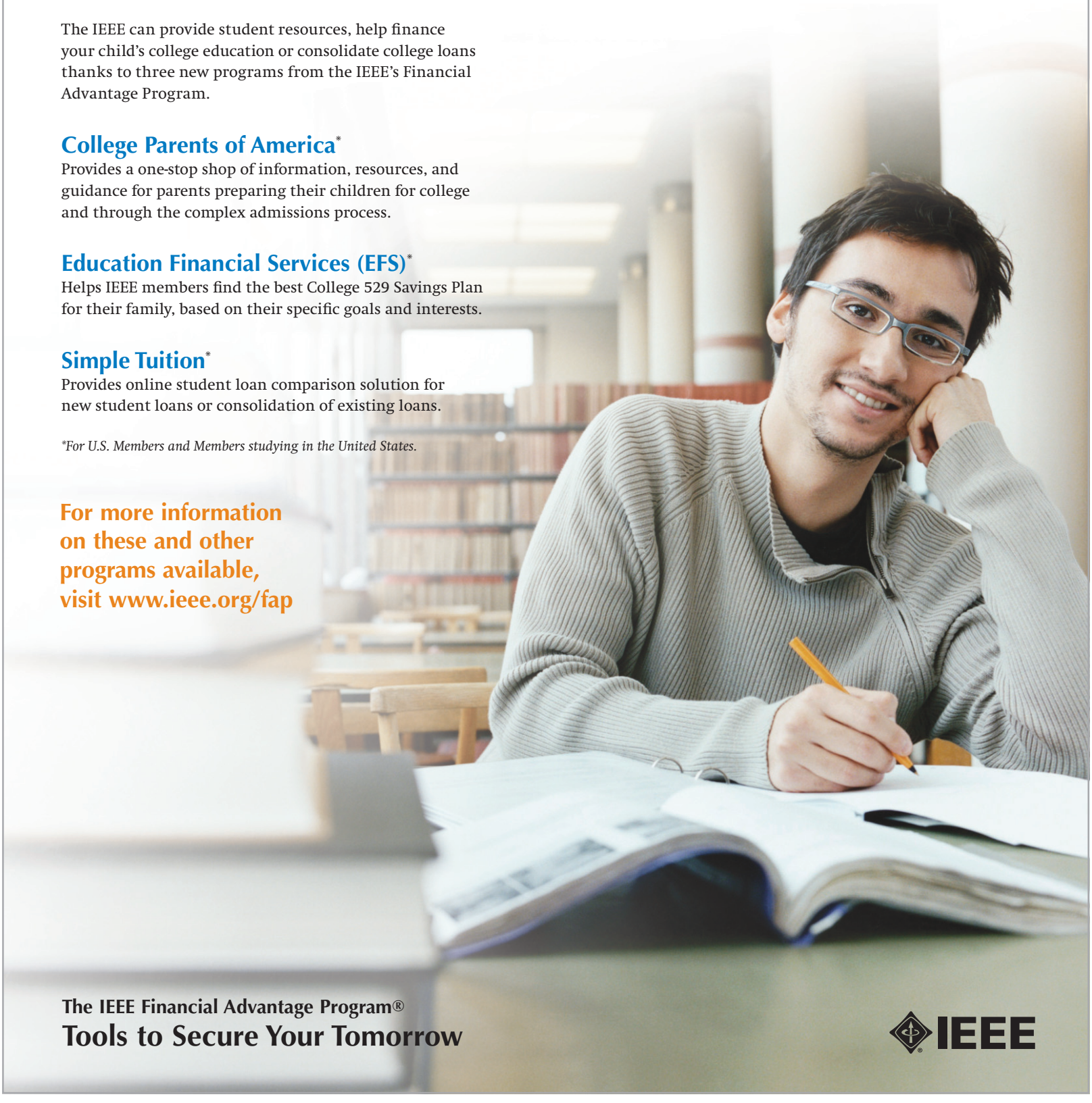
Helps IEEE members find the best College 529 Savings Plan for their family, based on their specific goals and interests.

Simple Tuition*

Provides online student loan comparison solution for new student loans or consolidation of existing loans.

**For U.S. Members and Members studying in the United States.*

For more information on these and other programs available, visit www.ieee.org/fap



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The IEEE Student Branch at Atilim University had a picnic in May at Göksu Park in Ankara, Turkey, to give its members a fun break before final exams.

ATILIM UNIVERSITY IEEE STUDENT BRANCH

Student Branches Spur Growth

BY JASON LADAY

IEEE student membership in 2006 reached an all-time high, with a record 80 491 members. The number of new student members increased 9 percent, by 6621 students, over the previous year. Region 10 (Asia-Pacific) climbed by 5236 members, Region 8 (Europe, Middle East, and Africa) grew by 1544, Region 7 (Canada) by 233, Region 3 (Southeastern United States) by 204, and Region 1 (Northeastern United States) by 161.

The growth is continuing this year. Working behind the scenes to help boost this interest are IEEE student branches, located at more than 1500 universities and colleges worldwide. And in April alone, branches were established at universities in China, Ecuador, Egypt, India, Mexico, Taiwan, and Turkey. So what's fueling the interest?

REACHING OUT "As students at a newly founded university, we see an IEEE student branch as a means of communicating with other branches and engineers across Egypt and abroad," says Maha Elsabrouty, the student branch counselor at German University in Cairo. His is one of the branches created in April. "We also consider the branch a place where we can introduce activities such as training courses and summer projects."

Other reasons for creating a student branch include the value of joining a network of professionals, as well as the scholarships, engineering projects, and design contests offered by the IEEE.

"We wanted to integrate our engineering students into the worldwide forum of engineering professionals and make them part of the IEEE," says IEEE student branch counselor Ali Kara from Atilim University, in Ankara, Turkey—also formed in April. "I have been involved with IEEE activities and conferences for more than 11 years, and forming a student branch here has been a vision of mine since 2001," he adds.

Much of the impetus for forming a new student branch at the Bangalore Institute of Technology, in India, came from information on the petition needed to form a branch. There the students learned about such perks as professional networking and meetings, tours of tech facilities, access to distinguished lecturers, use of IEEE online services and resources, and the help that is available for setting up a library stocked with IEEE publications.

FIVE STEPS How do you organize a student branch? Just follow these five steps:

1. Fill out a student branch petition signed by at least 20 IEEE student members and three faculty members who are IEEE members and teach in IEEE fields of interest. One of the faculty members should also agree to become the students' branch counselor, or advisor, to provide guidance and assistance. The most successful student branches have strong counselors who like working with students, offer help when needed, and connect students to the university administration and the IEEE network.

2. Include with the petition the school's Web address, its course curriculum, verification that it's an accredited university, and a list of the engineering faculty.

3. Attach a separate form detailing the educational programs and degrees offered at the institution.

4. Complete and adopt a student branch constitution, which details the branch's goals and objectives. (A sample constitution is available from the IEEE.)

5. Submit these materials to IEEE Student Services either by e-mail or surface mail.

Student Services reviews the paperwork and, if everything is in order, it sends the petition to be approved by the regional director and the regional student activities committee chair. The entire approval process takes three to four weeks. However, recruiting student members, and finding the faculty and university administration support can take from six months to a year.

Some student branch counselors say filling out the paperwork is the easy part. Maintaining the students' interest is harder and must be done continuously.

"We held a series of seminars to introduce the IEEE to the students, held recruitment meetings, organized elections for positions within the branch, and prepared a room as our branch headquarters," says Elsabrouty of German University.

"The most difficult part was explaining how students would benefit from joining the IEEE," says Atilim's Kara. "Student organizers spent so much effort just doing that."

To find out what other branches are doing to keep students interested in the IEEE, see "Branches Buzz With Activity," right. ■

FOR MORE INFORMATION on forming an IEEE student branch, visit http://www.ieee.org/web/membership/students/branchresources/stbforms.html.

BRANCHES BUZZ WITH ACTIVITY

Here's just a sample of the events organized by the IEEE's student branches so far this year.

CAPITOL COLLEGE, LAUREL, MD.

- Toured the Johns Hopkins University Applied Physics Laboratory, also in Laurel.
- Attended an IEEE-sponsored business conference at George Washington University, in nearby Washington, D.C.

PUNE INSTITUTE OF COMPUTER TECHNOLOGY, INDIA

- Organized the "IEEE Reverse-Engineering Series: A Look Inside the iPod," during which students took apart the popular music player to learn what makes it tick.
- Held a two-day seminar and workshop called "Emerging Trends in Wireless Technologies."

UNIVERSITY OF CALIFORNIA, LOS ANGELES

- Offered internships to students unsure about joining the IEEE. Participants were given various responsibilities to help them determine which branch positions—if any—were appropriate for them.

UNIVERSITY OF WISCONSIN, MILWAUKEE

- Organized "Introduction to Soldering" seminar to teach students the often-forgotten art of soldering.
- Organized "Introduction to Microprocessors" seminar that taught students how to fabricate a circuit board.

WASHINGTON STATE UNIVERSITY, PULLMAN

- Organized a dinner and technical career fair dubbed "E^4" (Electrical Engineering Employment Exposition).

WESTERN CAROLINA UNIVERSITY, CULLOWHEE, N.C.

- Partnered with more than 300 teachers, parents, and students to support a local team participating in the first Lego League robot competition, geared to students ages 9 to 14, at Southwestern Community College, in Sylva, N.C.

Lewis Mozzini

Waltzing to the Beat

When Lewis Mozzini watches the hit reality TV show "Dancing With the Stars," a competition that pairs celebrities with professional dancers, he's not just watching it for entertainment. He's checking whether the contestants are getting the dance steps right. From the waltz to swing dancing, and the fox-trot to the tango, this IEEE life member has danced them all. The 70-year-old began ballroom dancing more than 50 years ago, and he doesn't plan on stopping anytime soon.

PASSION Ballroom dancing
PROFESSION Software engineer
HOMETOWN Warner Robins, Ga.

"I can dance for another 20 years," he says. "Dancing reduces stress and is good exercise."

Mozzini's love of dancing began in elementary school in King City, Calif. Back then, ballroom dancing was occasionally taught in physical education class. "When the weather outside was bad, we stayed inside, and the teachers taught us dance steps," he recalls. The first dance he learned was the fox-trot. Mozzini was instantly hooked, in part because he loved the music. "If you like music, you understand the beat and can dance," he explains.

Through high school he learned new dances, including the waltz and swing dancing—a favorite. Big band music, which is ideal for swing, was popular at the time, so Mozzini and his friends hit various clubs every week to dance.

But then along came rock 'n' roll, which brought an end to big band music's popularity, and Mozzini put his hobby on hold for a few decades. "There weren't many dance clubs where I lived that played the music I liked," Mozzini says. "The closest one was more than a 100-kilometer drive, so I didn't dance much."

STARTING ANEW He got back into the "swing" of things in 1998, when he moved from California to Warner Robins, Ga., for a job as a software engineer at Comarco Systems. An acquaintance told him about dance classes offered nearby, and Mozzini decided it was time to polish his dancing shoes.

As it turned out, his dancing also introduced him to the love of his life. The classes required a partner, and he didn't have one. Fortunately, the instructor knew of a woman who was looking for a partner. The two instantly clicked, both on and off the dance floor. Together, he and Jerry [see photo] perfected dances they knew from the early 1950s, and expanded from there, learning the cha-cha, rumba, salsa, samba, and tango. "I was out of practice, but luckily I had a good partner in Jerry," Mozzini says. "The best part of the class was that we got married a year after we met." Since then they've been ballroom dancing nearly every week at local halls.

Mozzini now works for Engility Corp., also in Warner Robins. He doesn't claim to be an expert dancer, but he's just as passionate today about his hobby as he was decades ago. "I enjoy software engineering, but ballroom dancing really beats using a computer."

—Anna Bogdanowicz

DAVID STUART

Max Roesel

Model Railroad Engineer

IEEE Member Max Roesel has been fascinated with model railroads for most of his life. It all started with a train set he got as a present when he was 8 years old. Now 55, Roesel, who works for Robins Air Force Base, in Warner Robins, Ga., still remembers the excitement he felt putting together the small oval track and watching his Santa Fe Railroad locomotive chug around.

PASSION Building model railroads
PROFESSION Systems engineer
HOMETOWN Macon, Ga.

"Eventually I gave away that train set, but otherwise I would still have it," Roesel says.

His model railroads today are a far cry from that simple one he assembled years ago. And he does a lot more than just slide tracks into place. Roesel creates everything practically from scratch—from the wiring that brings power to the trains to the trees and houses that populate the landscape. "What I enjoy most is that I can create so many scenes," he says.

Roesel's models generally start out as kits he buys in hobby stores or at model railroad shows. They range in difficulty, with the smaller-scale tracks—some just a few millimeters wide—being tougher to assemble.

First he draws the track layout. A table then becomes his construction site, holding the tracks and wires. Next he hooks up the wires to the command control—the device that sends power to the track. Each locomotive has a decoder that reads the controller's signals to make it run.

Then it's time to turn the bare table into a miniature world of Roesel's creation. The landscape is made out of Sculptamold, which is similar to papier-mâché. He often uses wood or plastic kits to construct his buildings. After adding finishing touches of trees and figurines of people and animals, it's time to activate the tracks.

Roesel's designs became more complex when he joined the National Model Railroaders Association in 1975. The group, despite the "national" in its title, has members from around the world who gather at an annual convention to admire each other's layouts and learn new techniques.

Roesel is also an active member of the Central Georgia Model Railroad Club. Club members work together on models, which can be quite large and take several years to complete. One of the club's creations was displayed from August 2005 to September 2006 at the Atlanta International Airport. "It took us three years to build that model, and we were thrilled with how it turned out," Roesel says.

—A.B.

If you have an interesting hobby you'd like to share—such as marathon running, mountain climbing, or playing in a band or orchestra—e-mail the editors: institute@ieee.org.

RECOGNITIONS


GULYAEV


PUSTOVOIT

FELLOW
YURI GULYAEV and
MEMBER
VLADISLAV PUSTOVOIT
were the recipients of Russia's 2006 State Prize for Science.

They were recognized for helping to create two new fields of physics—acoustoelectronics and acousto-optics—which rely on surface acoustic waves to control electrical signals and light emission.

The annual prize, which was awarded by President Vladimir Putin, is one of the most esteemed government honors in Russia. Each laureate receives 5 million rubles (about US $193 800).

Gulyaev is president of the Scientific and Technical Society of Radio Engineering, Electronics, and Telecommunications at the Russian Academy of Sciences, in Moscow.

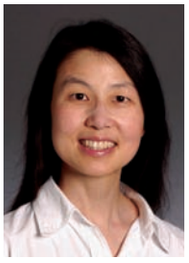
Pustovoit is head of the Scientific Technological Center of Unique Instrumentation at the RAS.

SENIOR MEMBER
CHRISTOPHER HOANG PHAM
was presented with the Education Career Medal from the Vietnam Ministry of Education and Training for his contributions to research and development at the Hanoi University of Technology's networking laboratory.

Pham is an engineering manager at Cisco Systems in San Jose, Calif. He heads its Beyond the Ordinary team, which focuses on devising techniques and tools for processing and networking technology.

He serves as a core team member for the Cisco Asian Affinity Network, which mentors educators and students in Vietnam and other Asian countries. He is also the president-elect of the Vietnamese Association for Computing, Engineering, Technology, and Science, a networking organization in Fremont, Calif. His term ends in 2009.

He earned bachelor's and master's degrees in electrical engineering at San Jose State University in 1992 and 1995, respectively.



FELLOW
JEANNETTE WING
has been appointed by the National Science Foundation to be assistant director of its Computer and Information Science and Engineering (CISE) Directorate.

In that role, Wing is responsible for guiding and managing funding for CISE, which supports research and education in computer and information science and engineering.

Wing was head of the computer science department at Carnegie Mellon University, in Pittsburgh. Her research interests include the security, specification, and verification of software; concurrent and distributed systems; and programming languages. Her projects included security metrics and tamper-resistant embedded systems. She has written and edited several journal articles and books and has been on the editorial boards of 10 journals, including the *Journal of the Association for Computing Machinery*.

She earned a bachelor's degree in computer science and engineering and a master's in electrical engineering and computer science from MIT. She went on to receive a doctorate in computer science in 1983, also from MIT.

IN MEMORIAM

ARTHUR GUENTHER
Optics Pioneer

MEMBER GRADE: Life Fellow
AGE: 75
DIED: 21 April

During his three decades working for the U.S. Air Force, Guenther earned a reputation as a pioneer in optics development and as one of the world's preeminent experts in simulating the effects of atomic explosions.

He joined the Air Force in 1956 and was assigned to Kirtland Air Force Base, in Albuquerque. After serving for two years, he became a civilian employee. He developed a laser program in 1960 and then became chief scientist at the Air Force Weapons Laboratory at Kirtland. He left there in 1988 to become chief scientist for advanced defense technology at Los Alamos National Laboratory, also in New Mexico.

Guenther took a job in 1991 as a scientific advisor and manager of alliances at Sandia National Laboratory, in Albuquerque. He was also a science advisor to three New Mexico governors and dealt primarily with technology-based economic development.

After retiring from the Air Force in 1997, Guenther became a research professor at the University of New Mexico's Center for High-Tech Materials, also in Albuquerque.

He received many awards, including the Distinguished Senior Executive Award from President Reagan and the Distinguished Scientist of the Year Award in 1977 from the New Mexico Academy of Science.

He earned a bachelor's degree in chemistry in 1953 from Rutgers University in New Brunswick, N.J. He received a doctoral degree in chemistry and physics in 1957 from Pennsylvania State University and a doctorate of science degree in 1973 from the University of Albuquerque.

THEODORE H. MAIMAN
Laser Pioneer

MEMBER GRADE: Member
AGE: 79
DIED: 5 May

Maiman, a physicist and founder of two companies, played a major role in developing the world's first laser.

As head of Hughes Research Laboratories, in Malibu, Calif., Maiman patented a laser using a pink ruby medium. He demonstrated the laser [shown in photo] for the first time on 16 May 1960.

In 1962 Maiman founded Korad Corp., which researched, developed, and manufactured lasers. He later sold the company to Union Carbide Corp. In 1968 he founded Maiman Associates, which provided consulting services in lasers and optics. In 1976 he joined TRW Electronics, headquartered in Cleveland, as its technology manager, and he organized new TRW high-tech ventures.

He received a bachelor's degree in engineering physics in 1949 from the University of Colorado at Boulder. He earned a master's degree in electrical engineering in 1951 and a Ph.D. in physics in 1955, both from Stanford University.

JAMES A. ROOKS
Founder and President of J&R Consulting

MEMBER GRADE: Life Fellow
AGE: 78
DIED: 8 May

Rooks formed J&R Consulting after working at Westinghouse Electric Corp. for 35 years. He was also a founding member and later chair of the IEEE Industrial Applications Society's Oregon and Southwest Washington Chapter.

Rooks joined Westinghouse in 1956 as an electrical engineer in Wilkinsburg, Pa. He worked at several of the company's locations until he retired in 1991. In 1992 he formed J&R in Tigard, Ore. The firm provided consulting services to pharmaceutical companies, helping them to set up information management systems in their laboratories.

Rooks held several volunteer positions with the IEEE. He was membership chair for the IEEE Oregon Section and a senior member and facilitator of the IEEE IAS Pulp and Paper Industry Committee. He coauthored 18 technical papers for the committee and was to be recognized by the society this year for his lifetime leadership in engineering applications in the pulp and paper industry.

He joined the U.S. Air Force in 1947 and spent most of his service as a cryptographer in Spokane, Wash. He earned a bachelor's degree in electrical engineering in 1953 from Washington State College, in Pullman.

CLOCKWISE FROM TOP LEFT: RUSSIAN ACADEMY OF SCIENCES (2); LUUN DENG; CARNEGIE MELLON; BECKY ROOKS; HRL LABORATORIES; UNIVERSITY OF NEW MEXICO

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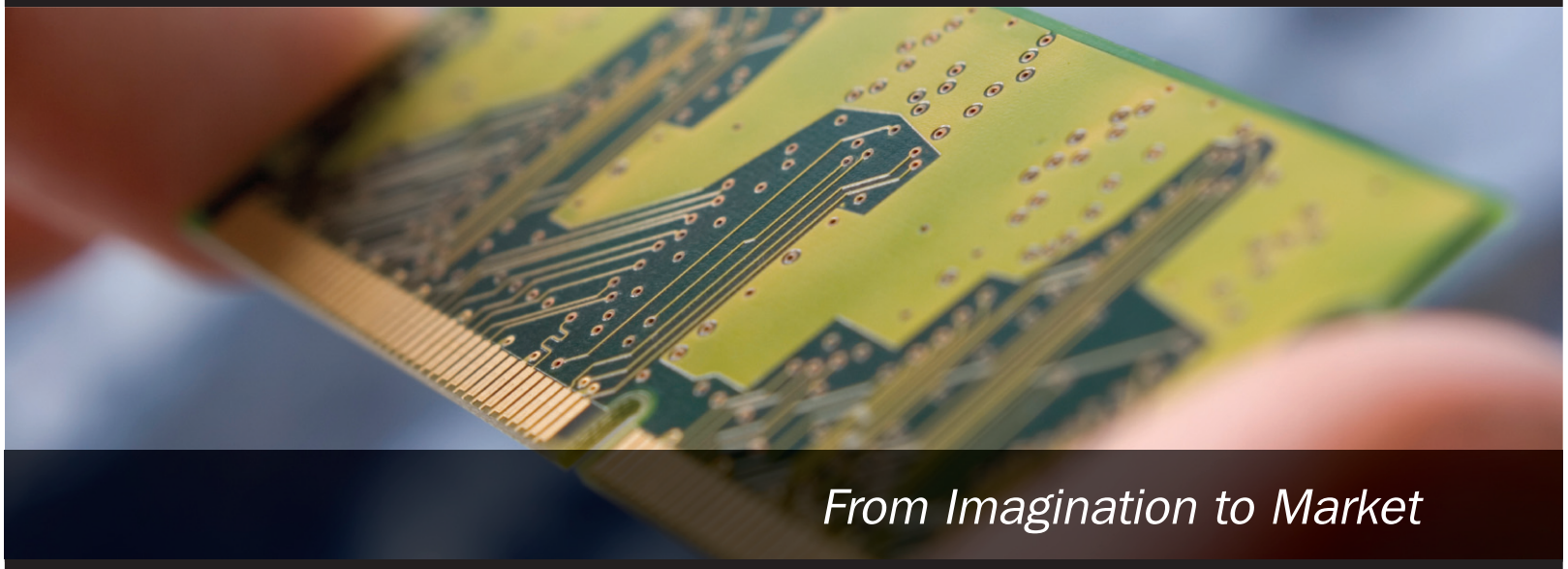

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