On My Mind

As globalization continues to transform our approach to education and research, the School of Electrical and Computer Engineering embraces the challenge before us. Simply visit ECE, and you’ll gain a heightened appreciation for both the world and the engineer’s evolving role in it.

ECE’s faculty and students—both native-born and international—add global perspectives to our courses and programs. And these diverse insights only enhance the international atmosphere, propelling us to new levels of discovery.

In this issue we showcase some global initiatives, highlighting key partnerships and projects that fuel us toward international preeminence. Our cover package spotlights several faculty members who take their expertise beyond Purdue, traveling overseas to teach and collaborate. On page 12 alumnus Patrick Wang shares his thoughts regarding globalization’s impact on industry. Then on page 16 some stellar students relate their firsthand experience of studying overseas.

We hope you enjoy this global edition of the magazine and encourage your feedback and thoughts.

Mark J. T. Smith
Michael J. and Katherine R. Birck Professor and Head
School of Electrical and Computer Engineering

In Your Words

I was very pleased to read the latest Engineering Impact. I am very glad so see that Dr. Jamieson is dean of Engineering. I met her a few years back and think she was acting head of ECE then. Purdue could not have done better.

Victor Green
BSEE ‘49, MSEE ‘53

Tell us what you think by sharing your Purdue memories or reacting to a story in this issue. We invite you to write to us via the contact information listed on page 2. In doing so, you grant us permission to publish your letter in part or in whole in an upcoming issue. We also reserve the right to edit letters for length and/or clarity.
## UP FRONT
A message from the head of Electrical and Computer Engineering.

## AROUND ECE
Noteworthy news, faculty honors, cutting-edge research, and more.

## BEHIND THE SCENES
Pat Dilts brings heart, soul, and a wealth of knowledge to her work.

## COVER
From West Lafayette to Finland, Singapore, and beyond, ECE leaves an indelible stamp on the world.

## IN MY VIEW
Patrick Wang’s international perspective on engineering’s expanding globalization.

## UP CLOSE: FACULTY
Mimi Boutin and Hong Tan add global perspectives to their teaching and research.

## UP CLOSE: STUDENTS
Personal accounts of studying outside one’s home country.

## CAMPAIGN IMPACT
Learn how to leave a rich legacy that will benefit our school for years to come.

## UP CLOSE: ALUMNI
Boilermaker love connections burn brightly for these Purdue couples.

## ALUMNI NEWS
ECE grads receive top business appointments and career honors.
In Memoriam

Professor Emeritus Gerold Neudeck, 70, died on April 25, 2007. A longtime ECE colleague and friend, he served the school for 38 years before retiring on December 31, 2006. From 1988 to 1991 he was an associate dean in the College of Engineering. Our thoughts are with his family.
Sands Leads Nano Center

Timothy Sands, the Basil S. Turner Professor of Engineering, has assumed responsibilities as director of the Birck Nanotechnology Center. The Birck center opened in 2005 and is considered one of the nation’s top university facilities for nanotechnology research.

The two-floor, 187,000-square-foot facility involves more than 300 faculty, staff, and graduate students from 36 schools and departments across the university.

Sands, who has been at Purdue since 2002, has a joint appointment between the School of Electrical and Computer Engineering and the School of Materials Engineering. He says the prospect of Purdue building a center dedicated to nanotechnology research was a factor in his decision to come to the university.

“I visited Purdue while on sabbatical from the University of California, Berkeley, in 2001. I was impressed with the plans that included an academic research building housing faculty and students from several disciplines who would work together with a common research interest,” Sands says. “I had prior experience working in such an environment. I know what we can accomplish at Birck and was excited by the prospect of leading such a team.”

Sands was director of the Integrated Materials Laboratory at Berkeley and director of the nonvolatile memory research group for Bell Communications Research (Bellcore) in Red Bank, New Jersey. “Nanotechnology advances will impact healthcare, energy, computer technology, homeland security, food safety, and so many other areas,” he says.

Cynthia Sequin
Engineers Create ‘Optical Cloaking’ Design for Invisibility

Researchers using nanotechnology have taken a step toward creating an “optical cloaking” device that could render objects invisible by guiding light around anything placed inside this “cloak.”

The Purdue engineers, following mathematical guidelines devised in 2006 by physicists in the United Kingdom, have created a theoretical design that uses an array of tiny needles radiating outward from a central spoke. The design, which resembles a round hairbrush, would bend light around the object being cloaked. Background objects would be visible, but not the object surrounded by the cylindrical array of nano-needles, says Vladimir Shalaev, Purdue’s Robert and Anne Burnett Professor of Electrical and Computer Engineering.

The design does, however, pose a major limitation: It works only for any single wavelength, and not for the entire frequency range of the visible spectrum. “But this is a first design step toward creating an optical cloaking device that might work for all wavelengths of visible light,” Shalaev says.

Research findings are detailed in a paper that recently appeared in the journal Nature Photonics. The paper was co-authored by doctoral students Wenshan Cai and Uday Chettiar, research scientist Alexander Kildishev, and Shalaev, all from ECE.

Calculations indicate the device would make an object invisible in a wavelength of 632.8 nanometers, which corresponds to the color red. The same design, however, could be used to create a cloak for any other single wavelength in the visible spectrum, Shalaev says.

“How to create a design that works for all colors of visible light at the same time will be a big technical challenge, but we believe it’s possible,” he says. “It is clearly doable. In principle, this cloak could be arbitrarily large, as large as a person or an aircraft.”

The research is based at the Birck Nanotechnology Center in Discovery Park.

Symposium Promotes a Hydrogen Economy

With the continued rising cost and demand for oil and gasoline, international leaders convened at Purdue in April for the second Hydrogen Initiative Symposium, sponsored by the Energy Center in Discovery Park.

Attendees shared ideas and information on how to end global dependence on fossil fuels and move to a hydrogen economy. Among the Purdue researchers and presenters at the symposium was Jerry Woodall, a distinguished professor of electrical and computer engineering. Woodall discussed a process he developed for producing hydrogen by adding water to an alloy of aluminum and gallium. The hydrogen could then be used to run an internal combustion engine.

Launched in 2005, the Energy Center brings together more than 75 Purdue experts. In addition to hydrogen, the center focuses on such energy sources as solar, wind, nuclear, and electromechanical systems, among others.
PhD Students Make Headlines

Several PhD students from Electrical and Computer Engineering captured recent honors, including the following:

**Joshua Dillon** was selected to attend the July 2007 meeting of Nobel laureates to be held in Lindau, Germany. He will join a student delegation supported by funding from the U.S. Department of Energy Office of Science, the National Science Foundation Directorate for Mathematical and Physical Sciences, and Oak Ridge Associated Universities.

**Sungoh Kwon** won grand prize in the 2nd Inside Edge International Thesis Competition. Samsung Electro-Mechanics hosted the contest, part of its efforts toward supporting the research activities of young engineers.

**Sayeef Salahuddin** received an IBM PhD Fellowship Award. In addition, he and **Professor Supriyo Datta** won the Inventor Recognition Award from the Focus Center Research Program, which expands pre-competitive, cooperative, long-range applied microelectronics research at U.S. universities.

2007 Silicon Valley Symposia

ECE kicked off its 2007 Silicon Valley Symposia series February 20 at the Thomas Fogarty Winery in Woodside, California. The evening included a special performance by Ba Na Na, a Purdue Glee Club men’s quartet.

This series of technical seminars highlights opportunities for industry and alumni to collaborate and invest in field-defining research taking place at Purdue. Monthly events in Silicon Valley run through October. For a complete schedule, please go online at engineering.purdue.edu/symposia.

Faculty Kudos

The International Society for Optical Engineering has named **Jan Allebach** as a 2007 SPIE fellow based on his achievements in electronic imaging. He was also awarded honorary membership in the Society for Imaging Science and Technology.

The IEEE Computer Society named **David Ebert** as a golden core member. The honor recognizes him for being part of the distinguished core of dedicated volunteers and staff who have made the society the world’s preeminent association of computing professionals. He also received the group’s Meritorious Service Award for outstanding performance as editor in chief of IEEE Transactions on Visualization and Computer Graphics (2003-06).

**Dan Elliott** has been named as an American Physical Society fellow for his pioneering experimental demonstrations of coherent control in atomic systems.

**Jianghai Hu, Xiaojun Lin,** and **Mithuna Thottethodi** have all been honored with a CAREER Award from the National Science Foundation.

The IEEE Electron Devices Society named **Mark Lundstrom** as the first recipient of its Education Award.

**Ness Shroff** was named an IEEE fellow for his contributions to the modeling, analysis, and control of computer communication networks.

The Association for Computing Machinery’s SIGSAC—Special Interest Group on Security, Audit, and Control—presented top honors to **Eugene Spafford**. He received the Outstanding Contributions Award for influencing national cybersecurity policy, education, and research.

**Hong Tan** was co-recipient of the Best Paper Award at this year’s World Haptics Conference in Tsukuba, Japan. The Technical Committee on Haptics, which she chairs, won the Most Active Technical Committee of the Year Award from the IEEE Robotics and Automation Society.

Ba Na Na helped kick off the 2007 Silicon Valley Symposia series with a special musical performance.
A Welcome, Steady Presence

Thirty-two years after joining ECE, Pat Dilts continues to provide a consistent wealth of knowledge and expertise.

Last fall Pat Dilts embarked on a scenic, three-week trek through New York, Vermont, Maine, and Massachusetts. The road trip north provided a relaxing reprieve from her daily routine, even though navigating Boston proved challenging. “We were totally disoriented in Boston,” she recalls. Fresh from the road and back on campus, Dilts resumed her role as administrative assistant to Mark Smith, head of Electrical and Computer Engineering.

A Lafayette native, Dilts has enjoyed an impressive tenure at the university, working here on three separate occasions—including a part-time stint while still in high school. She joined ECE 32 years ago. “I’ve been with ECE since it was EE, since 1975. I basically have been in this complex all that time,” she says of the EE building wing she calls home five days a week.

Dilts initially worked with the executive assistant to the head and assumed some of those duties upon his retirement. Over the years, she has supported seven heads or acting heads: Ben Coates, Dick Schwartz, Bernd Hoefflinger, David Landgrebe, Kent Fuchs, Leah Jamieson, and Smith. “I haven’t run off too many,” she jokes.

In addition to witnessing occasional leadership changes, Dilts adapts to countless process and procedural modifications, especially as technology evolves. “The biggest change here—as everywhere—is the volume of tasks performed electronically,” she says, citing the evolution and growth of e-mail. “When the service was new, you might get excited and say, ‘Look, I got e-mail.’ Now, you can’t keep up with it.”

Like many experienced administrative staff, Dilts recalls days when they typed (on a typewriter, which is now basically obsolete) all of the faculty vitas twice annually. In the late 1970s, the main office used a special typewriter that interfaced with a printer to type and address form letters and envelopes. “That was a great timesaver,” Dilts recalls. “Then we moved to ‘dumb’ computers,” a newer development, but one that provided little control over formatting.

As she’s adapted to these and other developments, Dilts has remained content in her ECE post. “I’m just never been a job hopper,” she says, noting her appreciation for work that affords a feeling of accomplishment and doesn’t require repetitive action eight hours a day.

“I’ve met a lot of terrific people and have many good friends through Purdue. I’d do it again,” she says without hesitation.

Dilts also sees value in maintaining some consistency for the sake of the school. “I have corporate memory, and they’re going to be sorry when I’m gone,” she muses. “But I don’t know any way to impart that information in someone else, and which portion would you choose to relay?” For example, departments can’t expect someone who’s been around five years or less to recall names from 20 years ago. That’s where Dilts’ knowledge proves invaluable.

ECE also affords her the opportunity to offer helpful insights toward the corporate good. “I can be a little outspoken sometimes, but sometimes that’s necessary,” she says, explaining that she feels welcome to voice concerns when she believes an idea won’t produce the desired outcome. “I do have this school’s interest in mind.”

Matt Schnepf
We live and work in an increasingly connected world. Margaret Spellings, the U.S. secretary of education, underscored academia’s disappearing borders prior to International Education Week 2006. “More than ever, success in the world depends on what you know, not where you live,” she said. “Technology has leveled the playing field and flattened the world. It has shown the value of math, science, and other subjects in high demand across the globe. And it has illustrated the importance of foreign languages in communicating and forming partnerships with citizens from other cultures and countries.”

Many professors travel overseas to teach, conduct research, or attend international conferences. Even from the vantage point of America’s classrooms and laboratories, they make contact with students from around the globe who come here to study. According to the Institute of International Education, the U.S. hosted more than half a million foreign students during the 2005-06 academic year. These students made Purdue the third top destination, affirming the university’s standing as a global learning leader.

Our faculty plays a key role in the international exchange of ideas, and the School of Electrical and Computer Engineering prides itself on our team’s contributions. Here we spotlight some professors making a key global impact. ■ M.S.
Ed Delp hops a plane for international destinations more often than most people get a haircut, regularly lecturing, collaborating on research, and serving on doctoral committees.

His passport has been stamped in Australia, Germany, Holland, Iceland, the Netherlands, Portugal, Spain, the United Kingdom, several Asian countries, and—most often—Finland. He’s spent eight summers there as a visiting professor at Tampere University of Technology’s International Center for Signal Processing, and in 2006 was selected by The Academy of Finland as one of 24 professors to participate in its five-year Distinguished Professor Programme.

The academy noted Delp’s international renown as a forefront scholar in multimedia signal processing research. His work for the program will focus on image and video/audio indexing and retrieval, scalable image and video compression, and multimedia security, with particular focus on next-generation mobile applications.

“From the technical side, there’s a lot of really good work going on in Europe and Asia, so it gives me a larger palette to work from. It gives me insights that I bring back to use in developing new ideas in our program,” the Purdue Silicon Valley Professor of Electrical and Computer Engineering and professor of biomedical engineering says of the image processing field.

Yet the value of international connections extends far beyond his work. “This exposure to different cultures helps you think differently and allows you to try to understand the way other people think,” Delp says. “I also believe it can help minimize stereotypes about Americans.” For him, he says, “I like understanding what’s going on in the world.”

**From Cincinnati to Purdue and Beyond**

Delp’s fascination with technology began while growing up in Cincinnati, where he was born a 1949 New Year’s Day baby. His father, a World War II electronics technician who operated a television repair shop for a while, sparked the youngster’s interest in ham radio. Delp gave up the hobby in high school, and then returned to it several years ago.

“I didn’t appreciate anything having to do with math or science until a couple of high school teachers turned me on to those subjects,” Delp recalls. He went on to earn electrical engineering undergraduate and master’s degrees at the University of Cincinnati, then his PhD from Purdue in 1979.

“I well remember getting that acceptance letter. I still have it,” Delp says. “Purdue was and is a big powerhouse in image processing.”

After a year as a visiting Purdue professor, he spent four at the University of Michigan, and in 1984 returned to join Purdue’s faculty. At that time, he’d never traveled outside the United States.

As his work progressed in Purdue’s Video and Image Processing Laboratory and Scalable Parallel Research Applications Laboratory—supported by funding from AT&T, Intel, Kodak, Rockwell, the National Science Foundation, and others—the registered professional engineer earned an international reputation. That quickly led to invitations to present his findings, to be a guest lecturer at universities, and to give conference kenotes. So far, his research results have been reported in more than 300 publications and presentations.

“Our group is very well known in the world in video coding and multimedia security,” he says. “We’ve done well.”

His kudos include a 2002 honorary doctor of technology degree from Tampere University of Technology in Finland, and 2002 and 2006 fellowships from the Fulbright Center and Nokia Foundation to bring American scholars to Finnish universities. He’s also a fellow in the Institute of Electrical and Electronics Engineers, Society of Photo-optical Instrumentation Engineers, and Information Systems & Technology Engineers.

Worldwide invitations have been continuous for Delp, and he extends his own, too, bringing international scholars to Purdue. For that, he uses funding he’s received since being named a distinguished professor in 2002. His guests have included visitors from Spain, Holland, Portugal, and other countries.

**Enjoys Teaching, Mentoring**

Despite his global travels, time with students at Purdue is something Delp treasures, and it’s reflected in many teaching awards, including the 1990 Honeywell Award, 1992 D. D. Ewing Award, and 2004 Wilfred Hesselberth
Award, all for excellence in teaching.

He’s developed a dozen courses at Purdue, including introductions to cryptography and secure communications, digital video compression, and biomedical imaging systems.

Mentoring is one of his strong suits, says Mary Comer, an ECE assistant professor who earned bachelor’s, master’s, and PhD degrees in West Lafayette. “He told me many times that I should continue on to get a PhD, until I finally believed that I could do it. It was definitely the right path for me,” she says.

Comer is one of six women who have earned doctorates under Delp. “I’m proud of that,” he says. “They’re all very successful.”

Graduate student Fengqing Maggie Zhu says, “Professor Delp’s globally renowned reputation and associations with experts in both the industry and the academic worlds bring new perspectives to students. He’s provided me with the opportunity to continuously expand my learning horizon.”

Delp’s style is to set expectations beyond what students think they are capable of achieving, says current graduate student Anthony Martone. “While he pushes students outside their comfort zones, he provides the guidelines needed to succeed. He also encourages creativity in research and freedom to explore ideas.”

Loves Gadgets

He’s a big believer, too, in understanding and owning the technology he discusses with his students. “I’m very interested in gadgets,” he says, and that’s how he spends his rare free time.

When he moved to a different home three years ago, he set about creating a “smart house.” Now when he travels he keeps tabs on his house. “I can log into my house from Europe, check the temperature, look at cameras that point outside and see what’s going on, check the caller ID log, and remotely watch the cable TV system if I want to see the local news. And I have a fancy security system. I did that as a hobby.”

While in the United Arab Emirates during Indiana’s February 2007 blizzard, he tapped into his gadget-equipped West Lafayette home to watch the 21-inch snowfall. “My wife also likes the idea of looking at her garden when we’re traveling.”

Delp could travel continuously in his work. However, he says, “I do like being in West Lafayette, doing my job. I like the flexibility, choosing my own projects, and my interactions with students.”

Cover features continued on next page
International Instruction

Although the push for engineering students to study outside the United States is a recent focus, Purdue professors have long been teaching around the globe. Two with global experience are Rudolf Eigenmann, a professor of electrical and computer engineering, and Kaushik Roy, the Roscoe H. George Professor of Electrical and Computer Engineering.

After spending a sabbatical semester in 2005 at the Universitat Politècnica de Catalunya (UPC), in Barcelona, Spain, and teaching a 10-week course on automatic parallelization, Eigenmann returned in 2006 to teach it as a 10-day intensive graduate class.

“Their research program is one of the best in Europe in this area,” he says of the Spanish university, which gave him the opportunity to meet leading researchers posted there and those who were visiting. The contacts he made will help initiate international research efforts, he believes, and he has started a discussion with UPC faculty to possibly initiate a student exchange program.

Roy has taught low-energy computing and communications/VLSI nanoscale design in Brazil, Mexico, Japan, Korea, Thailand, China, India, Taiwan, Ukraine, and several European countries. He’s also been a visiting scientist at Nan Yang Institute of Technology in Singapore, where he regularly visits to evaluate its graduate program and to serve on student thesis committees.

His travels help him recruit students to Purdue, and he feels building that diversity on campus is important. “It brings in different points of view, different thinking, not only in research, but in the learning of different cultures,” he states.

“That’s of tremendous benefit and help to Purdue students. And it helps us in having more tolerance.”

As for a globalized future, that’s a given for today’s students, Roy says. “To be a successful student and to be a success after graduation, it’s quite important to work not just with people in Indiana, not just in California, but with people from around the world.” ■ Kathy Mayer
Gerhard Klimeck affirms the necessity of international collaboration and dialogue, noting how conference interaction promotes science and engineering development. “New ideas and points of view are much better conveyed in personal discussions than in paper forms,” says the technical director of the Network for Computational Nanotechnology (NCN) at Purdue and a professor of electrical and computer engineering. “Most collaborations and interactions I have had in my professional career were seeded at conferences. Most of my professional employment was seeded through conference participation.”

Earlier this year Klimeck attended the IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS) in Bangkok, joining other international experts in nano-scaled device experiments and theory. There he presented a tutorial on nanoHUB.org, which the NCN operates. The site aids more than 3,400 national and international researchers and educators each month.

An Internet-based initiative, the nanoHUB serves as a resource for research and education in the areas of nanoelectronics and nanoelectromechanical systems and their application to nano-biosystems. In addition to online simulation services, nanoHUB’s menu also includes courses, tutorials, seminars, discussions, and facilities for collaboration in nanotechnology research.

In the past 12 months more than 5,300 people have run more than 190,000 simulations via the nanoHUB—half of them from outside the United States. During the same time period, 22,500-plus people accessed the site’s total content. “We are developing a capability for anyone in the world to use the most advanced simulation tools in nanoelectronics, NEMs, and nano-biosystems on the nanoHUB and provide educational material with it,” Klimeck says.

Additional features are on the way. “We’re adding visualization elements to the site’s toolkit, investigating how we can offer even more research assistance to users from Indiana to India,” Klimeck notes. The team has also redesigned the look and feel of the entire nanoHUB site, making it more user friendly to younger students and novice researchers.

Matt Schnepf
An International Perspective on Engineering

Alumnus Patrick Wang shares his views on what it takes to succeed in a growing global field.

**Q: How did studying at Purdue shape your global view of engineering?**
**A:** I was enrolled in the EE honors program after my first semester. This program allowed me a lot of latitude in choosing subjects, and I interviewed as many graduate students in electrical engineering and materials engineering as I could, and chose subjects and classes according to how good the teacher was and my interest.

A global view of engineering is the desirability to have a broad bandwidth of engineering capabilities existing within the individuals in an organization, but the key is how to harness such capabilities to the benefit of the organization. At Purdue, I met folks of many nationalities and people from all different backgrounds. This has opened my horizons to the benefits of multiculturalism and my belief that in global competition where “war for talent” is the norm, deploying global engineering resources in an aligned vision is the key to success. The hearts and souls of the engineering community also have to be aligned with other functions such as finance, sales, supply-chain management, etc. for this alignment to be effective.

**Q: What skills must students acquire in order to succeed in a global market?**
**A:** I believe the key skills are emotional intelligence and leadership; an open-mindedness to learn and a penchant for continuous improvement; a deep appreciation of the importance of organizational culture and the culture of people from other countries; and experience in at least one other function such as sales, finance, supply-chain management, and HR.

**Q: How can Purdue ECE continue to prepare students to compete globally?**
**A:** Purdue needs to attract great global talents to be tops in scientific and engineering research. Great research opportunities are key to attracting such global talents. Reputations in research raise the profile of Purdue. The “customers” Purdue should focus on are the professors. The best and brightest students flock to top research universities, and Purdue should offer scholarships to attract the best and brightest students on a global basis.

**Q: What are some benefits of engineers from different nations collaborating toward common goals?**
**A:** We should remember to “think global, act local.” For the China market, it’s futile to ask U.S.-based engineers to design products, for they do not know the local conditions. Shared services and outsourcing to lower-costs locations is the norm for most global companies to rationalize overhead costs. Engineers are in short supply on a global basis. Attracting and retaining great engineering talents has become a must for companies. People are less willing to move away from their home countries, hence the need to align engineers in different design and competency centers to a common vision.

**Q: What are some challenges of leading a global company?**
**A:** “Speed of management”—time zones and great distances. Plus, barriers of language and culture. The key is to build a strong corporate culture, which aligns the vision of the corporation with the passions of the workforce.

**Q: How will globalization continue to shape the future of engineering?**
**A:** Competencies reside with individuals in different pockets of the organization. Globalization, however, means people are less and less willing to move out of
their hometowns because they’re so used to “things” coming to them via the Internet, FedEx, and Airfreight. Companies that can overcome this will flourish. Engineers who are willing to move with the growth are more likely to succeed.

“

The key is to build a strong corporate culture, which aligns the vision of the corporation with the passions of the workforce.

“

Patrick Wang has served Johnson Electric as chairman and CEO since 1996. The map above illustrates the company’s global presence.

Patrick Wang (BSEE ’72, MSEE ’72, honorary doctorate ’04) is the CEO and chairman of Johnson Electric, the world leader in motors for automotive and commercial markets. The company, headquartered in Hong Kong, exports its products to more than 30 countries for 100-plus applications. Its three business unit groups include the Commercial Motor Group, the Automotive Motor Group, and the Components & Services Group.

Wang joined the Johnson Electric Group in 1972, becoming a director in 1976 and managing director in 1984. He was elected chairman and chief executive of the company in 1996.

Still actively connected with his alma mater, Wang provided a lead gift for ECE’s future facility—Seng-Liang Wang Hall—that will be named in honor of his father. He has received the Outstanding Electrical and Computer Engineer Award from ECE, plus the College of Engineering’s Distinguished Engineering Alumni Award.

Learn more about Johnson Electric by going online at www.johnsonelectric.com.

Johnson Electric Worldwide Locations

Patrick Wang has served Johnson Electric as chairman and CEO since 1996. The map above illustrates the company’s global presence.
Driven to Succeed

A global view fuels the research activities of Mimi Boutin.

You’re strolling through a neighborhood in Japan, China, or Korea but don’t understand the character sets in the street signs. It’s too challenging to find them in a dictionary, so how do you find your way? Snap a picture with your handheld portable device, get an instant translation, and you’re on your way.

That’s just one of the signal processing, computer vision, and object recognition ideas being developed by Mireille “Mimi” Boutin, assistant professor of electrical and computer engineering, who is also affiliated with Purdue’s Department of Mathematics. Another is a searchable database for shapes. Show what you’re looking for—a particular bolt, for example—and it’s quickly found, without language barriers.

Born and raised in Canada, Boutin says, “My mother was always encouraging us to do anything we wanted. There was no distinction between [toys for boys or girls], and we had many books in our house.”

After a nurse visited her school, Boutin told her father, a geography teacher, that all the girls wanted to be nurses. “My dad said, ‘Be a doctor,’ and I thought, ‘That’s a good point.’”

She trained in mathematics and physics, earning her undergraduate degree at the University of Montreal in 1996, then a PhD in math at the University of Minnesota in 2001. Landing a Purdue post was her goal because “it’s a place where engineering research is top-level, but at the same time, there’s contact with industry.” So she bettered her odds by spending the next year as a visiting research scientist at Brown University, then a year at Max Planck Institute in Germany.

“My dream came true,” Boutin says, and she settled in as a Boilermaker in 2004, putting her math and technology skills to work. “I think we can look at algebra and find novel applications and really make a difference in the world.”

She’s currently working with six graduate students, and challenging them. “In her eyes, there are never unsolvable problems,” says Haiyin Wang. “With her close guidance, we analyze the problem step by step, paying attention to every little detail, and finally we make progress on it.”

Hasib Siddiqui, another student, says Boutin gives “plentiful and critical feedback” that’s prompt and detailed. “Her mentoring style helped me develop a sense of independence, responsibility, and self-esteem.”

Boutin also enjoys her time in the classroom. “It’s nice to see that you can make a difference. I like helping students.” Traveling and maintaining international connections are also important to her. “I have friends all over the world and collaborators in Germany. It makes my life so much richer. And we can learn from what other people do and how they do it.”

Once a pianist, Boutin enjoys listening to music, reading, and writing. Her favorite times are hours spent with her 2-year-old twins, Johanna and Lia. “They’re not very interested in colors right now,” Boutin says. Perhaps reflective of their mother’s image processing work, they do know their letters, though. Says Mom, “When they see a stop sign, they’ll say, ‘T.’”

Kathy Mayer
Think Outside the Box

Hong Tan employs unique methods to uncover the universal language of touch.

From performing laparoscopic gall-bladder surgery to catheterizing a heart prone to tachycardia, surgeons turn to computer technology for training. They can simulate everything about the procedure but one critical component—touch. That could soon change, if the work of ECE associate professor Hong Tan bears fruit.

“Touch is a component critical in surgery, so you want it to be there when you train surgeons,” says Tan, who joined Purdue’s faculty in 1998. “We hope to create a virtual reality setting where the look and feel match what they will experience.” Long-term, she wants to better understand how people feel and perceive textures in the way we’ve come to understand colors.

These are just a couple of many areas and applications she’s exploring in her haptic interface, distributed contact sensing, haptic rendering, and psychophysics work. This includes directing the Haptic Interface Research Laboratory she founded at Purdue.

“What I do is not typical engineering,” says Tan, who also holds courtesy appointments in Mechanical Engineering and Psychological Sciences. “I do interdisciplinary work that brings solutions to engineering problems, especially interfaces between machines and people, to understand the human part, so eventually humans will be considered an OK component in engineering studies.”

Ali Israr, a graduate student, describes Tan’s teaching style as “think outside the box.” “She makes me look at problems from broader perspectives, and my analytical skills and the quality of my research have improved because of it,” Israr says.

“There’s so much more to be understood, and that’s exciting,” says Tan, who earned her master’s and PhD at Massachusetts Institute of Technology (in the electrical engineer/engineer in computer science program). She earned her undergraduate degree in biomedical engineering and instrumentation at Shanghai Jiao Tong University in her homeland, China.

There, her education from sixth grade on was at a boarding school. While it was difficult to be away from home, she says, “It was very strict.”

She carried with her a message from her mother: Get all the degrees there are, including postdoctoral. “My mother was very smart, but she never had the opportunity for education until she went to night school as an adult.”

Now a mother herself, she repeats the education mantra to her two sons. “I’m a typical Asian parent,” she laughs. “I want my kids to get straight A’s and be good at everything. The challenge for them is to find things they love to do and be happy at it, like I am.”

While family time, teaching, research, and international travel to present keynotes and participate in conferences consume most of her time, Tan also enjoys studying Chinese medicine, acupuncture, and Chi-gong, the Chinese form of Indian yoga. An accordion player as a youngster, today she and her husband also enjoy opera, and when she travels, “I make a point of visiting all the museums.” —Kathy Mayer
Broadening Their Horizons

A melting pot of personalities and talents, ECE boasts top international students, plus U.S. students who spend time studying abroad.

Roam an ECE classroom or laboratory, and you’re sure to gain a heightened perspective on the world of engineering. That’s because ECE prides itself on building a “global” student body—talented, highly skilled students from across the U.S. and abroad who increase their knowledge and skills by collaborating with a diverse set of peers.

Following are just a handful of students who enhance our global environment—a few from overseas, plus one American student who has spent time studying on another continent. ■ M.S.

Gaining a global perspective

Priyum Jyoti (Sophomore)
Delhi, India

“Studying outside of my home country provides me with global exposure, which is very essential to us as engineers. The world is a small place now, and being able to adapt to a new culture or place gives you an added advantage in the long term—the opportunity to adapt in a different surrounding.

I enjoy the opportunities with regards to undergraduate research, including projects through the EPICS program [Engineering Projects in Community Service] and IEEE [Institute of Electrical and Electronics Engineers]. And since I am studying at Purdue, which has a well-established and sound academic system, it gives me a chance to contribute to the development of technologies.”

A high standard of learning

Chia-Yiaw Chong (Junior)
Raub (Pahang state), Malaysia

“Communication has been my main challenge here because English is not my first language. And while Malaysia is hot year-round, here there are four seasons. I like spring best.

I am proud to make the decision to come to the U.S. The standard of education in the United States is much higher than in Malaysia, so I learn a lot here compared to my home country. Purdue has a high reputation in engineering, especially in electrical and computer. I also learn a lot about different cultures and know people from all around the world since Purdue is a well-known university with rich culture.”
“People from different countries bring with them different backgrounds of education, which can be superior to your own. This, in a way, stimulates competition and makes one work harder in order to succeed. Another effect of people studying and collaborating together is that people come to realize the different working styles of [those] they work with and learn to be tolerant of these different styles.

I am a [teaching assistant], and though I have been at the job for a while, I still am at many times amazed at the different ways students look at the problems given to them in labs.”

“Studying abroad enhanced my engineering studies by giving me a broader picture of what engineering is like around the world—for example, how the Olympics in Sydney were one of the more ‘green’ Olympics due to solar power, water conservation, and other issues. It shows how engineering is kind of like a global language, or necessity, and is all around us.

It gave me a different perspective of the world. I spent a few days camping in Kakadu National Park, which was amazing—being able to look up and see different and more stars than usual. I was able to share stories and learn from an ancient Aboriginal culture, [and received] a didgeridoo cut off a tree that same day. It was quite an experience.”
A Lifetime Commitment

ECE alumni help to enhance learning and research opportunities for our next generation of students.

Following stellar careers in the world of computers and electronics, two Purdue electrical and computer engineering alumni remember their days as undergraduate students at the university and are helping to ensure future generations have the same educational experience.

Richard Kenyon (BSEE ’50, MSEE ’51, PhD ’61) of Huntington Beach, California, and Robert Fenwick (BSEE ’58) of Los Altos Hills, California, are providing funding for interdisciplinary biological research in engineering and science, and for the $20 million Seng-Liang Wang Hall of Electrical and Computer Engineering in Discovery Park.

“My parents were both Purdue alumni and were very involved with the university,” Kenyon says. “I can remember as a child coming back to Purdue for Gala Week. It was a big event, and I looked forward to it for weeks in advance. We would go to the electrical engineering building, and there would be so many activities and thousands of people. Electrical sparks and lightning tests. It was exciting.”

Kenyon felt the same excitement when he taught computers at Purdue in the late 1960s. “I taught the first computer course given for credit at Purdue, and I believe there’s still a copy of my Programming the Datatron 205 Computer, 3rd edition in the math library,” he says. “I was teaching the students about computers and realized that I didn’t want to teach it—I wanted to go out and work on computers. So I went to work for McDonnell Douglas (now the Boeing Co.) as a programmer.”

More than three decades later, Kenyon retired as lead engineer from Boeing Integrated Defense Systems in Huntington Beach. “I was around when the first computer came out, the Univac 1, and look how the world has changed. And now I’m excited about what’s happening in the biological field as it relates to computers,” Kenyon says.

“I believe we will see the same type of growth in the way we research genome analysis and drug testing. Purdue is already a national leader in biological sciences, and I’d like my contribution to provide seed money that will attract more financial support for this field.”

Robert and Janet Fenwick are giving for much the same reasons—to provide students, faculty, and researchers with the best equipment and facilities. The Fenwicks’ gift of $1.5 million will help fund the Seng-Liang Wang Hall of Electrical and Computer Engineering.

Robert Fenwick is the retired chairman and CEO of On Command Video in Santa Clara, California. The company, which makes video entertainment and information systems, was founded in 1986. Previously, he founded BR Communications, based in Sunnyvale, California, in 1966.

Robert graduated first in his Purdue class and completed his graduate studies at Stanford University. He built his first company, BR Communications, on a technique that could simultaneously use Voice of America and Radio Free Europe broadcast transmitters as radar to determine their coverage areas. The company manufactured unique proprietary communications equipment that met the specifications needed by the military and by the diplomatic corps. He still owns patents on the sounding technique and time-diversity modem upon which the company’s success was based.

After selling BR Communications for $20 million in 1983, he founded On Command Video. This system provides a wide selection of televised movie choices at the convenience of the viewer rather than the broadcaster. Today the company provides the fastest and largest-capacity on-demand, in-room video entertainment and information system available. It is used internationally by hotel chains to provide guests with the widest selection of movies. Hotels such as the Fairmont, Ritz Carlton, Westin, Marriott, Hilton, Holiday Inn, and many others use the On Command Video programs.

Richard Kenyon’s connection to Purdue includes both studying and teaching on campus.
Robert and Janet Fenwick seek to provide top facilities and equipment at Purdue.

Janet Fenwick graduated from Middlebury College in 1959, earned her master’s degree from Stanford University in 1960, and taught school for four years. She volunteers as a commissioner of Foothill College, the community college in Los Altos Hills, and serves on the board of directors for the Community School of Music and Art. She is active with Environmental Volunteers, an environmental group that teaches natural science education to school children, as well as with her area’s Planned Parenthood advocates board. In 2006 she received the Los Altan of the Year award from the local newspaper.

Together, the Fenwicks will leave a lasting mark on Purdue. “I started my own business just three years after acquiring my doctoral degree, and I would not have been able to do it without an excellent education,” Robert says. “This is our way of giving back.”

Cynthia Sequin

Leave a Legacy and Support ECE

All gifts must specifically name the “Purdue University School of Electrical and Computer Engineering (ECE),”

Bequest/Will Provision
Gifts made in your will are deductible as a charitable contribution for federal estate tax purposes. Bequests can be designated for Purdue ECE as unrestricted or for a specific purpose.

Charitable Gift Annuity ($5,000 minimum)
Receive a lifetime income at a fixed rate in exchange for a gift of cash, marketable securities, or approved real estate to Purdue ECE.

Revocable Living Trust
Avoid estate taxes by naming Purdue ECE as a beneficiary.

Charitable Remainder Annuity Trust ($50,000 minimum)
Designate Purdue ECE and enjoy current tax benefits while securing a fixed, lifetime income.

Charitable Remainder Unitrust ($50,000 minimum)
Designate Purdue ECE and enjoy current tax benefits while adding a variable lifetime income based on a fixed percentage of the net fair market value of the trust assets as valued each year.

Pooled Income Fund ($1,000 minimum)
Enjoy current tax benefits with a gift that generates a lifetime income as your irrevocable gifts are combined with those of others in the Purdue ECE Pooled Income Fund. As an income beneficiary, you will receive your proportionate share of the fund’s net income. The annual income received is based on your investment in the fund and varies with the fund’s actual earnings.

Life Insurance
Make Purdue ECE the owner and beneficiary of a life insurance policy and enjoy current tax benefits. It can be a new insurance policy, a policy with premiums remaining to be paid, or a fully paid policy you have owned for years.

Purdue ECE can also be named as the beneficiary of a policy it does not own. This provision provides no current tax advantages, but the money passing to Purdue ECE at the insured’s death will qualify for the federal estate tax charitable deduction.

ECE has a number of naming opportunities available, allowing you to leave a legacy in your family’s name by providing for an ECE student scholarship, laboratory equipment, or faculty support, among other needs.

For additional information regarding naming opportunities or planned giving options, please contact Margarita Contreni at mcontreni@purdue.edu or (765) 496-6453.
It Takes Two

Known for educating top engineers from around the world, ECE has also served as a connecting point for future married couples.

**Do opposites attract?** Some 88 alumni couples from the School of Electrical and Computer Engineering are proving that theorem wrong. In their case, shared interests—and majors—as students led them to marriage and, often, careers in the same field.

Was it the logical mind of an engineer or the fickle arrow of Cupid that brought these pairs together? Here's a look at how they clicked:

**Bloor Redding**
(BSEE ’79; JD, University of Denver ’84)
Vice President and Assistant General Counsel, Hewlett-Packard

**Pat Borman Redding**
(BSEE ’79; MSEE, Colorado State University ’84)
Retired, Director of Engineering, Hewlett-Packard

Married: March 1980

As a child growing up in Indianapolis, Pattie Borman loved the challenge of solving tough math problems. Little did she know that a classmate in her seventh-grade advanced math course would one day become her husband. Pattie sat toward the front of the class; Bloor Redding sat in the back. She doesn’t remember him, though he had already set his sights on her the summer before in a typing class and thought she was smart and beautiful.

Bloor and Pattie had a few lunch dates in high school before each enrolled at Purdue to pursue engineering. By their sophomore year, they were dating steadily, including multiple viewings of *Star Wars*, hanging out at the Sweet Shop in the student union, hiking, and studying together.

“He was persistent, intriguing, talkative, a great listener, and caring,” recalls Pat of her interest in Bloor.

Following graduation in 1979, the two took jobs with Hewlett-Packard in Colorado; Pat had been a summer intern with the company before her senior year. When they weren’t designing instruments for HP, they enjoyed hiking in Rocky Mountain National Park. It was there, one June day, that Bloor proposed.

“I thought we would go to a lake that we had been told was beautiful. We were not aware, however, that the path to the lake was blocked by snow drifts still very deep,” Bloor says. “We decided to stop and turn back, so I suggested we sit for a minute on a fallen log. I asked her, and she replied, ‘Are you serious?’” Pat was surprised and thrilled.

The couple’s career with HP eventually took them to Washington. Bloor had by then earned a law degree. He is a registered patent attorney and is vice president and assistant general counsel for the company. His group provides support throughout the IP (intellectual property) life cycle, from patent generation through litigation and licensing, and
has led the move to market-based patenting, cost-effective management of the patent supply chain, and cost-effective litigation techniques. Pat, now retired, became director of engineering for HP. After the move, she held a variety of positions in research and development and manufacturing engineering, designing and building inkjet printers.

Sharing the same employer and profession was never a problem for the pair, who say HP’s “earshot” rule of not employing spouses within the sound of each other’s voices kept things clean. The upside of the arrangement was that they were able to build a strong partnership, supporting each other at work and home, Pat says. “You can relate to each others’ problems and approach them from the same point of view and process,” Bloor agrees.

Now living in Vancouver, Washington, the couple has two children: Whitney, a pharmacy student at Purdue; and Bloor III, a freshman in high school. Pat jokes that if asked, the children would say that their parents have too much work-related dinner talk. “If your kids are not scientists, they may find both of you a bit overwhelming. Luckily our kids both enjoy science,” says Bloor.

Cathie and Jack Kozik can thank Professor William Hayt for playing Cupid...indirectly. It was in Hayt’s EE201 class that the two met during a study group. Jack caught Cathie’s eye. The attraction? He was a smart graduate student with a car, she recalls. They connected in a student lounge between classes and began dating at the end of Cathie’s sophomore year, splurging on two-for-one burger dates at Burger King or pizza.

Cathie had grown up in Dallas and the United Kingdom and had aspirations of becoming a computer designer. Jack was from St. Charles, Illinois, and was also interested in computer design; he also was interested in Cathie, who was “smart, pretty, and fun.” He loved the long conversations they shared over dinner and made his intentions clear when he proposed at a restaurant in Chicago.

They were married shortly after her graduation. He was then working at Bell Labs in Naperville, Illinois, and she was hired as a design engineer with AT&T in Lisle, Illinois. Her career since has included positions as chief information officer and senior vice president for Tellabs’ global information systems. In 2001 she was named one of the “Premier 100 IT leaders” by Computerworld. Since 2005 she has been corporate vice president, integrated supply chain management, for Motorola in Arlington Heights, Illinois.

At Lucent, Jack’s department is responsible for planning the evolution of Network Services products, focusing on converged voice/data services for next-generation fixed, mobile, and broadband networks. Prior to his present job, Jack was in Lucent’s Switching organization, leading the evolution planning for Lucent’s 5ESS Switch product into the packet and mobile technology areas.

Being in the same field has its benefits and challenges, the couple says. With teenage children—Liz, 18, and Mike, 15—managing calendars is a complicated business; whoever gets to the date first is the winner, they say. Another complication is that because Cathie and Jack work for

**Jack Kozik**
(BS Computer Science ’80; MSEE ’82)
CTO, Director of Architecture, Alcatel-Lucent’s Converged Business Group

**Cathie Stafford Kozik**
(BSEE ’82)
Corporate Vice President, Integrated Supply Chain Information Technology, Motorola

**Married: June 19, 1982**
Eric Stone had just completed his freshman year and was on his way home from a summer calculus class when a female classmate approached him. They walked along together, talked, and soon realized they lived in the same apartment building. It was the beginning of a long friendship for Eric and Tracy Gossett.

Eric thought his Pennsylvania-born classmate was outgoing, smart, and independent. She saw Eric as friendly, fun, and easy to talk to. Although their friends said they should date, they didn’t. Tracy was focused on her career and didn’t want to be held back by settling down with a husband and children.

Eric moved to California after graduation to work for Andersen Consulting (now Accenture) in Palo Alto. A year later, Tracy landed a job in the Bay Area as a technical marketing engineer with Hewlett-Packard. Eric was not a decisive factor in her job choice, but it soon became clear to both that their friendship could be more.

“About a year after Tracy moved out, we sat down in a coffee shop and talked about what it would be like if we started dating,” Eric says. “I think we both realized that if we started dating, there was no turning back and that we would eventually end up together for the rest of our lives.”

Eric proposed on a hillside overlooking Silicon Valley, and the couple was married in July 2001. Tracy is now a software development manager for HP. Eric is IT director for Cadence Design Systems in San Jose. They have two children—Ethan, 3, and Kate, 1—and are grateful that they have a great deal of flexibility in their jobs to tackle family life.

“We can share stories and perspectives and always learn a lot from each other,” says Eric. “The downside is that we tend to think alike—we both are fairly meticulous planners and both very logical in our thinking. It can lead to over thinking and analyzing almost anything.” Tracy adds, “Sometimes we laugh that we need more diversity between the two of us. We wonder if our discussions and lives would be more interesting if our jobs were different.”

Linda Thomas Terhune
DEA Award for Schoendorf

This year’s 10 recipients of Purdue’s Distinguished Engineering Alumni (DEA) Award included Joe Schoendorf (BSEE ’66), an executive partner with Accel Partners and a member of the World Economic Forum USA.

The DEA honor, presented by the College of Engineering, recognizes engineering alumni who have distinguished themselves in any field of endeavor that reflects favorably on Purdue University, the engineering profession, or society in general. Schoendorf was recognized for his “internationally acknowledged leadership in economic and entrepreneurial development on a global scale.” He was previously named by ECE as an Outstanding Electrical and Computer Engineer in 2003.

A venture-capital firm, Accel Partners supports entrepreneurs who are poised to define new categories and build world-class technology companies. The World Economic Forum seeks to improve the state of the world by engaging leaders in partnerships to shape global, regional, and industry agendas.

Tengdin Elevated to IEEE Fellow

The Institute of Electrical and Electronics Engineers (IEEE) has elevated John Tengdin (BSEE ’49) to the status of IEEE fellow. Each year, following a rigorous evaluation procedure, the IEEE Fellow Committee recommends a select group of recipients for elevation to fellow status, one of the institute’s most prestigious honors.

A consultant and editor in chief with Opus Publishing (www.opuss.com), Tengdin was noted for his leadership in “Ethernet local area network-based protective relaying and control in electric power substations.”

World Bank Appoints Muasher

Marwan Muasher (BSEE ’77, MSEE ’78, PhD ’81, honorary doctorate ’99) has joined the World Bank as senior vice president for external affairs, communications, and United Nations affairs. In this role, he will strengthen World Bank relations with donor countries, civil society groups, and multilateral partners.

“As someone who has worked extensively in both worlds of diplomacy and communications, I look forward to building strong and constructive relationships with countries of the world,” Muasher says. “I believe strongly in the World Bank’s mission to help countries reduce poverty and improve living standards, as well as help them with their reform efforts.”

Muasher has attained vast experience in international affairs. From 1997 to 2002, he served as Jordan’s ambassador to the United States. During his tenure he was instrumental in negotiating the first Free Trade Agreement between the United States and an Arab nation. He then returned to Jordan to serve as foreign minister and in 2004 became deputy prime minister responsible for reform and government performance.

ECE named Muasher as an Outstanding Electrical and Computer Engineer in 1999.

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This image of Earth’s city lights was created with data from the Defense Meteorological Satellite program Operational Linescan System, which NASA uses to map urbanization. The brightest spots are the most urbanized but not necessarily the most populated. (Compare Western Europe to China and India, for example.) See “Prime Numbers” on page 10 (college side) for a numerical quick look at our world.