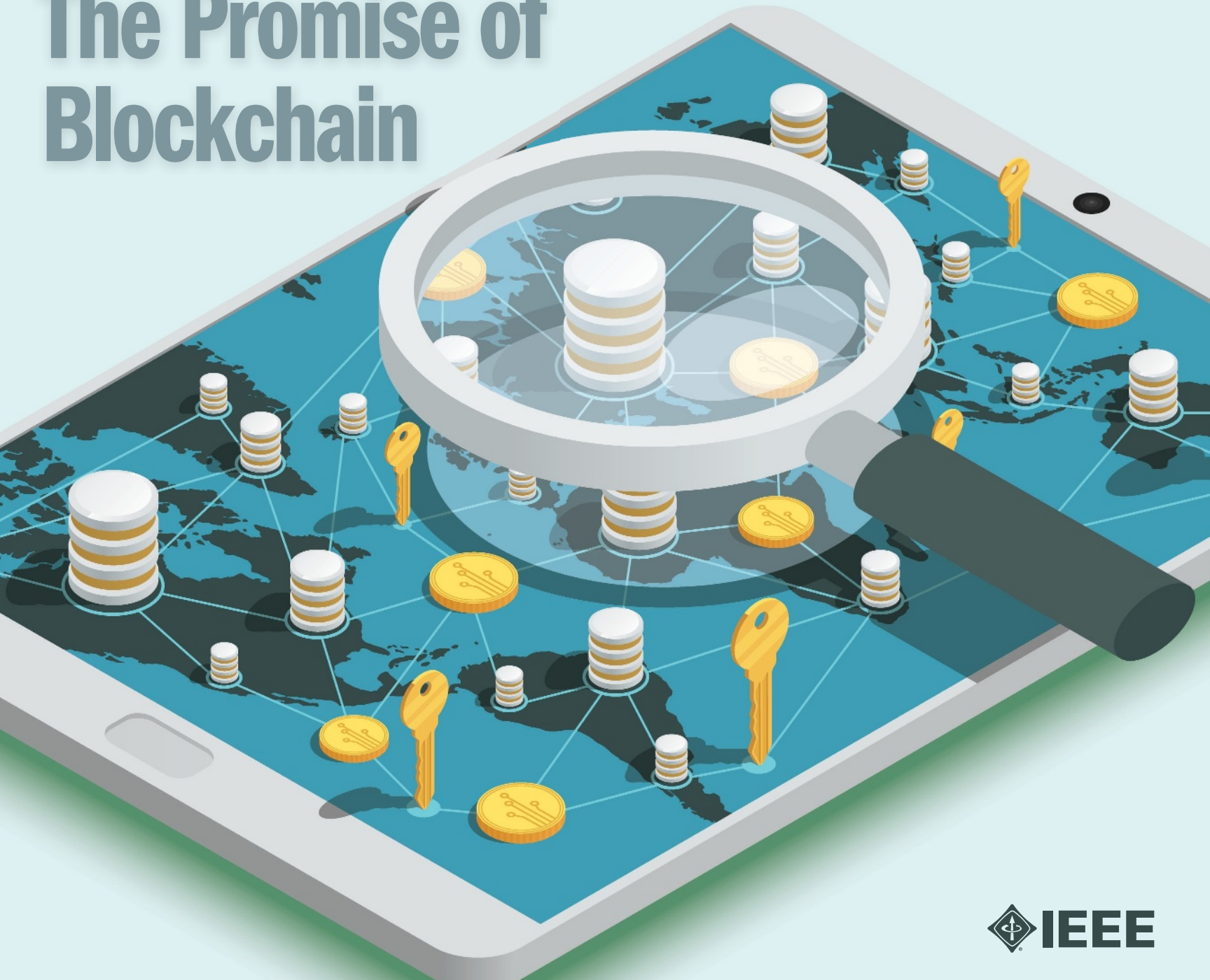


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The Promise of Blockchain



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Toshio Fukuda Is 2019 IEEE President-Elect



IEEE LIFE FELLOW
Toshio Fukuda has been chosen as 2019 IEEE president-elect. He will begin serving as president on 1 January 2020.

Fukuda, who was nominated by petition as a candidate, received 20,865 votes in the election. Life Fellow Jacek M. Zurada received 15,378 votes. Fellow Vincenzo Piuri garnered 12,993.

The results are unofficial until the IEEE Board of Directors accepts the IEEE Tellers Committee report in November.

The results are unofficial until the IEEE Board of Directors accepts the IEEE Tellers Committee report in November.

Fukuda is a professor of mechatronics engineering at Meijo University, in Nagoya, Japan. He is also a professor at the Beijing Institute of Technology and professor emeritus at Nagoya University. His research focuses on intelligent robotic systems and micro-nano robotics. He has published more than 2,000 articles in scientific journals, conference proceedings, and reports.

He was elevated to Fellow in 1995 “for the development of distributed intelligent robotics and system control with neuron-fuzzy-genetic-algorithms-based computational intelligence.”

He was director of IEEE Region 10 in 2013 and 2014 and was IEEE Division X director/delegate in 2001–2002 and 2017–2018. He was president of the IEEE Robotics and Automation Society in 1988 and 1989 and general chair of the IEEE International Symposium on Micro-Nano Mechatronics from 1990 to 2012. —Kathy Pretz

RECLAIMING DIGITAL IDENTITY

“Widespread surveillance of citizens—combined with social-engineering techniques—has eroded trust,” says John Havens, executive director of CXI. He is also executive director of the IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. “People no longer have control over their identity or their data—which is fundamentally at odds with an open and free society,” Havens says. “The situation,” he adds, “can lead to authoritarianism and the proliferation of systems that reinforce systemic biases rather than correcting them.”

CXI’s goal is to support the use of tools from fields including statistics, machine learning, and causal inference to understand, expose, and tackle any inequities that are present in the collection and use of large-scale personal data.

RETHINKING METRICS

Measuring human and environmental well-being requires new metrics or indicators to determine holistic societal benefits, CXI says.

“With the current prioritization of short-term gains, autonomous and intelligent technologies are likely to increase inequality and social tensions,” Havens says, “and they are apt to further concentrate wealth and power among an ever-smaller class of privileged people. Our goal is to give policymakers a simple tool kit or set of recommendations to help them know which existing metrics favor this more holistic view of wealth and worth, and how to use them with autonomous and intelligent systems.”

NEW APPROACH

CXI is creating templates to teach people what extended intelligence, participant design, and system thinking mean. It encourages thought leaders from religious and spiritual communities as well as representatives of indigenous cultures to join the council to ensure that technologies will transform societies in ways that are positive, and beneficial to all. —K.P.



IEEE-SA, MIT Media Lab Launch Council on Extended Intelligence

THERE’S A LOT of concern that designers of autonomous and intelligent systems (A/IS) will overlook the impact their creations could have on society. That’s why the IEEE Standards Association and the MIT Media Lab recently launched the Council on Extended Intelligence (CXI).

The group seeks to foster the responsible creation of intelligent systems by recognizing they are part of larger human and environmental systems that need to be handled in a holistic way. The idea is encapsulated in the phrase *extended intelligence* and moves away from the “us

versus them” mentality in the “robots versus humans” language found in many news media articles.

“Extended intelligence recognizes that we exist in a system with institutions, the natural environment, and other people,” says Joi Ito, the Media Lab’s director. “This way of thinking encourages us to address some of the more fundamental problems of inequality and other dehumanizing elements of society so that the machines can help us, instead of making things worse.”

CXI has identified three areas that it believes need a concerted global effort: responsible participatory design, ways for people to reclaim their digital identity, and new metrics for determining economic prosperity.

BETTER DESIGN

CXI wants A/IS developers to incorporate the principles of participatory design into their projects. This approach actively involves all stakeholders in the design process, according to Andre Uhl, a research associate with the Media Lab director’s office. Stakeholders include employees, customers, citizens, and end users, but Uhl says they also can include cultural legacies and the environment.

Autonomous and Intelligent Systems Community Formed



OPEN COMMUNITY FOR ETHICS IN AUTONOMOUS AND INTELLIGENT SYSTEMS

THE IEEE STANDARDS

Association (IEEE-SA) and 11 other standards-development organizations have formed the Open Community for Ethics in Autonomous and Intelligent Systems (Oceanis). The open forum aims to bring together organizations interested in the development and use of standards as a means to address ethical matters.

The other founding members are the African Organization for Standardization, the Austrian Electrotechnical Association, Austrian Standards International, the British Standards Institution, the China Electronic Standardizations Institute, the CIO Strategy Council, the International Electrotechnical Commission, the Ecuadorian Service for Standardization, the National Standards Authority of Ireland, the Turkish Standards Institute, and the Verband und Deutsche Kommission Elektrotechnik Elektronik Informationstechnik.

IEEE'S INVOLVEMENT

IEEE was one of the lead groups in organizing Oceanis because the community supports the organization's mission and aligns with the IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. An IEEE-SA Industry Connections activity, the initiative aims to bring together technologists, ethicists, policymakers, business leaders, and end users to ensure those involved in developing technologies are educated, trained, and empowered to make ethical considerations a priority.

Oceanis is an open community. "The founding organizations have been discussing the role of ethics in their own communities, but we felt it best to pull our resources together," says Karen McCabe, senior director of technology policy and international affairs for IEEE-SA.

"The establishment of Oceanis aligns with IEEE's tagline and with the rationale behind IEEE's Global Initiative on Ethics of Autonomous and Intelligent Systems," Konstantinos Karachalios,

IEEE-SA managing director, said in a news release. "We are convinced that the complex ethical issues emerging in the development and deployment of such systems can only be addressed through processes that correspond to the envisioned principles, not through agreements behind closed doors. IEEE has already initiated an entirely new series of standardization projects, called IEEE P7000 Model Process for Addressing Ethical Concerns During System Design, open to any interested person and carried out through our rules-based and transparent process."

COMMUNITY ACTIVITIES

Oceanis participants will share information and coordinate on initiatives and programs, according to the news release, and they will work to enhance the understanding of the role standards play in facilitating innovation, as well as address ethics. The founders plan to jointly organize local, regional, and global events. If your organization would like to participate, email oceanis@ieee.org. —K.P.

Herz Award Goes to Mike Geselowitz

SENIOR MEMBER

Mike Geselowitz was chosen to receive the 2018 IEEE Eric Herz Outstanding Staff Member Award "for enhancing the values of the IEEE History Center and developing many initiatives promoting engineering and technology history."

Geselowitz is the senior director of the IEEE History Center, located on the campus of Stevens Institute of Technology, in Hoboken, N.J. He manages six staff members.

The center's mission is to preserve, research, and promote the history of IEEE fields of interest, as well as of IEEE itself. The center maintains resources for engineers, historians, and others interested in the development of electrical and computer engineering and their role in society. Its holdings include the IEEE archives, which consist of the published and unpublished records of IEEE



and a collection of photographs relating to electrical and computer technologies, as well as pioneering engineers' oral-history transcripts.

During his 21 years with IEEE, Geselowitz has led the History Center in several initiatives including the development of the IEEE Virtual Museum, which became the Engineering and Technology History Wiki. He also helped come up with the idea of IEEE REACH, which provides preuniversity educators and students with resources about the history of technology and engineering, and their relationship with culture, economics, politics, and society.

Geselowitz says he has decided to donate half his US \$5,000 cash prize to the IEEE History Center fund of the IEEE Foundation. The IEEE History Center relies on donations to continue to provide and enhance its services.

The IEEE Board of Directors created the Herz Award in 2005 to honor the IEEE Life Fellow and longtime volunteer, who served in many capacities including IEEE general manager and executive director. Herz died in 2016 at the age of 89.

The award consists of a framed certificate, a cash prize, and travel expenses to the award presentation. It recognizes a present or past full-time IEEE staff member.

The nomination deadline for the 2019 Herz Award is 15 January. Visit http://www.ieee.org/about/awards/recognition_herz.html.

—Katie Harrison

Calendar of events

DECEMBER



5-7

IEEE Global Conference on Internet of Things, Alexandria, Egypt

10-12

IEEE International Conference on Artificial Intelligence and Virtual Reality, Taichung, Taiwan

12-15

IEEE International Conference on Robotics and Biomimetics, Kuala Lumpur, Malaysia

JANUARY



4-6

IEEE Rising Stars Conference, Las Vegas

14-16

IEEE/Society of Instrument and Control Engineers International Symposium on System Integration, Paris

20-21

IEEE IoT Summit on Small and Nano Satellites, Orlando, Fla.

FEBRUARY

7-8

IEEE Texas Power and Energy Conference, College Station, Texas

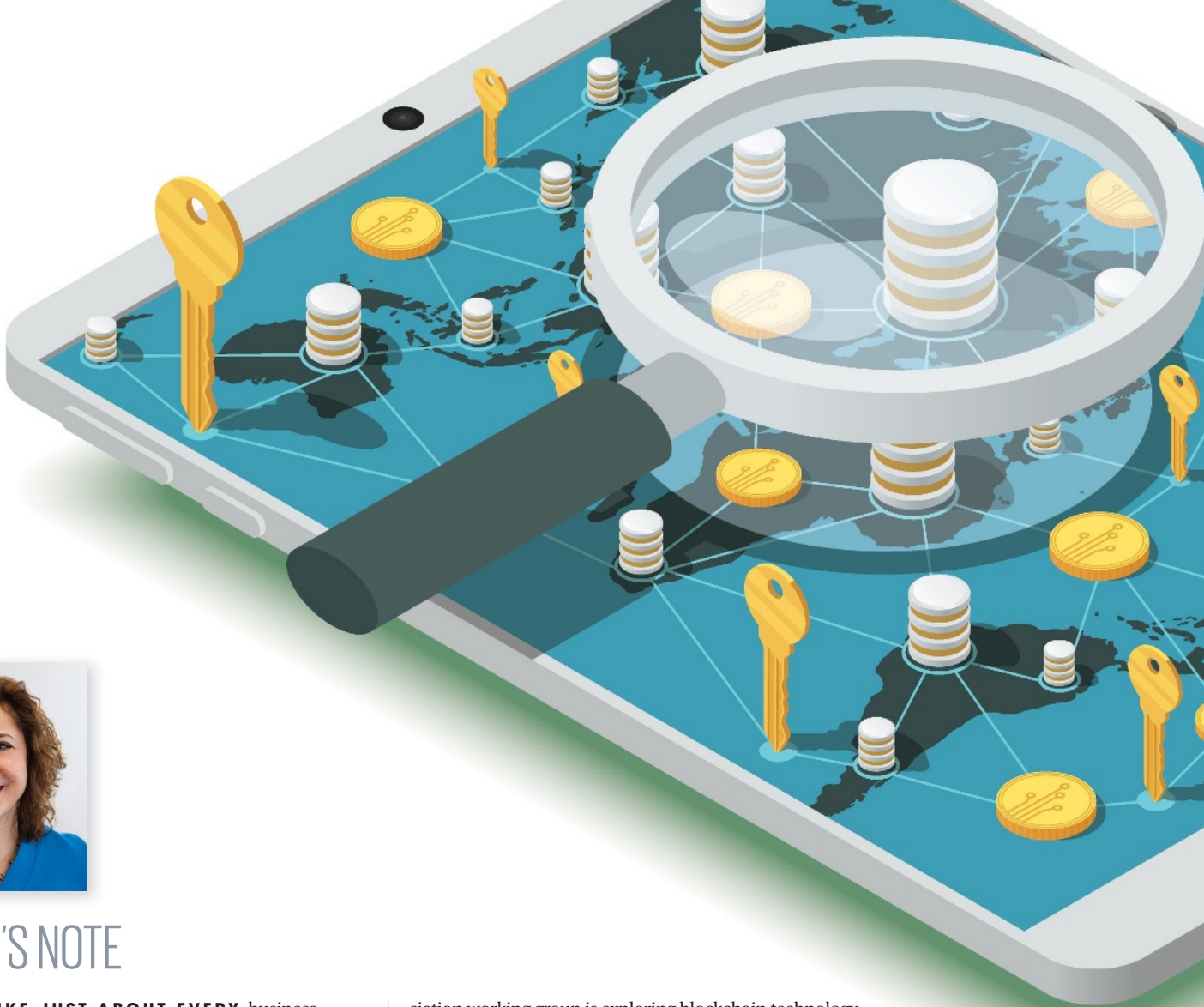
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IEEE International Conference on Industrial Applications of Engineering Sciences, Dubai



13-18

IEEE Meeting Series, Tampa, Fla.



EDITOR'S NOTE

IT SEEMS LIKE JUST ABOUT EVERY business article I read nowadays hypes how blockchain technology is going to change the world. The technology first got noticed for supporting Bitcoin and other cryptocurrencies with its secure, transparent, and decentralized design for record-keeping.

Any industry that keeps records could use the distributed ledger to improve its operations, but most organizations and engineers don't yet have a handle on the technology. To help get them up to speed, IEEE this year launched its Blockchain Initiative, featured in our cover story [right].

The article explains how, for example, the health care industry could adopt the technology for medical records to help ensure a medical professional was not negligent. Another way the technology could be useful is for creating and storing smart contracts: legal documents that use digital signatures. Several companies are using blockchain systems to handle tasks such as finalizing a will and signing a contract without the need for an attorney or real estate agent.

Members are forming groups around the world to focus on how blockchain applications can meet local needs. There are groups in China, Switzerland, Ukraine, and the United States, with more on the way.

Blockchain also might be able to save lives. Almost 1 in 10 people around the world get a foodborne disease each year, and about 420,000 die as a result. I was lucky enough not to eat the E. coli-tainted romaine lettuce that sickened more than 200 people in the United States this year. It took government investigators two months to track the lettuce back to the grower. On page 6, I write about how an IEEE Standards Asso-

ciation working group is exploring blockchain technology for tracking the source of foodborne illness to more quickly contain an outbreak.

Some companies have figured out how the technology can help them. On page 7, we look at unexpected ways blockchain is being used.

I'm always honored to meet an IEEE Fellow. These senior members or life senior members receive the highest recognition the organization can bestow because of their extraordinary record of accomplishments. But first someone has to take the time to nominate a Fellow candidate. Frankly speaking, the process isn't that easy. The form can be difficult to fill out. That's why the IEEE Fellow committee has introduced several changes. Learn what they are on page 11.

In President Jefferies' final column [p. 9], he talks about how IEEE members contribute their diverse experiences, viewpoints, and interests to yield exceptional results. He says their innovation and creativity in meeting challenges and opening new opportunities—that magic of IEEE's people—will ensure the organization's future. He plans to work with the incoming president, José M.F. Moura, and the IEEE Board of Directors on a strategic focus for the organization.

Congratulations to Toshio Fukuda, who won the election to become IEEE's 2019 president-elect. Read about him on page 2.

—Kathy Pretz, editor in chief
@kathypretz

To comment on articles in this issue, visit <http://theinstitute.ieee.org/December2018>



Blockchain Initiative Helps Advance the Decentralized Ledger

BY MONICA ROZENFELD

BLOCKCHAIN HAS become a buzzword in the past couple of years, but many people still don't know what the technology can do. Best known as the foundation of cryptocurrency transactions, the decentralized ledger has the potential to replace existing databases, providing more transparency and security. It could be adopted by nearly every industry including energy, finance, health care, manufacturing, real estate, and transportation.

To help advance the technology, IEEE launched its Blockchain Initiative in January, and dozens of activities are underway. They include standards development and e-learning courses, as well as conferences. Groups have been formed, or are under way, worldwide to focus on blockchain applications based on local needs.

The initiative's efforts are in collaboration with the IEEE Computer Society, the IEEE Reliability Society, and the IEEE Standards Association (IEEE-SA). Nearly 200 volunteers are involved.

"This is a grassroots effort that gives technical communities the ability to advance blockchain, and inform one another about aspects of the technology they haven't thought about," says Tim Kostyk, who is overseeing the initiative. He is the senior program director of IEEE Future Directions, the organization's R&D arm. "The more people who are involved, the more the technology benefits."

BEYOND THE HYPE

One of the biggest advantages of a blockchain system over current databases, Kostyk says, is that it provides provenance: proof of ownership. "Blockchain allows for traceability in which users can see who had their hands on a product or service and at what point in time," he says.

A blockchain database records every transaction and makes that record visible to all participants. Moreover, each transaction is blocked by the transaction that comes after it, making it nearly impossible to delete or edit previous records.

The health care industry could benefit from adopting the technology for medical records to help ensure a medical professional was not negligent. Doctors would record detailed information about medications prescribed, vaccines given, exams conducted, and surgeries performed.

That information would be locked in a permanent ledger, not only providing the ability for patient records to be accessed by different medical providers but also making it nearly impossible for information to be deleted or edited—protecting against false malpractice allegations. IEEE is holding workshops and developing standards to advance blockchain technology for medical records.

Blockchain technology also could help ensure food safety. Retail giant Walmart, for example, is using it to track its produce, from farms to store shelves. That helps ensure items have not been contaminated and are not past their sell-by date.

Another way blockchain technology could be useful, Kostyk says, is for creating and storing smart contracts: legal documents that use digital signatures. Several companies are emerging to provide blockchain systems to handle tasks such as finalizing a will and signing a contract without the need for an attorney or real estate agent. Users have their own

private key assigned to each transaction that acts as a personal digital signature. It would be nearly impossible to delete or edit a legal document once it was recorded on the ledger.

FILLING THE GAPS

To advance blockchain technology, and to ensure the systems are secure, more education is needed. That's why the initiative is offering e-learning courses and webinars to help educate technologists.

In partnership with IEEE-SA, the initiative has a variety of standards development projects in the works. The conformance and authentication project, for example, is developing a rating system to gauge the level of performance of each blockchain platform, measuring its efficiency and security.

Other projects include developing standards for blockchain use for utilities and energy infrastructure as well as for the Internet of Things.

The initiative publishes an e-newsletter, which is distributed to its technical community of 1,600 subscribers.

LOCAL GROUPS

Something unique to the IEEE Blockchain Initiative is its formation of local groups around the globe. The idea is to allow participants to focus on aspects of the technology that suit their local needs, says Senior Member Ramesh Ramadoss, co-chair of the initiative and chair of the IEEE P2418.1 Blockchain Standards working group.

"Some groups are interested in blockchain because of cryptocurrency, others for government projects or public financing for projects in underserved areas," Ramadoss says. "We let them decide how to get involved locally through their section and globally through the initiative."

Groups are being formed in Canada, China, India, South Korea, Switzerland, Ukraine, and the United States, with more on the way. The local groups network through a virtual forum and at various in-person events.

The initiative is becoming so well known that many non-IEEE members from IBM, Oracle, and other companies are getting involved and sponsoring events, Kostyk says.

"The more blockchain advances," he says, "the more it's considered credible and the more people are going to invest in, develop, and standardize it." ♦

How Blockchain Could Trace Food From Farm to Fork

BY KATHY PRETZ

DURING A foodborne-illness outbreak, identifying the root cause of the contamination can be difficult. The food supply chain includes a lot of players—farmers, distributors, processors, packagers, and grocers—often from different regions or even multiple countries. Each business in the chain has its own private record-keeping system; some still use pen and paper.

An E. coli outbreak in the United States that began in April—the largest in more than a decade—came from tainted romaine lettuce that sickened more than 200 people in 36 states. It took government investigators two months to track the lettuce back to a grower in Yuma, Ariz.

Almost 10 percent of people around the world get a foodborne disease each year. Of those 600 million people, 420,000 die as a result, according to the World Health Organization.

IEEE and several other organizations are exploring how blockchain technology could track the source of an outbreak and help contain it. Rather than each company storing information in its own system, the businesses would contribute encrypted blocks of data to a distributed ledger that could be monitored and verified.

Through data provenance, or proof of ownership, blockchain provides the ability to isolate where in the supply chain a problem occurred. This could lead to a more targeted recall process and create less risk for consumers and other stakeholders.

To help provide definitions and protocols for such a ledger, the IEEE Standards

Association formed the IEEE 2418.3 Standard for the Framework of Distributed Ledger Technology (DLT) Use in Agriculture working group.

“With rising consumer consciousness toward food safety and food sources, DLT can play a vital role in delivering a new level of service to customers,” Maria

RECORD-KEEPING

For the most part, consumers have no way of knowing where their food comes from. In the case of the tainted romaine this year, the lettuce was supplied to restaurants and retailers through multiple sources.

“When the lettuce gets to the supermarket, the package notes its distributor, but

chain caused by data control and silos.”

Part of the problem with tracking is that many in the supply chain still keep only paper records, she says, adding, “This is generally true whether it’s flowers or food.” Another advantage of a blockchain system over current databases, she says, is that it

There are additional viable uses for blockchain technology in agriculture, Palombini says, such as combating the sale of counterfeit and low-quality seeds. Such seeds can fail to germinate or produce deformed plants, affecting crop yield. The ledger also could verify the source of specialized seeds such as non-genetically modified and organic varieties.

“Seed companies can put the origination of their stock on the blockchain so farmers and others impacted on the food value chain would be able to verify the source of seeds,” Palombini says.

NEW REVENUE STREAMS

DLT could provide innovative opportunities to help increase small farmers’ revenue and their access to capital. In general, small farmers lack the relationships and access to distributors and retailers to sell their excess inventory.

Farmers now can advertise their produce on blockchain exchanges monitored by verified wholesalers and distributors, according to Palombini. Once an exchange is fulfilled, the sale is documented. Not only does that eliminate food waste, it also could help farmers obtain loans, because they have digital proof of inventory and a tamper-resistant sales record.

“This opens new opportunities for growers, not only for increasing their revenue but also for obtaining financing to expand their farm operations—which is one of the biggest problems they face right now,” Palombini says. ♦

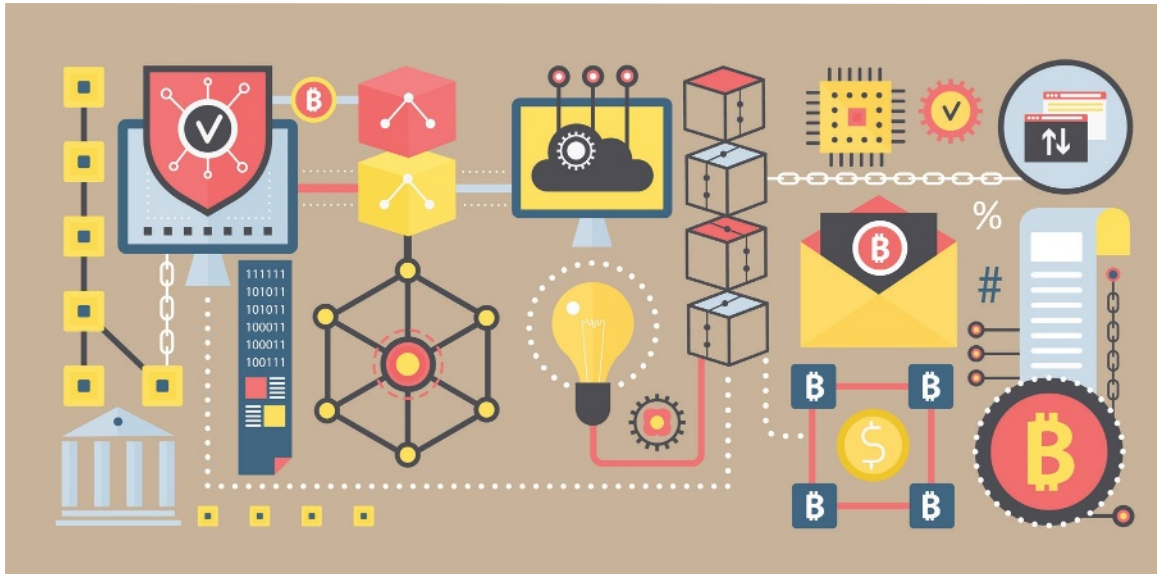


Palombini says. She’s the emerging communities and opportunities development director for the IEEE Standards Association’s Global Business Strategy and Intelligence group.

neither the consumer nor the grocer knows whether the head of lettuce was grown in Arizona or elsewhere,” Palombini says.

“That’s because there is a lack of visibility of the supply

provides proof of ownership. Every food product would have some kind of identifier—a label, a bar code, an RFID tag, or a sensor—recorded in the ledger, making it easier to verify its source.



Five Surprising Blockchain Applications

BY MONICA ROZENFELD

BLOCKCHAIN IS perhaps best known as the underlying technology to support cryptocurrency transactions. But the decentralized ledger has the potential to be adopted for a host of other applications, replacing existing systems to provide more transparency and security.

Blockchain involves a database that records every transaction and makes it visible to all participants with access to the network. Moreover, each transaction is blocked by the transaction that comes after, making it almost impossible to delete or edit previous records. That keeps people from hiding fraud and malpractice.

Here are a few ways the technology could be implemented to improve current methods.

HUMAN RESOURCES

According to a survey commissioned by job website CareerBuilder, 58 percent of employers have caught a lie on a résumé. Verifying an employee's credentials can be difficult and time-consuming.

A few startups and human resource vendors are working to design blockchain systems that store verified information about a candidate pulled from multiple sources including prior jobs and criminal records. The systems would let a hiring company pull up a prospective candidate's profile within

minutes—which would be especially useful for positions that need to be filled quickly or in industries that have high turnover, such as retail.

Such human-resource-management systems have the potential to replace résumés altogether. Once employees are hired, companies could add additional information to their profiles, such as performance reviews, as a way to store information about each worker in one place.

MONITORING FISH SUPPLY

Did you know that 20 percent to 30 percent of the seafood sold in the United States is caught illegally? Blockchain technology could help ensure that the fishing industry is legally compliant, letting the food industry know where fish were caught and by whom. A blockchain system would allow everyone involved in the supply chain, including those who sell fishing supplies, fishing companies, fishmongers, and customers, to have access to that information.

This year the World Wildlife Fund partnered with the Ethereum blockchain company ConsenSys and fishing export company SeaQuest Fiji to implement a system that verifies where, when, and how tuna are caught. The goal is to share the information with consumers. According to market research company CB Insights, shop-

pers eventually will be able to scan a QR code on the package to confirm that they're buying legally caught tuna, and whether sustainable, eco-friendly practices were used.

PROTECTING COPYRIGHT

Whether it's illegally sharing music or images, copyright violations can be difficult to monitor and penalize.

Under U.S. law, copyright holders have exclusive rights to their original works. Commercial use of the works without permission is a copyright infringement. By using a blockchain-based platform such as Binded or Copytrack, a photographer could upload her images and the ledger would establish ownership with a digital stamp. Such systems would then crawl the Web to track where and how the art is being used, such as for marketing purposes.

Copytrack says it receives on average US \$2.5 million per month in claims from illegal use of content stored on its platform.

The company also can set up licensing agreements for those who wish to legally use materials stored on its platform.

TRACKING GUNS

A blockchain system could help track gun ownership, from the manufacturer to the purchaser. The system would

store the buyer's information, including previous gun purchases and background checks. The ledger would be accessible to gun shops and regulators.

Blocksafe is developing a system to monitor the purchases of new smart weapons that are equipped with sensors and a decentralized VPN, which allows for the weapon to send and receive data to and from the blockchain system. The system would be able to track a gun's location, which is especially useful when the weapon has been lost or stolen. The smart guns also can send real-time data about when and where they were fired, and even provide detailed information such as the angle at which they were aimed, according to a *Fast Company* article.

In the future, it might be possible to link names on the U.S. no-fly list—people prohibited from boarding commercial aircraft for travel to, within, or out of the United States—to a blockchain system to prevent unlawful gun purchases by those on the list. Some countries might even be able to include the gun owner's mental health records and Internet browsing history on blockchain, according to a *Futurism* article.

STORING YOUR IDENTITY

Instead of having a birth certificate, a driver's license, and a passport as forms of identification, blockchain could provide everyone with a digital ID that includes all their personal information.

IEEE Senior Member Monique Morrow, CTO of Cisco Services, has proposed identity-as-a-service using a blockchain platform to provide a secure means of identifying every person on Earth. The owner could access her documents through the system, and it could be set up so that identity would be confirmed using the owner's biometrics, Morrow explains.

People displaced due to a natural disaster or conflict who are without documentation could be identified through the blockchain system. The layered security of a blockchain system also would make it more difficult to steal, falsify, or lose important documents—helping to prevent identity theft, Morrow adds.

She is working on a prototype of what she is calling the Humanized Internet, which would help provide everyone with an ID. According to a UNICEF report, a third of children younger than 5 have not been issued a birth certificate. Children who are unregistered at birth or without identification documents often are excluded from access to education, health care, and social services, the report states. ♦

Sparking Conversation

Our blog posts inspired comments from readers



Why Engineering Schools Are Getting More Serious About Teaching Ethics

THE IMPACT THAT autonomous and intelligent systems might have on society is becoming more concerning to engineering schools and other observers. Cornell, Harvard, MIT, Stanford, and the University of Texas recently introduced courses that put more emphasis on ethics when designing autonomous and intelligent systems.

IEEE agrees more importance should be placed on ethics education. At its TechEthics panel discussion last year, panelist Deborah G. Johnson, a retired professor of applied ethics at the University of Virginia's School of Engineering and Applied Science, in Charlottesville, said, "We have to keep stressing that engineering is a social activity, and a part of it is to act on this idea that what engineers are doing has social effects."

My father would say, "The best way to teach people ethics is to treat them ethically." That's advice to take to heart.

I have some reservations about how ethics are taught at

the college level. Or maybe it's more that we wait until the college level. When I was doing my undergrad, I was in a program under ABET evaluation, so ethics training was

on the faculty's mind. I ended up taking a plain-vanilla 101-style ethics course and the closest thing available to a technical ethics course, a medical ethics course. I learned about your Kants and your Utilitarianisms and all that. That does have the value of teaching you how to argue that a situation is right or wrong with better firepower than "because I said so."

That's all fine and good, but—much like the technology we develop—ethical training is a tool: You can use it for the dark purpose of justifying negative actions just as well as justifying positive ones. A good technical ethics course should do more than just teach about how to put the argument together; it should give examples of scientists and engineers behaving ethically.

We should lionize upstanding scientists and engineers in our culture as examples of real heroism. If you want to teach people to be ethical, you really need to get them young.

—*vertigo*

Ethics should be required coursework in universities for all disciplines. There are not just societal implications to nearly all fields of study. In a global view, there are instances where some things may be legal and ethical in one country but not in another. Students need to become aware of that early on so that it guides their professional work throughout their career.

—*pjgeneva*

Engineering truly is a social activity that has great social ramifications. Thus the need for infusing ethics into engineers and engineering students cannot be overemphasized.

—*Charles*

Will Amazon Disrupt the U.S. Health Care System?

HERE'S MUCH ANTICIPATION that Amazon will improve the U.S. health care industry once its new venture with Berkshire Hathaway and JPMorgan Chase gets going. The online shopping giant has teamed up with the holding company and the largest bank in the United States to form a nonprofit company aimed at lowering health care costs for their combined 1.2 million employees.

Some skeptics question whether the new venture will be able to accomplish what other companies have failed to do. But other observers anticipate that Amazon will disrupt the health care industry as it did with bookselling, shopping, and space exploration and, along the way, cut costs for consumers.

As a physician who has been advocating for technology to disrupt the current system, I am really excited about this. Human physiology has not changed much in hundreds of thousands of years. In the past century since the Flexner Report, we have made some diagnostic and treatment advances but lost the context, care, and compassion that should be part of medicine. The current system has assessed a minimum competency (which is good) but also attracts opportunistic, self-serving, and occasionally sociopathic personalities who use the system for personal gain (not good). Computer algorithms are objective

and far more accurate in achieving diagnoses. The future of medicine and physicians will be to act as holistic interpreters of pathophysiology and put them in perspective of each individual's life and purpose. My hope is that this technological advance will put back the warmth, wisdom, and compassion that should distinguish the medical profession, no matter the role of the practitioner.

—*RTMis*

If Amazon creates the proper nonprofit structure and work environment, and can stimulate competition from the health care companies, then this could work.

—*jamesplatts*

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PRESIDENT'S COLUMN



The Magic of IEEE Members

Our people are the basis of our success

JIM JEFFERIES IEEE PRESIDENT AND CEO

NO MATTER THE country, the type of event, or the demographics of the individual—whether experienced or young professional, male or female, volunteer or staff—the common denominator of IEEE's success is our people. Our engaged and inspired members make IEEE a unique, respected voice. IEEE as an institute is centered on our members, who create the value of IEEE, guide the organization's direction, and allow IEEE to have such a strong impact on the world. Our volunteer leadership is envied everywhere and embodied in our mission and values.

Engaging all our members and updating our membership model has been part of my strategic agenda and actively engaged by the IEEE Board of Directors. While our mission is directed to advancing technology and the profession for public good, members are the gateway to constantly test our value propositions and our ability to meet contemporary needs—both technical and professional.

We need to identify the reasons why members joined and what is keeping them part of the organization. We need to be open to alternative membership arrangements. Our basic business models are under pressure from alternative publishing and convention options. We need to maintain their strength to keep our stature as well as to support our essential mission in educational, humanitarian, and public policy activities.

STAYING SUCCESSFUL

To assure our continued success, we must be at the leading edge, engaging industry and other partners, and providing an ever-expanding range of multidisciplinary com-

munities. We need the support of our volunteer leaders in setting priorities and applying innovation so we can commit quickly to new opportunities while also being willing to discontinue those activities whose value may be declining. It also requires special attention to the importance of staff and volunteer relationships.

Although our societies traditionally have had the lead in the technical area, there is room to grow the richness of our forums by including additional perspectives. Some progressive forums are already offering greater inclusion via creative sharing arrangements, cooperative workshops, and multidisciplinary foci.

Affinity groups, like Young Professionals, Women in Engineering, Consultants, Life Members, and Entrepreneurs, are also a force in directing wider member inclusion and highlighting examples of success. There is strength in our unity, but it will take a subtle yet constant push to move it forward. A good place to start is at the local chapter level where there is a greater alignment with the needs and goals of the local section and a range of leadership opportunities available.

A VIEW TO THE FUTURE

What I envision is our entire IEEE community, at all levels, engaging in activities that actively work toward creating a vision of that future that is attainable by each group, from the smallest section or chapter to the largest board.

We have a responsibility to keep the magic going. We do that when we recognize and reward, when our tools help reshape a career, when our publication opens a new insight, when our conference builds a new community, when history and STEM outreach create

excitement, when our standards or policy influence the future direction of technology, when we link technology solutions to humanitarian issues, when we leverage our impact through our Foundation, and when we open new, diverse leadership opportunities.

Looking toward the future, I am excited about the possibilities for an organization as diverse and dynamic as ours. With the support of the people of IEEE, there is no limit to our successes. Our varied members bring together their diverse experiences, viewpoints, and interests to yield extraordinary accomplishments. That is what unites us in a truly global community as engineering and technical professionals and as IEEE members defined by a commitment to advancing technology to benefit humanity through our work.

It was my experience as a member that has encouraged me to devote my time and energy to IEEE, and I know that every volunteer I meet values being part of our technical professional community. The strength of IEEE is built from the bottom up. Those who attend local meetings, share their knowledge and experience, and help with the heavy lifting of coordinating and communicating IEEE activities are the heroes who make IEEE strong.

We also have the ability to continue drawing and refreshing our volunteers from an incredible pool of members. They are the reason we have not exhausted all the potential for the future in continuing to grow in size and stature.

It is that innovation and creativity in meeting challenges and opening new opportunities—that *magic* of IEEE's people—that will create and ensure our envisioned future.

Please share your thoughts with me at president@ieee.org. ♦



Recommend a Candidate for an IEEE Award

Recognize colleagues by nominating them for IEEE's highest awards

BY LYNN FRASSETTI

EACH YEAR IEEE PAYS TRIBUTE to technical professionals whose outstanding contributions have made a lasting impact on technology and the engineering profession. The IEEE Awards program seeks nominations annually for IEEE's top awards—Medals, Recognitions, and Technical Field Awards—that are given on behalf of the IEEE Board of Directors.

The Medals and Recognitions are presented at the annual IEEE Honors Ceremony. The 2019 event is scheduled for 17 May at the Marriott Marquis San Diego Marina, in conjunction with the IEEE Vision, Innovation, and Challenges Summit.

You don't have to be an IEEE member to receive an award or to nominate or endorse a candidate. Nominations for 2020 IEEE Technical Field Awards are due by 15 January, and ones for medals and recognitions are due by 15 June. These are annual deadlines.

For help with submitting a nomination—including award criteria, candidate eligibility, and submission guidelines—visit <https://www.ieee.org/about/awards/awards-guidelines.html>. For a list of IEEE awards accepting nominations and to download nomination forms, visit <http://www.ieee.org/awards>.

The IEEE Awards Board has an ongoing initiative to increase diversity among its selection committees and candidates, including their technical discipline, geography, and gender. Help by nominating a colleague for one of the following:

IEEE MEDALS AND RECOGNITIONS

IEEE Medal of Honor

For an exceptional contribution or an extraordinary career in the IEEE fields of interest.

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IEEE Alexander Graham Bell Medal

For exceptional contributions to communications and networking sciences and engineering.

SPONSOR: Nokia Bell Labs

IEEE Edison Medal

For a career of meritorious achievement in electrical science, electrical engineering, or the electrical arts.

SPONSOR: Samsung Electronics Co. Ltd.

IEEE Medal for Environmental and Safety Technologies

For outstanding accomplishments in the application of technology in the fields of interest of IEEE that improve the environment and/or public safety.

SPONSOR: Toyota Motor Corp.

IEEE Founders Medal

For outstanding contributions in the leadership, planning, and administration of affairs of great value to the electrical and electronics engineering profession.

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IEEE Richard W. Hamming Medal

For exceptional contributions to information sciences, systems, and technology.

SPONSOR: Qualcomm Inc.

IEEE Medal for Innovations in Healthcare Technology

For exceptional contributions to technologies and applications benefitting healthcare, medicine, and the health sciences.

SPONSOR: IEEE Engineering in Medicine and Biology Society

IEEE Jack S. Kilby Signal Processing Medal

For outstanding achievements in signal processing.

SPONSOR: Texas Instruments Inc.

IEEE James H. Mulligan, Jr. Education Medal

For a career of outstanding contributions to education in the fields of interest of IEEE.

SPONSORS: MathWorks, Pearson, and the IEEE Life Members Fund

IEEE Jun-ichi Nishizawa Medal

For outstanding contributions to material and device science and technology, including practical application.

SPONSOR: The Federation of Electric Power Companies, Japan

IEEE Robert N. Noyce Medal

For exceptional contributions to the microelectronics industry.

SPONSOR: Intel Foundation

IEEE Dennis J. Picard Medal for Radar Technologies and Applications

For outstanding accomplishments in advancing the fields of radar technologies and their applications.

SPONSOR: Raytheon Co.

IEEE Medal in Power Engineering

For outstanding contributions to the technology associated with the generation, transmission, distribution, application, and utilization of electric power for the betterment of society.

SPONSORS: IEEE Industry Applications, IEEE Industrial Electronics, IEEE Power Electronics, and IEEE Power & Energy societies

IEEE Simon Ramo Medal

For exceptional achievement in systems engineering and systems science.

SPONSOR: Northrop Grumman Corp.

IEEE John von Neumann Medal

For outstanding achievements in computer-related science and technology.

SPONSOR: IBM Corp.

IEEE CORPORATE RECOGNITIONS

IEEE Corporate Innovation Award

For an outstanding innovation by an organization in an IEEE field of interest.

SPONSOR: IEEE

IEEE SERVICE AWARDS

IEEE Richard M. Emberson Award

For distinguished service advancing the technical objectives of the IEEE.

SPONSOR: IEEE Technical Activities Board

IEEE Haraden Pratt Award

For outstanding volunteer service to the IEEE.

SPONSOR: IEEE Foundation

IEEE Honorary Membership

To individuals not members of the IEEE, who have rendered meritorious service to humanity in IEEE's designated fields of interest.

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IEEE Theodore W. Hissey Outstanding Young Professional Award

For contributions to the technical community and IEEE fields of interest.

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Questions? Email awards@ieee.org or call +1 732 562 3844.

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It's Now Easier to Nominate a Potential Fellow

BY STEFANO GALLI

LAST YEAR the IEEE Board of Directors and the Fellow Committee approved an amendment to the committee's operations manual that is expected to allow the committee to operate more efficiently.

One important modification is related to the nomination process. The number of required references for a nominee has been reduced to between three and five, from the original five to eight. This policy change hopefully will increase the number of nominees from industry, whose nominators often have struggled to find enough Fellows to serve as references, especially when the nominee was not involved in scholarly activities.

The committee also made several changes to the Fellow nomination form, which is now effective with the current nomination cycle, for the class of 2020. The deadline for nominations for that class is 1 March 2019.

The changes include:

- ◆ A more structured, streamlined form that elicits crisper, more focused narratives of the candidate's accomplishments.
- ◆ Removal of potential ambiguities concerning the nominee's identity by encouraging the inclusion of a common "disambiguation identifier" such as *open researcher* and *contributor ID*, *researcher ID*, or *Scopus author ID*. An identifier is a unique and persistent number that is assigned to a group of documents written by the same author and help attribute papers to the right author. This is particularly useful when a nominee has a common name and most of the presented evidence is based on scholarly papers.
- ◆ Clearer identification of the nominee's one or two most distinctive technical contributions.
- ◆ A more structured way to list technical accomplishments and the nominee's IEEE and non-IEEE activities.
- ◆ A new section to list awards from IEEE as well as those from other organizations.

- ◆ Reducing the number of words to 15 from 20 for the award's citation.

THREE NEW GUIDES

The nomination form is the most critical document for making the case for elevation to IEEE Fellow. Many nominations are unsuccessful because the information is poorly written or does not follow the requirements. In the committee's continuing efforts to educate those involved in the Fellow nomination and evaluation process, it has issued three recommendation guides.

The document also clarifies the difference between references and endorsers. Both support the case for elevation, but they serve different purposes. The references are to provide an independent evaluation of, and support for, the nominee. Therefore, they should be experts in the nominee's technical field and be familiar with the person's contributions and the impact they have on the profession, society, or both. All references must be Fellows in good standing, with the exception of those from IEEE Region 9, who may be senior members or life senior members.

An endorser, who does not need to be an IEEE Fellow or otherwise affiliated with IEEE, strengthens the nomination but only by providing specific evidence highlighting the nominee's contributions and their impact. Endorsements can be helpful for those candidates who perform proprietary or classified work, for which public evidence is often not available. The most effective endorsements come from a company officer, program director, or committee chair of a technical community or standards body.

The "Effective References and Endorsements" guide aims to provide a

better understanding of roles and responsibilities. It includes best practices for making effective letters of support, as well as a list of things to avoid.

The "Society/Technical Council Evaluators and IEEE Judges" guide includes the best practices for assessing a nominee's accomplishments. Nominators are encouraged to read this guide to get a better understanding of what evaluators and judges are looking for in the application and how they weigh the supporting information.

All three guides can be found at <https://www.ieee.org/fellows>, under the Fellow Guides header. ◆

IEEE Fellow Stefano Galli is the 2018 IEEE Fellow Committee chair.



The "How to Write an Effective Nomination" guide provides examples and best practices from the perspective of those who are evaluating the nominations. It includes advice on how to choose the right nomination category. These are the categories: application engineer/practitioner, educator, research engineer/scientist, and technical leader.

The guide also describes who makes an effective reference, and suggests when and how to solicit endorsements. It walks the nominator through the form, section by section, helping the person convey the impact of the candidate's contributions for evaluators who might not be familiar with the specific area of work.



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