IEEE Standards Education e-Magazine

The IEEE Standards Education e-Magazine: A publication for those who learn, teach, use, deploy, develop and enjoy Standards! Sponsored by the Standards Education Committee IEEE is committed to: promoting the importance of standards in meeting technical, economic, environmental, and societal challenges; disseminating learning materials on the application of standards in the design and development aspects of educational programs; actively promoting the integration of standards into academic programs; providing short courses about standards needed in the design and development phases of professional practice. Serving the community of students, educators, practitioners, developers and standards users, we are building a community of standards education for the benefit of humanity. Join us as we explore the three fundamental dynamics of standards--technology, economics and politics, and enjoy our feature articles about the use, deployment, implementation and creation of technical standards.

The IEEE Standards Education e-Magazine
2nd Quarter 2014, Vol. 4, No. 1

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Letter from the Editor-in-Chief

Yatin Trivedi

2nd Quarter 2014

Perhaps the technology industry has never had a stronger craze (and the hype) than the latest one; stronger than the craze for personal computers in the 80s and the 90s, or the craze to connect to the "net" at the turn of the millennia, or the must-have smartphones in the last five years. When I say craze, I mean it in the most positive manner. Not only did it change the way people did their work in the office or at home, but it also changed the way we communicate with each other and manage our money (BitCoins, anyone?). Of course, the latest craze I am talking about is the Internet of Things, or IoT.

When the computers – personal or otherwise – first came on the scene it was mostly for scientific applications and you had to be the "smart one" to see the need for it. But the second wave that followed the nerds was like a tsunami. Computers became the way of life and we have never looked back. The same thing happened when the slow modems created the early internet traffic for the brainiacs, and the second wave enveloped the rest of us in such a hurry that we can't remember the days without connectivity. The only difference in the next mega-sweeping-changes to be brought by IoT is that instead of, or in addition to, people being swept up, it will be the machines and things that will be morphed beyond recognition.

So where do standards and education fit in this IoT equation? Simple – communication standards have played a tremendous role in the success of computers and consumer devices. Internet, as we know it with its warts and all, is based on layers upon layers of standards that range from the fibers and cables to media access controllers (MACs), to packet structures for transmitting data, to secure data access and privacy policies for applications. Of course standards are important and essential. The engineers who built and tested the infrastructure and the equipment learned these standards at the university or at work. Some of that learning happened by plan and foresight, but most happened by necessity to engage in particular project which required long hours and learning just enough to get the work done.

Unless we plan well ahead, we will face the same challenges for a skilled workforce to build the new world of IoT. Applications are many and the promises are enormous, but the foundation needs to be solid. There are many new standards coming up, and many old standards are getting a makeover to suit the new innovative applications. Hence this issue of Standards Education eZine is focused on IoT. We have some of the leaders from IEEE's IoT initiative contributing to this issue. If you are teaching IoT in any of its forms, and would like to contribute to the knowledge body, please write to us. We would love to provide access to your courses or other learning materials on-line.

Learn. Teach. Share an opinion. Enjoy!

Yatin Trivedi
Editor-in-Chief

Yatin Trivedi, Editor-in-Chief, is Director of Standards and Interoperability Programs at Synopsys. He is a member of the IEEE Standards Association Standards Board (SASB), Standards Education Committee (SEC), Corporate Advisory Group (CAG), New Standards Committee (NesCom), Audit Committee (AudCom), Industry Connections Committee (ICCom) and serves as vice-chair for Design Automation Standards Committee (DASC). Since 2012 Yatin has served as the Standards Board representative to IEEE Education Activities Board (EAB). He represents Synopsys on the Board of Directors of the IEEE-ISTO and on the Board of Directors of Accellera. He represents Synopsys on several standards committees (working groups) and manages interoperability initiatives under the corporate strategic marketing group. He also works closely with the Synopsys University program.

In 1992, Yatin co-founded Seva Technologies as one of the early Design Services companies in Silicon Valley. He co-authored the first book on Verilog HDL in 1990 and was the Editor of IEEE Std 1364-1995™ and IEEE Std 1364-2001™. He also started, managed and taught courses in VLSI Design Engineering curriculum at UC Santa Cruz extension (1990-2001). Yatin started his career at AMD and also worked at Sun Microsystems.
Yatin received his B.E. (Hons) EEE from BITS, Pilani and the M.S. Computer Engineering from Case Western Reserve University, Cleveland. He is a Senior Member of the IEEE and a member of IEEE-HKN Honor Society.

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Welcome to the IEEE Standards Education e-Magazine

A publication for those who learn, teach, use, deploy, develop and enjoy Standards!

Technical standards are formal documents that establish uniform engineering or technical criteria, methods, processes and practices developed through an accredited consensus process.

Standards are:

- developed based on guiding principles of openness, balance, consensus, and due process;
- established in order to meet technical, safety, regulatory, societal and market needs;
- catalysts for technological innovation and global market competition.
- Knowledge of standards can help facilitate the transition from classroom to professional practice by aligning educational concepts with real-world applications.

IEEE is committed to:

- promoting the importance of standards in meeting technical, economic, environmental, and societal challenges;
- disseminating learning materials on the application of standards in the design and development aspects of educational programs;
- actively promoting the integration of standards into academic programs;
- providing short courses about standards needed in the design and development phases of professional practice.

Serving the community of students, educators, practitioners, developers and standards users, we are building a community of standards education for the benefit of humanity. Join us as we explore the dynamic world of standards!

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A Word from the Chair, IEEE Standards Education Committee

By Dr. James Irvine, Chair, IEEE Standards Education Committee

2nd Quarter 2014

It gives me great pleasure to write this having been elected to chair the Standards Education Committee for 2014. I am lucky to chair the SEC at a very exciting time, when a number of programmes started under my predecessors Yatin Trivedi and before him David Law are starting to bear fruit.

As reported elsewhere in this magazine, SEC has been running **workshops educating students in the standards development process**, and its long-running student grant programme continues to grow and attract entries from all corners of the world. We also provide resources for professors who wish to include standards in their curricula. In 2014, we plan to take these activities to the next level through a new initiative which will contain an exciting new on-line course on standards, and provide increased and more coordinated activities in our existing programmes.
We continue to co-operate with other organisations interested in standards education, such as ITU, ISO and ANSI. Over the next couple of months, we will be presenting at the Capstone Design Conference in the US, and at the ITU Kaleidoscope conference in St Petersburg, Russian Federation. We will also be involved in the IEEE Sections Congress in Amsterdam.

Another new initiative for the year is to use our experience of standards education to look more at educating technologists on policy. IEEE has many years of experience in informing policymakers on technology, particularly in the US but now also in Europe. However, the reverse has not always been the case.

I'm fortunate to work with a knowledgeable and enthusiastic group of staff and volunteers. However, you can never have too much of a good thing. If you would like to get involved, or simply have a good idea you think we should pursue, please get in touch.

Cheers

James

Dr. James Irvine is a Reader in the EEE Department at Strathclyde University in Glasgow. His research interests include resource management and security for wireless systems, and he works as Academic Co-ordinator within the Mobile VCE programme. Prior to this he worked on the ACTS MOSTRAIN project providing communication services to high speed trains. He holds four patents, with three more being pursued, and has authored

two books. Technical Programme Chair of VTC2004-Spring in Milan, Dr Irvine was elected in 2002 to the Board of the IEEE VTS, where he is chair of the VTS Technical Advisory Committee, and President for 2008-9. In 2014, he became Chair, IEEE Standards Education Committee.

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Feature Articles

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Designing for Wearables is Complex and Builds on Existing Strengths

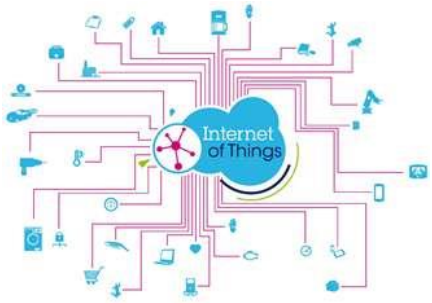
By Oleg Loginov

2nd Quarter 2014

Wearable electronics are cool! Consumers, manufacturers, and the media are all buzzing about it. Today, wearables hitting the market range from the purely functional to the purely fashionable, from implanted devices that keep the body working to devices worn or carried as optional accessories. And it is no longer just about humans! Dog collars with GPS locators and Bluetooth® tags are becoming a norm.

Developing products for this space is not easy. While people are rushing to cash in and design products for today's consumer, many issues need to be considered when developing products for the emerging Internet of Things (IoT) wearables sector including power, form factor and secure wireless connectivity. And, of course, it all needs be manufacturable.

Key considerations during design



As with any portable device, power is always a major consideration. People want devices that operate at least as long as they'll be away from a recharging source of power, and ideally even longer. And as difficult as it may be to stem the tide of feature creep, sometimes reducing features to increase battery life can actually improve the overall customer experience. So selecting power-efficient components – ideally smaller ones that don't get hot – is important early on in the design process.

In addition, consider the challenges associated with the selection of the final form factor of the product. A chosen form factor should be in harmony with the usage and placement scenarios and will need to consider factors such as heat, moisture protection, comfort and the aesthetics of the final product.

Finally, as the world becomes more connected, the security of the communications among objects is also becoming increasingly important. In addition to that the privacy of the data has to be protected as well. A person wearing a full-time heart-rate monitor would want assurances that this private medical data is properly protected and can only be accessed by people with explicit permission.

The open nature of IoT is a wonderful platform for collaboration, but it also requires the implementation of proper authentication mechanisms and privacy protection techniques in conjunction with a secure software foundation that aims to eliminate security holes and can isolate accidental or malicious failures and data leaks.

Experience has also made clear that as the value of an application increases, data privacy concerns also tend to increase and everyone wants assurances that their data will be used carefully and is well protected. For this purpose, we may soon have firewalls at microscale to preserve data and system integrity and safety. Essentially, the necessary layers of security should be appropriate to the criticality of the application. Ensuring privacy will be important for consumers to fully embrace the wearable market.

There is another twist in this story. A smart phone is a great example of what a wearable technology would face in the near future. Let's take our location data as an example; it is used by many applications to provide us either with the appropriate information or simply as a "payment" for the "free" use of an app. Similarly wearable devices will have an opportunity to source their data to multiple parties. An average heart rate could be something that a consumer is willing to expose, but a minute by minute heart rate coupled with the activity record could be much more private information. This example illustrates the need for multilevel data abstraction coupled with sophisticated multi-level data access control.

These are the most significant design obstacles for consideration before bringing a product to this rapidly growing market.

Technology available now

One reason for the interest and rapid growth of the wearables market is that existing technologies are being effectively applied to create useful products. In fact, there are an almost infinite number of combinations of four key semiconductor technologies that are already available in volumes.
The four technologies enabling most wearable applications are:

1. Sensors, which measure what's happening around us, from how fast we're moving and in which direction, to ambient air pressure, temperature, and relative humidity.
2. Powerful microcontrollers provide the application's "brain" while occupying just a few millimeters of board space. They are supported by extensive software libraries and development tools that help to accelerate application development.
3. Power management and control technologies extend battery life or enable battery-less operation via energy harvesting.
4. Wireless Communication technologies allow objects to communicate over distances.

Using combinations of these four existing technologies correctly can often leverage the work done with these products in other markets to address many of the wearables design issues discussed above.

The semiconductor players who will be most successful in wearables will be those that have the ability to create solutions from a complete portfolio of sense, power and embedded-processing components and offer leading-edge expertise in digital security – companies like STMicroelectronics.

With today's technology – and what will be developed in the future – the IoT as a whole offers enormous opportunity for development but the wearables market specifically is poised to grow exponentially in the coming years.

Oleg Logvinov is the Director of Special Assignments at STMicroelectronics' Industrial & Power Conversion Division. After graduating from the Technical University of Ukraine (KPI) with the equivalent of a Master's degree in electrical engineering, he worked as a senior researcher at the R&D Laboratory of the Ukraine Department of Energy at the KPI.

During the last 25 years Mr. Logvinov has held various senior technical and executive management positions in the telecommunications and networking industry. He currently serves on the IEEE Standards Association (IEEE-SA) Corporate Advisory Group and the IEEE-SA Standards Board. Mr. Logvinov also actively participates in several IEEE standards development working groups. He helped found the HomePlug Powerline Alliance and today serves as the Chief Technical Officer and Board Member of the Alliance. Mr. Logvinov has nineteen patents to his credit and has been an invited speaker on multiple occasions.

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Standards in the Internet of Things

By Gary Stuebing, Engineering Manager, IoT Standards, Cisco Systems; Member IEEE Standards Education Committee

2nd Quarter 2014

As a new member on the Standards Education Committee (SEC), I suppose as right of passing they ask you to contribute! So here I am.

When the SEC approached me, I asked what the IEEE Standards Education eZine Editorial Board was looking for, and they gave me a couple of ideas. It was suggested that I write an article on IoT in Education or an article talking about how standards impacted my life.

I picked up a book I had lying on my shelf and started to read about standards, when it struck me. There it was… an ISBN number. It was then that the whole idea of standards struck me from an inanimate book. I thought about my RFID library card and the books I had picked up at the library. I started thinking about that ISBN Number, and going to the library to find a book, check it out, read and return the book. I had the perfect object for the Internet of Things and the standards involved in making the process simpler! And in researching, I found that it wasn't as simple as I had first thought. In fact, a number of different processes and standards were involved. I want to warn you up front, this will not be a detailed or comprehensive look at the entire world of books and standards! Nor will I go through the myriad of standards related to books! I'm going to graze over the highpoints and hopefully make some points we can all agree on at the end.

As I thought about book standards, it occurred to me that the first standard for books is language! We typically don't think of language as a standard, but if we look at the definition for a standard taken from the Macmillan Dictionary:

"A level of quality or achievement, especially one that people generally consider normal or acceptable"

Well, that could refer to anything that is normal or acceptable, couldn't it? Therefore, I start with language. It is certainly normal and accepted by most parts of society.

The human race has been producing books for a very long time. At some point, a very long time ago, someone came up with the idea of filing these many objects. This was usually done on shelves. I couldn't say with certainty how that was done. I expect that it could have been done by subject, or possibly by author name or title. In any event at some point, even this became much too onerous. The good news was that the growth of human knowledge was being captured. The bad news was, nobody could find it!

In 1876 a man named Melvil Dewey published a booklet, for which he received a copyright. The focus of the publication was specific to positioning books on shelves. The purpose was to build a classification system for libraries, which would allow them to use relative locations on shelves allowing these books to be found again. In 1885, Dewey published a second version which expanded upon the original concept and now included the cataloging,

and indexing public and private libraries and for pamphlets, clippings, notes, scrap books, indexes, etc.

This original system is STILL updated and published by the Online Computer Library Center (OCLC). Stemming from the Dewey Decimal System came the Universal Decimal Classification (UDC) system. The Universal Decimal Consortium based in The Hague maintains the UDC. We have a couple of standards there, with many revisions over the years. We've now added a couple of consortiums to manage them.

In the 1960's, computer technology started to become an important part of doing trade. As a result, book publishers began to look for a way to track the publishing of these books. Without going into al the details, in 1972, the International Standards Organization (ISO) announced the creation of the first ISO 2108 Standard, creating the ISBN (International Standard Book Number). ISO 2108 has undergone several revisions, as the corrected and expanded numbering system. Along with the ISBN, the International Standard Serial Number (ISSN) was developed for periodicals.

The next step for libraries was the barcode. The barcode started finding it's way into the library systems in the 1970's. The original use for the Barcode was in the Grocery industry. Called the Universal Product Code (UPC), this system was the first organized effort to manage products using a barcode. Today there are more than 4 current published standards related to the code itself. Computer applications were built to manage all of the numbers being generated. The libraries built systems, which tied the UPC to the ISBN, ISSN and UDC. This was the way that things were tracked for a long time. A simple Barcode was used to tie ISBN or ISSN, the UDC and the borrower. When you checked out your book, the library read the barcode on your card and the barcode on the book.

In the early 2000's, the latest innovation in library technology took place. Libraries started placing Radio Frequency Identification Tags (RFID) in books. The RFID was basically a tag that broadcast the virtual barcode of the book to readers. This system reduced the cost to manage books. It also introduced some new applications for libraries. RFID readers can be built into most fixtures or handheld devices. As a result, mobility in tracking was now possible. This enabled many new or improved functions by RFID technology. Some of these include:

- An ability to check-out faster and possibly more accurately without the need of staff
- 24/7 self return service
- Fast and automated sorting of returned books
- Accurate and faster inventory management
- Quick identification of misplaced books
- Reliable theft protection as readers at entrances and exits can "check" a book as it passes.

It's at this point I will stop. I warned you! This would be a high level skim. Even without taking a deep dive, when I looked at the systems, devices, data formats, tags and markings I discovered over 30 Standards. There were also at least 7 standards organizations, alliances and consortia providing support for these standards. And I'm just getting started!

Although the route I took to get to this point was rather simplistic, I think there are some strong themes. The points I am attempting to make with this article are these:

- The Internet of Things exists all around us. Some of these connections aren't at all obvious. It seems to me that when the term "Internet of Things" is said out loud, most people think of sensors, or machines, control systems or bio medics. To me, the Internet of Things refers to all things, even those most inanimate objects.
- Making simple things simple is complicated!
- To control these "things" or simply objects, STANDARDS ARE a requirement. It's certainly not clear what those standards will be at this point. They may be standards around data format, or middleware to transport the formats or simply standards related to the signaling required to move the data from one communication point to another.
- Just like books, these standards will evolve in ways that the original designers and implementers had not even envisioned. Although Melvil Dewey gave the library world an incredible gift, I'm quite sure that he would never have envisioned that path his system would eventually enable.

Look around you! Everything you see is a part of the Internet of Everything! And either now, or at some point, it will be part of the Internet. Perhaps this will be as simple as a picture in a file folder, library or collection or a long forgotten book sitting on a library shelf. There will be many opportunities to define these many standards or specifications. There is a great deal of work to be done!

Gary Stuebing is currently leading the Internet of Things standards efforts at Cisco Systems in the Enterprise Networking Group CTO's office. Gary was the Director of Telecommunications at Mutual Life of Canada until 1996. In 1996 he went into private consulting and eventually moved to Charlotte, NC, to manage the Telecom group at Belk Stores Services. In 2000, he joined Duke Energy as a member of the IT Strategies and Architecture group with responsibility for IT communications and infrastructure services. During this time he was also a key member of the Mergers and Acquisitions team. He led a group, which managed the integration of IT for mergers, acquisitions and divestitures. In 2004 he became a permanent member of the Power Line Communications Group at Duke Energy. It was during this time that he led the efforts to build a business case for "smart" Power Distribution communications. Gary had been the lead for Powerline Communications standards and regulatory work at Duke Energy. In 2007 he joined the Smart Grid PLC and Network Design team as a Strategic Planning Manager. In 2012, Gary led the efforts for Smart Grid Standard in Cisco's Connected Energy business group. He is now the Strategic Planning Manager for Technology Development, and currently represents Cisco in a number of Smart Grid standardization efforts at the IEEE, ITU, IEC and the UCAIug. He represents Cisco on the Boards of HomePlug, Wi-Sun, and the IEEE Corporate Advisory Group.

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Internet of Things: The Need for Collaboration in Crowded Space

By Bilel Jamoussi, Chief, Study Groups Department, ITU-T, and Alain Louchez, Managing Director, CDAIT, Georgia Tech

**This article is reproduced with permission. It appeared in the ITU Blog, February 28, 2014.

The emergence of the Internet of Things (IoT) represents a dramatic twist in societal evolution; 'things' of any nature have the potential to interconnect and, in the process, they are bound to change how we think and go about our daily lives.

An ITU workshop, "Internet of Things: Trends and challenges in standardization", held at ITU headquarters in Geneva, 18 February 2014, gathered a multi-disciplinary selection of experts to take stock of progress in the IoT arena with a view to highlighting priorities for its future development.
A keynote presentation given by Daniel Faulk of SAP explored several IoT dimensions in key 'vertical' markets, focusing in particular on resulting opportunities for the enterprise in relation to new IoT-fuelled sources of 'big data'.

Among the other guest speakers were representatives of standards bodies such as ITU-T, IEEE, OGC and oneM2M; the open-source community, with the likes of Eclipse and OASIS; and companies including SAP and u-blox. Academic and research institutes were integral to the event and presentations were given on IoT-related research underway at the University of Dortmund (Germany), Institut Mines Télécom/Telecom Bretagne (France), the University of Tokyo (Japan), the Bosch IoT Lab at St. Gallen University (Switzerland), the Georgia Institute of Technology (USA), and the Electronics and Telecommunications Research Institute (Korea).

Trends and Challenges

Speakers' presentations are freely available on the ITU website here. A number of themes came to dominate the workshop's discussions:

1. Several equally promising, well-researched avenues have been established around the world to develop IoT standards that would meet the market's expectations.
2. The IoT is more cluttered and complex than cellular; its value resides in the data, not the connection.
3. IoT standards development should emphasize speed and simplicity, something being reflected by a renewed sense of urgency in IoT standardization.
4. The importance of open-source solutions cannot be denied and will continue to grow.
5. Portfolios of IoT-related standards and protocols are already available at all OSI layers.

6. Security, privacy and trust are recurring leitmotifs in conversations around the IoT and here the workshop welcomed the crucial discussions around IoT regulation currently underway in the European Union and the U.S. Federal Trade Commission.
7. Workshop participants highlighted the need to improve the coordination of IoT standards development, both among and within different standards bodies.

A challenging global jigsaw puzzle

The workshop's speakers represent only a sample of global IoT standardization efforts. Other ICT standardization expert groups working on the topic include those with a 'horizontal' perspective such as the IETF, ISO/IEC JTC 1 Special Working Group 5, Open Mobile Alliance and the Object Management Group; and others that serve the IoT standards needs of 'vertical' markets such as healthcare, energy (smart grid), intelligent transportation, home and building automation, manufacturing and household appliances. In addition, some countries may develop 'domestic' IoT standards, with an example provided in the guidelines published by China's Ministry of Industry and Information Technology (MIIT) which aim to establish at least 200 national and industrial IoT standards by 2015.

Given the multiplicity of IoT-related ecosystems, it was suggested during the workshop that the standards community might not achieve a 'one-size-fits-all' IoT standards suite (arguably the preferred outcome) and that several actionable options of more limited scope might eventually coexist.

IoT standardization's future direction

The huge potential of the IoT is well documented. An expression heard during the workshop noted that its emergence has been one of "phenomenal and impactful growth".

However, while passionately desired and discussed in many circles, there is not yet a lingua franca for the IoT industry. And like Godot, despite our anticipation, this lingua franca might never show up. As such, perhaps there is scope for concurrent paths to be explored in the IoT standardization field, hedging our bets by building effective bridges between idiosyncratic IoT intranets (viz. leaning on different protocols). A possible advantage of such an approach could be having firewalls between subnets, acting as ramparts against cascades of catastrophic failures and generalized security breaches. In addition, as the IoT will call for the transformation of business models, discussions around IoT's standardization must include those around its management if we are to foster "trust, motivation and involvement", a triad the workshop highlighted as key to the IoT's success.

This ITU event again underlined that, to achieve mainstream IoT adoption, a broad range of issues must still be overcome in areas spanning from its technical underpinnings and management to its legal and societal implications. In light of the numerous IoT protocols, standards and business models under development, driving the IoT's expansion will pivot around our ability to accelerate and extend dialog that brings together the many pieces of the IoT puzzle.

Dr. Bilel Jamoussi is Chief of the Study Groups Department at the International Telecommunication Union Standardization Bureau in Geneva, Switzerland where he is responsible for the organization and management of the ITU-T Study Groups, Focus Groups, Global Standardization Initiatives, Joint Coordination Activities, and their secretariat.

Alain Louchez is the Managing Director of the Center for the Development and Application of Internet of Things Technologies (CDAIT pronounced sedate) in charge of directing the Internet of Things (IoT)-related development efforts across the Georgia Institute of Technology (Georgia Tech). He is a member of the Advisory Council of the Georgia Tech Center for International Business Education and Research (CIBER) and the Georgia Tech Lorraine (European campus) Advisory Board.

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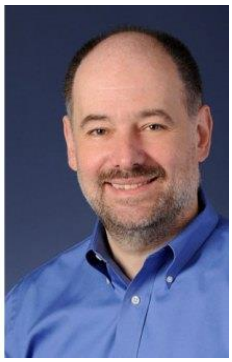
Your Questions Answered: The Internet of Things

Two IEEE experts respond to readers' concerns about a connected future

By Amanda Davis, Senior Editorial Assistant, IEEE, "The Institute"
31 March 2014

This article is part of our March 2014 special report on the Internet of Things, a network of items—each embedded with sensors—which are connected to the Internet.

With the emerging area of the Internet of Things (IoT), there are endless applications and implications for society. That's why we opened up the discussion and invited members to ask about topics of concern to two IEEE experts: Member Vida Ilderem, vice president and director of integrated computer research at Intel Labs, in Santa Clara, Calif., and Senior Member Oleg Logvinov director of market development in the Industrial and Power Conversion Division at STMicroelectronics, in Geneva. Here are the questions and answers. To continue the conversation, submit your questions or remarks in the comments section or tweet them to us @IEEEInstitute.

What type of new business models will the IoT bring?

Ilderem: There are many components for the IoT including sensor platforms, communication and connectivity systems, cloud computing, big data and analytics, and security and manageability. Big data and analytics especially provide a huge opportunity for new service businesses to open up. There will be a transformation in business practices because companies will be able to make better decisions based on the data that come from information collected by the IoT, helping them become more efficient and productive.

Moreover, new types of business opportunities will emerge because of the growth of the IoT, such as edge analytics, which is used to work with real-time events and constrained network bandwidth. More opportunities will emerge for developers to innovate new applications of the IoT that combine multiple data sources.

Logvinov: The IoT will deliver a broad range of business models, some that will work and others that won't. But many will surprise us. "Sensing-as-a-Service" is one such model, and

we already see it implemented today to some degree. For example, such data collection services can be useful for businesses to analyze a variety of factors such as staffing, servicing, and sales support so that they can be prepared for an increase in their needs ahead of time. The Internet of Things revolution will bring the power of big data to the world. Our smartphone is already a sensor hub that collects data that monitors such things as temperature, location, a person's pulse rate, and even locates potholes in the road.

With the emergence of smart grids and smart homes, how is the IoT going to impact the utility industry? How can utility companies leverage the IoT?

Ilderem: The smart grid is one of the first beneficiaries of the IoT because of deployment of smart meters. Next-generation thermostats like Nest and advanced security-monitoring systems are among the first products for smart homes. There are also products for monitoring energy efficiency and management that are becoming available. This video from Intel on a smarter grid gives a good example of how the IoT is used in the utility industry, and covers energy management for smart homes. Technical standards and interoperability among utilities and these new applications are two of the challenges that must be addressed before utility companies can take full advantage of the IoT.

Logvinov: The IoT is going to impact almost all industries. Imagine, as a homeowner, allowing your appliances, such as a dishwasher or washing machine to decide when it will run a load based on when the price of electricity is cheapest. By programming our electric car with our next destination, it would know the minimum amount of charge needed for its next trip. But we're not there yet. In order for the grid to become smarter, our homes, buildings, and cities have to be smarter too. [More on this in The Institute's June special issue on smart cities].

With the proliferation of the IoT, we will see more convergence among traditionally isolated applications and the emergence of platforms that will allow us to connect them together for a better energy system. I believe that such convergent platforms will make our lives easier. But first we still need to solve a number of challenges to make this vision possible, including security and privacy concerns. Developing a platform that serves multiple applications of the IoT and is able to secure the data is a complex task and, of course, we may need to create new technical standards to accomplish it. Last year, IEEE launched a project called Convergence of Smart Home and Building Architectures to address this challenge. It is open to all members to work with us on this mission.

What do you believe will be the greatest hurdle for full interoperability? What area do you think will reap the greatest benefit?

Ilderem: For faster deployment of the IoT, the ecosystem of industries needs to align around common building blocks and data standards. There are also existing infrastructures that will require connectivity and access with the new deployed infrastructures for the IoT. Data and protocol interoperability is a must for broad IoT adoption.

Logvinov: Today, the greatest challenges to reach full interoperability are probably security and privacy of the data that we are trying to exchange. There are a lot of things we

could build, deploy, or attach to the Internet today and lots of information that we could collect that would probably cause tremendous concern to people whose information is being collected. We need to solve these security concerns and when we do, we will unleash the potential of the IoT. The benefits and impact will be profound in almost every area of our lives, regardless of whether we are talking about mapping road conditions or predicting potential illnesses.

Digital health monitoring is ripe for growth. What types of devices do you think will be connected to the IoT, and how will the data from these devices, including consumer electronics, affect the health care industry?

Ilderem: The health-industry ecosystem is very complex and is comprised of many players, including hospitals, health-insurance companies, and government agencies. With the advent of wearable technologies for fitness and wellness monitoring, consumers will become more proactive in taking care of themselves in the digital-health monitoring era. Also, efficient telemedicine—receiving health care via the computer or smartphone—would require additional advancements in devices and standards. Once again, privacy and security of the data collected from these devices become an important concern.

Logvinov: Let's take a look at one example: BodyGuardian. Users can monitor their heartbeat and be alerted to early signs of heart disease via their smartphones or tablets—a procedure that traditionally requires a patient to be in a medical facility. Just imagine the improvement in the patient's quality of life as well as the improvement in the quality of the diagnostic data because the patient can be monitored during normal daily activities. This is just the tip of the iceberg. Some of us are getting used to our smartphones providing us with our heart rate while we are exercising. It is hard to imagine what more this data can tell us when it is also coupled with our location, surroundings, diet, and other background information. I believe the IoT will enable much more efficient preventative care, and that is going to be a significant shift in the health-care industry.

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IEEE Workshops on Technical Standards & Consensus Building

By David Law, Vice-Chair, IEEE Standards Education Committee

2nd Quarter 2014

The dynamic and exciting world of technical standards and standards development can be difficult to convey to those who have never experienced being part of a standards working group. The IEEE Standards Education Committee aims to address this through its Workshops on Technical Standards and Consensus Building.
On 6 March 2014, 60 students from University of Strathclyde in Glasgow, Scotland, experienced first-hand how some of the work of standardizing technologies gets done. The full-day workshop on Technical Standards and Consensus Building was hosted by Dr. James Irvine of the Electronic and Electrical Engineering Department. Dr. Irvine was joined in facilitating the workshop by David Law, Chair of the IEEE 802.3 Working Group (Ethernet) and Adrian Stephens, Chair of the IEEE 802.11 Working Group (WiFi). As highly experienced standards developers from industry (David is with Hewlett-Packard and Adrian is with Intel), students learned the fundamentals of standards, how they are absolutely critical to industry and heard case studies that focused on key technical questions and negotiations during the development of the some of the most widely used technologies in the world.

Consensus-Building Simulation

During the multi-hour consensus-building exercise, students are split into working groups of about 10 people and a case study involving space travel is presented to all.[1] Each working group is instructed to evaluate four technical questions in light of technical suitability, economic factors, and possible regulatory impact. Each person within the group receives a 'role' to play. The roles are representative of the individuals who participate in standards development. The exercise is set up so every participant is involved and plays a necessary part in discussions and decision making. Students must work through the technical questions by applying negotiation and business skills, in addition to applying some engineering principles.
After many rounds of negotiating within their working groups, each 'Chair' reports the results for each technical question. It is during this group reporting that much is learned, including that technology, economics and politics all play a role in developing standards.

Facilitator Adrian Stephens observed:

This workshop impressed me by how quickly the participants were exhibiting behavior typical of real standards development meetings. The workshop started with students, most of which really wanted to have their say, but knew nothing of this type of working group structure. The students received a bunch of "secret instructions" on the roles they would be playing. Split into groups, each group chose one person to act as working group chair who then tried to steer the group towards making decisions. What impressed me was that all of

the groups succeeded in making good consensual decisions, after much debate (and fun) was experienced. I believe the students ended up with an insight into what really goes on in standards, and practiced a useful life skill – consensus building.

The workshop at University of Strathclyde is the third time the IEEE Standards Education Committee (SEC) has sponsored the consensus-building workshop. Feedback from over 100 workshop participants has been very, very positive and the SEC will continue to support and expand this activity.
To inquire about holding an IEEE Workshop on Technical Standards and Consensus Building at your college or university, please contact me.

Jennifer McClain
j.mcclain@ieee.org

[1] The IEEE Case Study was authored by Steve Carlson and is the copyright of the IEEE.

David Law is a Distinguished Engineer at Hewlett-Packard Networking and has worked on the specification and development of Ethernet products since 1989. Throughout that time he has been a member of the IEEE 802.3 Ethernet Working Group where he has held a number of leadership positions. He served as the Vice-Chair of IEEE 802.3 from 1996 to 2008 and in 2008 was elected to Chair of IEEE 802.3. David is a member of the IEEE-SA Standards Board, Chair of the IEEE-SA Standards Board Patent Committee (PatCom) and Vice-Chair of IEEE Standards Education Committee.

In 2000 he received the IEEE-SA Standards Medallion for 'leadership and technical contributions to Ethernet networking standards' and in 2009 he received the IEEE Standards Association Standards Board Distinguished Service award 'For long term service to improve the operation and integrity of IEEE-SA governance'. David has a BEng (hons) in Electrical and Electronic Engineering from Strathclyde University, Glasgow, Scotland. He is a senior member of the IEEE.

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Standards Education Grants for Student Projects: Updated Instructions for Applications & Final Student Papers

By David Law, Vice-Chair, IEEE Standards Education Committee

2nd Quarter 2014

The IEEE Standards Education Committee (SEC) continues to offers grants of US $500 for students (per project) and US $300 for faculty mentors to help complete senior, undergraduate or graduate projects. Projects may be for design, capstone, development or research in which an industry technical standard(s) was applied to complete the project.

For students participating in the grant program, it is an excellent way to receive extra funding for student projects, to learn about technical standards necessary for their career development, and to have their final papers peer-reviewed by an IEEE committee.

Purpose of the Standards Education Grants

The purpose of the grants is to facilitate students studying, analysing and/or implementing standards in projects. This can be achieved by implementing an existing standard in hardware and/or software, analyzing the performance of a standard in a particular situation, testing compliance with, or alternatively adapting or extending a standard to fit a new scenario. Projects are expected to include a significant component working on the standard: projects that simply make use of standards through modules or libraries without significant design input will not be eligible for an award.

Updated Standards Education Grant Instructions

For 2014, the IEEE Standards Education Committee amended some of the criteria in the grant application in an effort to clarify for students the information needed to help them become successful grant recipients. Many times students have difficulty in completing Section 2 of the application where they are asked about the standards they plan to analyze or use in their projects.

Instructions in this section now include the following language.

- Provide a list of technical industry standards being analyzed and how they will be implemented to achieve your project goal. If you will be comparing two or more standards, please illustrate.
- Description or plan of how the project will proceed from beginning to end, including:
    - where in the project you will be choosing/considering the standards;

- an explanation of how and when you will apply the standard(s) in the project.

As always, the following **NOTE** is included which contains ***the key provision*** for receiving an IEEE Standards Education Grant:

*****NOTE that using off-the-shelf modules, products or components built to industry standards does not satisfy this requirement. SEE FAQ's for more details and examples.**

So what does this mean, "off-the-shelf" modules?

If you propose to use a router with an integrated IEEE Std 802.11TM (WiFi®) access point to connect a laptop using WiFi to the internet as part of the project, this does not meet the criteria for receiving a grant. The router and the laptop have already implemented the requirements of IEEE 802.11 standard necessary to support the connection, so there really is nothing to do except connect the laptop to the access point. Hence while the IEEE 802.11 standard is being used, it has not been implemented, analysed, tested, adapted or extended by the project. The goal of gaining an understanding of the standard as part of the project would therefore not have been achieved. If on the other hand as part of the project, you propose to design and build part of an IEEE Std 802.11 (WiFi) access point, for example the Radio Frequency (RF) front end, this is an implementation of the standard and therefore would eligible for consideration for a grant.

Final Student Application Papers

Students who receive the IEEE Standards Education Grants must submit a final paper called a Student Application Paper. The final papers detail which industry technical standard(s) were applied (analyzed and implemented). Each paper highlights specific design choices in the application of various technical standards and describes the resulting product, process, or service.

New criteria for the final student application papers includes a mandatory section called, "Standards Applied." In this section, students must clearly state which standards were used, how they were applied, and explain what they learned. The paper must also include a Reference section that includes all of the standards applied in the project.

More Information

The IEEE Standards Education Grants will continue to be available through 2014. Applications may be submitted at any time during the year.

For more information about the IEEE Standards Education Grants and how to apply, please visit the IEEE Standards Education website, and be sure to read all of the application instructions and FAQ section.

All successfully accepted final papers are posted to the IEEE Student Application Papers website.

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Standards Education Grants for Student Projects: Updated Instructions for Applications & Final Student Papers

By David Law, Vice-Chair, IEEE Standards Education Committee

4th Quarter 2014

In each issue of the IEEE Standards Education eZine, we provide information related to our Standards Education Grants Program. I am pleased to provide an end-of-year 2014 update on the awards given this year.

The Standards Education Committee (SEC) received 22 grant applications in 2014 and approved 18 of them. Between 2009 and 2014, the SEC approved 137 out of 227 grant applications.

IEEE Standards Education Grants were given to students at the following institutions in 2014:

- Amrita School of Engineering, India (2 grants)
- County College of Morris, NJ, USA
- DEI-Politecnico di Bari, Mofetta, Italy
- DeVry University, Ohio
- GIK Institute, Pakistan
- Institute of Electrodynamics of National Academy of Science of Ukraine
- Jamia Millia Islamia, New Delhi, India
- London Metropolitan University, UK
- Karunya University, India (2 grants)
- Texas A&M, College Station, TX, USA
- Peking University, China
- University of Alabama at Birmingham, USA
- University of Central Florida, Orlando, FL, USA
- University of Engineering & Technology, Pakistan
- University of New Mexico, Albuquerque, NM, USA
- University of Pennsylvania, Philadelphia, PA, USA

About the IEEE Standards Education Grants

The IEEE Standards Education Committee (SEC) will continue in 2015 to offers grants of US $500 for students (per project) and US $300 for faculty mentors to help complete senior, undergraduate or graduate projects. Projects may be for design, capstone, development or research in which an industry technical standard(s) was applied to complete the project. For students participating in the grant program, it is an excellent way to receive extra funding for student projects, to learn about technical standards necessary for their career development, and to have their final papers peer-reviewed by an IEEE committee.

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Introduction to Student Application Paper, "Impact of Distributed Generation on Electric Power Distribution System Reliability"

By Dr. Yue Yuan, Professor, Department of Electrical Engineering, Hohai University, P.R. China

With the development of manufactory and control technologies and the pressure from reducing CO2 e emission, distributed generators (DGs) are popular in the distribution system for the abundant energy resources and their environmentally friendly operation. It is evident that these DGs driven by distributed energy resources have many advantages, such as low investment and high flexibility. However, they would also change the structure of the traditional distribution system, bringing challenges in reliability and security to the present system.

The paper, Impact of Distributed Generation on Electric Power Distribution System Reliability, models the integration of DGs to the distributed system. It analyzes its impact on distribution system reliability indices, and quantifies the coordination between reliability and economic benefits. This paper proposes a multi-state approach to model the output of a typical DG, which can capture the properties of most type of DGs. By using Monte Carlo simulations and Minimal Path method, reliability indices of a distribution system with DGs are calculated with the application of IEEE Std 1366, in which sample systems and calculation examples are provided as a guide for other traditional electric power distribution systems. To solve the problem of radial topology change of distribution systems brought from DGs , IEEE Std 1547 is applied to the test system, acting as a guide for interconnecting DGs to the power distribution system. An example based on IEEE RBTS Bus6 was calculated,--and by testing its availability and practice, the project proves that DGs integration can improve distribution system reliability.

About the Use of Standards

As seen in the IEEE library, IEEE Std 1366™-2012, i.e., IEEE Guide for Electric Power Distribution Reliability Indices, currently involves requirements primarily for the point of electric power distribution. By contrast, IEEE Std 1547, i.e., IEEE Standard for Interconnecting Distributed Resources With Electric Power Systems, is related to distributed resources integration. These two standards cover the reliability evaluation of electric power distribution systems with DGs from two different aspects. This project combines the two standards for reliability evaluation in a complementary way.

The idea of implementing IEEE Std 1366 and 1547 was initially proposed by an under-graduate student, Miss Shiyu Liu at Hohai University last semester. She was enthusiastic for exploring these standards and wants to develop further application.

Yue Yuan received his B.E degree in 1987, M.E degree in 1990 in 1997 from Xi'an Jiaotong University, Shaanxi and Ph.D from Hiroshima University, Japan in 2002. He joined the Department of Electronics Engineering, Xián Jiaotong University's College of Engineering, Shaanxi in 1992. Currently, he is holding the post of Professor in Electrical Engineering Department, Hohai University, Nanjing. His research interests include analysis, design, planning and operation of the electric power system, renewable energy generation technology and so on.

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BEST OF STUDENT APPLICATION PAPERS

In each issue we publish selected "Best of Student Application Papers." These papers are written by students who have received IEEE Standards Education Grants to help with projects that include the use and implementation of technical standards.

Impact of Distributed Generation on Electric Power Distribution System Reliability: Application of IEEE Std 1366TM and IEEE Std 1547TM

By Shiyu Liu, Yue Yuan
School of Energy and Electrical Engineering, Hohai University, Nanjing, P. R. China

Abstract— With the development of the smart grid, more and more distributed generations (DGs) are introduced to the distribution networks, which affect the power system obviously. To begin with, this paper proposes a multi-state model for DGs. Then a sequential Monte Carlo simulation with minimal path method is discussed. In addition, referring to IEEE Std 1547 and combining island schemes, each load point and reliability indices defined in IEEE Std 1366 are estimated to discuss the reliability of the system with DGs. Finally, an example based on IEEE RBTS Bus6 is applied to test the method, validating that the DGs access can improve the distribution system reliability.

Index terms—reliability, distributed generation, minimal path, Monte Carlo method

I. INTRODUCTION

In recent years, as a very important part of the smart grid, distributed generations(DGs) with its abundant energy resources and environmental friendly operation are enjoying popularity in the distribution system. DGs, which are defined as generations with the capacity of less than 10 MW, are widely introduced to the present power distribution system. Although these distributed energy resources have many advantages such as low investment, environmental friendliness and high flexibility, they also changed the structure of the traditional distribution system and brought many uncertainties to the present system [1].

Integration of DGs totally changes the radial topology features of the traditional distribution systems. In addition to uncertainty of DG's output, the power flow direction in distribution networks with DGs is changed with the operation state of networks, namely, bidirectional power flow, which brings uncertainty of operating condition of distribution networks. Also, frequency offset and voltage fluctuations are challenges to the power

quality and reliability of distribution system. All above make essential changes in steady state and dynamic characteristics of distribution networks with DGs.

Therefore, there is a great change in the theory and calculation methodforthe reliability evaluation of the new distribution systems with DGs.

Firstly, as DGs, depending on energy resources such as wind and PV, are random, traditional generation model could not be applied for DG directly. Secondly, when the system failure occurs, island operation mode allows isolating the failure by forming an island and maintaining the DG in operation state. However, factors such as uncertainty of the distribution generation output power, load uncertainty and switch configuration are supposed to be considered in islanding schemes. Based on the points above, this paper proposes a multi-state model to meet the properties for DGs. Considering the influence of the distributed power supply of the distribution system reliability, the sequential Monte Carlo simulation method is used to evaluate the system reliability based on the minimal path of the DG. The reliability indices defined in IEEE Std 1366 [2] are utilized to give a reference to the quantitative assessment of the reliability benefit brought by DG. Meanwhile, IEEE Std 1547 [3] makes references for integration of DGs in distribution systems. Finally an example based on IEEE RBTS Bus6 is applied to test the presented method.

Read the rest of Impact of Distributed Generation on Electric Power Distribution System Reliability: Application of IEEE Std 1366™ and IEEE Std 1547™

Shiyu Liu (S'10) is currently an undergraduate of School of Energy and Electrical Engineering, Hohai University, China. She is going to receive B.E degree in electrical engineering from Hohai University this year. Her future research interest is power system reliability evaluation.

Yue Yuan received his B.E degree in 1987, M.E degree in 1990 in 1997 from Xi'an Jiaotong University, Shaanxi and Ph.D from Hiroshima University, Japan in 2002. He joined the Department of Electronics Engineering, Xián Jiaotong University's College of Engineering, Shaanxi in 1992. Currently, he is holding the post of Professor in Electrical Engineering Department, Hohai University, Nanjing. His research interests include analysis, design, planning and operation of the electric power system, renewable energy generation technology and so on.

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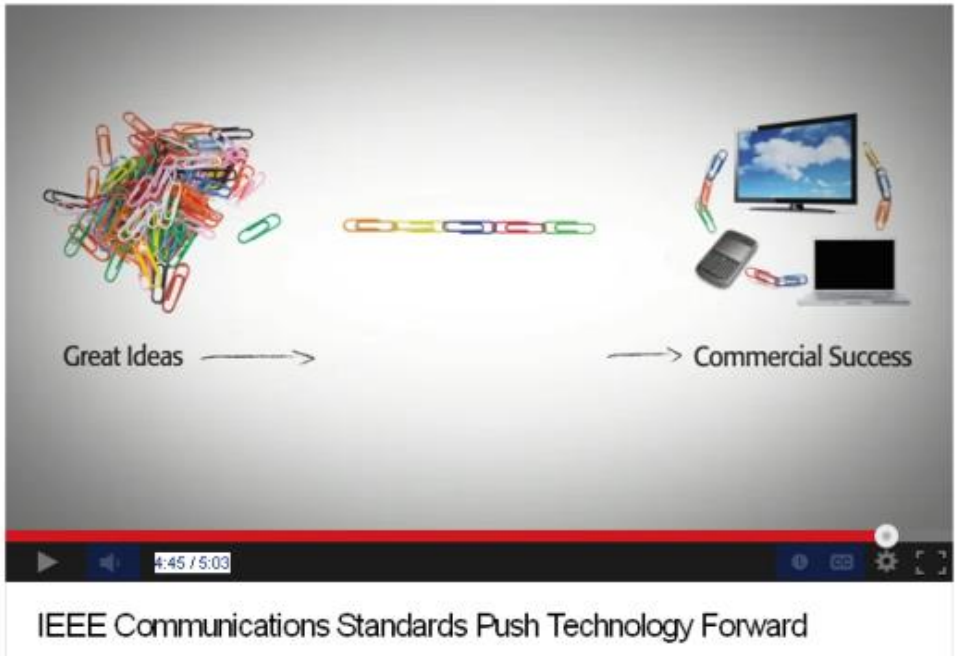
Video Series: Discussions about the Importance of Standards and Standards Education

Learn about the broad range and impact of standards developed under the IEEE Standards Association umbrella. (6:17)

IEEE Standards...Pushing Technology Forward



Learn the value of openly developed interoperable standards (5:04)

In part three of three, President of the IEEE Standards Association, Karen Bartleson talks with eZine Editor-in-Chief Yatin Trivedi about Global Collaboration and Standards Education (2:57).

Part one in three part series (2:48)
Part two in three part series (2:41)
Part three in the three part series (2:57)

IEEE Standards Association Past President Steve Mills and our Editor-in-Chief Yatin Trivedi discuss three fundamental dynamics of standards--technology, economics and politics, and address the importance of having a strong foundation in understanding standards and their impact on innovation.

Part three in the three-part series (5:44)
Part two in the three-part series (4:59)
Part one in the three-part series (5:53)

Videos will launch in You Tube.

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IEEE Standards Education Funny Pages...

This cartoon appears in the book "Ten Commandments of Effective Standards" by Karen Bartleson. Reproduced with permission from Rick Jamison.

Contributions
Have something amusing (cartoon, video) related to standards you'd like to share? Contact our IEEE eZine staff editor Jennifer McClain at mailto:j.mcclain@ieee.org.

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News and Upcoming Standards Education Opportunities

2nd Quarter 2014

IEEE Standards Education Committee Announces First Recipients of IEEE-Microsoft Student Application Paper Grant

The IEEE Standards Education Committee is pleased to announce that the first IEEE-Microsoft Student Application Paper Grant for undergraduate and graduate students in Sub-Saharan Africa has been awarded to Mr. Banditi Tawanda, a Bachelor of Electronic Engineering Undergraduate student from the National University of Science and Technology, Zimbabwe, for the project, "Wireless Accident Detection and Reporting System." He is being guided in his research work by Mr. Bhekisisa Nyoni of the Department of Electronic Engineering.

Mr. Banditi received US $500.00 to support using and applying technical standards to complete his project. Upon completion of the project, Mr. Banditi will submit a final report called a Student Application Paper to the IEEE Standards Education Committee. If the paper is accepted, it will be published to the IEEE's Student Application Papers website http://standardspapers.ieee-elearning.org/.
The IEEE-Microsoft Student Application Paper Grants are open to all undergraduate and graduate students located within Sub-Saharan Africa. The grants are to help with graduate and capstone design projects that include an industry standards component.
The IEEE and Microsoft partnered to offer the grants in an effort to support Microsoft's interest in standards capacity building and the IEEE's initiative to support capacity building in Africa.

For more information on the IEEE-Microsoft Student Application Paper Grants for undergraduate and graduate students in Sub-Saharan Africa, visit:
http://www.ieee.org/education_careers/education/standards/microsoft_student_application.html

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ANSI Paper Competition addressing "Standards Level the Playing Field"

Paper Competition Announced for U.S. Celebration of World Standards Day 2014

The theme for this year's paper competition, Standards Level the Playing Field, reflects the important role that voluntary consensus standards play in support of trade and economic growth in today's increasingly global economy. The competition is sponsored by SES - The Society of Standards Professionals; submissions are due by 8 August 2014.

The IEEE Standards Education Committee is sponsoring a Joint Panel Session at the Capstone Design Conference on 4 June 2014

The goal of the Capstone Design Conferences is to "provide a forum for the extended capstone design community (faculty, administrators, industry representatives, and students) to share ideas about improving design-based capstone courses."

The Standards Education Panel Session will present: Case Studies in the Use of Standards with Capstone Projects: A Multidisciplinary Approach

The goal of this workshop is to show how using industrial standards in capstone projects can make them more relevant to students and future employers. Standards education promotes the importance of standards in meeting technical, economic, environmental, and societal challenges. The workshop will utilize a case study approach that captures technology, economics, and political issues addressed by industry standards. At the same time, the case studies will illustrate how standards offer strong technical and critical thinking components.

Please be sure to join us if you are participating in the Capstone Conference!

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Online Standards Education Courses

IEEE Educational Activities and the IEEE Standards Education Committee have collaborated with IP Shield to extend this offering of high-quality educational tutorials at a discount to visitors from the IEEE.

An awareness and understanding of Standards is essential for success in today's global economy. Introducing The Standards Aware Series, a collection of 9 courses designed for anyone who uses, writes or distributes Standards. From new hires to seasoned engineers and professionals across all industries, this collection offers something for everyone. In addition, participants who successfully complete any of the 9 Standards Aware courses are eligible for continuing education units through the Association for Continuing Education and Training (IACET).

The Standards Aware Series is similar to taking a **Standards 101** course at the university level. To learn more about the courses, watch a brief video.

Courses in the series:

- What are Standards?
- Why are Standards Used?
- Standards Development Organizations
- Standards Development Process
- Standards and Trade
- Conformity Assessment
- Strategic Standardization
- Finding Standards
- Copyright Aware

More information and pricing.

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Call for IEEE Standards Education eZine Contributions

The IEEE Standards Education eZine Editorial Board invites contributions from industry practitioners, educators and students on topics related to education about technical standards.

Interested parties may submit an inquiry or article abstract for consideration to the Editorial Board at any time throughout the year via email to: ezine-eb@listserv.ieee.org.

Abstracts should be no longer than 500 words and final articles should be no more than 2,000 words.

Particular areas of interest include, but are not limited to:

- impact and development of standards in various regions of the world;
- best practices and ideas for incorporating standards into the classroom and curricula.

Final contributions should include a 100 word biography of the author(s) and a high-resolution (JPEG) picture. All illustrations must be provided in a high-resolution (JPEG) format. References to all copyrighted material must be properly cited.

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Subscribe to the IEEE Standards Education eZine

Subscribe to the eZine and we'll notify you when a new issue is available.

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IEEE Standards Education eZine Editorial Board

Yatin Trivedi, Editor-in-Chief, is Director of Standards and Interoperability Programs at Synopsys. He is a member of the IEEE Standards Association Standards Board (SASB), Standards Education Committee (SEC), Corporate Advisory Group (CAG), New Standards Committee (NesCom), Audit Committee (AudCom), Industry Connections Committee (ICCom) and serves as vice-chair for Design Automation Standards Committee (DASC). Since 2012 Yatin has served as the Standards Board representative to IEEE Education Activities Board (EAB). He represents Synopsys on the Board of Directors of the IEEE-ISTO and on the Board of Directors of Accellera. He represents Synopsys on several standards committees (working groups) and manages interoperability initiatives under the corporate strategic marketing group. He also works closely with the Synopsys University program.

In 1992, Yatin co-founded Seva Technologies as one of the early Design Services companies in Silicon Valley. He co-authored the first book on Verilog HDL in 1990 and was the Editor of IEEE Std 1364-1995™ and IEEE Std 1364-2001™. He also started, managed and taught courses in VLSI Design Engineering curriculum at UC Santa Cruz extension (1990-2001). Yatin started his career at AMD and also worked at Sun Microsystems.
Yatin received his B.E. (Hons) EEE from BITS, Pilani and the M.S. Computer Engineering from Case Western Reserve University, Cleveland. He is a Senior Member of the IEEE and a member of IEEE-HKN Honor Society.

Jeffry J. Handal is the Manager of the Networking and Infrastructure Group at Louisiana State University (LSU), Baton Rouge, LA. He received a B.S. in Electrical Engineering graduating Summa Cum Laude in May 2003 from LSU, and was offered a full scholarship to complete graduate school studies working with NASA on a flight safety program. In December 2005, he graduated with honors with the degree of Master of Science in Electrical Engineering with a concentration on Systems Engineering from LSU. He passed the Professional Engineering exam for Louisiana in 2008.

Mr. Handal became a volunteer with the IEEE in 2006 and has since served in many roles, including Student Liaison and Professional Activities (PACE) Coordinator in the Baton Rouge Section. In 2007, he accepted the role of GOLD (Graduates of the Last Decade) Coordinator for IEEE Region 5 and was the GOLD International Committee Liaison. In 2010, he worked closely with children K through 12 as part of the Precollege Education Committee and was IEEE Region 5 representative to the Employment and Career Services Committee. In 2012, he became the Standards Coordinator for Region 5 and in 2013 he became a member of the IEEE Standards Education Committee.

Mr. Handal is a pilot and volunteers for Civil Air Patrol. He is working on his Commercial Pilot License.

Dr. James Irvine is a Reader in the EEE Department at Strathclyde University in Glasgow. His research interests include resource management and security for wireless systems, and he works as Academic Co-ordinator within the Mobile VCE programme. Prior to this he worked on the ACTS MOSTRAIN project providing communication services to high speed trains. He holds four patents, with three more being pursued, and has authored two books. Technical Programme Chair of VTC2004-Spring in Milan, Dr Irvine was elected in 2002 to the Board of the IEEE VTS, where he is chair of the VTS Technical Advisory Committee, and President for 2008-9.

Amin Karim is a visiting professor at the college of engineering and information science at DeVry University. Prior to this position, he served as the national Dean of the College of Technology at DeVry. He is a past Chair of the Electronics and Computer Engineering Technology Department Heads Association of the American Society for Engineering Education and served as a TAC of ABET evaluator for engineering technology programs. He is a member of the IEEE Standards Education Committee.

Frederic Surre is a lecturer in the Electrical and Electronic Engineering Department at City University London. His research interests are centred on the design of optical systems for sensing and communications, with a particular interest in the modelling, design and characterisation of active device for Infra-red and terahertz waves.
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David Law is a Distinguished Engineer at Hewlett-Packard Networking and has worked on the specification and development of Ethernet products since 1989. Throughout that time he has been a member of the IEEE 802.3 Ethernet Working Group where he has held a number of leadership positions. He served as the Vice-Chair of IEEE 802.3 from 1996 to 2008 and in 2008 was elected to Chair of IEEE 802.3. David is a member of the IEEE-SA Standards Board, Chair of the IEEE-SA Standards Board Patent Committee (PatCom) and Vice-Chair of IEEE Standards Education Committee.

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He chairs, or is a principal technical contributor to, US and international EMC standards organizations including ANSI ASC C63® (immediate past chairman), the Institute of Electrical and Electronics Engineers (IEEE), and the International Electrotechnical Commission's (IEC) International Special Committee on Radio Interference (CISPR). He was named chairman of CISPR in October 2007. He is a member of the IEC's Advisory Committee on EMC (ACEC) and the Technical Management Committee of the US National Committee of the IEC.

In November 2008 he was presented with the prestigious IEC Lord Kelvin award at the IEC General Meeting in Sao Paulo, Brazil. This is the highest award in the IEC and recognizes Don's many contributions to global electrotechnical standardization in the field of EMC. He is a life Fellow of the IEEE and an honored life member of the IEEE EMC Society (EMCS) and member of its Board of Directors, chair of its technical committees on EMC measurements and Smart Grid, vice president for standards, past EMCS president, and past chair of its standards development committee. He is also past president of the IEEE Standards Association (SA), past member of the SA Board of Governors and past member of the IEEE's

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