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Advancing Technology for Humanity

The Digital Reflector

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TABLE OF CONTENTS

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IEEE Fellow Who Contributed to Manned Apollo Space Program to Receive IEEE-USA's Highest Honor

Dr. Arthur Winston, who served as IEEE president in 2004, will receive the Robert S. Walleigh Distinguished Contributions to Engineering Professionalism Award, IEEE-USA's highest honor.

Winston is being recognized "for leadership through innovation, mentoring and promoting engineering management and entrepreneurial practices, as well as the creation of new policies of national interest."

He and other IEEE members will be honored during the joint IEEE Region 4 and 6 meeting at the Excalibur Hotel and Casino in Las Vegas on 30 January 2016.

Winston was elected an IEEE Fellow in 1991 for developing the NASA Apollo Heat Shield Re-entry Temperature Measurement System, which monitored the heat shield that protected the command module upon return to the earth's atmosphere. He also developed and implemented a worldwide nuclear test monitoring system that allowed the United States to participate in the Strategic Arms Limitation Talks (SALT).

Winston is director emeritus of the Tufts University Gordon Institute in Medford, Mass., the first educational institution designed specifically to develop engineering leaders. In 2007, he and two colleagues received the $500,000 Gordon Prize from the National Academy of Engineering "for the development of a multi-disciplinary graduate program for engineering professionals who have the potential and the desire to be engineering leaders."

As a past IEEE Educational Activities Board (EAB) vice president, Winston extended EAB interests to include pre-university education and played a key role in the development of the engineering career resources Website, tryengineering.org. He is credited for bringing together for the first time deans of education and deans of engineering. In 2010, he received the EAB Meritorious Service Citation.

Among his industry experiences are tenures at Bell Telephone Co. in Canada, the U.S. National Research Corp., Canada's National Research Council and the Allied Research Corp., now a part of Boeing. He is an expert in the fields of instrumentation and measurement.

The Walleigh Award

The Robert S. Walleigh Distinguished Contributions to Engineering Professionalism Award is designed "to honor members of the engineering profession for long-term dedicated effort and outstanding accomplishments in advancing the aims of IEEE professional activities in the United States."

Robert S. Walleigh was an electrical engineer and IEEE member who worked for the National Bureau of Standards – now the National Institute of Standards and Technology (NIST) – for more than 35 years. He supervised the building of NIST headquarters in Gaithersburg, Md., and retired as a senior adviser for international affairs in 1979. For the next 18 years he worked as an IEEE-USA senior specialist.

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

IEEE – Is It For Me?

Take a good look at the question posed in the title of this editorial. Sounds like a simple, straightforward question. In the words of the late comedian John Pinette – "NAY NAY!" Grammatically the question has a very simple structure – it has only four words, three of which are made up of two letters and the final word has only three letters! I'm thinking that a question like this should be understandable by a fourth grader. But thanks to the intricacies of the English language there are two radically different ways to answer this question. Huh!! Let me explain.

If you put a low keyed inflection on the "really difficult" three letter word in this question (try it!) I think that you will agree that you will interpret it as "Do I enjoy being an IEEE member?" On the other hand, if you emphatically inflect the word "for" the question interprets as "Does IEEE really understand and work to satisfy my needs as an engineer?"

To me, as the incoming IEEE Region 1 Director, I ask you to ponder both questions for a moment. Why I ask this of you is that if the IEEE is to be germane as an engineering organization it has to have positive responses to both of these core questions from you.

What makes this exercise extremely powerful is that besides yourself there are 399,999 other members of IEEE on this planet. As a matter of fact IEEE has the highest active membership of any technical organization in the world! And there is good reason for this – IEEE , which is a basically volunteer organization, offers a multitude of services, benefits and opportunities to its members. But the total number of members in IEEE is irrelevant. What is most important is that YOU reading this editorial truthfully answer these two questions with a resounding YES! If you did, the staff and volunteer leaders at the local, regional, national and international level are doing their job in offering and informing you of the multitude of programs geared to all phases of your professional and technical life. And most importantly, you are using these career enhancing opportunities to your advantage! Congratulations! If your response to even one of these questions is "NO" then IEEE has to change to become more relevant to YOU. If you said no to one or both of these questions I would like to speak to you privately – so PLEASE continue reading.

Over the next several minutes I want to offer some suggestions for your consideration that may bring personal and financial benefits of IEEE membership to you (DISCLAIMER - no this will NOT be a sales pitch to have you spend any money but a fervent desire that you maximize your career development using tools that IEEE can provide you with). To be clear, I will not be able to spell these benefits out in detail to you individually in this issue of The Reflector only because you alone know what specific things you want and need from IEEE. But the IEEE has the organization and the breadth of volunteer leader expertise to cater to your "wish list".

So, let's begin with your "wish list". Please take a minute to jot down the ten most important things you want and/or need from IEEE. This list can include, as examples, such things as, technical meetings in your chosen field of expertise; technical meetings in areas outside of your field of expertise; the ability to meet & interact with engineers (i.e. networking); professional activities (such as monitoring legislative activity influencing the engineering profession); how to utilize developing new social media and collaboration tools; learning what all those forks, knives and spoons are

used for at a formal dinner, and the list goes on! I'll wait while you finish your list…….

Okay you're back! Great! Let's look at your list. Very interesting, you included some very unique needs. I bet that if you compare your list with all of the other readers that continued on in this exercise you will find that your list is genuinely unique – remember I said that I could not spell out the benefits to you in detail in a way that would be meaningful to you because each IEEE member's needs is absolutely a function of their individual personality! The good thing is that in all likelihood, most, but not all, of your wish list items can be met by your taking advantage of existing IEEE programs. Okay now let's roll up our sleeves and see how we can address ALL of your needs so that we can change your response to the two questions from "no" to "YES".

Let's break up your list into two groups – the first group consists of needs that already exist in the portfolio of programs that IEEE has developed and is currently offering. The second group is composed of programs that do not currently exist. You say that you are not sure which of these two groups each of your ten needs fall into. Okay, fair question. Remember I said this was NOT going to be a sales pitch for money. It still is not and will not turn into one. But what I need to refer to is the old but still relevant adage - "you get out of something what you put into it". Fortunately GOOGLE has made this task's work level sooooo easy! Get on your smart phone, tablet or PC and ask Google "are there any IEEE meetings on Nanotechnology coming up in the Boston area?" Within .028 seconds you will have your answer! Or you can go directly to the source of this information by logging onto the IEEE website itself at www.ieee.org. The only rub is that you may have to do it weekly or so to capture any new meetings being offered about this topic.

Okay, so now let's assume that you have found solutions to half of the needs on your list. "How about the other five needs/wants that I have" you say. Now comes the good part. IEEE wants to hear from you! If there is something that they are not yet providing or addressing there is a good chance other members may also want something like this even if it did not appear on their top ten list. You just single-handedly uncovered a currently unmet need that if met would make IEEE an even better organization!!!!! BRAVO to you! And thank you.

In closing let me reiterate the old adage – to get something out you have to put something in. I think you will agree that if you follow the steps I have outlined above you will not have devoted a lot of your time but you will have gained a considerable amount of insight into what your IEEE membership can offer you.

And just some food for thought, can you imagine the payback to you if you were to decide to spend a relatively small amount of your time as an IEEE volunteer. And can you imagine the payback if you were to become a volunteer leader…..

Before you go back to what you were doing before you started reading this editorial in The Reflector, I have one very important comment to make. There is one three letter word in the dictionary that is both singular in its definition and absolutely essential to leading a satisfied life – that word is JOY. Our psyche requires that we do things in life that bring us joy. I am sure that your getting involved in the "community" that we know as IEEE will provide you with that basic of basic feelings. A good personal example is my decision to say "yes" to writing this editorial. It took effort and time out of my busy schedule, but to be totally honest with you it was time spent very wisely because I now feel good about having had the opportunity to "talk" to you and hope that you take the next step in allowing the IEEE to be an important part in making you a better engineer, and person.

Again, it was great "talking" with you and I would sincerely like very much for you to e-mail me at r.tabroff@ieee.org if you would like to converse further. I would be extremely interested to hear what steps you would recommend that IEEE take In order to make itself a better, more viable organization for you.

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Locally held IEEE Conferences

Save the travel costs and particpate in these IEEE conferences held locally.

2016 IEEE High Performance Extreme Computing Conference
September 13 - 15 2016
www.ieee-hpec.org
(Abstract submission deadline is May 16, 2016)

2016 IEEE Symposium on Technologies for Homeland Security
May 10 -12 2016
www.ieee-hst.org

2016 IEEE International Symposium on Phased Array Systems & Technology
October, 18 - 21 2016
www.array2016.org
(Abstract submission deadline, February 1, 2016)

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Twitter: https://twitter.com/ieeeboston

Facebook: https://www.facebook.com/IEEEBoston

YouTube: https://www.youtube.com/user/IEEEBostonSection

Google+: https://plus.google.com/107894868975229024384/

LinkedIn: https://www.linkedin.com/groups/IEEE-Boston-Section-3763694/about

Call for Course Speakers/Organizers

IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity. The IEEE Boston Section, its dedicated volunteers, and over 8,500 members are committed to fulfilling this core purpose to the local technology community through chapter meetings, conferences, continuing education short courses, and professional and educational activities.

Twice each year a committee of local IEEE volunteers meet to consider course topics for its continuing education program. This committee is comprised of practicing engineers in various technical disciplines. In an effort to expand these course topics for our members and the local technical community at large, the committee is publicizing this CALL FOR COURSE SPEAKERS AND ORGANIZERS.

The Boston Section is one of the largest and most technically divers sections of the IEEE. We have over 20 active chapters and affinity groups.
If you have an expertise that you feel might be of interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is http://ieeeboston.org/course-proposals/ . Alternatively, you may contact the IEEE Boston Section office at sec.boston@ieee.org or 781 245 5405.

- Honoraria can be considered for course lecturers
- Applications oriented, practical focused courses are best (all courses should help attendees expand their knowledge based and help them do their job better after completing a course
- Courses should be no more than 2 full days, or 18 hours for a multi-evening course
- Your course will be publicized to over 10,000 local engineers
- You will be providing a valuable service to your profession
- Previous lecturers include: Dr. Eli Brookner, Dr. Steven Best, Colin Brench, to name a few.

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Entrepreneurs' Network - 6:30PM, Tuesday, 2 February

Patents and the Business Proposition of IP

Meeting Location – Constant Contact, 1601 Trapelo Road, 1st Floor, InnoLoft, Waltham, MA .

PRE-MEETING DINNER at 5:15 PM (sharp) at Bertucci's, Waltham.

Entrepreneurs and investors are increasingly viewing patents with some skepticism. Some Investors say that they are unwilling to fund building out a strong patent portfolio because if the business is successful, they can buy whatever patents they need. They would rather their early investments be devoted to building and launching the minimum viable product, gaining customers, and ramping revenue. Facebook is one example they point to. Other investors say that they will not invest in a startup that does not have the potential to create a significant patent portfolio that can serve as a barrier to future competitors and, should the startup fail, provide some value at the end. Google is often cited as an example of a company that had patents early and has built a healthy portfolio. All these conversations are taking place against a backdrop of diminishing patent value generally, and particularly the value of software, payment, and business methods patents. Some of these changes result from various court decisions. Other changes have been brought by the American Invents Act (AIA); these changes make it much more difficult to enforce patents of all kinds in the US. A new administrative procedure called Inter Partes Review (IPR) makes it very cost effective to challenge most issued patents at the US Patent and Trademark Office. So what is an entrepreneur to think and do? Tonight's panel of experts will address these and many other issues from both the business and legal perspectives.

Speaker: Stephen Y. Chow, Esq., Partner, Burns & Levinson, LLP

Over three decades of practice, Attorney Stephen Y. Chow has developed numerous patent portfolios and strategies for chemical, electrical, information technology and life sciences enterprises, litigated patent, copyright, trademark, trade secret, antitrust, unfair competition, international trade, telecommunications and e-commerce cases before state and federal courts and agencies. Mr. Chow has coordinated or served as an expert in litigation before foreign tribunals. He has also advised manufacturers, telecommunications carriers, commercial exchanges and educational, financial and research institutions on commercial, legislative and regulatory matters, particularly in internal policies and development of new services and products, as well as in early-stage financing. Mr. Chow sees himself as a strategist and trouble-shooter for technology companies in financial, governance and intellectual property disputes and development. In particular, he offers integrated patent, technology and business prosecution, assessment and enforcement with the commensurate benefits.

Since 1995, Mr. Chow has taught corporate, intellectual property and litigation practice at Suffolk University Law School, including the perennial "Counseling Technology-Leading Emerging Enterprises." In 1997, he was elected to the American Law Institute, for which he has been active on consultative committees on contract, corporate, employment, intellectual property, international and privacy law

Speaker: Rob Friedman, Entrepreneur, CEO, and Board Member

Rob Friedman has more than 35 years of senior operating management and consulting experience and has launched several successful venture backed companies with IP. He was

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cofounder and CEO of Bitstream (BITS, 1981-91); President of Electronics for Imaging (EFII, 1991-92); Chairman of Ares Software (which was sold to Adobe Systems (ADBE, 1993-96) and Softwatch Ltd (1998-2003). BITS, EFII and Ares were all companies with innovative and proprietary software technology as well as patented technology in the electronic and desktop publishing industries. Softwatch was a developer of software to create targeted healthcare Web sites to support global pharmaceutical brand marketing and had no patents. Rob also cofounded and served as Chairman & CEO of Open Security Solutions, LLC (OSS) from 1999 to 2010. OSS was a patent holding and licensing company that entered into agreements with leading patent assertion and licensing companies to successfully monetize its patent portfolio. Rob currently serves as Chairman & CEO of Chestnut Hill Sound Inc. (CHS), which he cofounded in 2004. CHS is presently a licensor of intellectual property. Rob was a founding Board member of Actio Corporation and continues to serve on its Board of Directors. Actio provides manufacturing companies with centralized supply chain management solutions. Rob has a Bachelor of Science Degree in Accountancy from the University of Illinois and is a CPA having practiced with Arthur Andersen and Price Waterhouse prior to becoming an entrepreneur.

Speaker: Bob Weber, Managing Director, Patent Kinetics, LLC

Robert Weber is a successful intellectual property professional, inventor, serial entrepreneur, management consultant, and senior executive. Presently, he is Managing Director, Patent Kinetics, LLC, a company that helps entrepreneurs and patent owners build and monetize valuable patent portfolios. Weber is an inventor with 28 issued US patents and a number of foreign counterparts assigned to Intertrust Technologies, where he served as SVP Business and Technology Strategy, 1996-1999. The Intertrust portfolio was characterized in the Wall Street Journal as a once in a generation billion dollar licensing opportunity. (Intertrust is presently a joint venture of Sony and Philips.) Most recently, Patent Kinetics and its legal team successfully resolved a patent and trademark case brought on behalf of the inventor and trademark owner. Previously, in his role of Vice President, Corporate Development and Licensing (part time), for Open Security Solutions, LLC., Weber was instrumental in licensing a patent portfolio relating to information security to a well-known patent licensing and assertion company and in obtaining a resolution of patent litigation that had been pending in the Eastern District of Texas. In 2009, this litigation was resolved in favor of OSS and its partner company. Weber has also been a Principal Consultant at Northeast Consulting Resources, Inc. At NCRI, his consulting practice focused on the intersection of business and technology strategy with a particular emphasis on Information Commerce, the copyright industries, Internet-based services, and technology-based companies.

Weber divides his time between Boston and Silicon Valley. He is a former Vice Chair, Programs, of the Boston Entrepreneurs Network and is a member of the Licensing Executives Society, the Silicon Valley Forum, and the MIT Enterprise Forum of Cambridge where he serves on the ConnectedThings2016 organizing committee.

Moderator: William R. Byrnes (wrbyrnes@aol.com). Bill is an attorney and senior executive experienced in assisting entrepreneurs with the legal and business management issues arising on a day-to-day basis in the product, sales, and contract life cycles involving customers, vendors, and other third party relationships.

Bill received his undergraduate degree in English Literature and Creative Writing from Boston University, a J.D. from Suffolk University Law

School, and a L.L.M. degree in Taxation from Boston University Law School, Graduate Tax Program. He is also a Boston Entrepreneurs' Network board member.

Meeting Location: Constant Contact, Inc., Reservoir Place, Main Building InnoLoft Great Room, 1st Floor, 1601 Trapelo Rd., Waltham, MA (Exit 28B, I-95/Route 128)

Pre-meeting Dinner at 5:15 PM (sharp) at Bertucci's, Waltham, (Exit 27B, Route 128). Check for Updates at: Boston Entrepreneurs' Network Website at (http://www.boston-enet.org)

Directions: http://www.constantcontact.com/about-constant-contact/office-location-waltham.jsp

Reservations: ENET Constant Contact meetings are free to ENET members and $20 for non-members. No reservations are needed for the dinner. To expedite sign-in for the meeting, we ask that everyone -- members as well as non-members -- pre-register for the meeting online. Pre-registration is available until midnight the day before the meeting. If you cannot pre-register, you are welcome to register at the door.

Robotics and Automation Society – 6:00PM, Tuesday, 9 February

The Quest Operating System for Real-Time Computing

Dr. Richard West, Boston University

Many applications in areas such as robotics, automotive and avionics systems, and manufacturing require support for real-time and safety critical tasks. Existing systems either do not provide adequate timing guarantees, are too cumbersome, or are not able to ensure the safe operation of tasks in the presence of faults. In this talk I will introduce the Quest operating system for real-time and safety critical computing.

Quest is being built from the ground up at Boston University, and operates on single- and multi-core processors. I will begin by briefly describing Quest's unique virtual CPU (VCPU) scheduler, which integrates the management of real-time tasks and asynchronous events such as interrupts. Building upon this, I will describe the Quest-V separation kernel. Quest-V uses virtualization technologies found on many modern multi-core processors to partition the system into separate components. This leads to a chip-level distributed system, where failure of one component is isolated from other components, making it suitable for safety critical applications.

Finally, time-permitting, I will talk about the Quest-Arduino (Qduino) API for creating real-time multi-threaded tasks without the traditional complexities and lack of predictability associated with libraries such as Pthreads. Qduino is designed for physical computing in areas such as robotics, where tasks interact with the environment through sensors and actuators.

Richard West is an Associate Professor of Computer Science at Boston University. His research interests encompass operating systems, real-time/embedded systems, resource management, kernels, system organization, and hardware-software interaction. His group is currently working on the development of the Quest real-time OS and the Quest-V separation kernel. Funding from the NSF and Intel is being used to develop several ports of Quest(-V) on Intel

embedded platforms (Galileo, Edison, Minnowboard Max), for use in mixed-criticality applications in areas such as robotics, manufacturing, automotive systems and IoT.

In the past, Dr. West has collaborated with the resource management team at VMware, Inc. He worked on hypervisor scheduling, and cache modeling and management for multicore processors, which resulted in several patent submissions. Dr. West holds a Ph.D and M.S from the Georgia Institute of Technology, USA, and an M.Eng from the University of Newcastle-upon-Tyne, England.

Tuesday, February 9th, 2016; Doors open: 6:00 P.M.; Presentation: 6:30 P.M.; Dinner: 8:00 P.M.

Olin College
1000 Olin Way
Needham, MA 02492
Milas Hall Auditorium

UNHOSTED DINNER
Bertucci's
1257 Highland Ave.
Needham, MA 02492

Have more questions? Want to share a drink with the speaker? Want to network with fellow engineers and professionals? Just want to chat about the current goings-on in Robotics, or technology in general? Join us for dinner, where you can talk about Robotics in a more casual setting!

GENERAL INFORMATION
This and other RAS meetings are open to the general public. For more information about the RAS Boston Chapter, contact Chapter Chair Ryan Pettigrew at chair@robotics-boston.org or visit http://www.robotics-boston.org/.

To assist us in planning this meeting, please pre-register at http://www.ieeeboston.org/Register/.

Reliability Society – 5:30PM, Wednesday, 10 February
Co-sponsored by Northeastern ESD Association

ESD Device Sensitivity Trends and their Impact on Manufacturing Technology

Later this year the ESDA will be publishing a new version of the ESD Technology Roadmap which will make projections of ESD device-level protection levels out to the year 2020. In this talk we will present a preview of this roadmap as well as other information about device protection capability and device and system-level testing. The implications of these trends on the development of new technologies such as 3D ICs and advanced automated processes will also be discussed.

Dr. Terry L. Welsher retired from Lucent Technologies-Bell Laboratories Engineering Research Center in 2001 as the Director of the Quality, Test & Reliability department. He began his career in Bell Labs in 1978 where he worked on electrical conduction mechanisms in insulating polymers and electrolytic corrosion failure mechanisms in electrical interconnection materials. In 1984 he was appointed Distinguished Member of Technical Staff for his work in these fields. In 1986 he was promoted to Technical Manager to re-constitute the Bell Laboratories core expertise in electrostatic discharge (ESD). The

newly formed group proceeded to produce a string of ground-breaking contributions to the field and played a key role in advancing industry standards. In 1994, he broadened his group›s activities to all aspects of hardware reliability for Lucent Technologies with special emphasis in environmental stress testing (EST) and product reliability prediction and planning. In 1998 he was promoted to Director of the Quality, Test & Reliability Center of Excellence where he directed the development and deployment of product quality, test and reliability assurance practices for Lucent Technologies business units. This work included design for testability of integrated circuits, board and system level test and diagnosis and special techniques for testing of RF and optoelectronic systems and components.

Dr. Welsher was Chairman of the ESD Association Standards Committee 1988-1989. He was Technical Program Chair in 1991, Vice General Chair in 1992 and General Chair in 1993 of the EOS/ESD Symposium. He served as member of the Symposium Board of Directors 1993-1995. He has also been active in quality standards and roadmapping activities with Sematech, the ESD Association and the JEDEC 14 Quality and Reliability Committee. He has also served on the Board of Directors of JEDEC. He holds a B.S. in Chemistry from Florida State University and Ph.D. in chemical physics from the University of Texas at Austin. He is author or co-author of thirty-five papers in solid state physics, applied mathematics, organic chemistry, electronics reliability and electrostatic discharge.

This meeting will be held on Wednesday, February 10, 2015 at MIT Lincoln Laboratory Forbes Road Location, 3 Forbes Road, Lexington, MA. It will begin with personal networking at 5:30 PM.

The presentation will follow at 6:00 PM.
To assist us in planning this meeting, please pre-register at http://www.ieeeboston.org/Register/.

Photonics Society – 6:30PM, Thursday, 11 February

Our next IEEE Photonics Society Meeting will take place at 6:30 PM Thursday, February 11th, 2016 and will be located 3 Forbes Road (an MIT Lincoln Laboratory facility), Lexington, MA, 02420. The meeting is free and open to the public.

All are welcome. Prior to the seminar there will be social time and networking from 6:30 – 7:00PM.

Dinner will also be provided. The seminar will begin at 7:00PM.

For more information contact Jade Wang, Boston IEEE Photonics Society Chapter chair at jpwang@ll.mit.edu, or visit the Boston IEEE Photonics Society website at www.bostonphotonics.org.

Directions to Forbes Rd Lincoln Laboratory: (from interstate I-95/Route 128)

- Take Exit 30B onto Marrett Rd in Lexington – Merge into left lane
- Make the first Left onto Forbes Rd.
- Proceed straight through the small rotary and enter the parking lot.
- The entrance is on your right.

To assist us in planning this meeting, please pre-register at http://www.ieeeboston.org/Register/.

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Entrepreneurs' Network - 6:00PM, Tuesday, 16 February

Digital marketing: Many options, but where to go?

Meeting location – Microsoft Technology Center, One Cambridge Center (Kendall Square, next to Marriott Hotel), Cambridge, MA.

A panel will discuss cost effective and efficient options for using digital marketing. If your venture needs to reach prospective customers quickly and in a focused fashion, then you will find this meeting most valuable.
For more information and updates, visit www.boston-enet.org

Where: Microsoft Technology Center, One Cambridge Center, Cambridge, MA. 02142 Phone: (781) 487-6400 The One Cambridge Center GENERAL ENTRANCE is on Main Street, Cambridge, across from the Kendall Square Post Office. Exit Kendall Square T Station to Main Street. Once you exit the station, head down the Marriott side of Main Street going in the direction of Boston/the Longfellow Bridge.

The One Cambridge Center entrance is located next to the Boston Properties entrance. Enter through the glass revolving door and proceed to the Microsoft facilities on the second floor. Note: There is also a direct Microsoft entrance across from the rotary at the confluence of Main Street and Broadway. See also: http://www.microsoft.com/en-us/mtc/locations/boston_directions.aspx

Note: There is also a direct Microsoft entrance across from the rotary at the confluence of Main Street and Broadway.

Admission: General admission is $10. Free to ENET members. Free Pizza and soft drinks will be served. Advanced registration is requested

Computer, Communications and Consumer Electronics Societies and GBC/ACM - 7:00 PM, Thursday, 18 February

Using Software Defined Relationships to Build the Internet of Things

Bob Frankston

Consumer electronics is in transition. We are shifting from creating value and defining products using electronics to creating solutions using software. Consider the smartphone: is it a telephone, or is it a gaming unit, a calendar a camera or a television? With other form factors we can mix or match parts to create a desktop computer, a television, a home control system or whatever we can imagine. Many single-use devices and classic limitations no longer exist. The Internet is central to this revolution. It is a byproduct of creating connectivity solutions using any available means. The Internet represents a fundamental change in how we build systems and in what it means to communicate. You simply click on a URL and you're "there". You don't worry about wires or reserved frequency. You can just assume that the packets will appear at the destination most of the time. Using software defined relationships as building blocks is very different from traditional hardware-based engineering. Welcome to the new world of software and the Internet. There's no dependence on providers or networks. For the IEEE these changes present an opportunity and challenge. Devices are becoming connected, opening up new frontiers as we create and share our own solutions and become less dependent on service providers.

We're at the very earliest stages of an exciting new world.

Bob Frankston is a Fellow of the IEEE, the ACM and the Computer History Museum. He is on the Board of Governors and is a Distinguished Lecturer for the IEEE Consumer Electronics Society. He writes the Bits Vs. Electrons column in the IEEE/CE Magazine. He has been online since 1966 and was co-developer of the first electronic spreadsheet and has been honored by the IEEE for his contributions to home networking while at Microsoft. He received BS degrees in both Computer Science and Mathematics and Master's and Engineer's degrees in Computer Science and Electrical Engineering all from MIT. Since leaving Microsoft he has been doing angel investing and advising. He is currently working with entrepreneurs and established companies on the issues we face as we transition to a software-defined connected world.

The meeting will be held in the new meeting auditorium at the Verizon Technology Center. The address is 60 Sylvan Road, Waltham, MA 02451. The entrance is by the far corner - with the picnic tables out front - and not the tower or the new building. It is most easily reached by the West Street entrance.

Verizon requires us to provide a list of attendees in advance, so if you want to come, you need to register at http://Frankstonfeb2016.eventbrite.com, but admission is free.

We will be taking the speaker to dinner at Green Papaya after the talk at about 9pm.

Location: Verizon Labs, Waltham, MA

Up-to-date information about this and other talks is available online at http://ewh.ieee.org/r1/boston/computer/. You can sign up to receive updated status information about this talk and informational emails about future talks at http://mailman.mit.edu/mailman/listinfo/ieee-cs, our self-administered mailing list.

For more information contact Peter Mager p.mager at computer.org

Consultants Network – 6:30PM, Wednesday, 24 February

The Impact of Thermal Management in Electronics Design from Wearable Electronics, IoT to Data Centers

Kaveh Azar, Ph.D., President and CEO, Advanced Thermal Solutions, Inc.

In the past 20 years we have witnessed a paradigm shift in the way electronics and the Internet have influenced our lives. The nineties was the era of expanding the World Wide Web's infrastructure and building access to this massive information-highway. The decade of 2000 embraced the penetration of the web into our lives and the transport of information to the point of use, be it a nuclear power plant or a portable electronics. And now, the Internet of Things (IoT) is bringing the next wave of change, ushering in the connectivity to data and its processing as never before. This new architecture is changing the requirements of electronics design and the speed by which it is delivered. The success of such effort s pivots around speed of processing and delivery --- mandating electronics that can operate at much higher frequency with higher reliability, irrespective of their end-use.

Speed is directly correlated to power and power

results in heat, heat adversely impacts speed and reliability. With the hyper-competitive market, the winning product is the one that is first-to-market with the least-cost and highest-reliability. Hence, the foundation of a successful design is poured at the design stage where the right design mitigates heat related failures and costs, be it loss of speed, system failures in terms of bit error, malfunction or a costly product due to cooling requirements.

\In this presentation, thermal management of electronics is reviewed and the important role that circuit design plays in mitigating such heat-related challenges is discussed. Whether a system is a handheld device or high-speed computing, thermal coupling between system components plays a menacing role in its successful operation. The presentation will show how thermal coupling occurs and the means of managing it at the design stage to help reduce its impact. The Presentation will conclude with a high-level review of available cooling technologies and what measures can be taken with respect to design and packaging at the component and the PCB levels in designing a product that is right-the-first-time, with the least-cost and highest reliability.

Save the travel costs and particpate in these IEEE conferences held locally.

PLEASE NOTE: The meeting is open to the public. No charge for Consultants Network members or employees of Constant Contact; $5 entrance fee for all others. Casual dress.

Registration

- **(no registration required)**

The Consultants Network meeting starts at 6:30 PM. The meeting will take place at Constant Contact, Reservoir Place - 1601 Trapelo Road, Waltham, 1ST Floor, Great Room South, MA 02451, in the Great Room on the third floor

Driving Directions

Follow I-95/route 128 to Trapelo Rd in North Waltham, Waltham. Take exit 28 from I-95/route 128. (https://goo.gl/maps/tvn3l)

Consultants Network meetings generally take place on the fourth Wednesday of each month, but are not held during the summer months. Check the Consultants Network website for meeting details and last-minute information.
http://www.boston-consult.com/calendar.php

For more information, e-mail cn.boston@ieee.org or chairman@boston-consult.com; or contact the chairman Heinz Bachmann, at 978-637-2070. The Consultants Network website is at www.boston-consult.org.

Locally held IEEE Conferences

Save the travel costs and particpate in these IEEE conferences held locally.

2016 IEEE International Symposium on Phased Array Systems & Technology
October, 18 - 21 2016
www.array2016.org
(Abstract submission deadline, February 1, 2016)

2016 IEEE Symposium on Technologies for Homeland Security
May 10 -12 2016
www.ieee-hst.org
(Abstract submission deadline is January 4, 2016)

2016 IEEE High Performance Extreme Computing Conference
September 13 - 15 2016
www.ieee-hpec.org
(Abstract submission deadline is May 16, 2016)

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

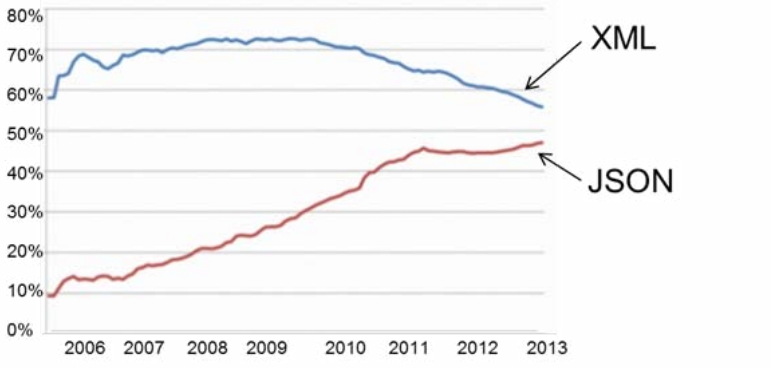
Data Interoperability using JSON and JSON Schema

Date & Time: Tuesday & Wednesday; May 3 & 4; 8AM - 4PM

Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

Speaker: Roger Costello, MITRE

Description/Overview:
JSON is a very popular data format. It is heavily used in data exchanges between browsers and web servers but its usage has expanded well beyond browser-server data exchanges. This class covers all parts of the JSON data format. Upon completion the student will be able to create JSON documents of arbitrary complexity. JSON Schema is a powerful language for specifying the allowable content of JSON documents. JSON Schema is often used as a contract between machines exchanging JSON data. To ensure conformance to the contract JSON documents are validated against a JSON Schema using a JSON Schema validator. Roughly 2/3 of the first day is spent on JSON. The remaining time is spent on JSON Schema (which is considerably more complex than JSON). Security risks of JSON and JSON Schema and how to mitigate the risks will be emphasized.



Based on directory of 11,000 web APIs listed at Programmable Web, December 2013

This is an packed class, lots of excellent information is covered. The instructor created a tutorial on JSON and JSON Schema, consisting of over 300 Powerpoint slides, 100 examples, and 16 lab exercises. The class is a hands-on course. Over the 2 days the student will have ample opportunity to test their understanding of the material, as he/she works on 16 lab exercises. A zip file will be provided containing the complete tutorial. The student must bring a laptop and have internet access (we will be using an on-line JSON Schema validator).

Target audience:
This class is for anyone dealing with data: exchanging data, manipulating data, creating data. No programming experience required. Experience with HTML and/or XML is useful.

Benefits of attending or goals of course: You will understand the JSON data format and be able to create JSON documents of arbitrary complexity. You will understand how to specify the format of JSON documents using JSON Schema and how to validate JSON documents against a JSON Schema.

Outline:

- Comparison of JSON to other data formats (e.g., XML)
- JSON – 7 types of values: object, array, string, number, true, false, null
- JSON Schema – we will cover all the keywords for specifying schemas, such as type, minimum, maximum, multipleOf, pattern, maxLength, items, maxItems, properties, and many others

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Materials included with registration: Course notes. A zip file will be provided containing the complete tutorial. The student must bring a laptop and have internet access (we will be using an on-line JSON Schema validator).

Speaker Bio: Roger Costello has a Ph.D. in computer science from Ohio State University. His specialty is data formats. For 15 years he was immersed in the XML suite of technologies and has written dozens of articles on various aspects of XML. For the last three years he has focused on the JSON technologies. He has taught the JSON, JSON Schema class at his company to standing-room only classes.

Decision (Run/Cancel) Date for this Courses is Friday, April 22, 2016

Payment received by April 19	
Members	**$395**
Non-members	**$435**
Payment received after April 19	
IEEE Members	**$435**
Non-members	**$475**

http://ieeeboston.org/event/data-interoperability-using-json-and-json-schema-spring-2016/

IEEE Boston Section Awards- Call for Nominations

IEEE BOSTON SECTION AWARDS
The Boston Section presents awards annually to distinguished members of the Section. The award nominations are due by January 31st and the awards are presented in May. The description, requirements, and eligibility for those awards are listed below.

DISTINGUISHED MEMBER AWARD
Description: The purpose of this award is to recognize distinguished long-term service to the Boston Section of the IEEE and significant contributions in an IEEE field of interest.

Eligibility: Individuals nominated for this award must have been members of the Boston Section for at least the previous ten (10) years. Individuals nominated for this award must currently be members of the Boston Section and members of the IEEE. The award is based upon evidence of distinction in long-term service to the Boston Section and for contributions to the fields of interest to the IEEE. Selection criteria include leadership roles and leadership quality, innovative and important contributions to the Boston Section, service and dedication to the Boston Section, and technical achievements in the fields of interest to the IEEE.

DISTINGUISHED SERVICE AWARD
Description: The purpose of this award is to honor an IEEE Boston Section member who has made exceptional and distinguished contributions to the Boston IEEE Section. Eligibility: Individuals nominated for this award must be members of the Boston Section and the IEEE. The award is based upon evidence of distinguished service to the Boston Section. Selection criteria include leadership roles and leadership quality, innovative and important services/contributions to the Boston Section.

STUDENT ACHIEVEMENT AWARD
Description: The purpose of this award is to recognize a college student who demonstrates the potential to become a distinguished leader and outstanding contributor in an IEEE field of interest.

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Eligibility:
Individuals nominated for this award must be a student, in good standing, at an institution of higher education located in the Boston Section or be a legal resident within the Boston Section who is attending an institution of higher education outside the Section. The nominee may be a student pursing an undergraduate or graduate degree. The nomination must be submitted by, or endorsed by, the student's major advisor. All nominees' major field of study must be in an IEEE field of interest. The award is based upon evidence of distinguished leadership, accomplishment, and/or outstanding contributions that further the aims of the IEEE.

Presentation: All awards will be presented at the Boston Section's annual event.

IEEE fields of Interest
Engineering
Computer Sciences and Information Technology
Physical Sciences
Biological and Medical Sciences
Mathematics
Technical Communications
Education
Management
Law and Policy.

IEEE BOSTON SECTION AWARDS NOMINATION FORM
Application deadline February 20th
Applications should be sent to susan.murphy@ieee.org

Nominee information
Please provide the following: name, address, telephone number, email address, and IEEE member number for the candidate.

Award for which candidate should be considered:

Distinguished Member Award
In recognition of the outstanding long-term service (10-years or more) of an IEEE Boston Section member to the Boston Section of the IEEE and significant contributions in an IEEE field of interest

Distinguished Service Award
In recognition of exceptional and distinguished contributions to the IEEE Boston Section by an IEEE Boston Section member

Student Achievement Award
In recognition of a college student who demonstrates the potential to become a distinguished leader and outstanding contributor in an IEEE field of interest

Citation Wording
Please provide 3 lines of suggested wording for the award plaque (not more than 25 words).

Nominee background
Please provide the follow information for the nominee: Resume; Short biography (not more than 500 words) including: Years of experience, years of active IEEE membership, positions held within IEEE, and society and affinity group membership(s) within IEEE

Endorsement
Please provide a letter of endorsement for the nominee. Include a summary of the contribution(s) you believe warrants this nomination (not more than 250 words).

Nominator information
Please provide the following: name, address, telephone number, email address, and IEEE member number for the nominator.

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Making You a Leader - Fast Track

Date & Time: **Wednesday, April 27; 8:30AM - 5:00PM**

Location: **Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA**

Speaker: **Robin Goldsmith, President, GoPro Management**

We do projects to make change. Yet, change will not occur without leadership, and leaders are rare. Leaders make others want to do what the leader wants done. Leaders cause ordinary people to achieve extraordinary things. Managing is not the same as leading, and titles do not make leaders. Seminars can teach you to manage, but they cannot teach you to be a leader. Rather, making a leader takes special techniques—such as our personal development clinics—that can change deep-seated behaviors learned over a lifetime. However, since clinics usually last about ten weeks, this mini-clinic was devised as a more convenient alternative. This format places responsibility upon the participant to carry out an extended informal follow-on program after completion of the formal seminar workshop session. During the follow-on period, the participant uses time-condensed methods that simulate the lifetime learning which makes a leader. Therefore, commitment to carrying out these exercises is essential for successful transformation.

Participants will learn:

- Leadership characteristics and practices that are essential for project and personal success.
- Differences between management and leadership, how they conflict, and why leaders are so rare.
- Behaviors leaders use to influence others, up and down, to want to do what the leader wants them to do
- Special techniques personal development clinics use to change lifetime learning and make leaders.
- How to employ those special techniques in a follow-on mini-clinic to develop the leadership skills they need to make their projects successful.

WHO SHOULD ATTEND: This course has been designed for business and systems professionals who want to improve their ability to lead and influence other people.

OUTLINE

LEADERSHIP CHARACTERISTICS & ROLE
How leadership looks and feels
Management vs. leadership
Leadership components of project success
Basic leadership practices; power sources
Real change leaders in organizations

TEAMS AND LEADERSHIP
Everyone feels leadership is lacking
Everyone thinks s/he is a leader
Results, not actions or intent
Workgroups, teams, and leaders
Situational leadership styles
Coaching and sports analogies to projects

INSPIRING AND MOTIVATING
Gaining commitment to project success
Communicating that influences others
Addressing negativism and groupthink
Conscious and unconscious messages
Greatest management principle
Hierarchy of needs effects on projects
Hygiene factors vs. motivators
Helping project players get their rewards
Influencing up and down without authority

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Inspiring the extra efforts projects need
Energizing the project team

SHARED VISIONS
Relating values and vision to projects
Getting others to embrace one's vision
Developing a motivating project vision

WHERE AND HOW LEADERS ARE MADE
Born or made? How do we know?
Habits of thought that affect project success
Overcoming self-limiting lifetime learning
Leader's critical success factors
Traditional education doesn't make leaders
Special way—personal development clinics

SETTING AND ACCOMPLISHING GOALS
S.M.A.R.T. goals for self and project
Action plans to achieve your goals
Visualizing and emotionalizing

DEFINING THE FOLLOW-ON PROGRAM
Clarifying project leadership objectives
Breaking into prioritized subgoals
Establishing rewarding daily achievements
Special techniques to change habits

CARRYING OUT THE MINI-CLINIC
Working with a follow-up support structure
Mapping results regularly to goals
Objectively recording leadership changes
Self-leadership through the process

Speaker's Bio:
Robin F. Goldsmith, JD is an internationally recognized authority on software development and acquisition methodology and management. He has more than 30 years of experience in requirements definition, quality and testing, development, project management, and process improvement. A frequent featured speaker at leading professional conferences and author of the recent Artech House book, Discovering REAL Business Requirements for Software Project Success, he regularly works with and trains business and systems professionals.

Decision (Run/Cancel) Date for this Courses is Monday, April 18, 2016

Payment received by April 13
Members $220
Non-members $245

Payment received after April 13
IEEE Members $245
Non-members $265

http://ieeeboston.org/event/making-you-a-leader-fast-track-fall-2015/

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Defining and Writing Business Requirements

Date & Time: **Monday & Tuesday, April 25 & 26; 8:30AM - 5:00PM**

Location: **Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA**

Speaker: **Robin Goldsmith, President, GoPro Management**

Discovering and documenting business requirements for projects always has been the weakest link in systems development. Up to 67 percent of maintenance and 40 percent of development is wasted rework and creep attributable to inadequately defined business requirements. Too often projects proceed based on something other than what the business people really need; and traditional methodologies commonly focus mainly on the format for writing requirements. This interactive workshop also emphasizes how to discover content, why to build it and what it must do to produce value for the customer/user. Using a real case, participants practice discovering, understanding, and writing clear and complete business/user requirements that can cut creep, speed project delivery, reduce maintenance, and delight customers

Participants will learn:

- Avoiding creep--role and importance of defining business requirements accurately and completely.
- Distinctions between the user's (business) requirements and the system's (design) requirements.
- How to gather data, spot the important things, and interpret them meaningfully.
- Using the Problem Pyramid™ tool to define clearly problems, causes, and real requirements.
- Formats for analyzing, documenting, and communicating business requirements.
- Techniques and automated tools to manage requirements changes and traceability.

WHO SHOULD ATTEND: This course has been designed for systems and business managers, project leaders, analysts, programmer analysts, quality/testing professionals, auditors, and others responsible for assuring business requirements are defined adequately.

OUTLINE

REQUIREMENTS ROLE AND IMPORTANCE
Sources and economics of system errors
How requirements produce value
Business vs. system requirements
Survey on improving requirements quality
Software packages and outsourcing
How we do it now vs. what we should do

DISCOVERING "REAL" REQUIREMENTS
Do users really not know what they want?
How the "real" requirements may differ
Aligning strategy, management, operations
Technology requirements vs. design
Problem Pyramid™ tool to get on track
Understanding the business needs/purposes
Horizontal processes and vertical silos
Customer-focused business processes
Who should do it: business or systems?
Joint Application Development (JAD) limits
Management/supervisor vs. worker views

DATA GATHERING AND ANALYSIS
Surveys and questionnaires
Research and existing documentation
Observing/participating in operations
Prototyping and proofs of concept
Planning an effective interview
Controlling with suitable questions

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

FORMATS TO AID UNDERSTANDING
Business rules, structured English
E-R, data flow,flow, organization diagrams
Data models, process maps
performance, volume, frequency statistics
Sample forms, reports, screens menus

DOCUMENTATION FORMATS
IEEE standard for software requirements
Use cases, strengths and warnings
7 guidelines for documenting requirements
Requirements vs. implementation scope
Iterating to avoid analysis paralysis
Conceptual system design solutions
Detailing for clarity, clarifying quality

GETTING MORE CLEAR AND COMPLETE
Stakeholders and Quality Dimensions
Addressing relevant quality factor levels
Standards, guidelines, and conventions
Detailing Engineered Deliverable Quality
Simulation and prototyping
Defining acceptance criteria

MANAGING THE REQUIREMENTS
Supporting, controlling, tracing changes
Automated requirements management tools
Measuring the "proof of the pudding"

Speaker's Bio:
Robin F. Goldsmith, JD is an internationally recognized authority on software development and acquisition methodology and management. He has more than 30 years of experience in requirements definition, quality and testing, development, project management, and process improvement. A frequent featured speaker at leading professional conferences and author of the recent Artech House book, Discovering REAL Business Requirements for Software Project Success, he regularly works with and trains business and systems professionals.

Decision (Run/Cancel) Date for this Courses is Friday, April 15, 2016

Payment received by April 12	
Members	**$415**
Non-members	**$430**
Payment received after April 12	
IEEE Members	**$430**
Non-members	**$455**

http://ieeeboston.org/event/making-you-a-leader-fast-track-fall-2015/

Preliminary Announcement

Basics of Software Defined Networking (SDN)

Date & Time: **Saturdays, April 23 & 30; 9AM - 12 noon; Monday May 3, 6-9PM (optional)**

Location: **TBD (along Rt. 128 between Lexington and Woburn)**

Speaker: **Dr. Bhumip Khasnabish, ZTE (TX) Inc.**

Introduction: This is an introductory level course on Software Defined Networking (SDN). Motivations for SDN and architectures of SDN will be discussed. Network migration and transformation for supporting SDNized organic and over the top (OTT) services will be also covered. We'll use IEEE and

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

other journal/magazine publications and published standards specifications as reference materials for this course. Hands-on assignments will help the students initiate and complete exercises using open source platforms and test beds. We'll also discuss novel techniques for solving the emerging real-life/-operator challenges related to (i) cost-effective network infrastructure development, and (ii) networked services and security management.

Outline of Topics to be covered:

- What is SDN and Why do we need SDN?
- SDN Architecture Overview
- Review of Open Source SDN and related Projects
- North- and South-bound Interfaces of SDN Controller
- East- and West-bound Interfaces of SDN Controller
- Review of Open Source SDN Tools and (Virtual) Labs
- Migration to SDN and Integration with Legacy Networks
- Hands-on works/assignments suggestions using open source test beds

Target Audience:
The course is designed for network and network software/system designers who are considering to gain introductory knowledge about SDN.

Benefits of Attending the Course:
This is an introductory level course on Software Defined Networking (SDN). The students will learn about motivations for and architectures of SDN as applicable to the mobile and multimedia networks for both organic and over the top (OTT) services. The assignments will help the students initiate and complete exercises using open source platforms and test beds.

Materials included in the course:
A summary of the slides, and a list of useful web resources including a few white papers.

Speaker Bio:
Dr. Bhumip Khasnabish works in the Strategy Planning and Standards Development division of ZTE (TX) Inc., USA. Previously, he worked at Verizon/GTE Laboratories (Waltham, MA, USA) and at Bell-Northern Research (BNR) Ltd. (Ottawa, Ontario, Canada). His research interests include network and system virtualization, network coding, open networks and systems, and software-defined networking and services. Bhumip initiated cloud and data center activities in the IETF, co-chaired the ATIS IPTV Interoperability Forum (IIF), and founded and chaired both the ATIS NG-CI task force and the MSF Services WG. In addition, he is a member of the DMTF and ONF leadership teams. As an ONF member, Bhumip contributed to the development of: Migration Use Cases and Methods, Migration Tools and Metrics, and SDN Migration Considerations.

Look in the March Digital issue for registration inforamtion

Introduction to Embedded Linux

Last Notice to take Advantage of the Early Registration Discount. Register now and Save $$$!!!!

Time & Date: **6 - 9PM; Mondays, March, 7, 14, 21, 28**

Location: **Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA**

Speaker: **Mike McCullough, RTETC, LLC**

Overview - This 4 day course introduces the Linux Operating System and Embedded Linux Distributions. The course focuses on the development and creation of applications in an Embedded Linux context using the Eclipse IDE. The first part of the course focuses on acquiring an understanding of the basic Linux Operating System, highlighting areas of concern for Embedded Linux applications development using Eclipse. The latter part of the course covers testing, booting and configuring of Embedded Linux systems including embedded cross-development and target board considerations.

Who Should Attend – The course is designed for real-time engineers who are building Embedded Linux solutions. It is also targeted at experienced developers requiring a refresher course on Embedded Linux. This course will clearly demonstrate both the strengths and weaknesses of the Linux Operating System in Embedded Systems.

Course Objectives

• To provide a basic understanding of the Linux OS and the Eclipse IDE framework.
• To understand the complexities of Embedded Linux Distributions in embedded systems.
• To learn how to configure, boot and test Embedded Linux distributions and applications running on Embedded Linux target systems.
• To give students the confidence to apply these concepts to their next Embedded Linux project

Hardware and Software Requirements – The student should have a working Linux desktop environment either directly installed or in a virtualization environment. The desktop Linux should have the GNU compiler and binary utilities (binutils) already installed. A working Eclipse C/C++ installation or prior knowledge of C-based Makefiles is useful for completion of lab exercises. Lab solutions are also provided with the course. An Embedded Linux target hardware platform is useful but not absolutely required for this course.

Additional Reference Materials

• Linux Kernel Development by Robert Love
• Linux System Programming by Robert Love
• Embedded Linux Primer by Christopher Hallinan
• Pro Linux Embedded Systems by Gene Sally
• Embedded Linux Development Using Eclipse by Doug Abbott
• Linux Device Drivers by Jonathan Corbet et al
• Essential Linux Device Drivers by Sreekrishnan Venkateswaran

Lecturer – Mike McCullough is President and CEO of RTETC, LLC. Mike has a BS in Computer Engineering and an MS in Systems Engineering from Boston University. A 20-year electronics veteran, he has held various positions at LynuxWorks, Tilera, Embedded Planet, Wind River Systems, Lockheed Sanders, Stratus Computer and Apollo Computer. RTETC, LLC is a provider of Eclipse-based development tools, training and consulting for the embedded systems market.

OUTLINE

Course Schedule Day 1

The Basics
Linux Terminology, History and Versioning
The Linux Community: Desktop & Embedded
Linux and the GPL
Linux References (Books and Online)
Getting Started

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Building the Kernel Source Code
Embedded Linux Kernels
Linux 2.6 and 3.x
Basic Kernel Capabilities
Process and Threads Management
Signals and System Calls
Synchronization, IPC and Error Handling
Timing and Timers
Memory Management and Paging
The I/O Subsystem: A Tale of Two Models
Modularization
Debugging
Process-Level and System-Level Debug
GDB, GDB Server and the GDB Server Debugger
Other Debug and Test Tools
An Eclipse Remote Debug Example
Advanced Debug with printk, syslogd and LTTng
System-Level Debug
System-Level Debug Tools
The /proc Filesystem
Advanced Logging Methods
KGDB and KDB
Crash and Core Dumps

Course Schedule Day 2
Process & Threads Management
What are Processes and Threads?
Virtual Memory Mapping
Creating and Managing Processes and Threads
Thread-Specific Data (TSD)
POSIX
The Native POSIX Threading Library (NPTL)
Kernel Threads
Signals
System Calls
Scheduling
Linux 2.4 and 2.6 Scheduling Models
The O(1) Scheduler
The Completely Fair Scheduler (CFS)
Synchronization
Via Global Data
Via Semaphores, Files and Signals
Condition and Completion Variables
Mutexes and Futexes
Inter-Process Communications (IPC)
Message Queues
Semaphores Revisited
Shared Memory
Pipes and FIFOs
Remote Procedure Calls
Networking

Course Schedule Day 3
Memory Management and Paging
Demand Paging and Virtual Memory
Allocating User and Kernel Memory
Mapping Device Memory
The Slab Allocator
The OOM Killer
Memory in Embedded Systems
Advanced Memory Operations
Linux and Memory
Managing Aligned Memory
Anonymous Memory Mappings
Debugging Memory Allocations
Locking and Reserving Memory
Error Handling
errno and perror
strerror and strerror_r
oops, panics and Segmentation Faults
Timing
How Linux Tells Time
Kernel, POSIX and Interval Timers
High-Resolution Timers (HRTs)
Modularization
Creating a Module and Module Loading
Dependency Issues
In Embedded Systems
Shared Libraries
A Shared Library Example
Static and Dynamic Libraries
The I/O Subsystem: A Tale of Two Models
The Original Device Driver Model
The Standard I/O Interface
Major and Minor Numbers
Configuring the Device Driver
The Evolution of the New Device Driver Model
The Initial Object-Oriented Approach
Platform Devices, Busses, Adapters and Drivers
Comparing the Two Driver Models

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Course Schedule Day 4

Advanced I/O Operations
Standard I/O Operations
Scatter-Gather and Asynchronous I/O
Poll, Select and Epoll
Memory-Mapped I/O
File Advice
I/O Schedulers
Interrupt and Exception Handling
Bottom Halves and Deferring Work
The Linux Boot Process
The Root Filesystem
Desktop Linux Boot
Bootloaders and U-Boot
Embedded Linux Boot Methods
Building and Booting from SD Cards
Managing Embedded Linux Builds
Configuring and menuconfig
Building Custom Linux Images
Target Image Builders
LTIB and Yocto
System Architecture Design Approaches
Deploying Embedded Linux
Choosing and Building the Root Filesystem
Useful Embedded Filesystems
Module Decisions
Final IT Work
Embedded Linux Trends
Some Final Recommendations

Decision (Run/Cancel) Date for this Courses is Friday, February 26, 2016

Payment received by Feb. 23
Members $400
Non-members $430

Payment received after Feb. 23
IEEE Members $430
Non-members $455

To Register, http://ieeeboston.org/event/introduction-embedded-linux-spring-2016

Call for Course Speakers/Organizers

IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity. The IEEE Boston Section, its dedicated volunteers, and over 8,500 members are committed to fulfilling this core purpose to the local technology community through chapter meetings, conferences, continuing education short courses, and professional and educational activities.

Twice each year a committee of local IEEE volunteers meet to consider course topics for its continuing education program. This committee is comprised of practicing engineers in various technical disciplines. In an effort to expand these course topics for our members and the local technical community at large, the committee is publicizing this CALL FOR COURSE SPEAKERS AND ORGANIZERS.

The Boston Section is one of the largest and most technically divers sections of the IEEE. We have over 20 active chapters and affinity groups.
If you have an expertise that you feel might be of interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is http://ieeeboston.org/course-proposals/ . Alternatively, you may contact the IEEE Boston Section office at sec.boston@ieee.org or 781 245 5405.

- Honoraria can be considered for course lecturers
- Applications oriented, practical focused courses are best (all courses should help attendees expand their knowledge based and help them do their job better after completing a course
- Courses should be no more than 2 full days, or 18 hours for a multi-evening course
- Your course will be publicized to over 10,000 local engineers
- You will be providing a valuable service to your profession
- Previous lecturers include: Dr. Eli Brookner, Dr. Steven Best, Colin Brench, to name a few.

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

CALL FOR PAPERS Dates Extended

2016 IEEE International Symposium on

Phased Array Systems and Technology

Revolutionary Developments in Phased Arrays

18–21 October 2016

Westin Waltham Hotel, Greater Boston, Massachusetts, USA

www.array2016.org

About the Symposium

Phased array systems continue to be a rapidly evolving technology with steady advances motivated by the challenges presented to modern military and commercial applications. This symposium will present the most recent advances in phased array technology and present a unique opportunity for members of the international community to interact with colleagues in the field of Phased Array Systems and Technology.

Suggested Topics:

- System Architecture
- Aperture Design
- Antenna Elements
- Beamforming Techniques
- T/R Modules
- Signal Processing for Arrays
- Array Measurements
- Advanced Materials
- Packaging and Manufacturing
- Applied Computational Electromagnetics

Special Sessions

Please provide suggestions for special sessions to the Technical Program Chair at info@array2016.org

Paper Template and Submission Procedures

Template and submission procedures are available at www.array2016.org/forauthors.htm

Publication Information

All accepted papers will be published on the conference CD-ROM and distributed to conference attendees. Selected papers meeting the publishing requirements will be published in IEEE Xplore as part of the IEEE Conference Publication Program.

Important Dates:

Summary (~1000 words + figures)	01 Feb 2016
Notification of Acceptance	15 Mar 2016
Final Papers (8 page max)	01 Jul 2016

Sponsors

Platinum: Raytheon

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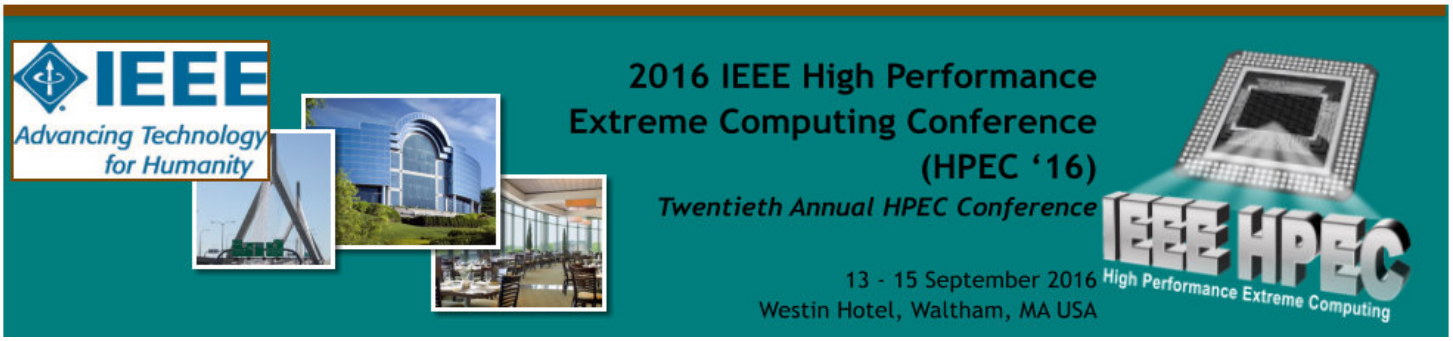

www.ieee-hpec.org

The IEEE High Performance Extreme Computing Conference (HPEC '16) will be held in the Greater Boston Area, Massachusetts, USA on 13 – 15 September 2016. The HPEC charter is to be the premier conference in the world on the confluence of HPC and Embedded Computing.

The technical committee seeks new presentations that clearly describe advances in high performance extreme computing technologies, emphasizing one or more of the following topics:

- Advanced Multicore Software Technologies
- Case Studies and Benchmarking of Applications
- Automated Design Tools
- Mapping and Scheduling of Parallel and Real-Time Applications
- Computing Technologies for Challenging Form Factors
- ASIC and FPGA Advances
- Open System Architectures
- Data Intensive Computing
- Big Data and Distributed Computing
- Interactive and Real-Time Supercomputing
- Graph Analytics and Network Science
- Fault-Tolerant Computing
- Embedded Cloud Computing
- Digital Front Ends
- General Purpose GPU Computing
- Advanced Processor Architectures
- Secure Computing & Anti-Tamper Technologies
- New Application Frontiers

HPEC accepts two types of submissions:

1. Full papers (up to 6 pages, references not included), and
2. Extended abstracts (up to 2 pages, references included).

Preference will be given to papers with strong, quantitative results, demonstrating novel approaches or describing high quality prototypes. Authors of full papers can mark their preference for a poster display or an oral presentation. Presenters who wish to have hardware demonstrations are encouraged to mark their preference for a poster display. Accepted extended abstracts will be displayed as posters.

All paper and extended abstract submissions need to use the approved IEEE templates. Full paper submissions with the highest peer review ratings will be published by IEEE in the official HPEC proceedings available on IEEE eXplore. All other accepted submissions and extended abstracts are published on ieee-hpec.org. Vendors are encouraged to sign up for vendor booths. This will allow vendors to present their HPEC technologies in an interactive atmosphere suitable for product demonstration and promotion.

We welcome input (hpec@ieee-hpec.org) on tutorials, invited talks, special sessions, peer reviewed presentations, and vendor demos. Instructions for submitting will be posted on the conference web site shortly.

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Introduction to Embedded Android

Last Notice Before the Course Begins, Register Now!!!

Date & Time: **Mondays, January 4, 11, 18, 25, 2016, 6 - 9PM**
Location: **Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA**
Speaker: **Mike McCullough, RTETC, LLC**

Course Summary - This course introduces the student to the use of Android in Embedded Systems and the use of Embedded Android Distributions. The first part of the course focuses on acquiring an understanding of basic Android concepts and on how Android is hosted by the Linux Operating System, highlighting areas of concern for Embedded Android systems development such as overall system design, boot performance and customization. The latter part of the course covers the differences between the standard Android Open Source Project and Embedded Android distributions.

Who Should Attend - The course is designed for real-time engineers who are building Embedded Android solutions. It is also targeted at experienced developers requiring a refresher course on Embedded Android. This course will clearly demonstrate both the strengths and weaknesses of the use of Android in Embedded Systems.

Course Objectives

• To provide a basic understanding of Android and its use in Embedded Systems
• To gain an understanding of the complexities of Embedded Android Distributions
• To learn how to configure, build, boot and deploy Embedded Android solutions
• To understand the differences between the AOSP and Embedded Android build approaches
• To give students confidence to apply these concepts to their next Embedded Android project

OUTLINE

Course Schedule Day 1

The Basics
What Android Is and What It Is Not
Android Terminology, History and Versioning
The Android Community: Phones, Tablets and Embedded Systems
Android, the GPL and the Apache Harmony Project
Android and Linux References (Books and Online)
Getting Started
The Android Open Source Project
Android Hardware Requirements
Embedded Linux Usage in Android
Java Usage in Android
The Android API
The Dalvik Virtual Machine (VM)
The Android Runtime and Zygote
The Java Native Interface (JNI)
Binder and System Services
Key Android Libraries

Debugging in Android
Process-Level and System-Level Debug
ADB, DDMS and Monkey
GDB and KGDB
GDB Server and Remote Debugging
An ADB Example

Course Schedule Day 2

Applications Development Overview

Eclipse-Based Application Development
The .apk File
The Android Emulator
Linux Modifications to Support Android
Wakelocks
Low-Memory Killer
Binder
Anonymous Shared Memory (ashmem)
Alarm
Logger
More Androidisms
Android Internals
Hardware Support
Native User Space
More on Dalvik and Java in Android
System Services and Binder
Useful AOSP Packages
System Startup Overview

The AOSP
The Android Development Host
AOSP Basics
Building and Running Android
ADB and the Emulator

Course Schedule Day 3

The AOSP Build System
Comparison with Other Builders
Configuration and Functions
The envsetup.sh File
Make Recipes
Cleaning
Modules in Android

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

The Default Build
Basic Build Recipes
AOSP Build Recipes
The Build Commands
Building the Software Development Kit (SDK)
Building the Compliance Test Suite (CTS)
Building the Native Development Kit (NDK)
API Updates
Building a Single Module
Building Out-of-Tree and In-Tree
Linaro
The Linaro Organization
Key Members and Participants
The Linaro Mission Objective
The Linaro Android Distribution Approach
Getting the Latest Linaro Distribution
The Linaro Distribution and Desktop Requirements
The Linaro Repository
The Linaro Maintainer Tools
The Linaro Image Tools
The Linaro Distribution for the i.MX53
Top Level Hierarchy
The GCC Tools for Linaro
The abi, android-toolchain-eabi and bionic Directories
The bootable and build Directories
The cts, dalvik and development Directories
The device Directory
The docs and external Directories
The frameworks and hardware Directories
The kernel Directory
The libcore and linaro-kernel-config Directories
The ndk, packages and prebuilt Directories
The sdk Directory
The system Directory
U-Boot in Linaro
The Linaro Build Process
The Linaro SD Creation Process
The Linaro Tarballs

Course Schedule Day 4

Native User Space
The Android Filesystem
The Android Root Directory
The system and data Directories
Building the Linux and Android Filesystems
SD Card Layout
The Android Init Process
Operation and Configuration
Global Properties and ueventd
The Boot Logo
The Android Command Line
The Shell
Toolbox
Native Utilities and Daemons
Framework Utilities and Daemons
Adding Capabilities to the Android Filesystem
The Linux Console Shell
The bash and ash Shells
Busybox
Linux Daemons Used by Android
Adding Capabilities to the Linux Filesystem
The Android Framework
Framework Startup
Core Building Blocks
System Services and Binder
Boot Animation
Dex Optimizations
Application Startup
Utilities and Commands
Support Daemons
The Hardware Abstraction Layer (HAL)
Advanced Android Customizations
Adding New Hardware Support
Customizing the Default Packages
More Init Customizations
Embedded Android Trends
Moving to a Generic User Interface
Easier Development for Non-Phones
Debugging Embedded Android
Better Documentation and Training
Some Final Recommendations

Lecturer Bio – Mike McCullough is President and CEO of RTETC, LLC. Mike has a BS in Computer Engineering and an MS in Systems Engineering from Boston University. A 25-year electronics veteran, he has held various positions at LynuxWorks, Tilera, Embedded Planet, Wind River Systems, Lockheed Sanders, Stratus Computer and Apollo Computer. RTETC, LLC is a provider of Eclipse-based development tools, training and consulting for the embedded systems market.

Decision (Run/Cancel) Date for this Courses is Monday, December 28, 2015

Payment received by Dec. 21
IEEE Members $390
Non-members $420

Payment received after Dec. 21
IEEE Members $420
Non-members $440

To Register, http://ieeeboston.org/event/introduction-to-embedded-android-fall-2015/

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Advanced Embedded Linux Optimization

Time & Date: **6 - 9PM, Mondays, April 4, 11, 18, 25**

Location: **Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA**

Speaker: **Mike McCullough, RTETC, LLC**

Course Summary - This 4-day technical training course provides advanced training in the debugging, testing, profiling and performance optimization of Embedded Linux software. The first part of the course focuses on advanced debugging, testing and profiling in an Embedded Linux context with a focus on using Eclipse, Backend Debuggers, JTAG and In-Circuit Emulators as well as Kernel Logging capabilities and Kernel Hacking. The latter part of the course covers performance measurement and optimization affecting boot, memory, I/O and CPU performance and key performance optimization tools for Embedded Linux software including the perf tool, advanced cache usage and compiler-based optimization.

Who Should Attend - The course is designed for real-time engineers who are developing high-performance Linux applications and device drivers using Embedded Linux distributions. It is also targeted at experienced developers requiring a refresher course on Advanced Embedded Linux optimization.

Course Objectives

- To understand methods for debugging, profiling and testing Embedded Linux software.
- To provide an overview of Linux application performance measurement and optimization.
- To understand the tools used for performance optimization of Embedded Linux software.
- To give students the confidence to apply these concepts to their next Embedded Linux project.

OUTLINE

Course Schedule Day 1

Getting Started with Embedded Linux
Linux and the GPL
Building the Kernel Source Code
Embedded Linux Kernels
BSPs and SDKs
Linux References (Books and Online)
Basic Debugging Review
Embedded Applications Debugging
GDB, GDB Server and the GDB Server Debugger
An Eclipse Remote Debug Example
Debugging with printk and LTTng
System Logs
Other Debuggers
System-Level Debug
System-Level Debug Tools
The /proc and /sys Filesystems
Basic Logging
KGDB and KDB
Crash Dumps and Post-Mortem Debugging
Debugging Embedded Linux Systems
Backend Debuggers
JTAG and In-Circuit Emulators
Hardware Simulators
Analyzers
Debugging Device Drivers
Kernel Probes
Kexec and Kdump
Kernel Profiling

Course Schedule Day 2

Testing
Design for Test
Agile Software Design
Unit-Level Testing
System-Level Testing
Code Coverage Tools
gcov
Automated Testing
DebugFS
Configuring DebugFS
DebugFS Capabilities
Advanced Logging
LogFS
Using Logwatch and Swatch
Using syslogd and syslog-ng

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Kernel Hacking
Configuring Kernel Hacking
Kernel Hacking Capabilities
Tracing
ptrace and strace
New Tracing Methods
SystemTap
Ftrace, Tracepoints and Event Tracing
Tracehooks and utrace

Course Schedule Day 3
Profiling
Basic Profiling
gprof and Oprofile
Performance Counters
LTTng
Another DDD Example
Manual Profiling
Instrumenting Code
Output Profiling
Timestamping
Measuring Embedded Linux Performance
Some Ideas on Performance Measurement
Common Considerations
Uncommon Considerations
Using JTAG Methods
BootLoader Optimizations
Boot Time Measurements
Effective Memory and Flash Usage
Filesystem Choices
Addressing Performance Problems
Types of Performance Problems
Using Performance Tools to Find Areas for Improvement
Application and System Optimization
Device Driver Optimization
CPU Usage Optimization
Memory Usage Optimization
Disk I/O and Filesystem Usage Optimization
The Perf Tool
Improving Boot Performance
Boot Time Optimization
The Linux Fastboot Capability
Building a Smaller Linux
Building a Smaller Application
Filesystem Tips and Tricks
Some Notes on Library Usage
Performance Tool Assistance
Recording Commands and Performance
System Error Messages and Event Logging
Dynamic Probes
User Mode Linux and Virtualization

Course Schedule Day 4
Improving CPU Performance
Run Queue Statistics
Context Switches and Interrupts
CPU Utilization
Linux Performance Tools for CPU
Process-Specific CPU Performance Tools
Stupid Cache Tricks
Improving System Memory Performance
Memory Performance Statistics
Linux Performance Tools for Memory
Process-Specific Memory Performance Tools
More Stupid Cache Tricks
Improving I/O and Device Driver Performance
Disk, Flash and General File I/O
Improving Overall Performance Using the Compiler
Basic Compiler Optimizations
Architecture-Dependent and Independent Optimization
Code Modification Optimizations
Feedback Based Optimization
Application Resource Optimization
The Hazard of Trust
An Iterative Process for Optimization
Improving Development Efficiency
The Future of Linux Performance Tools
Some Final Recommendations

Lecturer Bio – Mike McCullough is President and CEO of RTETC, LLC. Mike has a BS in Computer Engineering and an MS in Systems Engineering from Boston University. A 25-year electronics veteran, he has held various positions at LynuxWorks, Tilera, Embedded Planet, Wind River Systems, Lockheed Sanders, Stratus Computer and Apollo Computer. RTETC, LLC is a provider of Eclipse-based development tools, training and consulting for the embedded systems market.

Decision (Run/Cancel) Date for this Courses is Friday, March 26, 2016

Payment received by March 23
IEEE Members $395
Non-members $435

Payment received after March 23
IEEE Members $435
Non-members $470

To Register, http://ieeeboston.org/event/advanced-embedded-linux-optimization-spring-2016

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Flexible Electronics - Packaging Design, and Materials Analysis for Aerospace, Military, Medical & High end Consumer Products

Time & Date: 8AM - 5PM; Thursday, March 31, 2016

Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

Speaker: Tina Barcley, , Chief Technical Officer, TAS Consulting

Prerequisites:
Assume Student can read schematics, understand component usages and has some basic thermal analysis capability.

Class Summary:
This is a one-day session focusing on the advanced packaging needed for a flexible board design. This course will not cover schematic layout and circuit design. It will cover what you do with the completed schematic. It will address layout issues to avoid and what components work best in a flexible design. It will show what methods are available and almost available to package the flexible circuit board.

What materials work best for which industry?

What analysis should be performed to assure the design will work in the intended environment?

Who should attend?
This course is designed for Engineers involved in the above design elements of a project. This course will demonstrate the work needed to review the materials and environment for designs using flexible circuits.

Course Objectives:
- Understand circuit board layout changes for flexible electronics
- Show how to remove Heat in a flexible board.
- Review, Show, Typical Analysis needed for Reliability concerns
- Review electronics Packaging Issues and How to handle them
- Introduce Solder Fatigue concepts and what to do about it
- Review different Industry needs and show the key indicators for each.
-

Course Schedule:
1. Review student backgrounds and industries – course will be pushed toward the industries represented. (1/2 hr.)
2. Basic background on flexible boards (1/2 hr.)
3. Review schematic layouts – what works and what doesn't – this will be industry specific. (1/2 hr.)
4. Review analysis needed: structural, thermal, reliability, solder fatigue (1 hr.)
5. Walk through analysis for each of the above. (1 hr.)
6. Show issues of each of the analysis types, work-arounds, show stoppers, and realistic answers to some industry concerns. (1 ½ hr.)
7. Review solder fatigue differences for different solders. (1/2 hr.)
8. Review any additional industry needs specific to student's industries and questions. (1 hr.)
9. Lab Time- Students to work on project – can bring one or work on one provided. (1 ½ hr.)

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Instructor:
Tina Barcley has over 30 years of experience in electronic packaging, testing, and analysis (BS Engineering – Thermal and Materials and MS – Systems Engineering and program management. Tina worked for aerospace companies (ITT, TRW, Perkin Elmer, Goodrich and Aerojet), NASA (Marshall Space Flight Center), automotive (both Ford and Chrysler), military black boxes (Singer Librascope, Army, Navy and Air Force modules) as well as high end medical and commercial (Spectracom, MKS, Kodak, etc.). She has run and created testing labs, procedures, designs, fixes for designs, and the first BGA used in high temperature environments. Tina has R&D experience, proposal experiences, and program management experience in all the above industries. She has 21 US patents — all in electronics packaging, materials, and thermal. . Her experience has included all levels of parts reliability for systems ranging from 6-month to 10-year reliabilities. She is a frequent speaker at industry-specific conferences like IMAPS (International Microelectronics and Packaging Society) and ASE (Automotive Society of Engineers) and is on the IPC (IPC - Association Connecting Electronics Industries) Specification Review Panel.

Decision (Run/Cancel) Date for this Courses is Wednesday, March 16, 2016

Payment received by March 14
IEEE Members $235
Non-members $260

Payment received after March 14
IEEE Members $260
Non-members $285

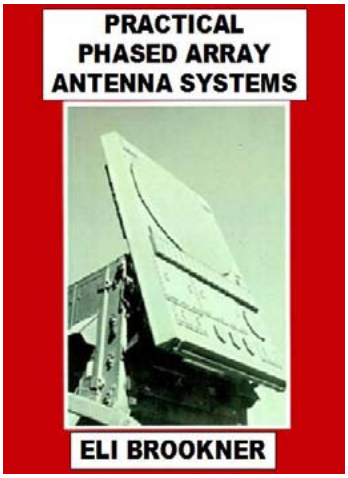
To Register, http://ieeeboston.org/event/flexible-electronics-spring-2016

Phased - Array and Adaptive-Array Fundamentals and their Recent Advances

Time & Date: 6 - 9PM; Mondays, March 14, 21, 28, April, 4, 25, May 9, 16, 23, June 6, 13

Location: MITRE Corporation, 202 Burlington Road, Bedford, MA (tentative)

Speaker: Dr. Eli Brookner, Raytheon Company (Retired)



All Attendees of the class will receive a trial license of MATLAB and Phased Array System Toolbox from MathWorks in addition to a set of examples which help demonstrate the key radar concepts covered in the course material.

Text: "Practical Phased Array Antenna Systems", Dr. Eli Brookner, Editor, Artech House, 1991 Hardcover, 258 pages, List Price $179, Hardcover, 258 pages. Covers array fundamentals: phase and time-delay steering; grating lobes for 1- and 2-dimensional arrays; effects of errors and failures on gain, sidelobes and angle accuracy; array weighting, thinning, blindness, mutual coupling, elements, phase-shifters and feeds; limited field of view (LFOV) arrays; SPY-1; example design.

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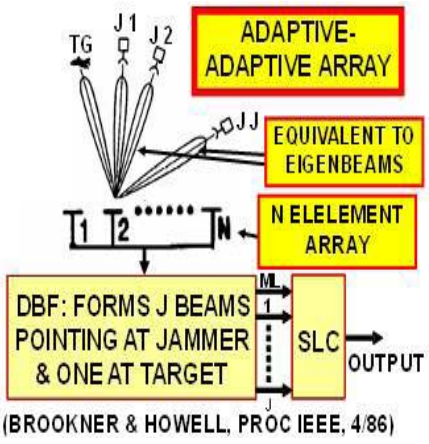
This course is based on the book entitled Practical Phased Array Antenna Systems by Dr. Eli Brookner. The book covers array basics and fundamentals which do not change with time. The course, the book and the notes will provide an ideal introduction to the principles of phased array antenna design and adaptive arrays. The course material and notes cover in addition recent developments in phased arrays updated to 2016.

With the explicitly tutorial approach the course and book offers a concise, introductory-level survey of the fundamentals without dwelling on extensive mathematical derivations or abstruse theory. Instead a physical feel will be given. The book provides extensive curves, tables and illustrative examples.

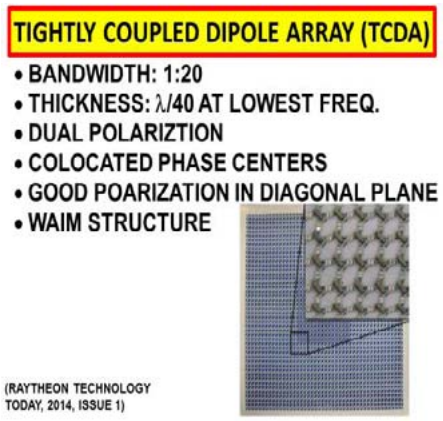
Covered in easy terms will be sidelobe cancellation, full adaptive array processing without suffering its computation complexity (through the use of adaptive-adaptive array processing also called beam-space processing and eigenbeam processing). Finally, Space-Time Adaptive Array (STAP) for airborne platforms will be explained and related to the displaced phase center antenna (DPCA).

This course is intended for the engineer or scientist not familiar with phased-array antennas as well as the antenna specialist who wants to learn about other aspects of phased-array antenna systems. The major emphasis will be on the system aspects of phased-array systems.



Lecture #1. Monday March 14; Phased Array Fundamentals: Fundamental Principles of Electronically Scanned Array (ESA) explained with tube COBRA DANE used as example. Covered will be: Near and Far Field Definitions, Phased Steering, Switched-Line Phase Steering; Time Delay Steering, Subarraying, Array Weighting, Monopulse, Duplexing, Array Thinning, Embedded Element, dual polarized circular waveguide element, advantage of triangular lattice over square lattice, Tour of COBRA DANE (6 stories high) via color slides.

Lecture #2. Monday March 21; Linear Array Fundamentals: Conditions for no grating lobes; beamwidth vs scan angle; sine space; Array Factor; sidelobe level vs antenna beamwidth; directivity; antenna efficiency factors; array weightings; array frequency scanning; array bandwith.



Lecture #3. Monday March 28; Planar Arrays: Array Factor; array separability; sine-space (sinα-sinß space, T-space); grating lobes location for triangular and rectangular lattice; directivity; very useful bell curve approximation; array thinning system issues.

Lecture #4. Monday April 4; Array Errors: Effects of element phase and amplitude element errors and element failures; simple physical derivation of error effects; paired echo theory; subarray errors; quantization errors; examples.

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Lecture #5. Monday April 25; Radiating Elements: Waveguide; dipole; slotted waveguide; microstrip patch; stacked patch; notch (wideband); spiral; matching (wide-angle); waveguide simulator; practical limitations, mutual coupling and array blindness; scattering matrix; design procedure; , polarization miss-match loss.

Lecture #6. Monday May 9; Active Phased Arrays: 2nd generation solid state hybrid active electronically scanned array (AESAs) covered using PAVE PAWS as example, T/R Module Introduced, Cross Bent Dipole Element, Mutual Coupling, Array Blindness, Tour of PAVE PAWS (6 stories) via color slides. 3rd Generation AESAs: THAAD, SPY-3, IRIDIUM, F-15 APQ-63(V)2, APG-79, XBR, AMDR and upgraded Patriot GaAs and GaN microwave integrated circuits (Monolithic Microwave Integrated Circuit, MMIC).

CJR TEAM CELEBRATE A SUCCESSFUL FIRST LIVE-LAUNCH

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Lecture #7. Monday May 16; Array Feeds: Corporate and space fed; Reactive (lossless) and matched (Wilkinson); even/odd node analysis. Serial; Ladder; Lopez; Blass; Radial, Butler matrix; microstrip/stripline; Rotman Lens; SLQ-32; PATRIOT space-fed array; reflectarray. System Considerations: sequential detection, beam shape loss; receiver and A/D dynamic range; polarization miss-match loss; array noise figure and system temperature taking into account array mismatch. Phase Shifters: Diode switched-line, hybrid-coupled, loaded-line; ferrite phase-shifters: non-reciprocal latching; diode vs ferrite; MEMS (Micro-Electro-Mechanical Systems) and its potential for a low cost ESA.

Lecture #8. Monday May 23; Limited Scan (Limited Field of View [LFOV]) Arrays: Explained using simple high school optics for TPS-25, 1st Electronically Scanned Array (ESA) put in production. Fundamental Theorem specifying minimum number of phase shifters needed for a specified scan angle. Method for realizing this minimum using overlapped array antenna elements as with HIPSAF lens array system and Microwave Landing System (MLS); reflector; randomized oversized elements; use of sum and difference patterns; use of spatial filters to reduce grating lobes and sidelobes. Hemispherical Coverage Dome Antenna.

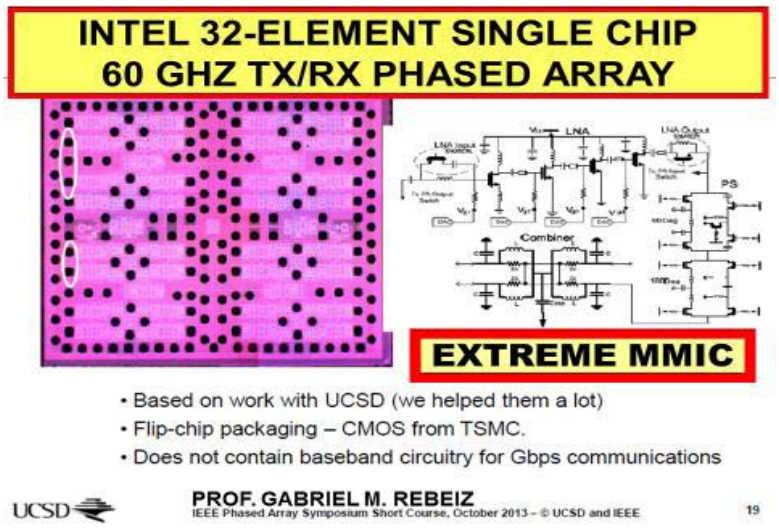
X-BAND 25K ELEMENT AESA AN/TPY-2

8 DELIVERED, 3 MORE ON ORDER.

PHOTO COURTESY RAYTHEON

Lecture #9. Monday June 6; Phased Array Amazing Advances and Breakthroughs -- Part 1: Systems: Patriot now has GaN active electronically scanned array (AESA) providing 360o coverage, now a 2015 state-of-the-art AESA radar system; S/X-band AMDR provides 30 times the sensitivity and number of tracks as SPY-1D(V); JLENS aerostat radar system now deployed over Washington DC; 3, 4, 6 faced “Aegis” radar systems developed by China, Japan, Australia, Netherlands, USA; Low Cost, Low Power Extreme MMIC (Moore’s law at Microwave and mm-waves): 4 T/R modules on single chip at X-band costing ~$10 per T/R module ; Intel single chip 32-Element 60 GHz Tx/Rx Phased Array, full phased array on wafer at 110 GHz; on-chip built-in-self-test (BIST), will be used in the internet-of-things and in cell phones which by 2020 is expected to number 50 billion, expect such single chip arrays to cost only few dollars in future; All the RF circuitry for mm-wave automobile radars at 25 GHz and 77 GHz are being put on a chip with some believing that such arrays and radars will soon be produced for just a few dollars; Valeo Raytheon (now Valeo Radar) developed low cost, $100s, car 25 GHz 7 beam phased array radar; about 2 million sold already, more than all the radars ever built up to a very few years ago. Digital Beam Forming (DBF): Israel, Thales and Australia AESAs have under development array with an A/D for every element channel; Raytheon develop-

ing mixer-less direct RF A/D having >400 MHz instantaneous bandwidth, reconfigurable between S and X-band; Radio Astronomers looking at using arrays with DBF. Materials: GaN can now put 5X to 10X the power of GaAs in same footprint, 38% less costly, 100 million hr MTBF, Raytheon invested $150 million to develop GaN; SiGe for backend, GaN for front end of T/R module. MIMO (Multiple Input Multiple Output): Where it makes sense; contrary to what is claimed MIMO array radars do not provide 1, 2 or 3 orders of magnitude better resolution and accuracy than conventional array radars; MIMO does not provide better barrage-noise-jammer, repeater-jammer or hot-clutter rejection than conventional array radars; contrary to claims MIMO



should not provide better minimum detectable velocity for airborne radars.

Sidelobe Cancellers (SLC): The simple single-loop, feed-forward canceller is introduced in easy terms. This is followed by a discussion of the simple single-loop feedback canceller with and without hard limiting. The normalized feedback SLC will also be covered. Presented will be their performance; transient response and cancellation ratio. Next the multiple-loop SLC (MSLC) will be covered. Applied to the MSLC will be the Gram-Schmidt, Givens and Householder orthonormal transformation methods. Systolic array implementations will be given.

Lecture #10. Monday June 13; Fully Adaptive Arrays: The optimum weight for a fully adaptive array is developed using a very simple derivation. Methods for calculating this optimum weight are given using the Sample Matrix Inversion (SMI) algorithm, the Applebaum-Howells adaptive feedback loop method, a recursive method, and Gram-Schmidt, Givens and Householder orthonormal transformations developed for the tracking problem and for the MSLC. The use of eigenvector beams and a whitening filter will also be developed. It will be shown how the latter reduces the transient response. Methods for obtaining the benefits of a fully adaptive array without its high computation and large transient time disadvantages are given. These are the adaptive-adaptive array processing procedures, the use of eigenbeam space, and the method of finding the largest eigenvalues and in turn their eigenbeams. The STAP algorithm will be introduced.

Phased Array Amazing Advances and Breakthroughs -- Part 2: Metamaterials: Material custom made (not found in nature): using 20 and 30 GHz metamaterial electronically steered antennas about the size of a laptop developed for transmission to satellites and back was demonstrated December 2013, goal is $1K per antenna, remains to prove low cost and reliability, how this antenna works explained for first time; 2-20GHz stealthing by absorption simulated using <1 mm coating; target made invisible over 50% bandwidth at L-band; Focus 6X beyond diffraction limit at 0.38 μm; 40X

diffraction limit, λ/80, at 375 MHz; In cell phones provides antennas 5X smaller (1/10th λ) having 700 MHz-2.7 GHz bandwidth; The Army Research Laboratory in Adelphi MD has funded the develop-

ment of a low profile metamaterial 250-505 MHZ antenna having a λ/20 thickness; Provides isolation between antennas with 2.5 cm separation equivalent to 1 m separation; used for phased array WAIM; n-doped graphene has negative index of refraction, first such material found in nature; Digital Processing and Moore's Law: Not dead yet; Slowed down but has much more to go; Expect increase in transistors density by about a factor of ~50 in the next 30 years and reduction in signal processing power consumption by factor of ~75; and then there is graphene which has potential for terahertz transistor clock speeds, manufacture on CMOS demonstrated, could allow Moore's law to march forward using present day manufacturing techniques; there is also spintronics which could revolutionize the computer architecture away from the John von Neumann model; and there is finally doing computation the way the brain efficiently and amazingly does perhaps by using synaptic transistors and/or memristors, remember the brain only weighs about 2-3 pounds and uses only ~20 W, we have a long way to go; Low Cost Packaging: Raytheon funding development of low cost flat panel X-band AESA using COTS type printed circuit boards (PCBs); Rockwell Collins doing it for airborne AESA; Lincoln-Lab./MA-COM developing low cost S-band flat panel array using PCBs, overlapped subarrays and a T/R switch instead of a circulator; SAR/ISAR: Principal Components of matrix formed from prominent scatterers track history used to determine target unknown motion and thus compensate for it to provide focused ISAR image. Technology and Algorithms: A dual polarized, low profile, (λ/40), wideband (1:20) antenna can be built using tightly coupled dipole antennas (TCDA); Lincoln Lab increases spurious free dynamic range of receiver plus A/D by 40 dB; MEMS: reliability reaches 300 billion cycles without failure; Has potential to reduce the T/R module count in an array by a factor of 2 to 4; Can provide microwave filters 200 MHz wide tunable from 8-12 GHz; MEMS Piezoelectric Material = piezoMEMS: Enables flying insect robots; Printed Electronics: Low cost 1.6 GHz (goal 2.4 GHz) diodes printed with Si and NbSi2 particles; Electrical and Optical Signals on Same Chip: IR beams could be used for transporting on computer chips digital information at the speed of light; COSMOS: DARPA revolutionary MMIC program: Allows integration of III-V, CMOS and opto-electronics on one chip without bonded wires leading to higher performance, lower power, smaller size, components; Graphene and Carbon Nanotube (CNT): potential also for non-volatile memory, flexible displays and camouflage clothing, self-cooling, IBM producing 200 mm wafers with RF devices; Superconductivity: We may still achieve superconductivity at room temperature; Superconductivity recently obtained for first time with iron compounds; Biodegradable Array of Transistors or LEDs: Imbedded for detecting cancer or low glucose; can then dispense chemotherapy or insulin; Quantum Radar: See stealth targets; New polarizations: OAMs, (Orbital Angular Momentum) unlimited data rate over finite band using new polarizations?? Bio: Biodegradable array of transistors or LEDs for detecting cancer or low glucose, can then dispense chemotherapy or insulin; Can now grow functioning non-rejecting kidney and heart for rats.

Decision (Run/Cancel) Date for this Courses is Wednesday, March 7, 2016

Payment received by March 3
IEEE Members $300
Non-members $340

Payment received after March 3
IEEE Members $340
Non-members $370

Your registration includes: **1 textbook**
15 reprints
copies of over 800 vugraphs

To Register, http://ieeeboston.org/event/phased-array-and-adaptive-array-fundamentals-and-their-recent-advances-spring-2016

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Software Development for Medical Device Manufacturers - An intensive two-day course

Time & Date: 8:30AM - 4:30PM; Wednesday & Thursday, March 30 & 31, 2016

Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

Speaker: Steven Rakitin, Quality Software Consulting

SUMMARY:
Developing software in compliance with FDA, EU regulations and international standards is challenging. This two-day intensive course provides practical guidance and suggestions for developing software that complies with applicable FDA and EU regulations, guidance documents and international standards such as IEC 62304 and ISO 14971. The focus of this course is interpreting Design Controls for software. Each section of the Design Controls regulation (820.30) is discussed from the software perspective. Corresponding requirements from IEC 62304 are woven into the flow.

In-depth discussion of critical topics such as Requirements, Software Verification & Validation, Risk Management and Fault Tree Analysis are included. In addition, techniques for validating software development tools and software used in Manufacturing and Quality Systems are also discussed. Interactive group exercises are included to facilitate discussion and learning.

WHO SHOULD ATTEND
Software and firmware engineers, software managers, RA/QA staff, validation engineers, and project managers. Anyone interested in learning how to develop medical device software in compliance with regulations, standards and guidance documents.

COURSE OUTLINE

- **Introduction**
  - – Medical Device Definitions – FDA and EU
  - – Regulatory Roadmap and FDA/EU Device Classification Schemes
  - – FDA Regulations and Guidance Documents for Software
  - – Standards – ISO 13485, IEC 62304, ISO 14971, EN-14971, IEC 60601, and IEC 62366-1
  - – All Software is Defective

- **Interpreting Design Controls for Software**
  - – Software Development Models
  - – Design and Development Planning
  - – Design Inputs
    - • About Requirements…
    - • Requirements Exercise
  - – Design Outputs
  - – Design Reviews
  - – Design Verification
    - • Software Verification Techniques
  - – Design Validation
    - • Software Validation Process
    - • Validation Exercise
  - – Design Transfer
  - – Design Changes
  - – Design History File

- **Validation of…**
  - – Software Tools used to develop Medical

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Device Software
- – Software used in Manufacturing
- – Software used in Quality Systems

• Risk Management
- – Standards and Regulations
- – Terms and Concepts
- – Risk Management Process
- – Risk Management Tools and Techniques
  - • Fault Tree Exercise
- – Data Collection and Analysis
- – Documentation Requirements

• Summary

• Comprehensive reference materials included

Speaker Bio:
Steven R. Rakitin has over 40 years experience as a software engineer and software quality manager. He helped write the first IEEE Software Engineering Standard (IEEE-STD-730 Standard for Software Quality Assurance Plans) as well as the current revision IEEE 730-2014. He is also a member of the working group writing IEEE Standard 1012 (System Verification & Validation). He has written several papers on medical software risk management as well as a book titled: Software Verification & Validation for Practitioners and Managers.

He received a BSEE from Northeastern University and an MSCS from Rensselaer Polytechnic Institute. He earned certifications from the American Society for Quality (ASQ) as a Software Quality Engineer (CSQE) and Quality Auditor (CQA). He is a Life Senior member of IEEE and a member of MassMEDIC.

He is on the Editorial Review Board for the ASQ Journal Software Quality Professional.

As President of Software Quality Consulting Inc., he helps medical device companies comply with FDA regulations, guidance documents, and international standards in an efficient and cost-effective manner.

Decision (Run/Cancel) Date for this Courses is Monday, March 21, 2016

Payment received by March 3	
IEEE Members	**$465**
Non-members	**$495**
Payment received after March 3	
IEEE Members	**$495**
Non-members	**$545**

To Register, http://ieeeboston.org/event/software-development-for-medical-device-manufacturers-spring-2016

Please take this short survey, https://www.surveymonkey.com/r/B8R2DYL

Antennas and Propagation for Wireless Communications

Time & Date: 6:30 - 9PM; Tuesdays, March 22, 29, April 12, 19, 26, May 3, 10, 17

Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

Speaker: Dr. Steven R. Best, MITRE Coprporation

Summary: This course provides participants with comprehensive coverage of a wide variety of antenna and propagation topics. The course provides an understanding of basic antenna property definitions, antenna design fundamentals and considerations, numerous antenna types and RF propagation fundamentals. The course also provides an overview of how antenna properties and propagation characteristics affect communication system performance. Topics covered include fundamental antenna performance properties, antenna specifications and data sheets, basic antenna types, elementary antennas, electrically small antennas, wireless device antennas, medical device antennas, low profile antennas, aperture and reflector antennas, circular polarized antennas, antenna arrays, propagation channel characteristics, antenna diversity and MIMO, and an overview of different antennas used in today's wireless communication systems and markets.

Learning Objectives:

Upon completing the course, the participant will be able to:

- Understand the concepts associated with antenna performance, operation and classification.
- Understand, evaluate and define antenna performance specifications.
- Describe and understand a broad spectrum of antenna types.
- Illustrate antenna operating principles with a factual knowledge of antenna theory.
- Understand the basic performance trade-offs associated with antenna design.
- Understand how to design basic antenna elements.
- Understand basic principles associated with the implementation of antenna arrays.
- Understand and describe how antenna performance and the RF propagation environment impact wireless communication system performance.
- Understand the basic types of antennas that are used in today's wireless communications markets.

Target Audience: Anyone working within the field of general RF systems, wireless, cellular and microwave systems will benefit from this comprehensive coverage of antenna properties and design. The course is well suited for design engineers and program managers who require an understanding of antenna principles and design concepts. Basic mathematical and computing skills are a prerequisite for this course. An electrical engineering background or equivalent practical experience is recommended but not required.

Outline:

Part 1:

Basic RF Concepts

• Review of fundamental RF Concepts • Basic design and performance requirements of a wireless

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communication system

Basic Antenna Concepts
• Definitions of basic antenna properties: impedance, VSWR, bandwidth, directivity, gain, radiation patterns, polarization, etc.
Types of Antennas
• Resonant antennas • Traveling wave antennas • Frequency Independent antennas • Aperture antennas • Phased arrays • Electrically small antennas • Circularly polarized antennas
Classification of Antenna Types
• By frequency • By size • By directivity
Fundamental Antenna Elements
• The monopole • The dipole • The loop • The folded dipole • The slot
Microstrip Antennas
• Element types • Microstrip element design • Design trade-offs • Designing and 802.11 microstrip patch
Baluns
Ground Plane Considerations
• Vertically polarized antennas • horizontally polarized antennas • The impact of the surrounding environment on antenna performance

Part 2:

Circularly Polarized Antennas
• Achieving circular polarization • The helix antenna • The crossed dipole antenna • The microstrip patch • The quadrifilar helix
Aperture Antennas
• Aperture design concepts • The horn antenna • The reflector antenna • The corner reflector **Impedance Matching**
• Impedance matching networks
Broadband Antennas
• Monopole configurations • Feed considerations • Dipole configurations • Bandwidth improvement techniques
Frequency Independent Antennas
• The log-periodic antenna • The spiral antenna
Electrically Small Antennas
• Impedance, bandwidth and quality factor of antennas • Defining electrically small • Fundamental performance limitations • The small dipole • The small loop • Design and Optimization of small antennas

Part 3:

Antenna Arrays
• Fundamental array theory • Types of antenna arrays • Feed network design considerations • Beam steering and shaping concepts • Performance trade-offs • Microstrip patch arrays • Dipole element arrays

Friis Equation and Link Budget
• The communication link • Understanding and calculating path loss • Receiver Sensitivity and antenna noise figure • Link budget calculations
Receiving Properties of Antenna
• How does an antenna capture power • Aperture area and efficiency • Coupling between antennas
Fractal Antennas
• Fractal antenna types • Performance properties of fractal antennas
RFID Antennas
• RFID system basics • Performance properties of RFID antennas
Ultra Wideband (UWB) Antennas
• Time domain considerations in antenna design • Antenna performance requirements in UWB systems
Low Profile Antennas
• The inverted L and inverted F antennas • The planar inverted F antenna (PIFA)
Device Integrated Antennas
• Antennas commonly used in wireless device applications

Part 4:

Propagation Channel Considerations
• RF path loss • Reflection, multipath and fading • Noise and interference • Polarization distortion • Diversity implementation • MIMO
Types of Antennas used in Communications Systems

• Wireless base station antennas • Wireless handset and portable device antennas • GPS antennas • HF, UHF and VHF communication antennas • Earth station and satellite communication antennas

Numerical Modeling of Antennas

• Software packages • Comparison with measurements

Antenna Design and Simulation Examples Using Commercial Antenna Design Software

Speaker Bio: Steven R. Best is a Senior Principal Sensor Systems Engineer with the MITRE Corporation in Bedford, MA. He received the B.Sc. Eng and the Ph.D. degrees in Electrical Engineering in 1983 and 1988, respectively, from the University of New Brunswick in Canada. Dr. Best has over 28 years of experience in business management and antenna design engineering in both military and commercial markets. Prior to joining MITRE, Dr. Best was with the Air Force Research Laboratory (AFRL) at Hanscom AFB, where his research interests included electrically small antennas, wideband radiating elements, conformal antennas, antenna arrays and communications antennas. Prior to joining AFRL, he was President of Cushcraft Corporation in Manchester, NH from 1997 to 2002. He was Director of Engineering at Cushcraft from 1996 to 1997. Prior to joining Cushcraft, he was co-founder and Vice President and General Manager of Parisi Antenna Systems from 1993 through 1996. He was Vice President and General Manager of D&M/Chu Technology, Inc. (formerly Chu Associates) from 1990 – 1993. He joined Chu Associates as a Senior Electrical Engineer in 1987.

Dr. Best is the author or co-author of 3 book chapters and over 100 papers in various journal, conference and industry publications. He frequently presents a three-day short course for the wireless industry titled “Antennas and Propagation for Wireless Communication”, he is the author of a CD-ROM series on antenna theory and design, and he has presented several Webinars on antenna topics. He has also authored an IEEE Expert Now module on electrically small antennas. Dr. Best is a former Distinguished Lecturer for IEEE Antennas and Propagation Society (AP-S), a former member of the AP-S AdCom, a former Associate Editor for the IEEE Transactions on Antennas and Propagation, and Senior Past Chair of the IEEE Boston Section. He is also a former Editor-in-Chief for AP-S Electronic Communications. Dr Best is a Fellow of the IEEE and a Past-President of the IEEE Antennas and Propagation Society.

Decision (Run/Cancel) Date for this Courses is Friday, March 11, 2016

Payment received by March 8
IEEE Members $425
Non-members $455

Payment received after March 8
IEEE Members $455
Non-members $475

To Register, http://ieeeboston.org/event/antennas-and-propagation-for-wireless-communications

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Call for Participants!!

Co-sponsors: IEEE-USA massport

Call for Participants

The 15th annual IEEE Symposium on Technologies for Homeland Security (HST '16), will be held 10 – 12 May, in the Greater Boston, Massachusetts area. This symposium brings together innovators from leading academic, industry, business, Homeland Security Centers of Excellence, and government programs to provide a forum to discuss ideas, concepts, and experimental results.

Produced by IEEE with technical support from DHS S&T, IEEE, IEEE Boston Section, and IEEE-USA and organizational support from MIT Lincoln Laboratory, Raytheon, Battelle, and MITRE, this year's event will once again showcase selected technical paper and posters highlighting emerging technologies in the areas of:

- **Cyber Security**
- **Biometrics & Forensics**
- **Land and Maritime Border Security**
- **Attack and Disaster Preparation, Recovery and Response**

We are currently reviewing and finalizing the technical paper, poster and tutorial session submissions in each of the areas noted above. Accepted papers will focus on technologies with applications available for implementation within about five years. All areas will cover the following common topics:

- Strategy and threat characterization, CONOPs, risk analysis,
- Modeling, simulation, experimentation, and exercises & training, and
- Testbeds, standards, performance and evaluations.

Contact Information

For more detailed information on the Technical Program, as well as Sponsorship and Exhibit Opportunities, visit the website: **http://ieee-hst.org/** or email: **information@ieee-hst.org.** **We expected the technical program to be posted online no later than March 1, 2016**

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