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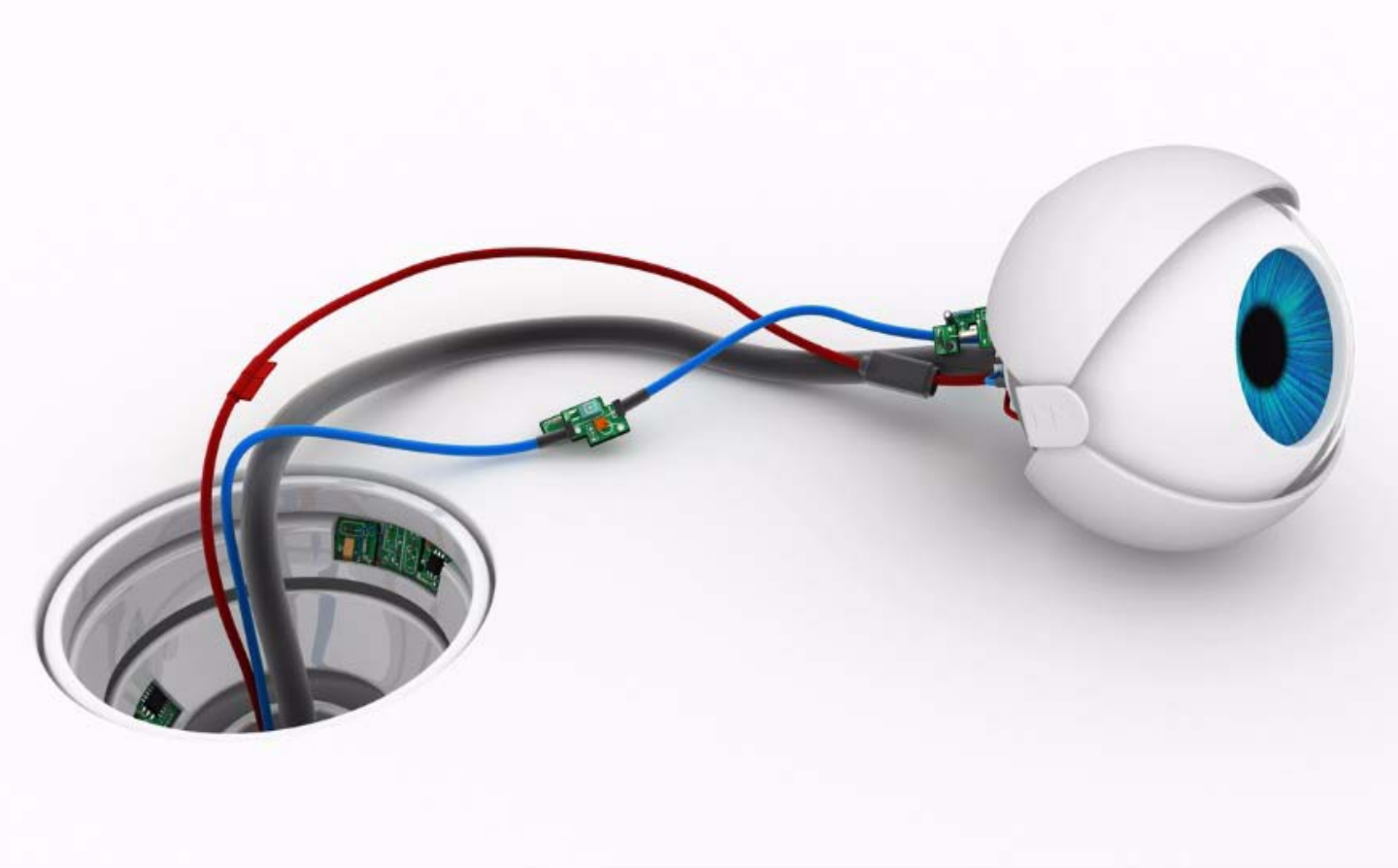

IEEE
Advancing Technology for Humanity

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Blockchains and ICOs

by Kevin Flavin,
Chair, IEEE Boston Section Electronic Communications Team

Blockchain. Sounds mysterious and exciting and dangerous all at once. The term is often used in conjunction with FUD (Fear, Uncertainty, and Doubt). Or it's mentioned in hushed tones at the family BBQ, because somebody's friend's brother has a friend that is dealing it - whatever that means.

Fortunately, there's a lot of information out there to clarify what it is. Unfortunately, there's a lot of information out there to muddy the information, possibly for nefarious purposes.

Fortunately, unfortunately - the key root of the words is: Fortune. Something that you could lose if you don't become completely familiar with the terms and conditions of what you are working with.

Well, the IEEE is here to help!

First, what is blockchain?
A blockchain records all prior transactions of a block (of information) into the new transaction 'block', creating a chain of encrypted blocks, that is then shared publicly. This is an oversimplification, and more and more often, when someone refers to blockchain, they are referring to a particular application of the technology in the creation of 'digital currency'.

The IEEE has published an article describing this on Spectrum's website: **https://goo.gl/714g3a.** Also they have a good webpage to cover this topic via The Institute: **https://goo.gl/Bi35vC.**

Need just a lingo refresher? Yes, there's a tap for that, via the Spectrum. Tap right here: **https://goo.gl/fjE5vk.** A blockchain, per Google/dictionary.com, is a digital ledger in which transactions made in Bitcoin or another cryptocurrency are recorded chronologically and publicly.

Blockchain as an ICO
ICO, or initial currency offering, is when a group of people decide to create a new digital currency. They publish a white paper of their application of the blockchain technology, and take investments into the initial round of creation of the digital currency.

There is a lot of information out there, some of it fraudulent, some of it valuable - caveat emptor, buyer beware.

A popular application of the blockchain, Bitcoin, is the most recognized use of the technology to create an ICO. Bitcoin is often quoted in the financial newspapers now, even though very few people own any of it.

Ethereum, while less recognized by the general public, is more accessible to the broader blockchain industry, and has been 'forked' more times than any other to create new ICOs. This is a severe over-simplification, but 'forking' is when someone takes a copy of the original, and goes in a different direction. Ethereum as a technology is popular because it's easier to launch new ICOs than using the Bitcoin technology - again an oversimplification, but you get the gist.

CNBC reports that more than $3 B USD was raised in new ICOs in 2017. I'm just going to leave this here and slowly back away.

If this feels a little 'squirrelly' to you, Jamie Dimon, CEO of JPMorgan Chase is not a fan of digital currency, and he predicted, "[if] you're stupid enough to buy [bitcoin], you'll pay the price for it one day."

Many other uses of this innovation!
However, there are many more uses of the blockchain technology besides digital currency. The technological idea of a secure block of information, encrypted to prevent tampering, is extremely valuable. Companies

are beginning to look at ways to apply the concept and technology in new ways to help solve their problems.

AT&T and Bayer are using blockchain to track their digital advertising - to solve the age-old problem of trying to measure the effectiveness of advertising and marketing.

Consulting firms are rushing to fill the void of good information, as well as helping companies apply the tools in their businesses. Cognizant and Accenture are very active in this area, with a steady flow of white papers and thought leadership available.

Companies aren't the only benefactors of the blockchain movement, governments have a role to play here and potentially can realize cost savings, better service and fewer risks. Estonia is a fast leader in applying blockchain to serving their residents and even Estonian nationals when they are abroad. You can read more about this innovative approach here: https://goo.gl/h5etNK.

What about the IEEE?
The IEEE has so many resources on this topic, in fact it's one of the top initiatives of the IEEE to provide information as well as developing standards where possible. They've built a sub-domain on IEEE just for blockchain: https://blockchain.ieee.org.

There's an IEEE Working Group: https://goo.gl/g7Nh5z

Anyone interested in engaging with the IEEE regarding blockchain can also participate on Collabratec: https://goo.gl/Xj4cF5

Finally, they've even implemented a Slack channel for blockchain: https://goo.gl/xvNnXK

I hope you get a chance to dig into this topic, and if you are already using blockchain, or are thinking about it, we would love to hear about how you are approaching it for your business.

Drop us a quick line, choosing the Digital Reflector Editorial Board as the recipient: https://goo.gl/D2eVPU

Call for Articles

Now that the Reflector is all electronic, we are expanding the content the publication. One of the new features we will be adding are technical and professional development articles of interest to our members and the local technology community. These will supplement the existing material already in our publication.

Technical submissions should be of reasonable technical depth and include graphics and, if needed, any supporting files. The length is flexible; however, a four to five page limit should be used as a guide. An appropriate guide may be a technical paper in a conference proceeding rather than one in an IEEE journal or transaction.

Professional development articles should have broad applicability to the engineering community and should not explicitly promote services for which a fee or payment is required. A maximum length of two to three pages would be best.
To ensure quality, technical submissions will be reviewed by the appropriate technical area(s). Professional articles will be reviewed by the publications committee for suitability.The author will be notified of the reviewers' decision.

The Reflector is published the first of each month. The target submission deadline for the articles should be five weeks before the issue date (e.g., June 1st issue date; article submission is April 27). This will allow sufficient time for a thorough review and notification to the author.

We are excited about this new feature and hope you are eager to participate!
Submissions should be sent to; ieeebostonsection@gmail.com

The Institute of Electrical and Electronics Engineers, Inc.

Spring 2018 Professional Development and Education Program
www.ieeeboston.org

Phased-Array and Adaptive-Array Fundamentals and their Recent Advances
Dates and Time: Eight Monday Evenings,
March, 19, 26, April 2, 9, 30, May 7, 14, 21
(Snow/make-up dates) June 4 or 11
6:00PM - 9:00PM
MITRE Corporation, Bedford, MA

Fundamentals of Real-Time Operating Systems
Dates and Time: Mondays, March 19, 26, April 2, 9
6:00PM - 9:00PM

More Digital Signal Processing for Wireless Communications
Dates and Time: Wednesdays, March 28, April 4, 11, 18 and 25
6:00PM - 9:00PM

Software Development for Medical Device Manufacturers
Dates and Time: Wednesday, April 11 and Thursday, April 12
8:30AM - 4:30PM

Embedded Linux BSPs and Device Drivers
Dates and Time: Mondays, April 16, 23, 30 and May 7
6:00PM - 9:00PM

Making You A Leader Fast Track - Become the Leader You Want and Need
Date and Time: Monday, June 18
8:30AM - 5:00PM

Writing Agile User Story &Acceptance Test Requirements - Cut Creep Overuns, Disappointment, and Embarrassment
Date and Time: Tuesday, June 19
8:30AM - 5:00PM

Determining and Communicating Project Value Return On Investment (ROI) - Communicate Right, Reliable, and Responsible REAL ROI Business Cases
Date and Time: Wednesday, June 20
8:30AM - 5:00PM

Proactive User Acceptance Testing - Confident Competence - The Testing Users Need to Be Confident the Software they Depend on Works
Date and Time: Thursday, June 21
8:30AM - 5:00PM

Developing Reusable Test Designs - Be an Instant Expert-Run More, and More Thorough, Tests in Less Time
Date and Time: Friday, June 22
8:30AM - 5:00PM

Online Courses
(Each Online Course - 90 day access for registrants!!!)

- Verilog 101: Verilog Foundations
- Systems Verilog 101 (SV101) Design Construct
- Systems Verilog 102 (SV102) Verification Constructs
- High Performance Project Management
- Introduction to Embedded Linux

(Discounts available if register for all three Verilog Courses)

- Software Development for Medical Device Manufacturers
- Reliability Engineering for the Business World
- Fundamental Mathematical Concepts Relating to Electromagnetics
- Embedded Linux Optimization
- Embedded Linux BSPs and Device Drivers
- Design Thinking for Technical Work

All Courses are being held at the Hilton Woburn, 2 Forbes Road, Woburn unless otherwise noted. For more information on these courses and other local IEEE activity see our website at www.ieeeboston.org, email: ieeebostonsection@gmail.com, or call 781-245-5405

Communications Society – 7:00PM, Thursday, 1 March

A Technical Description of Starry's Millimeter Wave based Broadband Service

This meeting is preceded by dinner with our guest speaker at Bertucci's, 475 Winter St, Waltham, MA at 5:30 PM.

Boston-based startup Starry has been operating a commercial millimeter wave-based broadband access network in the Boston metro area using a set of advanced technologies equivalent or similar to certain aspects of the proposed 3GPP 5G standards since early 2017. Starry operates a wide area broadband service using 37.0 ~ 38.6 GHz as granted under a market test authority license by the Federal Communications Commission (FCC), to test the commercial capability of millimeter wave frequencies. To prove out the technology's capability, Starry has extended base technologies of the IEEE's 802.11ac and 802.11ax such as MU-MIMO and Hybrid Digital Beamforming available in 802.11ac and 802.11ax and built sophisticated front ends using active phased array antenna systems to provide resilient broadband service wirelessly to the home, at gigabit-capable speeds. Starry also uses other leading edge technologies including the ITU-T's G.hn. Starry will share its technical and operational experience in building and operating this technology.

Speaker: Joe Lipowski, CTO, Starry
Joe Lipowski is co-founder and Chief Technology Officer (CTO) for Starry, since its inception in late 2014. Prior to Starry, Joe was the CTO for Aereo, where he led the technology development for Aereo's cloud-based antenna/DVR platform to deliver internet television over IP, pioneering the use of a high density small antenna farm. Prior to Aereo, Joe held senior executive technical leadership positions in the wireless communications field including at LoJack, Andrew Corporation, and Bell Labs/Lucent Technologies, Cirrus Logic, Pacific Communication Sciences and M/A-COM Inc. Joe holds 17 patents in wireless technologies.

Please circulate to interested parties.

Venue Note. This is our venue at the new Verizon Technology Center Campus in Waltham.
The meeting begins at 7 PM at 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.

Important Note: Verizon Technology Center requests the names of the meeting attendees in advance of the meeting. If you plan to attend, please send a note via e-mail with your name to John Nitzke at RF@ieee.org by Wednesday, February 28th.

The meeting is preceded by dinner at Bertucci's, 475 Winter St, Waltham at 5:30 PM. The speaker will be joining us at dinner.

Directions to Bertucci's restaurant in Waltham: Take Exit 27B on I95/128, heading west on Winter Street. After exiting, stay all the way to the right and take the first right turn into the shopping plaza. Please let Bob Malupin know if you plan to attend the dinner at Bertucci's. Bob can be contacted at Robert.Malupin@VerizonWireless.com .

Directions to Verizon Technology Center (old Verizon Labs location), 60 Sylvan Rd. campus, Waltham, MA 02451: Take Exit 27B on I95/128, heading west on Winter Street. Stay all the way to the right. Verizon Technology Center is 1/2 mile ahead. At the second traffic light, turn left onto WEST ST. and then take the first right (at the Verizon sign) which leads into the Verizon campus. Take the first left. The building and entrance for the meeting are on your right. Note that the entrance to the auditorium area is by the far corner – with the picnic tables out front – and not the tower or the new building.

Entrepreneur's Network and Technology and Engineering Management Society – 6:30PM, Tuesday, 6 March

Crossing the Chasm - From First Sales to Building Sales Growth

MEETING LOCATION: Constant Contact, Inc., Reservoir Place, 3rd Floor Great Room, 1601 Trapelo Rd., Waltham, MA

OK…You started a business and now aren't sure how to produce revenue. Do you need to begin your company's sales effort and don't know where to start or what to do? Simple questions yet no simple answers. Don't be confused by all the jargon out there! There are many different strategies and opinions, but every company is different. Therefore, your plan to roll out sales is going to be unique to your company. Our panelists combine many years of sales successes and failures in many verticals and will be joining together to discuss how to begin and ultimately consistently grow your sales.

Agenda:
6:30-7:30 pm - Networking
7:30-7:40 pm - Announcements
7:40-7:55 pm - E Minute - Up to 3 Startup companies' presentations
7:55-8:45 pm - 3 or 4 expert speakers on the night's topic
8:45-9:00 pm - Q & A
9:00-9:30 pm - Networking including meeting speakers

E-Minute Presentations: These 1 ½ minute presentations enable startup entrepreneurs to gain experience in presenting their summary to expert panels and audiences.

Refreshments: Cheese, crackers, chips, cookies, soft drinks & juice

Reservations: Free to ENET members and $20 for non-members. No reservations are needed for the pre-meeting dinner. Members & non-members, pre-register for the meeting online, until midnight the day before the meeting. If you cannot pre-register, you are welcome to register at the door.

Pre-Meeting Dinner: Join us for a pre-meeting networking dinner (self-pay) at Bertrucci's in Waltham prior to the start of this meeting. Dinner at 5:15 sharp.

Constant Contact is adjacent to RT 128 / 95 at Exit 28B. See: http://www.constantcontact.com/about-constant-contact/office-location-waltham.jsp

Moderator:

Ceri Ruenheck is President of It's Your Call (www.itsyourcall.com), a business to business telemarketing firm that was established in 1994. It's Your Call helps small businesses make the necessary outbound calls that they might not have the resources to perform themselves. In 2009, Ceri opened a second business www.twocoolcats.com, a website development company. In addition to running those businesses, Ceri consults to small companies who need help with putting together a marketing process. She is also a noted speaker and author of the e-book "Cold Calling for the Clueless" www.coldcallingforthecluelessness.com She is the mother of two boys and two cats all living in out of Harvard, MA.

Panelists:

Janet Comenos is CEO and Co-Founder of Spotted, the leading celebrity data company that helps consumer brands and agencies make smarter celebrity endorser and ambassador decisions. In 2017, AdWeek named Spotted "a diamond-studded data firm" and Janet was named one of the Boston Globe's top 20 female tech executives. She was previously SVP of Sales at Promoboxx. Janet is a Board Member of TUGG, an organization that pairs tech companies with philanthropies that serve unprivileged youth, and a Board Member of Influence Examiner, the leading FTC monitoring and compliance solu-

tion for consumer brands. She holds a B.A. from the University of Pennsylvania and is an avid tennis player.

Louie Balasny is Managing Director of botkeeper, a company that does everything a bookkeeper does, only faster, 24/7, with more reporting, beautiful dashboards, and at a fraction of the cost through the use of software, machine learning & skilled human accountants. Louie holds his Juris Doctor from Suffolk University Law School and began his career at Thomas Brady & Associates. There, he was Regional Director of Advanced Planning and was responsible for strategic development and implementation of advanced planning strategies.

He specialized in the execution of estate planning, business planning and insurance placement for individuals, executives and business owners. After several years, Louie moved into banking and was a Relationship Banking Officer at Admirals Bank where he was part of a team that helped bring in over $200 million in deposits. The startup world and lifelong desire to build something from the ground up has always been his passion which ultimately led him to botkeeper where his in charge of growing the sales as well as everything else that is done to get a startup off the ground.

Tom Libby, CEO, Diversified Sales Solutions Co-Founder Smarketing Institute

Tom is a seasoned Sales VP and Business Development Executive. He is a Co-Founder of the SmarketingInstitute.Org and the CEO of Diversified Sales Solutions, Inc., a firm that provides outsourced sales solutions. Getting Sales strategy right is part vocation, part mission for Tom. Over the past 18 years Tom has developed his management, leadership, and sales skills in diverse industries and includes experiences in startups, small companies up to and including fortune 500 companies.

Tom has received numerous awards and accolades during his career. He is a business professional with demonstrated results, as well as the ability to produce in high pressure situations. Today, Tom uses his sales & management experience to deliver interim management, training and coaching to small companies.

Co-Sponsor: IEEE Technology and Engineering Management (TEM) Society, Boston Chapter

National: The Engineering Management Society (EMS) was founded in 1951, becoming the Technology Management Council (TMC) in 2007. In 2015 we transitioned to the Technology and Engineering Management Society, (TEMS). The Boston TEMS Chapter has been approved by Section and IEEE HQ.

Vision, Mission, Values at http://www.ieee-tems.org/

Membership: https://www.ieee.org/membership-catalog/productdetail/showProductDetailPage.html?product=MEMTEM014

Boston TEMS Chapter: Technology and Engineering Management (TEM) Society, Boston Chapter is for Engineering Managers and Executives from Engineering, Science and Technology based companies. All those aspiring to become proficient and powerful Leaders are welcome. We aim is to provide knowledge to make strategic and critical decisions. We draw upon real-life scenarios from across the spectrum of engineering specialties. Our meetings will serve those looking to Manage Engineering Programs, Projects and Technologies. You can learn from leaders, get mentored by experts, share experiences and network with accomplished professionals.

We invite all our Technology and Engineering Management (TEM) Society members, Non-members and interested engineering executives in technology and engineering to participate in this meeting.

Photonics Society – 7:00PM, Thursday, 8 March

Ultrafast (100GHz) Modulation of LEDs

Seth A. Fortuna, UC Berkeley in the NSF Center for Energy Efficient Electronics Science

By coupling a light emitter to an optical antenna, it is now possible to make spontaneous emission faster than stimulated emission. This alludes to the exciting possibility of a directly-modulated LED that is faster than the LASER. Such an antenna-coupled LED (or simply antenna-LED) is well-suited as a light source for on-chip optical communication where small size, fast speed, and high efficiency are needed to achieve the promised benefit of reduced power consumption of on-chip optical links.

In this talk, I will discuss our recent progress in developing high speed and efficient antenna-LEDs implemented in a monolithically integrated manner. I will report the experimental demonstration of an electrically-injected III-V antenna-LED with a two-order of magnitude increase in the spontaneous emission rate. It will be shown that this nanoscale device can eventually achieve >100 GHz direct modulation rate at high efficiency and is therefore a suitable light source for atto-joule-per-bit on-chip optical communication.
Dr. Seth Fortuna, University of California, Berkeley, Berkeley, CA

Seth A. Fortuna received the B.Sc. from Pennsylvania State University in 2003, M.Sc. from University of Illinois at Urbana-Champaign in 2009 and Ph.D. from the University of California, Berkeley in 2017; all in electrical engineering. His dissertation research was recognized with the 2016 Tucker Award which honors superior work and scholarship in the technology of materials used in semiconductor devices. He has previously worked in industry at Intel Corporation and Philips Lumileds working primarily on reliability and failure analysis of semiconductor devices. He is currently a postdoctoral scholar at UC Berkeley in the NSF Center for Energy Efficient Electronics Science developing novel devices for energy efficient computing and communication.

Meeting Details:
This meeting begins at 7 PM Thursday, March 8th, 2018 and will be located 3 Forbes Road, Lexington, MA, 02420.

Note this is a satellite location ~1.5mi away from MIT Lincoln Laboratory. 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 Ajay Garg, IEEE Boston Photonics Society chair at ajay.sinclair.garg@ieee.org, or visit the IEEE Boston 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 by the flags.

Reliability Society – 5:30PM, Wednesday, 14 March

Advancements in Acoustic Micro Imaging

Jack H. Richtsmeier, Nordson Sonoscan

Acoustic Micro Imaging is an established non-destructive inspection technique that applies ultrasound for the inspection of microelectronic and semiconductor devices, packaging and associated materials. The technology has been widely used for bond / dis-bond assessment, defect and flaw detection as well as materials characterization. Recent advancements and new technological developments have allowed more applications to be resolved within the marketplace.

The presentation will include the following:

- Principles and Fundamentals
- Micro-slicing – Sonolytics
- Very High Frequency Transducers
- Waterfall & Water Plume
- 3-D Imaging (Virtual Rescan Mode (VRM))
- Frequency Domain Imaging (FDI)
- Integral Mode Imaging
- Surface profilometry (Acoustic Surface Flatness (ASF))
- Subsurface profilometry (Profile Mode)
- Multi-layer analysis (Sonosimulator)

This presentation will cover these latest advancements by showing examples and case studies through a variety of advanced packaging applications.

Author Bio: Mr. Jack H. Richtsmeier holds a Bachelor's Degree in Physical Science from The University of St. Thomas in St. Paul, MN. His professional background includes over 35 years of sales engineering and marketing experience within the industrial and scientific marketplace. He has a combined 25 years of expertise working in ultrasonics directly within the semiconductor and microelectronic market sectors. Mr. Richtsmeier is presently employed as Business Development Manager for Nordson Sonoscan, Inc. headquartered in Elk Grove Village, IL

Meeting Location: MIT Lincoln Laboratory, 3 Forbes Rd, Lexington, Massachusetts, 02421

Directions to 3 Forbes Road, Lexington, MA:

- Take Route 128/I-95 to Exit 30B, Route 2A Westbound.
- At the first traffic light, turn left onto Forbes Road.
- Go to the end of the street.
- At the traffic circle, turn right.
- Go halfway around the traffic circle and turn into the parking lot for MIT Lincoln Laboratory
- The main entrance is straight ahead, shared with "agenus".

Entrepreneur's Network – 6:30PM, Tuesday, 20 March

Building a Compelling Slide Deck: Winning Investors With Your Pitch & Presentation

MEETING LOCATION: Microsoft Technology Center, 5 Wayside Road, Burlington, MA 01803

One of the most obvious and challenging key requirements for the success of an early stage entrepreneurial company is securing funding. This meeting is focused on learning how to win potential investors with the right pitch deck and presentation. That is, does the deck articulate a vision, the market opportunity, growth potential, and the leadership team. It will also focus on how companies can build a value proposition, which is a critical step before raising money. Investors want to understand your value proposition - how does your product address a specific problem, why is it useful and to whom, or is it a disruptive technology?

The Panel is composed of a Professor teaching students how to create the correct business model and pitch deck, a successful business founder with an exit through acquisition, and a Senior Executive in private and public sectors who is also a turn-around specialist and author.

Agenda:
6:30-7:30 PM Registration & networking
7:30-7:40 PM ENET Chairman's announcements
7:40-7:55 PM eMinute - Up to 3 Startup companies' presentations
7:55-8:45 PM - 3 or 4 expert speakers on the night's topic
8:45-9:00 PM - Audience / Speakers Q & A
9:00-9:30 PM - Final networking including meeting speakers

eMinute Presentations: These 1 ½ minute presentations enable startup entrepreneurs to gain experience in presenting their summary to expert panels and audiences.

Refreshments: Cheese, crackers, chips, cookies, soft drinks & juice

Moderator: Brigid Siegel. Managing Partner and President Brigid Siegel Associates. Consultants focused on retained executive search, finding and developing leaders as well as building effective managing teams which will guarantee success in any technology, life sciences or biotech field. It starts with identifying objectives and finding the right people.

Speaker: Christopher Skipwith, Ph.D., is Assistant Professor of Biotechnology in the Department of Natural and Applied Sciences at Bentley University and a Member of Bentley's Health Thought Leadership Network. His work integrates basic science with policy, business, and public health to assess analytical standards for diagnostic tests and medical devices. He was involved in founding two point-of-care diagnostics start-up companies, IONU Biosystems and Ecelius Biosystems. He serves on the Board of the Science Education Academy, a Philadelphia-area initiative engaging underrepresented minorities in STEM-related careers, serves on the board of TBED21, Inc., which advances technology-based education for low-income areas, and co-chaired advocacy and diversity panels for the National Postdoctoral Association.

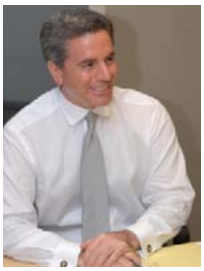
He has a B.S. in Materials Science & Engineering from the Georgia Institute of Technology, a Ph.D. in Biochemistry & Molecular Biophysics from the University of Pennsylvania, and was a postdoctoral fellow in the Department of Pharmaceutical Sciences at Northeastern University and Department of Materials Science and Engineering at MIT.

Speaker: Dr. Lissy Hu works with leading health systems and accountable care organizations to optimize post-acute care outcomes. She serves as the CEO and Founder of CarePort Health which enables healthcare

providers to enhance post-acute outcomes and costs by guiding patients across the care continuum and tracking their recovery in real-time. In 2016 CarePort was acquired by Allscripts to extend its breadth as the largest connected acute and post-acute provider network in the industry. Dr. Hu, an in-demand speaker and thought leader, has previously led sessions at the Institute for Healthcare Improvement, Harvard Business School, Case Management Society of America, HIMSS Population Health, Medical Group Management Association, Cleveland Clinic Innovation Summit, and SXSW among many others.

Dr. Hu and CarePort received a certificate of special congressional recognition for outstanding contribution to Massachusetts. CarePort has been named "10 Boston Healthcare Tech Companies to Watch" by VentureFizz and "Best Patient Relationship Management Solutions" by MedTech. CarePort is a past winner of the Harvard Business Plan Competition.

Dr. Hu is a graduate of Harvard Medical School and Harvard Business School, where she was a recipient of the Kaplan Life Sciences Award, and holds a bachelor's degree Summa Cum Laude from Columbia University.



Speaker: The Hon., Thomas A. Cellucci, Ph.D., MBA. has been a senior executive in both the private and public sectors for over 36 years. He served as the US Government's first-ever Chief Commercialization Officer after selling his fourth high technology firm, working for both President George W. Bush and President Obama. Tom is a turn-around artist on Wall Street and serves on many global Boards. He also currently assists President Trump's team when asked. Tom has authored or co-authored 25 scholarly books and over 211 high-tech business articles.

Cellucci earned a Ph.D. in Physical Chemistry from the University of Pennsylvania (1984), an MBA from Rutgers University (1991) and a BS in Chemistry from Fordham University (1980). He is on 21 Boards and Chairman of the Board of Trustees of Virginia International University near Washington, D.C., as well as Chairman of Eurasian Technological University in Almaty, Kazakhstan. He holds two endowed Chairs at prestigious universities in Kazakhstan, as well as taught at Harvard Business School, Princeton University and the University of Pennsylvania. He and his wife Julie spent their free time with their large amount of children and grandchildren.

Directions: Microsoft Technology Center, 5 Wayside Road Burlington, MA 01803 See: https://foursquare.com/v/microsoft-technology-enter/4a563f0af964a520d7b41fe3

Reservations: This meeting is free to ENET members and $20 for non-members. 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.

IEEE Boston Section Social Media Links:

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

Consultant's Network – 6:30PM, Tuesday, 27 March

Building a Successful Consulting Practice: What Does Success Mean to You?

Johanna Rothman

How can you tell if a potential consulting engagement is right for you? How can you know what to charge, so you're happy if you get the engagement or you don't? When you define success for yourself as a consultant, you can create the consulting business you want. You'll take the right gigs and decline the others. It's a matter of defining your version of success. You'll learn to define the kind of role you want, for the kind of clients you want, so you can create your successful consulting practice.

About Johanna Rothman
Johanna Rothman, known as the "Pragmatic Manager," provides frank advice for your tough problems.
She helps leaders and teams see problems, resolve risks, and manage their product development.
Johanna was the Agile 2009 conference chair and was the co-chair of the first edition of the Agile Practice Guide.

Johanna is the author of these books:
- Create Your Successful Agile Project: Collaborate, Measure, Estimate, Deliver
- Agile and Lean Program Management: Scaling Collaboration Across the Organization
- Manage Your Project Portfolio: Increase Your Capacity and Finish More Projects, 2nd edition
- Project Portfolio Tips: Twelve Ideas for Focusing on the Work You Need to Start & Finish
- Diving for Hidden Treasures: Finding the Value in Your Project Portfolio (with Jutta Eckstein)
- Predicting the Unpredictable: Pragmatic Approaches to Estimating Project Schedule or Cost
- Manage Your Job Search
- Hiring Geeks That Fit
- The 2008 Jolt Productivity award-winning Manage It! Your Guide to Modern, Pragmatic
- Project Management
- Behind Closed Doors: Secrets of Great Management

She writes columns for projectmanagment.com, and writes two blogs on her web site, jrothman.com, as well as a blog on createadaptablelife.com.

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.

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

A no host, PRE-MEETING DINNER will take place at 5:15 PM (sharp) at Bertucci's, 475 Winter Street, Waltham, MA (exit 27B, Rte. 128)

Driving Directions to Constant Contact
Follow I-95/route 128 to Trapelo Rd in North Waltham, Waltham. Take exit 28 from I-95/route 128.
(https://goo.gl/maps/tvn3I)

Consultants Network meetings generally take place on the fourth Tuesday of each month, but are not held during most summer months.

For more information, e-mail cn.boston@ieee.org or chairman@boston-consult.com; or contact the Chairman Frederick Beihold at (508) 405-0499.

IEEE Photonics Society
Boston Chapter Presents:

Advances in Interferometry Workshop

Wednesday, April 4, 11, 18, 25, May 2, 2018, 7:00–9:30 PM
Located at MIT Lincoln Laboratory – 3 Forbes Road, Lexington, MA, 02420, USA

This workshop will feature talks on different aspects of interferometry from the latest advances in optical interferometry to recent advances in atomic de Broglie interferometry. For complete coverage - talks are included on optical interferometry, such as developing the precision and stability necessary for instrumenting the Laser Interferometer Gravitational-Wave Observatory,which recently won the Nobel Prize in Physics for detecting the gravitational radiation of colliding neutron stars; health based bio-medical interferometry; ground based seismic wave interferometry; and radio astronomy interferometry. Amazing advances in Atomic Interferometry are examined, which is a technique that underlies a large number of recent precision measurements, exploiting the fact that matter, like light, exhibits wave-like properties. In atom interferometry, atoms laser-cooled to millionths of a degree above absolute zero, are driven into quantum superpositions by pulses of laser light. By manipulating the state of the atoms using lasers to steer the matter waves' paths and recombine the matter waves at the end of the experiment, the energy and couplings along the atoms' path and their interaction with the light pulses serve to determine the phase shift between matter waves across the two arms of the interferometer, identical to the way optical and radio interferometers work. Since atoms have mass, atom interferometers can be used to measure gravitational effects, and fundamental constants such as the gravitational constant and the fine structure constant.

This workshop will bring together leading experts in the field to discuss the latest research in interferometry and their future technological applications. This workshop also aims to foster communication and collaboration through networking among the individual engineers and researchers attending. Learn more about the rapid advances in interferometry directly from the foremost researchers in the different specialties involved, by registering for and attending this workshop.

Wednesday April 4, 2018	**Developing the Precision and Stability Necessary for Instrumenting LIGO** **Dr. Peter K. Fritschel, Massachusetts Institute of Technology, Kavli Institute, Cambridge, MA**
	Imaging the Invisible **Dr. Katie Bouman, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA**
Wednesday April 11, 2018	**Quantum Interferometry in the Presence of Gravity** **Dr. Igor Pikovski, Harvard-Smithsonian Center for Astrophysics and Harvard University, Cambridge, MA**
	An Interferometric Reflectance Bio Imaging Sensor **Prof. M. Selim Ünlü, Boston University, Boston, MA**
Wednesday April 18, 2018	**Prospects for Precise Measurements with Echo Atom Interferometry** **Prof. Anatharaman Kumarakrishnan, York University, Toronto, Ontario, Canada**
	Resonant Microphotonic Gyroscope **Dr. Andrey Matsko, OEWaves, Pasadena, CA**
Wednesday April 25, 2018	**More Power to Atom Interferometry** **Prof. Alexander D. Cronin, University of Arizona, Tucson, AZ**
	Quantum Sensors Based on Interferometry **Prof. Alexander V. Sergienko, Boston University, Boston, MA**
Wednesday May 2, 2018	**Ramsey-Bordé Interferometer for Electrons** **Prof. Karl-Peter Marzlin, St. Francis Xavier University, Antigonish, Nova Scotia, Canada**
	Quantum Hall Interferometry **Prof. Bertrand I. Halperin, Harvard University, Cambridge, MA**

Advance registration and fee required (Open to all IEEE members as well as non-members)
$75/$85 (IEEE Member/Non-Member) early registration fee for ten 1-hour talks over five nights; cost includes coffee and cookies each night, as well as downloadable copies of speakers slides. Early registration deadline March 31st, 2018. Post deadline fee $85/$95 (IEEE Member/Non-Member).

Registration form, abstracts, speaker's bios at: http://www.bostonphotonics.org/workshops/interferometry18/

For more information contact:
1) Farhad Hakimi, (fhakimi@ieee.org), Advances in Interferometry Workshop Co-Chair
2) Bill Nelson, (w.nelson@ieee.org), Advances in Interferometry Workshop Co-Chair

2018 MIT IEEE Undergraduate Research Technology Conference

Call for Submissions

CONFERENCE: Oct 5-7, 2018 | Massachusetts Institute of Technology, Cambridge MA, USA

SUBMISSION DEADLINE: June 30th, 2018

SUBMIT TO: https://ieee-r1-studentconference.myreviewroom.com

Envisioning a technical conference targeted towards undergraduate students all over the globe, the MIT IEEE Student Branch in 2015 inaugurated the IEEE MIT Undergraduate Research Technology Conference. This year we are organizing it again with the goal to make the conference a venue where undergraduate students can meet to present, discuss, and develop solutions advancing technology. Participants can attend a rich program with renowned speakers, technical sessions, a student design competition, exhibits, networking, and social activities, as well as a great opportunity for students to interact with leading industry experts. Our 2017 conference had 267 attendees, including several internationals and students from across the US, with a technical paper acceptance rate of 38%.

The conference theme is "Meet Innovative Technology," and the eight technical tracks include:

1. Machine Learning and Artificial Intelligence
2. Security and Communications
3. Human-Computer Interaction and Graphics
4. Robotics and Controls
5. BioEECS and Applied Physics
6. Computer Systems
7. Circuits, Materials, and Nanotechnologies
8. Theoretical Computer Science and Mathematics

Authors may submit content in the form of a technical paper, poster, or lightning talk.

All submissions must be written in English. Paper submissions must be no longer than 4 pages, single-spaced, with a minimum of 10 point font, and submissions may include figures, illustrations, and graphs. Abstract submissions for the poster and lightning talks are limited to 500 words.

All submissions will be peer-reviewed by faculty, graduate students, and industry professionals. Submissions are online, with a deadline of June 30th, 2018. Notification of acceptance will be sent via email by August 4th, 2018.

Please join the mailing list (MIT-Conference@ieee.org) for more information and updates on submission, the technical program, registration, and accommodation.

A conference proceeding of all the accepted papers that have been presented at the conference may be published and included in the IEEE Xplore journal. Electronic and online media containing all accepted submissions will be distributed to all registered attendees.

MEET INNOVATIVE TECHNOLOGY

Sponsored by the MIT IEEE Student Branch and IEEE Boston Section

http://ieee.scripts.mit.edu/conference

NOTE NEW EVENT DATE, LOCATION AND PAPER SUBMISSION DATES !!!!

Call for Papers and Posters

Co-sponsor: IEEE-USA

Call for Papers & Posters

The 18th annual IEEE Symposium on Technologies for Homeland Security (HST '18), will be held 23-24 October 2018, in the greater Boston, MA area. This symposium brings together innovators from leading academic, industry, businesses, Homeland Security Centers of Excellence, and government agencies 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, and Raytheon, this year's event will once again showcase selected technical papers and posters highlighting emerging technologies to:

- **Cybersecurity**
- **Biometrics & Forensics**
- **Land/ Maritime Borders & Critical Infrastructure Protection**
- **Humanitarian Assistance and Disaster Relief**

We are currently seeking technical paper and poster session submissions in each of the above areas. Papers examining the feasibility of transition to practice will also be considered. *This year, we introduce a new track focused on the highly topical area of Humanitarian Assistance and Disaster Relief.* All areas will cover the following common topics:

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

Contact Information

For more detailed information on the Call for Papers and Posters, as well as Sponsorship and Exhibit Opportunities, visit the website http://ieee-hst.org/ or email: information@ieee-hst.org. Submissions should be made at the following website: **https://cmt3.research.microsoft.com/HST2018/**

Important Dates

Paper Extended Abstract Deadline:	**May 1, 2018**
Paper, Poster and Acceptance Notification	**July 2, 2018**
Final Paper Submission Deadline:	**September 15, 2018**

All deadlines are by midnight Eastern Time.

Organizing Committee

General Chairs:	Melissa Choi, MIT Lincoln Laboratory James Flavin, MIT Lincoln Laboratory
Deputy Chair:	Fausto Molinet, Matrix Internationale
Technical Chairs:	Gerald Larocque MIT Lincoln Laboratory Anthony Serino, Raytheon
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Secure Cyberspace
Hong Liu, UMass Dartmouth
Firas Glaiel, Raytheon
Thomas Edgar, Pacific Northwest National Laboratory

IEEE Boston Section Online Courses:

(Students have 90 day access to all online, self-paced courses)

Verilog101:Verilog Foundations
Full course description and registration at ,
http://ieeeboston.org/verilog-101-verilog-foundations-online-course/

System Verilog 101: Design Constructs
Full course description and registration at ,
http://ieeeboston.org/systemverilog-101-sv101-design-constructs-online-course/

System Verilog 102: Verification Constructs
Full course description and registration at ,
http://ieeeboston.org/systemverilog-102-sv102-verification-constructs-online-course/

High Performance Project Management
Full course description and registration at ,
http://ieeeboston.org/high-performance-project-management-online-course/

Introduction to Embedded Linux Part I
Full course description and registration at ,
http://ieeeboston.org/introduction-to-embedded-linux-part-i-el201-online-course/

Embedded Linux Optimization - Tools and Techniques
Full course description and registration at ,
http://ieeeboston.org/embedded-linux-optimization-tools-techniques-line-course/

Embedded Linux Board Support Packages and Device Drivers
Full course description and registration at ,
http://ieeeboston.org/embedded-linux-bsps-device-drivers-line-course/

Software Development for Medical Device Manufacturers
Full course description and registration at ,
http://ieeeboston.org/software-development-medical-device-manufacturers-line-course/

Fundamental Mathematics Concepts Relating to Electromagnetics
Full course description and registration at ,
http://ieeeboston.org/fundamental-mathematics-concepts-relating-electromagnetics-line-course/

Reliability Engineering for the Business World
Full course description and registration at ,
http://ieeeboston.org/reliability-engineering-business-world-line-course/

Design Thinking for Today's Technical Work
http://ieeeboston.org/design-thinking-technical-work-line-course/

Determining and Communicating Project Value Return on Investment (ROI)

ROI Value Modeling ™ for Decision Making

Date & Time: **Wednesday, June 20; 8:30AM - 5:00PM (Note new date!)**

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

Location: **TBD, Woburn - Burlington, MA Area**

Companies are demanding reliable financial measures of proposed projects' value. Yet, project managers often don't know how to identify, calculate, or communicate a project's REAL ROI™ (Return on Investment). Traditional ROI calculations increasingly are being criticized for telling only part of the necessary story. The difficulty afflicts all types of projects but often is greatest in areas like IT, where benefits may seem intangible and frequent overruns impact estimates' credibility. This interactive workshop reveals 22 pitfalls that render common ROI determinations meaningless and shows instead how to identify full-story key effects on revenue and expense variables, reliably quantify tangible and intangible costs and benefits, and convincingly communicate the business value of project investments. Exercises enhance learning by allowing participants to practice applying practical techniques to a real case.

PARTICIPANTS WILL LEARN:

* The financial information that business decision makers need and demand.

* ROI and related calculations, strengths, weaknesses, and common pitfalls.

* Using ROI Value Modeling™ and Problem Pyramid™ to fully identify relevant costs and benefits.

* Quantifying intangibles, risk, flexibility, and opportunity.

* Professionally presenting credible business value measurements so people pay attention.

WHO SHOULD ATTEND: This course has been designed for business, systems, and project managers as well as analysts, implementers, users, and others who must know the return on project investments.

OUTLINE

WHAT MONEY HAS TO DO WITH IT

Project Manager role with regard to ROI
Situations demanding ROI, their issues
Difficulty of making convincing arguments
Linking ROI to the business case
Value Modeling™ Relationship Diagram
Investment vs. expense
Justification vs. objective analysis
Meanings of "It costs too much"
Total Cost of Ownership (TCO)
Factors other than cost to be considered
Costs and benefits, revenues vs. expenses
Return on Investment (ROI) calculations
Net present value, discounted cash flow
Payback period, annualized return
Internal rate of return (IRR), hurdle rate
'Telling the story' not just ROI calculations

Failing to quantify 'intangibles' and risk
Scenario approach to showing benefits
Mistakenly thinking ROI does not apply

DETERMINING MEANINGFUL BENEFITS

Why it's important to find the benefits first
Treacy's model of 5 revenue categories
Problem Pyramid™ to find requirements
Decision variable clarification chain
Putting a dollar value on intangibles
Opportunity, innovation, and flexibility
Mandates, project with no apparent benefits

ESTIMATING CREDIBLE COSTS

Problem Pyramid™ ties costs to value
Basing costs on implementation of design
Business case framework
Basic formula for estimating costs
Main causes of poor estimates
Top-down vs. bottom-up techniques
Risks that afflict ROI calculations
Three measurable ways to address risks
Best-, worst-, most-likely-case scenarios
Sources of parameter sizing assumptions
Defining a reasonable scenario for success
Getting reliable cost and revenue amounts

REPORTING AND MONITORING

Single vs. multiple scenario presentation
Applying apples vs. apples, when you can't
Scenario assumptions and parameters
No change vs. proposed scenarios' ROIs
Measuring intangibles' monetary effects
Continual, step-wise, and one-time changes
Percentage-likelihood impact adjustments
Presenting with spreadsheets
ROI Value Dashboard™ modeling tool
Caution about commercial ROI calculators
Using value modeling to improve decisions
Dashboard and scorecard-type notification
Capturing, calibrating with project actuals
Adjusting appropriately during project

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 Wednesday, June 13, 2018

Payment received by June 6
IEEE Members $235
Non-members $260

Payment received after June 6
IEEE Members $260
Non-members $280

http://ieeeboston.org/determining-communicating

Making You a Leader - Fast Track

Date & Time: **Monday, June 18; 8:30AM - 5:00PM (Note new date!)**

Location: **Hilton Hotel 2 Forbes Road, Woburn, MA**

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

Location: **TBD, Woburn - Burlington, MA Area**

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.

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
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, June 11, 2017

Payment received by June 4
IEEE Members $235
Non-members $260

Payment received after june 4
IEEE Members $260
Non-members $280

http://ieeeboston.org/event/making-leader-fast-track-leader-want-need/

Proactive User Acceptance Testing ™ -- Confident Competence

The Testing Users Need to be Confident the Software they Depend on Works

Date & Time: Thursday, June 21; 8:30AM - 5:00PM (Note new date!)

Speaker: Robin Goldsmith, President, GoPro Management

Location: TBD, Woburn - Burlington, MA Area

Projects aren't complete until users/customers are sure the systems they depend on actually meet business requirements, work properly, and truly help them do their jobs efficiently and effectively. However, users seldom are confident or comfortable testing system acceptability. Project Managers and Testing professionals need to know how to guide and facilitate effective acceptance testing without usurping the user's primary role. This intensive interactive seminar shows what users need to know to confidently make the best use of their time planning and conducting acceptance tests that catch more defects at the traditional tail-end of development, while also contributing in appropriate ways to reducing the number of errors that get through the development process for them to catch in UAT. Exercises give practice using practical methods and techniques.

PARTICIPANTS WILL LEARN:

* Appropriate testing roles for users, developers, and professional testers; and what each shouldn't test.

* How Proactive Testin™ throughout the life cycle reduces the number of errors left to find in UAT.

* Key testing concepts, techniques, and strategies that facilitate adaptation to your situation.

* Systematically expanding acceptance criteria to an acceptance test plan, test designs, and test cases.

* Supplementing with requirements-based tests, use cases, and high-level structural white box tests.* Techniques for obtaining/capturing test data and carrying out acceptance tests.

WHO SHOULD ATTEND: This course has been designed for business managers and system users responsible for conducting user acceptance testing of systems they must depend on, as well as for system and project managers, analysts, developers, quality/testing professionals, and auditors.

ROLE OF USER ACCEPTANCE TESTING

- Why users may resist involvement
- Making users confident about testing
- Objectives, types, and scope of testing
- Acceptance testing as user's self-defense
- Why technical tests don't catch all the errors
- Essential elements of effective testing
- CAT-Scan Approach™ to find more errors
- Proactive Testing™ Life Cycle model
- Separate technical and acceptance test paths
- Place of UAT in overall test structure
- Making sure important tests are done first
- Developer/tester/user test responsibilities

DEFINING ACCEPTANCE CRITERIA

- Defining acceptance test strategy up-front
- Source and role of acceptance criteria

5 elements criteria should address
Functionality the user must demonstrate
How much, how often user must test
Determining system quality
Who should carry out acceptance tests
How acceptance tests should be performed
Added benefit, revealing requirements errors

DESIGNING ACCEPTANCE TEST PLANS

Expanding the acceptance criteria
Allocating criteria to system design
Refining the design to catch oversights
Checklist of common problems to test
Equivalence classes and boundary values
Making quality factors (attributes) testable
Structural testing applicable to users
GUI features that always need to be tested
Defining requirements-based tests
Constructing use cases
Cautions about use case pitfalls
One- and two-column use case formats
Turning use cases into tests
Consolidating tests into efficient test scripts

CARRYING OUT ACCEPTANCE TESTS

Differentiating test cases and test data
Traps that destroy value of acceptance tests
Warning about conversions
Documentation, training, Help tests
Configuration, installation, localization
Security, backup, recovery tests
Suitability of automating acceptance testing
Performance, stress, load testing
Issues on creating test conditions, data
Capturing results, determining correctness
User's defect tracking and metrics

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 Thursday, June 14, 2018

Payment received by June 7
IEEE Members $235
Non-members $260

Payment received after June 7
IEEE Members $260
Non-members $280

http://ieeeboston.org/proactive-user-acceptance

Writing Agile User Story and Acceptance Test Requirements

Date & Time: Tuesday, June 19; 8:30AM - 5:00PM (Note new date!)

Speaker: Robin Goldsmith, President, GoPro Management

Location: TBD, Woburn - Burlington, MA Area

Everyone complains that poor requirements are the major cause of project problems. Yet, like the weather, nobody does much about it, at least not effectively. Traditional approaches advocate writing voluminous requirements documents that too often don't seem to help much and may even contribute to difficulties. Agile goes to the opposite extreme, relying on brief requirements in the form of three-line user stories that fit on the front an index card and a few user story acceptance criteria that fit on the card's back. Surprise, as Mark Twain noted, in some ways it's even harder to write Agile's brief requirements effectively. This interactive workshop reveals reasons user stories and their acceptance tests can fall short of their hype, explains critical concepts needed for effectiveness, and uses a real case to provide participants guided practice writing and evaluating user stories and their acceptance criteria/tests.

PARTICIPANTS WILL LEARN:

* Major sources of poor requirements that cause defects, rework, and cost/time overruns.

* How Agile user stories and their acceptance criteria/tests address these issues.

* Difficulties that still afflict requirements in Agile projects and why they persist.

* Writing more effective user stories and acceptance criteria/tests.

* What else is necessary to produce working software that provides real value.

WHO SHOULD ATTEND:

This course has been designed for product owners, analysts, developers, and other Agile (and other) project team members who are or should be involved in defining requirements.

AGILE, USER STORY FUNDAMENTALS

Agile Manifesto's relevant points
Characterization of traditional approaches
Waterfall and big up-front requirements
Agile's sprints and backlogs alternative
Agile project team roles
User story "As a <role>…" (Card)
User story acceptance criteria (Confirmation)
Estimating user story size
Splitting and refining
Prioritizing and allocating to backlogs/sprint
Constructing/implementing (Conversations)
Reviewing, retrospectives
Grooming backlog and reprioritizing
Exercise: Write Needed User Stories
Exercise: Define their Acceptance Criteria
Exercise: Review Your User Stories/Criteria

REQUIREMENTS ARE REQUIREMENTS—OR MAYBE NOT

User stories are backlog items, features
Chicken and egg relation to use cases
Issues and inconsistencies
Business vs. product/system requirements

"Levels Model" of requirements
Other mistaken presumptions
Requirements overview
Where user stories should fit, do fit instead
Conversation conundrum

WRITING MORE SUITABLE USER STORIES

Problem Pyramid™ tool to get on track
Exercise: Using the Problem Pyramid™
Exercise: Business Requirement User Stories
Issues identifying requirements
Product owner and business analyst roles
Project team participation
Dictating vs. discovering
Data gathering and analysis
Planning an effective interview
Controlling with suitable questions
Then a miracle occurs…

AND USER STORY ACCEPTANCE TESTS

Missed and unclear criteria
Turning criteria into tests, issues
How many tests are really needed
Test design techniques
Checklists and guidelines
Decision trees, decision tables
Boundary testing
Testing is main means to control risk
Defects and new user stories
Testing that user story focus misses
Reactive vs. proactive risk analysis
Given, when, then format

Exercise: Write User Story Acceptance Criteria
Exercise: Design their Tests
Exercise: Review Your User Stories/Tests

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 Tuesday, June 12, 2018

Payment received by June 5
IEEE Members $235
Non-members $260

Payment received after June 5
IEEE Members $260
Non-members $280

http://ieeeboston.org/writing-agile-user-story

Developing Reusable Test Designs

Be an Instant Expert--Run More, and More Thorough, Tests in Less Time

Date & Time: **Friday, June 22; 8:30AM - 5:00PM (Note new date!)**

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

Location: **TBD, Woburn - Burlington, MA Area**

Would you like to be an instant testing expert, able to start testing effectively in new situations without delay? And would you like to spend more of your time running tests and less of your time creating the tests? Reusable test designs are a little-known but powerful test planning/design tool that make it possible for you to run more effective test cases in less time. This interactive seminar workshop shows you how to apply a systematic structured Proactive Testing™ approach that first enables you to design much more thorough tests than traditional methods. Then, you'll discover how to convert your test designs into reusable test designs that you can apply instantly in new situations. You'll develop several reusable test designs in class and be ready to add more to your toolkit back on the job. Exercises enhance learning by allowing participants to practice applying practical techniques to an actual case.

Participants will learn:

- How test designs fit into the overall test planning structure and provide special advantages
- Systematic reliably repeatable methods for identifying test designs to test a given system.
- Checklists and guidelines that enable you to spot the conditions traditional methods overlook.
- Converting your project-specific test designs into reusable test designs you can use for other systems.
- Applying reusable test designs to jumpstart your testing with instant expertise and effectiveness.
- Quickly and reliably selecting the subset of test cases suitable for scale and risk.

WHO SHOULD ATTEND: This course has been designed for testers, managers, analysts, designers, programmers, auditors, and users who plan, oversee, and/or carry out testing of software products.

PROACTIVE TEST DESIGN BENEFITS

Proactive vs traditional reactive testing
Proactive Testing™ Life Cycle advantages
IEEE Standard for Test Documentation
Often-overlooked key to proper prioritizing
Systematic drill-down strategy
Master and detailed test plans
Test design specifications
Test case specifications
How taking time to structure saves time
Structuring to make test sets manageable
Facilitating reconstruction of test data
Taking off the blinders to allow selectivity
Re-using instead of rebuilding test designs
Instant expertise for testing new situations

IDENTIFYING NEEDED TEST DESIGNS

Functional (black box) testing
Three-level approach to functional testing
Keys for thoroughness
Breaking down to manageable pieces

Functionality Matrix technique
Use case perspective
Technical software actions
Test design specifications that are needed

DESIGNING TESTS MORE THOROUGHLY

How designing adds thoroughness
Traditional test design still misses a lot
Focused brainstorming for a better start
Checklists and guidelines to fill the gaps
Tests based on data formats
Coverage of data and process models
Decision trees and tables
Concerns common to all types of testing
Equivalence classes and partitioning
Ranges and boundary testing
GUI and navigation issues
Often-overlooked other dimensions to test
Formal/informal test design specifications
Extracting the reusable elements
Enhancing with system-specific tests
Link to driving effective automated tests

SPECIFYING (REUSABLE) TEST CASES

Translating test designs into test cases
Selecting scaled subset based on risk
Reusable test case specifications
Other essential test case component
Finding and creating test data
Test script and matrix formats
Simple and sophisticated automation

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, June 15, 2018

Payment received by June 8
IEEE Members $235
Non-members $260

Payment received after June 8
IEEE Members $260
Non-members $280

http://ieeeboston.org/developing-reusable-test-designs

Software Development for Medical Device Manufacturers -

An intensive two-day course

Time & Date: **8:30AM - 4:30PM, Wednesday & Thursday, April 11 & 12, 2018 (14 hours of instruction!)**

Location: **Hilton Hotel, 2 Forbes Road, Woburn, MA**

Speaker: **Steve Rakitin, President, Software Quality Consulting, Inc.**

OVERVIEW

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**
  - –Design Transfer
  - –Design Changes
  - –Design History File

- **Validation of…**
  - –Software Tools used to develop Medical 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 including 25 years of experience in the medical device industry. He has worked with over 85 medical device manufacturers worldwide, from start-ups to Fortune 100 corporations. He has written several papers on medical device 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 Senior Life 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 Course is Friday, March 23, 2018

Payment received by March 19	
IEEE Members	**$495**
Non-members	**$535**
Payment received after March 19	
IEEE Members	**$535**
Non-members	**$565**

http://ieeeboston.org/software-development-medical-device-manufacturers/

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Last Notice before Courses Begins, Please Register Now and Save $$$!!!

Fundamentals of Real-Time Operating Systems

Time & Date: **6 - 9PM, Mondays, March 19, 27, April 2, 9**
(12 hours of instruction!)

Location: **TBD, Woburn - Burlington, MA Area**

Speaker: **Mike McCullogh, President, RTETC, LLC.**

Course Summary - This course introduces the basics of Real-Time Operating Systems (RTOSes) using VxWorks and Linux as examples. The course focuses on the primary principles of RTOSes including determinism, real-time scheduling, interrupt latency and fast context switching as well as time and space partitioning in hard real-time environments. The first part of the course focuses on acquiring an understanding of microkernel and memory architectures for Real-Time including scheduling, signals, system calls, synchronization, inter-process communications and interrupt handling. The latter part of the course covers considerations for timing, memory management, device drivers, booting, debugging and deployment of Real-Time embedded systems.

Who Should Attend - The course is designed for real-time engineers who are using or intending to use a Real-Time Operating System. It is also targeted at experienced developers requiring a refresher course on RTOSes. This course will clearly demonstrate both the strengths and weaknesses of the Real-Time Operating Systems in Embedded Systems.

Course Objectives

- To provide a basic understanding of Real-Time Requirements
- To understand the complexities of RTOS scheduling and synchronization
- To learn how to configure, boot, test and deploy real-time embedded systems
- To give students the confidence to apply these concepts to their next RTOS project

Hardware and Software Requirements - The student should have a working Linux desktop environment either directly installed or in a virtualization environment or have access to a development environment for a Real-Time Operating System such as VxWorks. An Embedded Linux target hardware platform is useful but not absolutely required for this course.

Outline

Embedded Development Basics

Embedded Systems Characteristics
Embedded Real-Time Systems
Real-Time Enough
Embedded Linux and Real-Time

Real-Time Operating System Basics

Microkernel Architecture
Microkernel Scheduling
Determinism
Rate Monotonic Analysis and Fixed Priority Scheduling
Latency and Latency Measurements
Fast Context Switching
Real-Time Memory Architectures
Time and Space Partitioning and ARINC
Multiprocessor Basics
Amdahl's Law

RTOS Kernel Overview
Real-Time Scheduling and Task Management
Signals and System Calls
Synchronization
Inter-Processor Communications (IPC)
Interrupt Handling
Error Handling
Timing and Timers
Real-Time Memory Management

Real-Time Scheduling
OS Scheduling Types
Pre-emptive Multitasking
Typical Scheduling Issues
VxWorks Scheduling
Linux Scheduling
Linux Threads
Tasks and Task-Specific Data (TSD)
VxWorks Real-Time Processes (RTPs)
Measuring Task and Thread Performance

Signals in Embedded RTOSes

System Calls in Embedded RTOSes

Synchronization
Via Global Data
Via Semaphores, Files and Signals
Mutexes in VxWorks and Linux
Linux Futexes
Software Watchdog Timers

Inter-Process Communications (IPC)
More Semaphores
Message Queues
Shared Memory
Pipes and FIFOs
Remote Procedure Calls
Networking

Interrupt and Exception Handling
Basic Interrupt Process
VxWorks intLib and excLib
Routines You Can Call From Interrupt Context

Interrupt Service Routines (ISRs)
VxWorks and Linux ISRs

Bottom Halves in Linux

Deferring Work
Tasklets and Work Queues in Linux
Helper Tasks and Threads

Error Handling
Error Handling Approaches
errno and perror
strerror and strerror_r
Resets, OOPS, Panics and Segmentation Faults
Error Logging Approaches

Timing
How Linux Tells Time
Kernel, POSIX and Interval Timers
High-Resolution Timers (HRTs)
Watchdog Timers

Sleeping

Sleep Waiting and Spinlocks
Using Timers
Embedded Recommendations for Timing

Memory Management and Paging
The VxWorks Memory Model
The First-Fit Memory Algorithm
VxWorks memLib and memPartLib
Linux, Memory and Demand Paging
Mapping Device Memory
The Slab Allocators
Memory Barriers
The OOM Killer
Reserving and Locking Memory
Memory in Embedded Systems

Device Drivers
File Descriptors in VxWorks
The VxWorks IO Subsystem
VxWorks ioLib and iosLib
The 5 Basic Device Driver Types
File Descriptors in Linux
The UNIX Device Driver Model
Major and Minor Numbers
The New Device Driver Model

Booting
VxWorks Boot Example
VxWorks Configuration Files

VxWorks Application Startup
The Root Filesystem in Linux
Bootloaders and U-Boot
Embedded Linux Boot Methods
Building and Booting from SD Cards

Real-Time Debugging
Process-Level Debug
GDB, GDB Server and the GDB Server Debugger
The VxWorks Debug Agent (WDB)
A Remote Debug Example
Printing and Logging

System-Level Debug
System-Level Debug Tools
The /proc Filesystem in Linux
Advanced Logging Methods
Kernel Debugging
Crash and Core Dumps
Visualization Tools

System Architecture Design Approaches

Deploying VxWorks Systems
VxWorks Systems Customization and Configuration
VxWorks Field Upgrades

Deploying Embedded Linux
Linux Systems Customization and Configuration
Choosing and Building the Root Filesystem
Module Decisions
Final IT Work
Linux Field Upgrades

RTOS Trends
Development Trends
Monitoring Trends
Testing Trends

Some Final Recommendations

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. He has held a variety of software engineering positions at LynuxWorks, Embedded Planet, Wind River Systems and Lockheed Sanders. RTETC, LLC provides Real-Time embedded training and consulting to many embedded systems companies. RTETC focuses on Real-Time operating systems (RTOS), Linux and Android solutions for the embedded systems market.

Decision (Run/Cancel) Date for this Course is Monday, March 1, 2018

Payment received by March 5
IEEE Members $395
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Payment received after March 5
IEEE Members $430
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http://ieeeboston.org/fundamentals-real-time-operating-systems/

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Last Notice Before Courses Begins, Please Register Now and Save $$$!!!

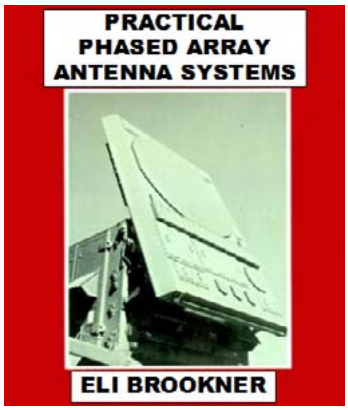
Phased-Array and Adaptive-Array Fundamentals and Their Recent Advances

Time & Date: 6 - 9PM, Mondays, March 19, 26, April 2, 9, 30, May 7, 14, 21
(Snow/make-up days June 4, 11)
(24 hours of instruction!)

Location: MITRE Corp., 202 Burlington Rd., Bedford, MA

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

Text: Practical Phased Array Antenna Systems", Dr. Eli Brookner
(included with registration)



"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.

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 change little 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 covers developments in phased arrays updated to 2018. 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, Cognitive Adaptive Array Processing (CAAP) which provides optimum full adaptive array processing without suffering its computation complexity and other disadvantages. The mystery will be taken out of the new Mulitple Input Multiple Output (MIMO) array radar and Space-Time Adaptive Array (STAP) for airborne platforms. STAP will be explained and related to the displaced phase center antenna (DPCA).

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 key array concepts covered in the course.

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 as well as get the latest developments in array systems, such as: MIMO, metamaterial arrays, Digital Beamforming (DBF), Extreme MMIC arrays, stealthing and cloaking. The major emphasis will be on the system aspects of phased-arrays.

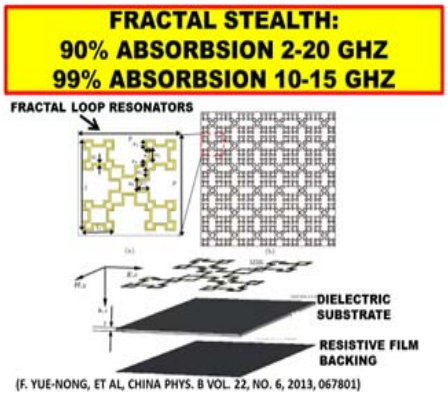
Lecture #1. Monday March 19; Phased Array Fundamentals: Electronically Scanned Array (ESA) explained with tube COBRA DANE used as example. Covered will be: Phased Steering, Switched-Line Phase Steering; Time Delay Steering, Subarraying, Array Weighting, Monopulse, Duplexing, Array Thinning, Embedded 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 26; 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 , April 2; Planar Arrays: sine-space (sinα-sinß and u-v space); grating lobes location for triangular and rectangular lattice; very useful bell curve approximation; array thinning system issues. 2nd Generation Active Phased Arrays: Solid state active electronically scanned arrays (AESAs) covered using PAVE PAWS as example. Also covered are: T/R Module, Cross Bent Dipole Element, Array Blindness, Tour of PAVE PAWS (6 stories) via color slides given. 3rd Generation AESAs: These use microwave integrated circuits (Monolithic Microwave Integrated Circuits [MMIC]): THAAD (TPY-2), SPY-3, IRIDIUM, F-15 APQ-63(V)2, APG-79, XBR, AMDR and upgraded Patriot. Patriot now a 2015 state-of-the-art 3rd generation AESA radar system it now having MMIC GaN AESAs providing 360o coverage. S-band AMDR provides 30 times the sensitivity and can handle 30 times the number of tracks as the AEGIS SPY-1D(V).

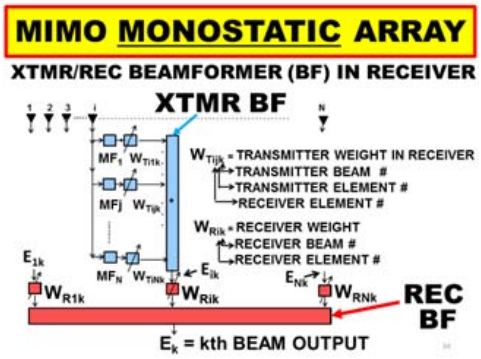
Lecture #4. Monday April 9; Array Errors: Effects of element phase and amplitude element errors and element failures; simple physical derivation of error effects given; paired echo theory; subarray errors; A/D quantization errors; examples. Radiating Elements: Waveguide; dipole; slotted waveguide; microstrip patch; stacked patch; notch (wideband); spiral; matching (wide-angle); waveguide simulator; practical limitations, mutual coupling, array blindness; scattering matrix; design procedure; polarization miss-match loss.

Lecture #5. Monday April 30; 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 on SLQ-32; PATRIOT space-fed array; reflectarray. 4TH Generation Digital Beam Forming (DBF) AESAs: Provides reduced search power and occupancy by nearly a factor of 2 (3dB) while im-



proving the search angle accuracy, like by about 40%; Cognitive radar enabler; Ultra low antenna sidelobes enabler; Israel, Thales, Australia and Lockheed Martin (LM) AESAs have an A/D for every AESA receive element channel (172,000 for LM system); Raytheon developing element level mixer-less direct RF A/D reconfigurable between S and X-band in microseconds; MOORE'S LAW: Potential future continuation of Moore's Law: via Spintronics, Memristor, Graphene, Quantum Computing.

Lecture #6. Monday May 7; Limited Field-of-View (LFOV) Arrays: Explained using simple high school physics. Hemispherical Coverage Array: Dome Antenna. System Considerations: sequential detection, beam shape loss; receiver and A/D dynamic range; polarization miss-match loss; AESA 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 electronically scanned arrays (ESAs). AESA Breakthroughs - Part 1: Extreme MMIC: Can now put on single chip 256-Element 60 GHz Transmit Phased Array. Such arrays to cost only few dollars. Low Cost Packaging: Raytheon, Rockwell Collins, Lincoln-Lab./ MA-COM and South Korea developing low cost flat panel S and X-band AESAs using commercial components, practices and printed circuit boards (PCBs); Materials: GaN can now put 5X to 10X the power of GaAs in same footprint. Metamaterials: Man made material which provides properties not found in nature. Coating of target with metamaterial has potential to make it invisible or stealthy. Has promise for: low cost 2-D ESAs for satellite internet communications; for cell towers, for radars.

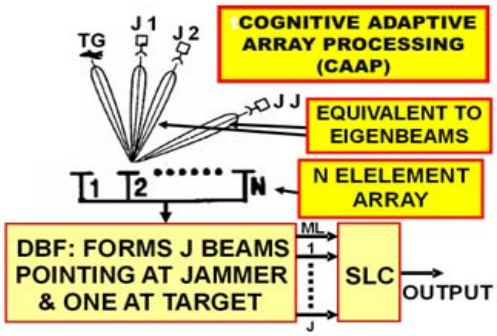


a.) LOCKHEAD MARTIN (LM) SPACE FENCE RADAR SITE, b.) CUTAWAY OF TRANSMIT ARRAY, c.) CROSS-SECTION OF RADAR-ON-A-BOARD TRANSMIT LRUs (MICROWAVE J. SEPT-2016: HTTP://WWW.MICROWAVEJOURNAL.COM/ARTICLES/26872V

Lecture #7, May 14. Sidelobe Cancellers (SLC): The simple single-loop, feed-forward canceller is introduced in easy physical terms. This is followed by a discussion of the simple single-loop feedback canceller with and without hard limiting. Multiple-loop SLC (MSLC) covered. Adaptive Arrays: The optimum Sample Matrix Inversion (SMI) algorithm for a fully adaptive array is developed using a very simple derivation. Cognitive Adaptive Array Processing (CAAP) introduced which lets one achieve the performance of SMI array without its disadvantages of the need for a large number of training samples, large computation load and sidelobe degradation. Displaced Phase Center Array (DPCA) and Space Time Array Processing (STAP) algorithm explained in simple terms and related. Ubiquitous least squares estimation (LSE) covered and applied to MSLC and tracking. Briefly introduce use of Gram-Schmidt, Givens and Householder orthonormal transformation methods of LSE. Systolic array implementations given.

Lecture #8. Monday May 21; AESA Breakthroughs - Part 2: 5th Generation Ultra Wideband (UWB) AE-

SAs: C to Ku band. MIMO Array Radars: Explained in simple physical terms rather than with heavy math. Gives attendees an understanding of where it makes sense to use. 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; also contrary to claims made MIMO should not provide better minimum detectable velocity for airborne radars. MIMO and Jamming: MIMO does not provide better barrage-noise-jammer, repeater-jammer or hot-clutter rejection than conventional array radars. Potential for automobile radars and radar combining covered. Technology and Algorithms: A dual polarized, low profile, (λ/40), wideband (20:1) antenna can be built using tightly coupled dipole antennas (TCDA); spurious free dynamic range (SFDR): Lincoln Lab increases SFDR of receiver plus A/D by 40 dB; Low Cost Printed Electronics: 1.6 GHz printed diodes achieved. Electrical and Optical Signals on Same Chip: Will allow data transfer at the speed of light; IR transparent in silicon. Biodegradable Arrays of Transistors or LEDs: Imbedded under skin for detecting cancer or low glucose. Quantum Radar: Has potential to defeat stealth targets!!!



Your Registration Includes: 1 textbook; 15 Reprints; over 800 Vugraphs; trial license of MATLAB and Phased Array System Toolbox from MathWorks with examples demonstrating key array concepts covered in the course.

Decision (Run/Cancel) Date for this Course is Monday, March 12, 2018

Payment received by March 5
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http://ieeeboston.org/phased-array-adaptive-array-fundamentals-recent-advances

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Embedded Linux BSPs and Device Drivers

Time & Date: 6 - 9PM, Mondays, April 16, 23, 30, May 7

Speaker: Mike McCullough, RTETC, LLC

Location: TBD, Woburn - Burlington, MA Area

Course Summary - This 4-day technical training course provides advanced training in the development of Embedded Linux Board Support Packages (BSPs), Device Drivers and Distributions. The first part of the course focuses on BSP and Software Development Kit (SDK) development in an Embedded Linux context with a focus on application performance measurement and improvement. The latter part of the course covers Embedded Linux Device Driver development including key device driver decisions and deployment considerations for Embedded Linux BSPs.

Who Should Attend - The course is designed for real-time engineers who are developing Embedded Linux BSPs and Device Drivers for Embedded Linux distributions. It is also targeted at experienced developers requiring a refresher course on Linux BSP and Device Driver development.

Course Objectives

• To gain an understanding of the complexities of BSP and SDK development and their uses in Embedded Linux systems.
• To provide a basic understanding of the Linux I/O Subsystem and the Device Driver Models provided with Embedded Linux distributions.
• To gain an in-depth understanding of character-based device drivers in Embedded Linux
• To understand key device driver subsystems including relatively slow I/O interconnects such as I2C, SPI and USB as well as high-speed interfaces such as USB 3.0 and PCIe
• To give students the confidence to apply these concepts to their next Embedded Linux project.

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)

Embedded Linux BSP Development Basics
BSP Requirements
U-Boot and Bootloader Development
Basic BSP Development
Files and Filesystem Support
The I/O Subsystem: Talking to Hardware
Memory Management and Paging
Error Handling in Embedded Linux BSPs
Timing and Timers
Interrupt Handling in BSPs
BSP Deployment Issues and Practices

Embedded Linux SDK Basics
The 3 Pieces of an SDK
Embedded Linux Distributions
The GNU Compiler Collection (GCC)
Other Embedded Linux Development Tools
Library Support
Glibc and Alternatives
SDK Deployment and Support

Debugging
GDB, GDB Server and the GDB Server Debugger
Other Debug Tools
An Abatron Board Bring-Up Example
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 Dumps

Course Schedule Day 2

Configuring Embedded Linux

Config Methods
Config Syntax
Adding Code to the Linux Kernel

Booting Embedded Linux

The Linux Boot Process
NFS and RAMdisk Booting
Root and Flash File System Development
Building the RAMdisk
Busybox Development

Testing and Debug of Embedded Linux BSPs

Kernel Debug and Kernel Probes
Kexec and Kdump
The Linux Test Project (LTP)
Performance Tuning Embedded Linux BSPs
User Mode Linux and Virtualization

Measuring Embedded Linux BSP Performance

Common Considerations
Uncommon Considerations
BootLoader Optimizations
Boot Time Measurements
Effective Memory and Flash Usage
Filesystem Performance Issues
Some Ideas on Performance Measurement

Course Schedule Day 3

The Original Device Driver Model

The fops struct and Char Drivers
The inode and dentry structs
Major and Minor Numbers
Embedding Channel Information
Deferring Work
The /proc Filesystem
Configuring the Device Driver
Modularization Revisited

The New Device Driver Model

An Object-Oriented Approach
Platform Devices and Drivers
Subsystem Registration
The Probe and Init Functions
The Show and Store Functions
The /sys Filesystem
Configuring the New Device Driver

Comparing the Two Driver Models

The Flattened Device Tree (FDT)

openBoot and its Effect on Embedded Linux
The Device Tree Script (dts) File
The Device Tree Compiler (dtc)
The Device Tree Blob (dtb) File
Building a dtb File

Hybrid Device Drivers

Other fops Functions
The Need for Ioctl

A Simulated Char Device Driver

The SIM Device Driver
Initialization
Open and Close
Read and Write
The /proc Driver Interface
MMAP Support

Course Schedule Day 4

Linux Device Driver Subsystems

Serial Drivers
The RTC Subsystem
Watchdogs
I2C & SPI
Block Devices
PCI
USB
VME
Video
Sound
What's Missing?

Memory Technology Devices

What is an MTD?
NAND vs NOR Flash Interfaces
The Common Flash Interface (CFI)
Driver and User Modules
Flash Filesystems

Drivers in User Space

Accessing I/O Regions

Accessing Memory Regions
User Mode SCSI, USB and I2C
UIO

High-Speed Interconnects

PCIe
GigE
iSCSI
Infiniband
FibreChannel
Serial RapidIO

Debugging Device Drivers

kdb, kgdb and JTAG
Kernel Probes
Kexec and Kdump
Kernel Profiling
User Mode Linux and Kernel Hacking

Performance Tuning Device Drivers
Some Final Recommendations

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 software development tools, training and consulting services for the embedded systems market.

Decision (Run/Cancel) Date for this Courses is Monday, April 9, 2018

Payment received by April 2
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Payment received after April 2
IEEE Members $430
Non-members $450

http://ieeeboston.org/embedded-linux-board-support

Last Notice Before Courses Begins, Please Register Now and Save $$$!!!

More Digital Signal Processing (DSP) for Wireless Communications

Time and Dates: 6 - 9PM, Wednesdays, March 28, April 4, 11, 18, 25

Location: Hilton Hotel, 2 Forbes Road, Woburn, MA

Speaker: Dan Boschen, Microsemi

Course Summary

This course is a continuation of the IEEE course "DSP for Wireless Communications" also taught by Dan Boschen, detailing digital signal processing most applicable to practical real world problems and applications in radio communication systems. Students need not have taken the Part I course if they are familiar with basic DSP concepts.

This course brings together core DSP concepts to address signal processing challenges encountered in radios and modems for modern wireless communications. Specific areas covered include carrier and timing recovery, equalization, automatic gain control, and considerations to mitigate the effects of RF and channel distortions such as multipath, phase noise and amplitude/phase offsets.

Dan builds an intuitive understanding of the underlying mathematics through the use of graphics, visual demonstrations, and real world applications for mixed signal (analog/digital) modern transceivers. This course is applicable to DSP algorithm development with a focus on meeting practical hardware development challenges, rather than a tutorial on implementations with DSP processors.

Target Audience:

All engineers involved in or interested in signal processing for wireless communications. Students should have either taken the first part of this course "DSP for Wireless Communications" or have been sufficiently exposed to basic signal processing concepts such as Fourier, Laplace, and Z-transforms, Digital filter (FIR/IIR) structures, and representation of complex digital and analog signals in the time and frequency domains. Please contact Dan at boschen@loglin.com if you are uncertain about your background or if you would like more information on the course.

Benefits of Attending/ Goals of Course:

Attendees will gain a strong intuitive understanding of the practical and common signal processing implementations found in modern radio and modem architectures and be able to apply these concepts directly to communications system design.

Topics / Schedule:

Class 1:
DSP Review, Radio Architectures, Transforms, Mapping to Digital, Pulse Shaping, Eye Diagrams

Class 2:
ADC Receiver, CORDIC Rotator, Digital Down Converters, Numerically Controlled Oscillators

Class 3:
Digital Control Loops; Output Power Control, Automatic Gain Control

Class 4:
Digital Control Loops; Carrier and Timing Recovery, Sigma Delta Converters

Class 5:
RF Signal Impairments, Equalization and Compensation, Linear Feedback Shift Registers

Speaker's Bio:
Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 20 years of experience in system and hardware design for radio transceivers and modems. He has held various positions at Signal Technologies, MITRE, Airvana and Hittite Microwave designing and developing transceiver hardware from baseband to antenna for wireless communications systems. Dan is currently at Microsemi (formerly Symmetricom) leading design efforts for advanced frequency and time solutions.

For more background information, please view Dan's Linked-In page at:
http://www.linkedin.com/in/danboschen

Decision (Run/Cancel) Date for this Course is Monday, March 19, 2018

Payment received by March 19
IEEE Members $340
Non-members $375

Payment received after March 19
IEEE Members $375
Non-members $440

http://ieeeboston.org/digital-signal-processing-dsp-wireless-communications-2/

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 ieeebostonsection@gmail.com 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.

Embedded Linux Board Support Packages and Device Drivers (*Online Edition*)

Students have access to this self-paced course for 90 days!!

Registration Fee: $350

Course Summary - This video course provides advanced training in the development of Embedded Linux Board Support Packages (BSPs) and Device Drivers. The first part of the course focuses on BSP and Software Development Kit (SDK) development in an Embedded Linux context with a focus on application performance measurement and improvement. The latter part of the course covers Embedded Linux Device Driver development including key device driver decisions and deployment considerations for Embedded Linux BSPs.

Who Should Attend - The course is designed for real-time engineers who are developing Embedded Linux BSPs and Device Drivers for Embedded Linux distributions. It is also targeted at experienced developers requiring a refresher course on Linux BSP and Device Driver development.

Course Objectives

- To gain an understanding of the complexities of BSP and SDK development and their uses in Embedded Linux systems.
- To provide a basic understanding of the Linux I/O Subsystem and the Device Driver Models provided with Embedded Linux distributions.
- To gain an in-depth understanding of character-based device drivers in Embedded Linux
- To understand key device driver subsystems including relatively slow I/O interconnects such as I2C, SPI and USB as well as high-speed interfaces such as Ethernet, USB 3.0 and PCIe
- To give students the confidence to apply these concepts to their next Embedded Linux project.

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 software development tools, training and consulting services for the embedded systems market.

Course Schedule

Getting Started with Embedded Linux

Embedded Linux Training Overview
Linux Terminology, History and the GPL
Building the Kernel Source Code
Embedded Linux Kernels
BSPs and SDKs
Linux References (Books and Online)
BSP Requirements
U-Boot and Bootloader Development
Embedded Linux BSP Development Basics
Basic BSP Development
Files and Filesystem Support
The I/O Subsystem: Talking to Hardware
Memory Management and Paging
Error Handling in Embedded Linux BSPs
Timing and Timers
Interrupt and Exception Handling in BSPs
BSP Deployment Issues and Practices
Embedded Linux SDK Basics
The 3 Pieces of an SDK
Embedded Linux Distributions and the GNU Compiler

Collection (GCC)
Other Embedded Linux Development Tools
Library Support, Glibc and Alternatives
SDK Deployment and Support
Debugging
GDB, GDB Server and the GDB Server Debugger
Other Debug and Test Tools
An Eclipse Remote Debug Example
Advanced Debug with printk and syslogd
System-Level Debug
System-Level Debug Tools
The /proc and sys Filesystems
Advanced Logging Methods
KGDB and KDB
Crash Dumps
Debugging Embedded Linux Systems
Configuring Embedded Linux
Config Methods
Config Syntax
Adding Code to the Linux Kernel
Booting Embedded Linux
Processor Startup
Initial Functions
The initcalls
Using __init Functions
NFS Booting
Root File Systems
RAMdisk Booting with initrd
RAMdisk Booting with initramfs
initrd vs initramfs
Root File System Development
Busybox Development
Building a RAMdisk for an initrd
Building a RAMdisk for an initramfs
Flash File System Development

Testing and Debug of Embedded Linux BSPs
Kernel Debug and Kernel Probes
Kexec and Kdump
The Linux Test Project (LTP)
Performance Tuning Embedded Linux BSPs
Virtualization
Measuring Embedded Linux BSP Performance
Common Considerations
Uncommon Considerations
BootLoader Optimizations
Boot Time Measurements
Effective Memory and Flash Usage
Filesystem Performance Measurement
Some Ideas on Performance Measurement

The Original UNIX Device Driver Model
The fops and file structs
The inode and dentry structs
Major and Minor Numbers
Embedding Channel Information
Deferring Work
The /proc Filesystem
Configuring the Device Driver
A Simulated Device Driver
Modularization Revisited
The Evolution of a New Driver Model
The Initial Object-Oriented Approach
Platform Devices and Drivers
A Generic Subsystem Model
The Generic Subsystem Model in Detail
Subsystem Registration
The Probe and Init Functions
The Show and Store Functions
User Access via the /sys Filesystem
Configuring the New Device Driver
The udev Linux Application
Comparing the Two Driver Models
The Flattened Device Tree (FDT)
openBoot and its Effect on Embedded Linux
The Device Tree Script (dts) File
The Device Tree Compiler (dtc)
The Device Tree Blob (dtb) File
Building a dtb File
Hybrid Device Drivers
Other fops Functions
The Need for Ioctl
Linux Device Driver Subsystems
Direct Connect Device Drivers
Serial/Console Drivers, I2C & SPI
Real-Time Clocks and Watchdogs
GPIO and the Pinmux
Flash MTDs and Direct Memory Access
USB, Power and CPU Management
Video and Audio

PCI and VME
Block Devices
RAMdisk and Flash Filesystems
MMCs and SD Cards
Network Device Drivers
MAC and PHY Device Drivers
net_device and net_device_stats
Network Device Initialization
Device Discovery and Dynamic Initialization
Network Interface Registration
Network Interface Service Functions
Receiving and Transmitting Packets
Notifier Chains and Device Status Notification
Unwired Device Drivers
Wireless Device Drivers (WiFi, WLAN)
Bluetooth and BlueZ
Infrared and IrDA
Cellular from 2G to 5G
Drivers in User Space
Accessing I/O and Memory Regions
User Mode SCSI, USB and I2C
UIO
High-Speed Interconnects
PCIe
iSCSI
Infiniband
FibreChannel
Debugging Device Drivers
kdb, kgdb and JTAG
Kernel Probes
Kexec and Kdump
Kernel Profiling
User Mode Linux
Performance Tuning Device Drivers
Some Final Recommendations

http://ieeeboston.org/embedded-linux-bsps-device-drivers-line-course/

Embedded Linux Optimization - Tools and Techniques (*Online Edition*)

Students have access to this self-paced course for 90 days!!

Registration fee: $250

Summary - This video 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 debugging, profiling and testing high performance 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.

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. He has held a variety of software engineering positions at LynuxWorks, Embedded Planet, Wind River Systems and Lockheed Sanders. RTETC, LLC provides real-time embedded training and consulting to many embedded systems companies. RTETC focuses on real-time operating systems (RTOS), Linux and Android solutions for the embedded systems market.

Getting Started with Embedded Linux
Embedded Linux Training Overview
Terminology
Linux Versioning
The GPL
Building the Kernel Source Code
Embedded Linux Kernels
BSPs and SDKs
Linux References (Books and Online)
A Development Cycle Focused on Performance
A Basic Optimization Process

Basic Debugging Review
Embedded Applications Debug
GDB, GDB Server and the GDB Server Debugger
Other Debuggers
An Eclipse Remote Debug Example
Debugging with printk, syslog, syslogd and LTTng

System-Level Debug
System-Level Debug Tools
The /proc and /sys Filesystems

Basic Logging
KDB and KGDB
Crash Dumps and Post-Mortem Debugging
Debugging Embedded Linux Systems
Backend Debuggers
In-Circuit Emulators
Hardware Simulators
Analyzers
Requirements Development
Performance Requirements
Derived Requirements
Testability and Traceability
Reviewing Requirements
Designing for Performance
Design for Test (DFT)
Agile Software Design
Software and Linux Decomposition
Memory Management
CPU and OS Partitioning
Design Reviews
Coding for Performance
Coding Standards and Consistency
Languages, Libraries and Open Source Components
Learning Magic Numbers
Letting Compilers Work For You
Global, Static and Local Variables
Code Reviews

Software Testing
Unit-Level Testing
System-Level Testing
Code Coverage Tools
gcov
Automated Testing
Some Embedded Linux Test Recommendations
DebugFS
Configuring DebugFS
DebugFS Capabilities
Advanced Logging
LogFS
Using Logwatch and Swatch
Using syslogd and syslog-ng
Tracing
ptrace and strace
New Tracing Methods
SystemTap
Ftrace, Tracepoints and Event Tracing
Tracehooks and utrace
Profiling
Basic Profiling
gprof and Oprofile
Performance Counters
LTTng
Another DDD Example
Manual Profiling
Instrumenting Code
Output Profiling
Timestamping
Addressing Performance Problems
Types of Performance Problems
Using Performance Tools to Find Areas for Improvement
Application and System Optimization
CPU Usage Optimization
Memory Usage Optimization
Disk I/O and Filesystem Usage Optimization
Measuring Embedded Linux Performance
Some Ideas on Performance Measurement
Common Considerations
Uncommon Considerations
Using JTAG Methods
BootLoader Measurements
Boot Time Measurements
The Perf Tool
Origins of Perf
The Perf Framework
Perf Commands and Using Perf
Listing Events
Counting Events
Profiling with Perf
Static Tracing with Perf
Dynamic Tracing with Perf
Perf Reporting
Performance Tool Assistance
Recording Commands and Performance
System Error Messages and Event Logging
Dynamic Probes
Jprobes and Return Probes
Kernel Probes

Kexec and Kdump
- 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
- Improving Kernel Performance

Kernel Hacking
CONFIG_EMBEDDED
Configuring printk
Test Code
Configuring Kernel and IO Scheduling

- 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

http://ieeeboston.org/embedded-linux-optimization-tools-techniques-line-course/

IEEE Boston Section Social Media Links:

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

Software Development for Medical Device Manufacturers *(Online Edition)*

Students have access to this self-paced course for 90 days!! ***Registration Fee : $125***

Course Description This course provides an introduction to the development of medical device software. The course is comprised of 4 modules that range from 30-45 minutes in duration. The focus is on complying with FDA Design Controls and IEC 62304 requirements.

This course is intended for software developers who are actively involved in developing medical device software.

Module 1

- Medical Device Definitions: FDA and European Union (EU)
- Regulatory Roadmap
- FDA/EU Device Classifications
- FDA QSR Regulation
- FDA Guidance Documents that pertain to medical device software

Module 2

- International Standards that pertain to medical device software
- Types of Software Regulated by FDA
- Quality System basics: Procedures, Work Instructions and Records
- ALL Software is Defective…

Module 3:

- Design Control Overview
- General Requirements
- Design and Development Planning
- Software Development Models
- Design Input
- About Requirements…
- Design Output
- Design Reviews

Module 4:

- Design Control (continued)
- Design Verification
- Software Verification Process
- Testing Overview
- Design Validation
- Software Validation Process
- Design Changes
- Design Transfer
- Design History File
- Course Summary

Speaker Bio:

Steven R. Rakitin has over 40 years experience as a software engineer including 25 years of experience in the medical device industry. He has worked with over 85 medical device manufacturers worldwide, from startups to Fortune 100 corporations. He has written several papers on medical device 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 Senior Life 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.

http://ieeeboston.org/software-development-medical-device-manufacturers-line-course/

Fundamental Mathematics Concepts Relating to Electromagnetics (*Online Edition*)

Students have access to this self-paced course for 90 days!!

Registration Fee: $150

Course Summary This course is designed for people wishing to refresh or to learn the fundamental mathematical concepts that are used to describe electromagnetic wave behavior. The modules address all of the basic math concepts covered in a traditional undergraduate electromagnetics course in an ECE curriculum. These concepts include Vector Basics, Integral Vector Calculus, Differential Vector Calculus, Fundamental Coordinate Systems and Complex Numbers. After completing these modules, a person should have sufficient math skills to pursue graduate studies in electromagnetics and/or be able to decipher the math presented in an upper-level text on the subject.

Target audience: This course is designed for people wishing to refresh or to learn the fundamental mathematical concepts that are used to describe electromagnetic wave behavior.

Course chapters

1. Vector Basics
2. Dot Product
3. Cross Product
4. Contour Integration
5. Vector Algebra
6. Surface Integration
7. Metric Coefficients
8. Coordinate Systems
9. Vector Coordinate Conversion
10. Del Operator and the Gradient
11. The Curl
12. Divergence
13. Stokes Theorem
14. Divergence Theorem
15. Laplacian
16. Complex Numbers

Instructor's Bio:

Dr. Kent Chamberlin is the Chair and a Professor in the Department of Electrical and Computer Engineering. In his more than thirty-five years in academia, he has performed research for more than twenty sponsors, including the National Science Foundation. He has received two Fulbright awards, including the prestigious Fulbright Distinguished Chair, which he served in Aveiro, Portugal. He has also served as an Associate Editor for the Institute for Electrical and Electronics Engineers, and he continues to be active in performing and publishing in a range of research areas.

http://ieeeboston.org/fundamental-mathematics-concepts-relating-electromagnetics-line-course/

Reliability Engineering for the Business World *(Online Edition)*

Students have access to this self-paced course for 90 days!!

Registration Fee: $320

Course Description

This course is about becoming a leader in reliability engineering. While statistics are the tools of reliability engineering, it takes knowledge not only of these tools but also of the business. Developing knowledge of the business, from sales, engineering, customer service, to supply chain management can determine how effective you can be in improving reliability.

Never take anything for granted, even some rules of thumb in reliability can be misleading, this course will show you how to prove what truly happens in the real world and how to effect change in any part of the business where it is needed. We will explore the balance sheet, organizational structure, customers, service, and high volume manufacturing. It's not just about how often things fail, it is also about where the defect came from, what is the financial effect, the recovery, when should a business take field action, effect of human error, failure analysis/material science, reliability testing, and much more. I will also discuss how you develop executive buy in for change. The course assumes a basic knowledge in reliability statistics. There are 12 sessions that cover the following topics.

Course Outline

Basics – Measurements
Business Model
Design Model (HW and SW)
HALT/RDT/Predictions
Manufacturing Model
Early Life Failures
Wear Out and Mid Life Crisis
Advanced Reliability

Course Objective

To teach you how to become the go to person in your business for objective business sensed reliability answers and requirements.

Instructor's Bio

Kevin is an innovative leader in reliability methodologies with more than 30 years experience in the storage industry. In his latest role as Director of Engineering, he developed a top down reliability/availability management process for design organizations developing mission-critical storage systems. Kevin previously directed the most extensive HALT/HASS operation in the industry, with over 300 chambers worldwide. He has written several papers, consulted with many companies, 3 patents awarded and 2 pending related to systems reliability and test.

His most recent work has been performing system architectural analysis to optimize system availability, serviceability and costs. Providing guidance to development to maximize system reliability and reduce service costs. He has provided consultation to many large companies such as EMC, CISCO, AT+T, HP, Seagate and many others. His position and experience has enabled him to perform extensive field studies and design of experiments. Kevin has developed many

http://ieeeboston.org/reliability-engineering-business-world-line-course/

Introduction to Embedded Linux
(Online Edition)

Students have access to this self-paced course for 90 days!! ***Registration Fee: $350***

Course Summary:
This first of a 2-part series introduces the Linux Operating System and the use of 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 covers the methods for booting Embedded Linux distributions 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 gain an understanding of the complexities of Embedded Linux Distributions and their use in embedded systems.
To give students 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
Linux Debugging and Performance Tuning by Steve Best
Optimizing Linux Performance by Phillip G. Ezolt
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
Course Downloadable Content:

Video Lecture
Hands-On Lab Instructions
Hands-On Lab Solutions
Additional Related Materials

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

Getting Started
Kernel Source Code
Building the Kernel
Embedded Linux Kernels
Linux 2.6

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 and KGDB
GDB Server and Remote Debugging

An Eclipse Debug Example
Other Debug and Test Tools
Other System-Level Debug Approaches
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

Inter-Process Communications (IPC)
Message Queues
Semaphores Revisited
Shared Memory
Pipes, FIFOs and Futexes
Remote Procedure Calls
Networking

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)

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

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
The New Device Driver Model and Kernel Object Classes
Initialization
Platform Devices, Busses, Adapters and Drivers
Comparing the Two Models

Embedded Linux Trends
Development, Monitoring and Testing

Some Final Recommendations

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 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.

http://ieeeboston.org/introduction-to-embedded-linux-part-i-el201-online-course/

Design Thinking for Today's Technical Work

New Online Course

Students have access to this self-paced course for 90 days!!

Registration Fee: $160

Course Description:

This course covers the principles of Design Thinking; the steps commonly used; how it enhances the likelihood of success in a wide variety of applications; and, in particular, how to apply it to technical work. Examples of its application to technical work are presented along with the successes that followed.

Design Thinking has garnered much attention in recent years mainly as a way to design consumer products that engage users, such as Apple's iPhone. But its use is spreading to situations ranging from how to provide medical care to planning one's career. This course explains what Design Thinking is about, but, most important, explains how an individual can apply Design Thinking to their own technical work. Care has been taken to focus the course content on using Design Thinking as a structured, practical process for the daily work of technical professionals. A specific technical example is carried through the teaching of the five stages of Design Thinking. The course covers applying Design Thinking to the range of tasks performed during a technical project, including design of: technical functions; user interactions (if applicable); factors for business success; solutions to problems that arise; and project presentations and reports to influence adoption of project outcomes, funding approval, and hiring for consulting. The content applies to employees of large to small companies, start-ups, consultants and contact work, and government organizations. The course is focused on an individual worker employing Design Thinking.

Course Objectives

Provide an understanding of Design Thinking and how an individual can apply it to their technical work:

- Understand the steps of Design Thinking (Understand, Define, Ideate, Prototype, and Test)
- Learn how to apply Design Thinking in technical work
- Understand where Design Thinking can be applied in project activities.

Who Would Benefit from this Course

Anyone who works on solutions to problems or designs hardware, software, products, services, and processes. This includes technical professionals, project managers, and organizational managers. Also, anyone who wants to learn what Design Thinking is about in a practical sense.

Course Modules

- Module 1 – How Design Thinking Can Help Technical Work (60 minutes)
- Module 2 – Understand: Explore the Problem (44 minutes)
- Module 3 – Define: Synthesize What Is Needed (23 minutes)
- Module 4 – Ideate: Generate Solutions (26 minutes)
- Module 5 – Prototype: Build Versions to Test (23 minutes)
- Module 6 – Test: Examine and Learn (28 minutes)
- Module 7 – Design Thinking for Presenting and Writing (23 minutes)

• Module 8 – Getting Started with Design Thinking (30 minutes)

Speaker biography

Speaker: James L. Poage, President/Owner JLP Performance Consulting

Dr. James L. Poage has been designing future concepts for Air Traffic Control for 25 years, first with the Volpe National Transportation Systems Center and then for the past dozen years as an independent consultant (JLP Performance Consulting). He has taught short courses on Benefit-Cost analysis to the FAA and NASA, as well as spoken at conferences and published in professional journals. Over the past 15 years, Dr. Poage has been applying Design Thinking to his project work; to marketing his consulting services; and to planning briefings, reports, and courses. His clients have included FAA, NASA, BAE Systems, Engility, Georgia Tech University, San Jose State University, and Saab Sensis. Dr. Poage has co-authored the book, Flair: Design Your Daily Work, Products, and Services to Energize Customers, Colleagues, and Audiences (Maven House Press, 2016), with his daughter, Jennifer Poage who works in fashion design. Dr. Poage has a Ph.D. in applied mathematics from the Harvard University School of Engineering and Applied Sciences and a M.S. and B.S. in electrical engineering from Stanford University.

Note: Course participants will receive a copy of the book, Flair.

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.

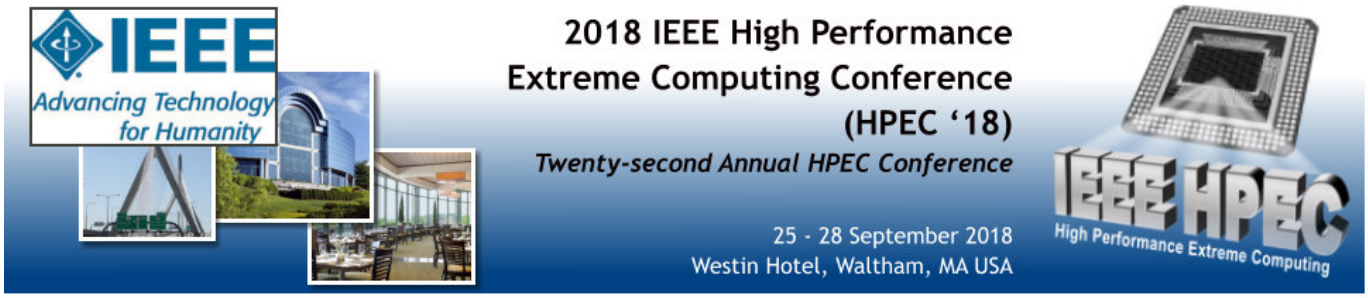
Twice each year a committee of local IEEE volunteers meet to consider course topics for its continuing education program. This committee is comprised of practicing engineers in various technical disciplines. In an effort to expand these course topics for our members and the local technical community 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 ieeebostonsection@gmail.com 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.

CALL FOR PAPERS



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