

BOSTON



THE REFLECTOR

ISSUE #2
FEBRUARY 2018

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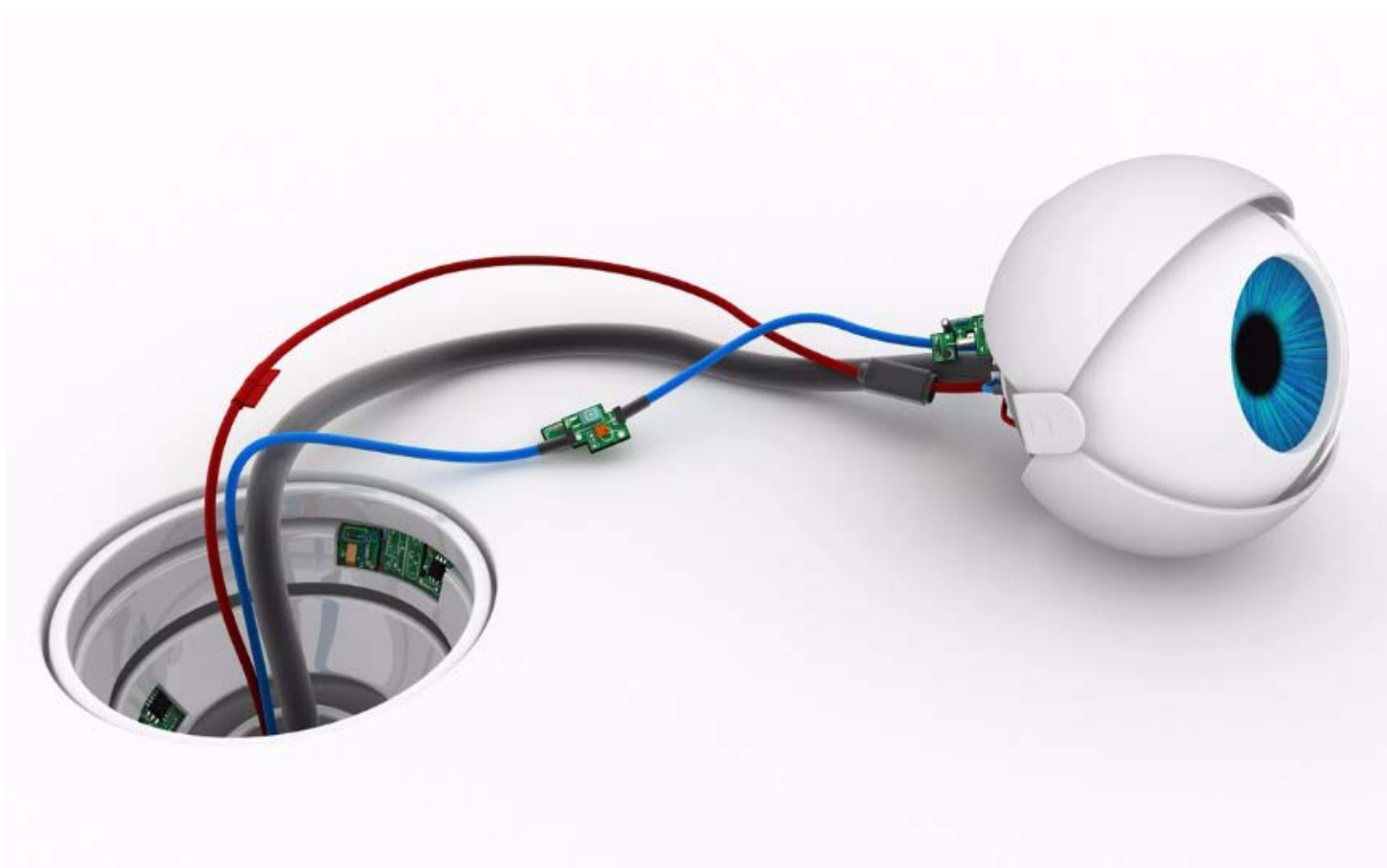


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Who, What, When, Where, and How... but mostly When

Kevin Flavin, Electronic Communications Team Chair

The Boston Section has had an Editorial Calendar for years, but we've never shared it with anyone outside the Editorial Board until now. It seems obvious now, but it wasn't until a member of the team suggested that it should be made available to the public, never-mind the rest of the section. So, we are providing on the website on the Advertise With Us page (<http://ieeeboston.org/advertise-ieee-boston-section/>)

For those that don't know what the editorial calendar is or what it does or even why it's important, let's take a step back and explain.

An editorial calendar defines and details the intention of a publication to cover certain themes, and provides an established timeline for participation and completion of the activities for a publication. For example, our editorial calendar defines the themes that are popular within our industries and the schedule to maintain a reasonable publication schedule for the compilation of articles, and other artifacts that make up the periodical. That may sound like a lot but basically, an editorial calendar details the what, the when, and the how for a periodical.

First, the editorial calendar usually only covers a year of activity. Typically, twelve months of coverage is the goal, however, it really depends on the publication. There are editorial calendars that cover multiple years, however those are rarer today because the pace of reader consumption is so fast and voluminous is much greater than ever before.

Second, our editorial calendar is theme based, which means in one month we'll cover Blockchain, for example, and other months, we will cover STEM topics. The idea is that external content providers, e.g. guest articles, slideshows, infographics, will know which month to pitch their ideas to, and for us to solicit content from the thought leaders for those periodicals.

Third, the editorial calendar is built over time. The first one we did, so many years ago, was very light on topics and we sort of stuck to the topics, but not really. It was more of a 'work-the-kinks-out' kind of thing. Something was better than nothing. We now look at other editorial calendars of periodicals within our industries, capturing their schedule, and trying not to conflict with their schedules if possible, but also supporting their calendar and to build upon the momentum of the themes.

Our editorial calendar needs to take our own activities into consideration. For example, the High Performance Extreme Computing Conference (<http://www.ieee-hpec.org/>) is a strong influence on our timeline. We are highlighting this topic leading up to the month of the conference, as interest and attention of the attendees focus on the conference, we will try to provide them related content, articles of interest, news, etc.

In addition, our courses, both online and live courses, will be highlighted within the pages of the periodical, with articles from the speakers, as well as related content to the topic of the course. This

part is new for us, and we are trying not to mess something up, but we hope it will be worthwhile to the members, and other readers of our Digital Reflector, as well as the IEEE Boston Section blog (<http://ieeeboston.org/blog/>). Yes, the editorial calendar provides guidance for the blog also.

What does that mean to you, dear reader, you may ask? Well, I am really glad you asked!

You, the reader, will know the topics in advance of the publication, giving you something to keep in your tickler file or to do list to check with that month's issue.

Each issue will include information that may be important to your work or your personal development, or even tools that can help you give your technical minded children challenges (STEM) to advance their knowledge.

Providers will know when to provide information to

reach you with the appropriate tools. This saves them time, and gives you a more efficient way to gather information that you need.

A significant intangible is supporting the momentum of a certain topic in the industry to coincide with external or third party activities.

While it is easy to link the Editorial Calendar, it's also worthwhile to highlight the topics we are covering and when. (Remember, these are our intended timing of the topics)

March - BlockChain

April - Drones

May - 3D Printing

June - Virtual Reality

July - Augmented Reality

August - STEM, Robotics

September - Education, HPEC

October - Artificial Intelligence

November - Holiday, EOY

December - IoT and Tech (gifts)

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 Electronic 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, May 21
8:30AM - 5:00PM

Writing Agile User Story & Acceptance Test Requirements - Cut Creep Overruns, Disappointment, and Embarrassment

Date and Time: Tuesday, May 22
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, May 23
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, May 24
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, May 25
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
- 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

(Discounts available if register for all three Verilog Courses)

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, cosponsoring GBC/ACM, Women In Engineering and Aerospace and Electronic Systems Society – 7:00PM, Thursday, 1 February

Edge Computing: Thinking Beyond the Data Center

Speaker: Beth Cohen

Meeting Location: Verizon Technology Center, 60 Sylvan Rd., Waltham, MA 02451

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

For over a decade, centralized cloud computing has been long been considered a standard IT delivery platform. Recently companies have been applying the simplified administration and flexibility of cloud computing architectures to distributed infrastructures that span across multiple sites and networks. Edge Computing is emerging as a new way of delivering IT Infrastructure for use cases that were never imagined. Think about the possibility of a global swarm of hundreds, thousands or even millions of nodes. Edge Computing requires radically different approaches and tools.

Use cases include:

- Extreme edge conditions (IoT, transportation, manufacturing, utility grids, VDI),
- Long distances between nodes (Satellites, Supply-chain, global shipping)
- Significant hardware and network connectivity constraints
- Hub and spoke designs (Telecom networks, global application distributions)
- We need to think differently about an Edge Computing ecosystem.
- Different architectures to different use cases: hierarchical, matrixes, widely distributed, or mesh.
- How node size affects performance and fit for each use case.
- Deployment considerations
- More stringent security (code/design) in exposed environments

Speaker Bio: Beth Cohen, Product Manager, Verizon

Beth is a Cloud Networking Product Manager at Verizon, working on developing new cloud based networking products and services. Previously, Ms. Cohen was a Senior Cloud Architect with Cloud Technology Partners and the Director of Engineering IT for BBN Corporation, where she was involved with the initial development of the Internet, working on some of the hottest networking and web technology protocols in their infancy. Most recently she has been working on Edge Computing architectures both from the development and building one within Verizon, but also as a program chair of the upcoming OpenDev Symposium on Edge Computing.

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, January 31st.

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.

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 diverse 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.

Entrepreneurs' Network – 6:30PM, Tuesday, 6 February

Successful Marketing Strategies for Different Types of Startup Companies

Meeting location – Constant Contact, 1601 Trapelo Road, 3rd Floor, Great Room, Waltham, MA.

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

There is not a one-size-fits-all strategy for marketing innovative products and services. Are you targeting enterprise customers or individuals? Is your product a luxury or budget item, specialized or commoditized? What are the marketing channels in your target industry? Do you have a small or large marketing budget? Sooo many alternatives and how do they all work together and be most effective? What about PR? To help you solve this marketing puzzle, we have invited expert speakers in startup marketing to share with you their experience, their strategies and success stories.

Agenda:

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

A question and answer session follows the presentation, and panelists will be available afterwards for responses to individual questions. As with every ENET meeting you will also get the chance to network with the panelists and other meeting attendees, both before the start of the meeting and afterwards

Speakers:



Steve Lesser, VP of Sales and Marketing, Zymplify, angel investor

Steve Lesser has been involved in the Boston high tech community since beginning his career at IBM in 1979. He was President of the IBM 100% Club in 1983 and attained 3 IBM Golden Circles in his six years in the General Systems Division. He spent 13 years with Marcam Corporation, a leading provider of ERP software, and was a part of their IPO in 1990. He ran North American Sales at Marcam, and then at MAPICS after its acquisition by Marcam in 1994. He ran Worldwide Sales at Centra Software (elearning platform), and at Imprivata (Identity Management Solutions). Both companies had successful public offerings on NASDAQ. He also was an investor in and responsible for Worldwide Sales & Marketing at Software Secure (Remote Proctoring for online learning), which was acquired by PSI Online in 2016. In May of 2017 he became a lead investor in Zymplify, a Northern Ireland based provider of a marketing automation platform and also runs Worldwide Sales & Marketing out of Boston. He believes that the Marketing Automation Software space led by local company, Hubspot, is still in its early stages and that Zymplify, the only European based vendor and its unique approach of Marketing as a Service can be one of the players in the long run

Steve was one of the original 3 angel investors in Constant Contact and is passionate about stock investing. He has enjoyed his 7 trips since May to Portstewart, Northern Ireland since last May and is beginning to feel more comfortable driving on the

left side of the road. He is a graduate of the University of Massachusetts, Amherst with a Bachelor's in Business Administration and an MBA.



Nina McIntyre, Marketing strategist, Interim CMO

Nina McIntyre has served as Chief Marketing Officer of several high growth technology companies in the Boston area. Nina has over 25 years of operational and executive leadership experience, and she has a track record of defining successful corporate and product marketing strategies resulting in industry leadership, bookings growth and positive acquisition outcomes. Her public company CMO roles include ATG (acquired following a successful company repositioning by Oracle in 2011) and Carbonite. She helped start 3 venture backed companies including Centive, Kubi Software and Bluetrain.io. Nina began her technology career as a product manager, working at IBM/Lotus on new product development. Nina holds a BA from Brown University and a Master of Science in Management (MBA) from the Sloan School of Management at MIT.



Sean Horrigan, Principal and Founder of PR Guy

Sean Horrigan is the Principal and Founder of PR Guy, a contemporary consultancy that helps small to mid-size businesses grow and prosper through powerful PR, better branding, and strategic social media. Sean's startup clients have included ISeeBell, Just Add Cooking, Smartick, DestinationWeddings.com, NOLA's Salsa, MOJO Cold Brewed Coffee, and Waxing the City. Prior to founding PR Guy, Sean worked with a number of agencies and non-profit organizations. Sean holds an M.A. in Marketing Communications from Emerson College.

Moderator:

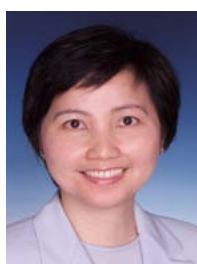
Kathy Yenke, Founder, Sales Catalyst Solutions

Kathy is the founder of Sales Catalyst Solutions,



a sales consultancy specializing in revenue growth and sales excellence. Utilizing the proven Sales Xceleration platform, Kathy helps clients exceed their growth and sales targets across a range of industries by creating a tailored sales strategy, developing effective sales processes, and assuring that sales execution ignites growth.

Starting her sales career at IBM, Kathy quickly rose through the executive ranks running \$1B billion business for IBM. She has best in class sales and executive training along with a career history of varied sales and business responsibilities. Building upon this foundation, Kathy's entrepreneurial spirit led her to start-ups and smaller companies where she always delivered outstanding performances. Kathy earned a BA in Economics and German from Bowdoin College and the Wharton Executive Management Program. She resides in Sudbury, MA with her husband and three children. In her spare time, Kathy enjoys downhill skiing, golf, and spending time with her family.



Organizer:

Millie Kwan, President, The WSI Touch

(<https://thewsitouch.com>)

Millie is Founder and President of The WSI Touch, a digital marketing agency that has been serving small to medium-sized businesses in Greater Boston since 2009. She has over 20 years' experience in IT development, management, education and research. She received her Doctor of Business Administration degree from Boston University and M.S. in Computer Science from Washington University in St Louis. She has taught at Babson College, University of Hong Kong and Boston University and published research on knowledge management, process redesign and workflow management. In her early career, she specialized in library automation and has led the

implementation of various library systems for the University of Rhode Island, the HELIN Library Consortium of Rhode Island, and Washington University in St Louis. Millie is also a Vice Chair of ENET.

E-Minute Presentations will be given at the start of the meeting. These very short presentations enable young startup entrepreneurs to gain experience in presenting their summary business plans to expert panels and audiences.

Directions: Constant Contact is adjacent to RT 128 / 95 at Exit 28B.

See: <http://www.constantcontact.com/about-constant-contact/office-location-waltham.jsp>

Reservations: ENET Constant Contact meetings are free to ENET members and \$20 for non-members. No reservations are needed for the pre-meeting dinner. To expedite sign-in for the meeting, we ask that everyone -- members as well as non-members -- pre-register for the 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.



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LIDS Seminar and IEEE Distinguished Lecture , co-sponsored by Signal Processing Society and Education Society – 3:30PM, Thursday, 8 February

Graph Signal Processing: Filters and Spectral Estimation

Geert Leus - Delft University of Technology

One of the cornerstones of the field of graph signal processing are graph filters, direct analogues of time-domain filters, but intended for signals defined on graphs. In this talk, we give an overview of the graph filtering problem. More specifically, we look at the family of finite impulse response (FIR) and infinite impulse response (IIR) graph filters and show how they can be used for different applications. Next, the concepts of graph stationarity and the graph power spectrum are introduced, which facilitates the analysis and processing of random graph signals. This is a challenging task due to the irregularity of the underlying graph domain. However, it turns out that graph filters can be used to define stationary graph signals and their power spectrum. Methods for estimating the power spectrum are presented, which include nonparametric approaches such as correlograms and periodograms, as well as parametric approaches with as parameters the graph filter coefficients generating the random graph signal. Finally, graph spectral estimation from a limited set of nodes in the graph will be discussed. The presented methods are illustrated in synthetic and real-world graphs.

Geert Leus received the M.Sc. and Ph.D. degree in Electrical Engineering from the KU Leuven, Belgium, in June 1996 and May 2000, respectively. Geert Leus is now an “Antoni van Leeuwenhoek” Full Professor at the Faculty of Electrical Engineering, Mathematics and Computer Science of the Delft University of Technology, The Netherlands. His research interests are in the broad area of sig-

nal processing, with a specific focus on wireless communications, array processing, sensor networks, and graph signal processing. Geert Leus received a 2002 IEEE Signal Processing Society Young Author Best Paper Award and a 2005 IEEE Signal Processing Society Best Paper Award. He is a Fellow of the IEEE and a Fellow of EURASIP. Geert Leus was a Member-at-Large of the Board of Governors of the IEEE Signal Processing Society, the Chair of the IEEE Signal Processing for Communications and Networking Technical Committee, a Member of the IEEE Sensor Array and Multichannel Technical Committee, and the Editor in Chief of the EURASIP Journal on Advances in Signal Processing. He was also on the Editorial Boards of the IEEE Transactions on Signal Processing, the IEEE Transactions on Wireless Communications, the IEEE Signal Processing Letters, and the EURASIP Journal on Advances in Signal Processing. Currently, he is the Vice-Chair of the EURASIP Special Area Team on Signal Processing for Multisensor Systems, an Associate Editor of Foundations and Trends in Signal Processing, and the Editor in Chief of EURASIP Signal Processing.

Meeting Location: Massachusetts Institute of Technology, 77 Massachusetts Avenue, Room 32-144, Cambridge, MA 02139.

For more information: <https://lids.mit.edu/news-and-events/events/lids-seminar-and-ieee-distinguished-lecture-graph-signal-processing-filters>

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

CubeSats with Lasers to Enable Science

Prof. Kerri Cahoy, Massachusetts Institute of Technology, Cambridge, MA



Three ongoing MIT STAR Lab CubeSat projects involve using lasers and optical technologies to enable new scientific capabilities in astrophysics and Earth science. First, we discuss the NASA-sponsored Satellite Laser Guidestar (SLGS) project in collaboration with the University of Arizona, a

detailed design and prototyping study to investigate the feasibility of using a free-flying laser beacon on a CubeSat as an artificial guidestar, to improve wavefront sensing and control capability on large segmented aperture space telescopes such as LUVOIR. The goal of SLGS is to increase the photons/second available to both the segment-phasing control loop and, for an exoplanet direct imaging internal coronagraph, the dark-hole digging control loop that uses high actuator count deformable mirrors, leading to a relaxation of observatory stability requirements.

Second, we discuss the DARPA-sponsored Deformable Mirror demonstration CubeSat (DeMi), a 6U Blue Canyon Technologies CubeSat to demonstrate the performance of a 140-actuator MEMS deformable mirror payload on orbit, with both Shack Hartmann and image plane wavefront sensing and control experiments. Third, we discuss the recently-proposed (but not yet selected) Laser Crosslink Atmospheric Sounder mission (LCAS) that is able

to measure atmospheric composition for species of interest at the same time as obtaining high resolution temperature-pressure profiles using laser occultation, in collaboration with the University of Florida and the University of Arizona.

Details:

This meeting begins at 7 PM Thursday, February 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.

For more information contact Ajay Garg, IEEE Photonics Society Boston Chapter chair at ajay.sinclair.garg@ieee.org, or visit the IEEE Photonics Society Boston Chapter 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.

Geoscience and Remote Sensing Society, Aerospace and Electronic Systems and Women in Engineering, 6:30PM, Tuesday, 13 February

Using Science Imaging Instruments as Sensors of the Jovian High-Energy Electron Environment

Speaker: Ashley Carter (PhD Candidate at MIT)

Dedicated instruments to monitor the high-energy radiation environment are not always included on spacecraft due to resource limitations; however, high-energy electrons in Jupiter's magnetosphere affect the operation, performance, and lifetime of spacecraft and their instruments. We develop a technique to quantitatively characterize the high-energy electron environment using the Galileo spacecraft science imagers (Solid-State Imager and Near-Infrared Mapping Spectrometer) and particle transport simulations in Geant4. We compare our results to Galileo's Energetic Particle Detector and to current Jovian radiation models.

Ashley Carlton received her Bachelor of Science degrees in Physics and Mathematics from Wake

Forest University in 2011, her Master of Science in Aeronautical and Astronautical Engineering from MIT in 2016, and is currently a Ph.D. candidate at MIT in Aeronautical and Astronautical Engineering. Carlton's undergraduate research studied the morphology and evolution of supernova remnants and the timing of pulsars. In between undergraduate and graduate school, Carlton worked as a Science Operations Team Mission Planner for the Chandra X-ray Observatory. Carlton's scientific interests include the high-energy physics, natural space environments, and modeling effects on spacecraft.

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

IEEE Boston Section Social Media Links:

Twitter: <https://twitter.com/ieeeboston>

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

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

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

Software Development Process and Reliability

Speaker: Milena Krasich



The software reliability improvement is a closed loop process with analytical tools selected to provide continuity of analyses. There are some major differences between software and hardware reliability growth test approach. During incremental agile development and reliability growth, the number of

identified and mitigated SW faults is the objective measure, not the failure rate. The true final software failure frequency can be measured only when software is tested operated in its expected use profile.

This presentation shows a closed loop reliability growth planning and data analysis process which is mapped to the software development. The process is made of compatible analyses methods for planning and data analysis in stages of SW development to ensure continuity and simplicity of application, as well traceability.

Closing the loop of the entire process allows review and adjustment of the assumptions made for the process parameters during the planning of the software reliability growth.

Milena Krasich is a Senior Principal Systems Engineer in Raytheon Integrated Defense Systems, Whole Life Engineering, RAM Engineering Group, Marlborough, MA.

Prior to joining Raytheon, she was a Senior Technical Lead of Reliability Engineering in Design Quality Engineering of Bose Corporation, Automotive Systems Division after her five-year tenure at the Jet Propulsion Laboratory in Pasadena, CA. While in California, she was a part-time professor at the Cal State University Dominguez Hills, graduate program Master of Science in Quality Assurance (Reliability, Advanced Reliability and Statistical Quality Control), and Cal Poly Pomona, undergraduate programs. She holds a BS and MS in Electrical Engineering from the University of Belgrade, Yugoslavia, and is a California registered Professional Electrical Engineer. She is Technical Advisor (Chair) to the US Technical Advisory Group (TAG) to the IEC Technical Committee, TC56 – Dependability.

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”.

Entrepreneurs' Network, Cambridge Meeting – 6:00PM, Tuesday, 20 February

How to Find, Select, and Build Your Co-Founding Team

Meeting location – Draper Laboratory, Hill Building, One Hampshire St. Cambridge, MA 02139. The entrance is called One Hampshire St but is actually, on Broadway. Attendees must arrive at Draper Labs before 7pm. Entrance will be locked after 7pm.

Are you a hacker? Or are you a hustler? Success in startups requires both. Some of the most successful founder teams are two-person teams (Wozniak and Jobs among them) where one founder (the hacker) is more technical and the other (the hustler) is more business oriented. The hacker is a problem solver who can make the technology work to meet the needs of customers, and do it efficiently. The hustler is a team builder who can orchestrate marketing, sales and operations. Sometimes teams have three, four or even more founders, but that can get unwieldy and decisions often gravitate toward two leaders in the group. Most common are single founders and they too can be successful (Zuckerberg, for example), but it's important that the single founder quickly build a core team to fill in the gaps that aren't his strengths.

In this meeting, an expert panel of three well recognized serial entrepreneurs and co-founders from tech and life science fields will take up co-founders and core team issues such as

How do you find co-founders? How do you recruit a core team?

As you build and maintain your team, how do you protect your interests? If someone leaves the team, can you get all or most of their stock back? Other issues include relations with past employers, ownership of IP, keeping trade secrets, etc.

How do you manage the expectations of founders, core team as well as investors?

Hope to see you then!

Agenda:

- 6:00-7:00 PM - Registration & networking
- 7:00-7:10 PM - ENET Chairman's announcements
- 7:10-7:25 PM - E Minute - Up to 3 Startup companies' presentations
- 7:25-8:15 PM - 3 expert speakers on the night's topic
- 8:15- 8:30 PM - Audience / Speakers Q & A
- 8:30 - 9:00 PM - Final networking includes meeting presenting speakers

A question and answer session follows the presentation, and panelists will be available afterwards for responses to individual questions. As with every ENET meeting you will also get the chance to network with the panelists and other meeting attendees, both before the start of the meeting and afterwards.

Speakers:



Greg Erman is the President and CEO of EmpiraMed, Inc., a company that has developed a patient engagement software platform called the PRO Portal to capture Real World Evidence and to execute Outcomes Based Contracts and Quality Improvement Intervention Programs. In his career, Mr. Erman has been a cofounder of nine different startup companies, and President and CEO of 6 companies. He has worked on commercializing about 250 medical academic research projects over a 10-year

period, raised about \$100M in venture capital, and successfully grew businesses to about \$20M in annual revenue with 150 employees. Each of Mr. Erman's three VC-backed ventures successfully exited to large public companies and generated returns up to 12X investment.



Emily Bernard co-founded PlacePass with Ethan Hawkes in 2016, after decades of traveling and working in the hospitality industry. PlacePass is a team of entrepreneurs, travelers, and tech geeks with the mission of enabling people to easily search, compare, and book great things to do in

any destination. Previously, Emily Bernard was a Vice President at Foreign Policy magazine (FP) in Washington, DC where she led the international media sales team and established an in-house nation brand consulting practice. Prior to Foreign Policy, Ms. Bernard served as Special Assistant to the President at America Abroad Media, a non-profit that produces radio and television programming on international affairs.



Kerri Garbis is President and co-founder of Ovation Communication LLC, a communication skills consulting firm specializing in presentation skills, business writing skills and building strong relationships. A unique firm, Ovation's communication expert trainers are working, profes-

sional actors. Ms. Garbis is a Business Etiquette Expert, certified by The Emily Post Institute, and an Emotional Intelligence Expert, certified by The Hay Group. She ensures that every Ovation consultant delivers the highest level of client-focused professional training. A professional actress since childhood, Ms. Garbis began her studies in voice and theatre at The Baltimore School For The Arts before earning her BFA in Musical Theatre. Kerri's first book, *Presentation Skills for Managers*, is

available now from McGraw-Hill.

Moderator:



Jane Obbagy is the founder and Managing Director of Obbagy Consulting, a firm specializing in providing environmental strategy services. As an executive, Ms. Obbagy works with private sector leaders, Boards of Directors, multi-stakeholder advisory boards, and

community representatives to implement sustainable business strategies and enhance environmental and social (ES) governance practices. Prior to establishing the firm in 2015, Ms. Obbagy was and continues to be a business entrepreneur. She has mentored emerging consulting practices to scale for growth, expansion, or leverage buyout.

Co-Organizer:



Robert Adelson, business and tax attorney, partner at Boston law firm of Engel & Schultz LLP, and Chairman of The Boston Entrepreneurs' Network. Rob has been an attorney for over 30 years specialized in business, tax, stock and options, employment, contracts, fi-

nancing, trademarks and intellectual property. Rob began as an associate at major New York City law firms before returning home to Boston in 1985 where he has since been a partner in small and medium sized firms before joining his present firm in 2004. Rob represents entrepreneurs, start-ups and small companies, independent contractors and employees and executives. Rob is a frequent speaker on business law topics and author of numerous articles published in Boston Business Journal, Mass High Tech and other publications. He has been named among the "Top 20 Boston Startup Lawyers" by ChubbyBrain.com, a website that provides tools for entrepreneurs. Rob has been on the ENET Board since 2002 and Chairman since 2009 and is also a Co-Founder and Board member of the 128 Innovation Capital Group (2004 -2015).

In 2016, he received the IEEE USA Professional Achievement award for “extreme dedication to the entrepreneurship community.” He holds degrees from Boston University, B.A., summa cum laude, Northwestern University (Chicago), J.D., Law Review, and New York University, LL.M. in Taxation. His website - www.ExecutiveEmploymentAttorney.com

FURTHER INFORMATION:

PUBLIC TRANSPORTATION: Is accessible by public transportation, to the Kendall Square stop on the Red Line.

LOCATION: Draper Laboratory, Hill Building, One Hampshire St. Cambridge, MA 02139. The entrance is called One Hampshire St but is actually on Broadway. Attendees must arrive at Draper Labs before 7pm. Entrance will be locked after 7pm.

REFRESHMENTS:

Pizza & soft drinks

COST AND RESERVATIONS: Free to ENET members and \$10 for non-members. Members & non-members, pre-register for the meeting online, until midnight the day before the meeting. Go to – www.boston-enet.org If you cannot pre-register, you are welcome to register and pay at the door.

PARKING: There is a public parking lot across the street from Draper. Also, \$10 parking is available after 6pm at Yellow Garage https://en.parkopedia.com/parking/garage/kendall_center_yellow_garage/02142/cambridge/ and Blue Garage https://en.parkopedia.com/parking/garage/kendall_center_blue_garage/02142/cambridge/

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Comprised of Engineers, scientists and professionals in the electrical and computer sciences and engineering industry

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Contact Kevin Flavin or 978-733-0003 for more information on rates for Print and Online Advertising

Determining and Communicating Project Value Return on Investment (ROI)

ROI Value Modeling™ for Decision Making

Date & Time: Wednesday, May 23; 8:30AM - 5:00PM

Speaker: Robin Goldsmith, President, GoPro Management

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, May 16, 2018**

Payment received by May 9

IEEE Members	\$235
Non-members	\$260

Payment received after May 9

IEEE Members	\$260
Non-members	\$280

<http://ieeeboston.org/determining-communicating>

Making You a Leader - Fast Track

Date & Time: Monday, May 21; 8:30AM - 5:00PM

Location: Hilton Hotel 2 Forbes Road, Woburn, MA

Speaker: Robin Goldsmith, President, GoPro Management

We do projects to make change. Yet, change will not occur without leadership, and leaders are rare. Leaders make others want to do what the leader wants done. Leaders cause ordinary people to achieve extraordinary things. Managing is not the same as leading, and titles do not make leaders. Seminars can teach you to manage, but they cannot teach you to be a leader. Rather, making a leader takes special techniques—such as our personal development clinics—that can change deep-seated behaviors learned over a lifetime.

However, since clinics usually last about ten weeks, this mini-clinic was devised as a more convenient alternative. This format places responsibility upon the participant to carry out an extended informal follow-on program after completion of the formal seminar workshop session.

During the follow-on period, the participant uses time-condensed methods that simulate the lifetime learning which makes a leader. Therefore, commitment to carrying out these exercises is essential for successful transformation.

PARTICIPANTS WILL LEARN:

- Leadership characteristics and practices that are essential for project and personal success.
- Differences between management and leadership, how they conflict, and why leaders are so rare.
- Behaviors leaders use to influence others, up and down, to want to do what the leader wants them to do
- Special techniques personal development clinics

use to change lifetime learning and make leaders.

- How to employ those special techniques in a follow-on mini-clinic to develop the leadership skills they need to make their projects successful.

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

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, May 14, 2017**

Payment received by May 7

IEEE Members	\$235
Non-members	\$260

Payment received after May 7

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, May 24; 8:30AM - 5:00PM

Speaker: Robin Goldsmith, President, GoPro Management

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, May 17, 2018**

Payment received by May 10

IEEE Members	\$235
Non-members	\$260

Payment received after May 10

IEEE Members	\$260
Non-members	\$280

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

Writing Agile User Story and Acceptance Test Requirements

Date & Time: Tuesday, May 22; 8:30AM - 5:00PM

Speaker: Robin Goldsmith, President, GoPro Management

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

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

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...

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.

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

**Decision (Run/Cancel) Date for this Courses is
 Tuesday, May 15, 2018**

Payment received by May 8

IEEE Members	\$235
Non-members	\$260

Payment received after May 8

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, May 25; 8:30AM - 5:00PM

Speaker: Robin Goldsmith, President, GoPro Management

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

Finding and creating test data
 Test script and matrix formats
 Simple and sophisticated automation

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

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, May 18, 2018**

Payment received by May 11

IEEE Members	\$235
Non-members	\$260

Payment received after May 11

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

Fundamentals of Real-Time Operating Systems

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

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

Speaker: Mike McCulloch, 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

Bootting

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
Non-members	\$430

Payment received after March 5

IEEE Members	\$430
Non-members	\$450

<http://ieeeboston.org/fundamentals-real-time-operating-systems/>

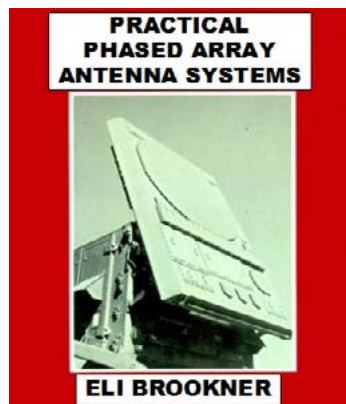
Phased-Array and Adaptive-Array Fundamentals and Their Recent Advances

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 (tentative)

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

Text: *Practical Phased Array Antenna Systems*", Dr. Eli Brookner



"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 Multiple 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:**PATRIOT UPGRADES**

- 2012: \$400M UPGRADE
- 2015: GaN AESA; 360° COV. 1/4TH SIZE AESAs IN REAR ⇒ 2015 STATE-OF-THE-ART SYSTEM

US ARMY FIELDING TO 2048

- >200 BUILT, 13 NATIONS
- 5000 EL PER/FACE, C-BAND

(FEB. 19, 2015/PRNEWSWIR1520E/
MICROWAVE&RF, AUG 2015, P. 24;
RAYTHEON WEBSITE)

(SEE: BROOKNER, E., MJ, 2/15)



ray (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 bandwidth.

Lecture #3. Monday, April 2; Planar Arrays:

sine-space ($\sin\alpha$ - $\sin\beta$ 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

AIR & MISSILE DEFENSE RADAR (AMDR)**S-BAND: AIR & MISSILE DEFENSE:**

- ADAPTIVE DIGITAL BEAM FORMING
- 30X > TARGETS THAN SPY-1D(V)
- 30X > SENSITIVE THAN SPY-1D(V)
- RADAR MODULAR ASSEMBLIES (RAMs) ARE BUILDING BLOCKS
- LRU IN RAM REPLACED <6MIN, EASY, ONLY 2 TOOLS NEEDED
- 37 RAMs = SPY-1D(V)+15DB
- ~14'x14' = SIZE OF SPY-1D(V)
- GaN ARRAY, 4 FACED
- GaN 34% < \$ THAN GaAs
- GaN HAS 10⁵ HR MTBF
- RAYTHEON INVESTED \$150M IN GaN
- SCALABLE



ARLEIGH BURKE
DESTROYER

(WIKIPEDIA PHOTO)

X-BAND: HORIZON SEARCH

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 360° 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

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

8 DELIVERED, 3 MORE ON ORDER.

PHOTO COURTESY RAYTHEON

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.

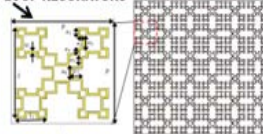
Lecture #5. Monday April 30; Array Feeds:

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;

FRactal Stealth:

- 90% ABSORPTION 2-20 GHZ
- 99% ABSORPTION 10-15 GHZ

FRactal LOOP RESONATORS



(F. YUE-NONG, ET AL, CHINA PHYS. B VOL. 22, NO. 6, 2013, 067801)

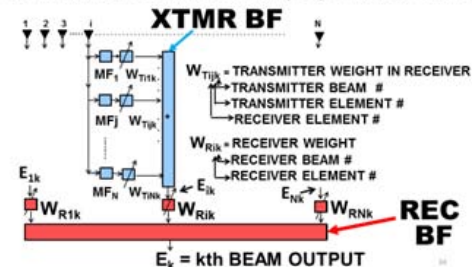
reflectarray. 4TH Generation Digital Beam Forming (DBF) AESAs: Provides reduced search power and occupancy by nearly a factor of 2 (3dB) while im-

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

MIMO MONOSTATIC ARRAY

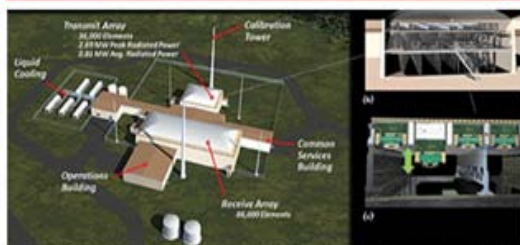
XTMR/REC BEAMFORMER (BF) IN RECEIVER



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: Ex-

LM NEW SPACE FENCE RADAR USES DBF AT ELEMENT ON RECEIVE - 172,000 CHANNELS



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](http://www.microwavejournal.com/articles/26872v)

aging: 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.

Lecture #7, May 14. Sidelobe Cancellers (SLC):

KYMETA MSA*-T ANTENNA DEMONSTRATED

GOAL: LOW COST KU BAND ARRAY FOR SATELLITE INTERNET COM



*METAMATERIAL SURFACE ANTENNA TECHNOLOGY

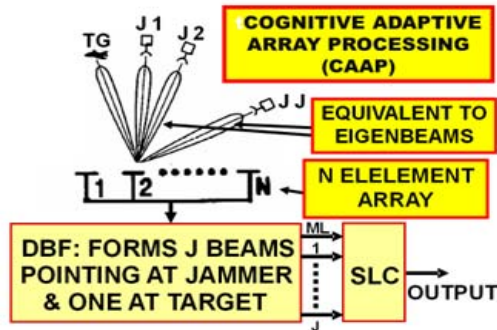
The simple single-loop, feed-forward canceller is introduced in easy physical terms. This is followed by a discussion of the simple single-loop feedback can-

celler 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, ($\lambda/40$), wideband (20:1) antenna can be built using tightly coupled dipole antennas (TCDA); spurious free dynamic range (SFDR): Lincoln Lab in-

creases 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

IEEE Members	\$300
Non-members	\$340

Payment received after March 5

IEEE Members	\$340
Non-members	\$370

<http://ieeeboston.org/phased-array-adaptive-array-fundamentals-recent-advances>

Embedded Linux BSPs and Device Drivers

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

Speaker: Mike McCullough, RTETC, LLC

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
Bootting 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

IEEE Members \$395

Non-members \$430

Payment received after April 2

IEEE Members \$430

Non-members \$450

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

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

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

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

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

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.

**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 diverse 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)*



**New
Online
Course**

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)	BootLoader Optimizations
Other Embedded Linux Development Tools	Boot Time Measurements
Library Support, Glibc and Alternatives	Effective Memory and Flash Usage
SDK Deployment and Support	Filesystem Performance Measurement
Debugging	Some Ideas on Performance Measurement
GDB, GDB Server and the GDB Server Debugger	
Other Debug and Test Tools	The Original UNIX Device Driver Model
An Eclipse Remote Debug Example	The fops and file structs
Advanced Debug with printk and syslogd	The inode and dentry structs
System-Level Debug	Major and Minor Numbers
System-Level Debug Tools	Embedding Channel Information
The /proc and sys Filesystems	Deferring Work
Advanced Logging Methods	The /proc Filesystem
KGDB and KDB	Configuring the Device Driver
Crash Dumps	A Simulated Device Driver
Debugging Embedded Linux Systems	Modularization Revisited
Configuring Embedded Linux	The Evolution of a New Driver Model
Config Methods	The Initial Object-Oriented Approach
Config Syntax	Platform Devices and Drivers
Adding Code to the Linux Kernel	A Generic Subsystem Model
Booting Embedded Linux	The Generic Subsystem Model in Detail
Processor Startup	Subsystem Registration
Initial Functions	The Probe and Init Functions
The initcalls	The Show and Store Functions
Using __init Functions	User Access via the /sys Filesystem
NFS Booting	Configuring the New Device Driver
Root File Systems	The udev Linux Application
RAMdisk Booting with initrd	Comparing the Two Driver Models
RAMdisk Booting with initramfs	The Flattened Device Tree (FDT)
initrd vs initramfs	openBoot and its Effect on Embedded Linux
Root File System Development	The Device Tree Script (dts) File
Busybox Development	The Device Tree Compiler (dtc)
Building a RAMdisk for an initrd	The Device Tree Blob (dtb) File
Building a RAMdisk for an initramfs	Building a dtb File
Flash File System Development	Hybrid Device Drivers
	Other fops Functions
Testing and Debug of Embedded Linux BSPs	The Need for ioctl
Kernel Debug and Kernel Probes	Linux Device Driver Subsystems
Kexec and Kdump	Direct Connect Device Drivers
The Linux Test Project (LTP)	Serial/Console Drivers, I2C & SPI
Performance Tuning Embedded Linux BSPs	Real-Time Clocks and Watchdogs
Virtualization	GPIO and the Pinmux
Measuring Embedded Linux BSP Performance	Flash MTDs and Direct Memory Access
Common Considerations	USB, Power and CPU Management
Uncommon Considerations	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/>

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

**New
Online
Course**

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	New Tracing Methods
KDB and KGDB	SystemTap
Crash Dumps and Post-Mortem Debugging	Ftrace, Tracepoints and Event Tracing
Debugging Embedded Linux Systems	Tracehooks and utrace
Backend Debuggers	Profiling
In-Circuit Emulators	Basic Profiling
Hardware Simulators	gprof and Oprofile
Analyzers	Performance Counters
Requirements Development	LTTng
Performance Requirements	Another DDD Example
Derived Requirements	Manual Profiling
Testability and Traceability	Instrumenting Code
Reviewing Requirements	Output Profiling
Designing for Performance	Timestamping
Design for Test (DFT)	Addressing Performance Problems
Agile Software Design	Types of Performance Problems
Software and Linux Decomposition	Using Performance Tools to Find Areas for
Memory Management	Improvement
CPU and OS Partitioning	Application and System Optimization
Design Reviews	CPU Usage Optimization
Coding for Performance	Memory Usage Optimization
Coding Standards and Consistency	Disk I/O and Filesystem Usage Optimization
Languages, Libraries and Open Source Components	Measuring Embedded Linux Performance
Learning Magic Numbers	Some Ideas on Performance Measurement
Letting Compilers Work For You	Common Considerations
Global, Static and Local Variables	Uncommon Considerations
Code Reviews	Using JTAG Methods
	BootLoader Measurements
Software Testing	Boot Time Measurements
Unit-Level Testing	The Perf Tool
System-Level Testing	Origins of Perf
Code Coverage Tools	The Perf Framework
gcov	Perf Commands and Using Perf
Automated Testing	Listing Events
Some Embedded Linux Test Recommendations	Counting Events
DebugFS	Profiling with Perf
Configuring DebugFS	Static Tracing with Perf
DebugFS Capabilities	Dynamic Tracing with Perf
Advanced Logging	Perf Reporting
LogFS	Performance Tool Assistance
Using Logwatch and Swatch	Recording Commands and Performance
Using syslogd and syslog-ng	System Error Messages and Event Logging
Tracing	Dynamic Probes
ptrace and strace	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/>

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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 Titera, 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.

Design Thinking for Today's Technical Work



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 contract 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 diverse 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.

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- Courses should be no more than 2 full days, or 18 hours for a multi-evening course
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- You will be providing a valuable service to your profession
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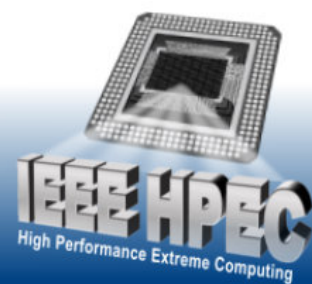
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The technical committee seeks new presentations that clearly describe advances in high performance extreme computing technologies, emphasizing one or more of the following topics:

- Machine Learning
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HPEC accepts two types of submissions:

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

IMPORTANT DATES:

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Preference will be given to papers with strong, quantitative results, demonstrating novel approaches or describing high quality prototypes. Authors of full papers can mark their preference for a poster display or an oral presentation. Presenters who wish to have hardware demonstrations are encouraged to mark their preference for a poster display. Accepted extended abstracts will be displayed as posters. All paper and extended abstract submissions need to use the approved IEEE templates. Full paper submissions with the highest peer review ratings will be published by IEEE in the official HPEC proceedings available on IEEE eXplore. All other accepted submissions and extended abstracts are published on ieee-hpec.org. Vendors are encouraged to sign up for vendor booths. This will allow vendors to present their HPEC technologies in an interactive atmosphere suitable for product demonstration and promotion. Papers can be declared "student paper" if the first author was a student when doing the presented work, and will be eligible for the "IEEE HPEC best student paper award." Papers should not be anonymized. We welcome input (hpec@ieee-hpec.org) on tutorials, invited talks, special sessions, peer reviewed presentations, and vendor demos. Instructions for submitting will be posted on the conference web site shortly. Full paper submissions should use the approved IEEE templates. The highest scoring submissions will be published by IEEE in the official HPEC proceedings available on IEEE eXplore. All other accepted submissions are published on ieee-hpec.org.



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