

BOSTON



THE REFLECTOR

ISSUE #11
NOVEMBER 2017

NEW ONLINE COURSE -
EMBEDDED LINUX BSP
AND DEVICE DRIVERS

P.27

HOMELAND SECURITY SYMPOSIUM
CALL FOR PAPERS,
(DEADLINE, NOV. 1)

P.26

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P.5

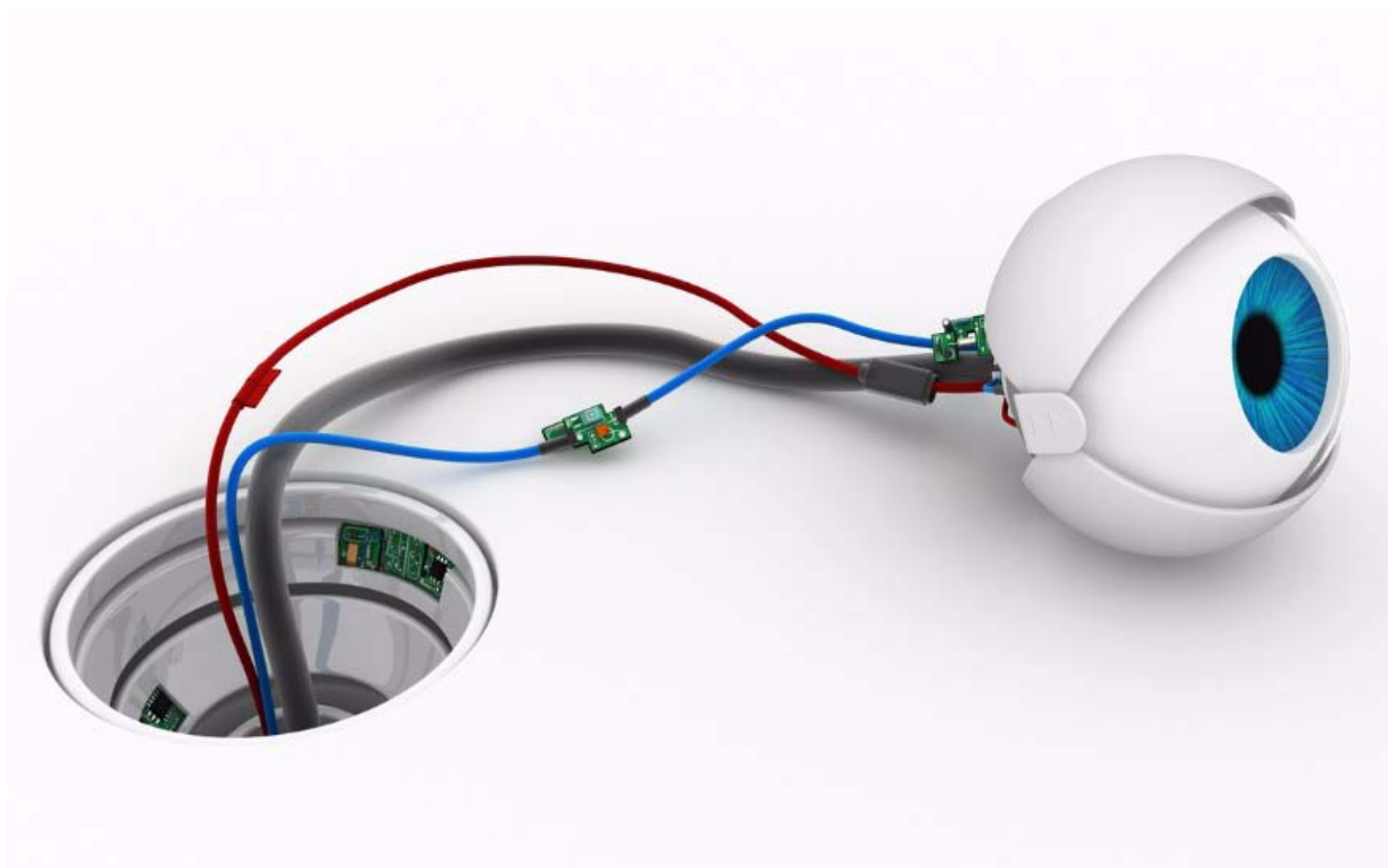


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Lennart, “Down Under”, A Report from Sections Congress 2017

by Fausto Molinet and Len Long



This August, our fearless leader (I’ll explain shortly), Section Chair Len Long, travelled down under (to Australia for those who’ve never heard that term before) to attend the triennial IEEE Sections Congress. Section Congress is a rather large event for IEEE and brings together around 1300 members from all 10 regions of IEEE as well as IEEE staff, to discuss how they see the future of our organization and provide suggestions on how to make it better. You can easily find out a lot about the 2017, and past, Sections Congress. Go to www.ieee.org and search on sections congress.

Some of the other major groups represented were the Young Professionals, Women in Engineering and IEEE Student Members. These groups are also represented in the Boston Section and chaired by Eric Walk, Nassim Razi and Soon Wan respectively. If you’d like to join them, the links above will take you to some local resources.

Ron Tabroff, former Boston Section Chair and now Region 1 Director, led the Northeast delegation that included the chair or a representative from all the sections. Each region was charged with coming up with three issues for the IEEE staff to address that would benefit members and sections.

Len reported, “Reaching out to industry was the highlight for me. It featured what has worked so far in other regions, especially Region 8. Reaching out

to industry can be best accomplished through IEEE members who work in a company. These members can help the company understand how it can collaborate with IEEE and the benefits from it.

Reaching out to these companies can also be done through the professional networks of IEEE members since they can communicate with one of their connections who works in a company who can then help them interact with key people in the company and establish the relationship between IEEE and the company.

Not only Section Industry Ambassadors (Industry Relations officers in other regions), but also Senior members, Young Professionals and Women in Engineering can contribute in industry engagement.

Northeastern University, for example, has established relationships with corporations so that its students could work in them as part of their undergraduate program.

I also got to meet many people from all around the world that had problems and issues similar to those we face in the Boston Section and they all had helpful suggestions to move us forward.”

It wasn’t all work though, Sections Congress is also about having some fun and interacting with other “IEEE’ers” on a social level, and Australia is a great

place to do that with a reputation for friendly people and some significantly offbeat experiences available nowhere else in the world.

Ron Tabroff organized several very well-planned events including a Harbour (that's the way they spell it) cruise.

Len participated in a climb of Sydney Harbor Bridge, a structured (excuse the pun) experience for those with no fear of heights. Len says, "Jane and I also visited Cairns and snorkeled in the Great Barrier Reef, went to Alice Springs, site of the first intercontinental telegraph station, rode a camel, visited Flying Doctors and School of the Air as well as Ayers Rock in the Australian Outback. In Sydney, we went to the Chinese Garden and the Rock, visited the opera house and then travelled to sev-

eral other cities. It's a rich country with very nice people. Jane and I also visited Christchurch, New Zealand - saw the earthquake devastation and had a meal with a family - visited the cardboard cathedral. It's beautiful country - many sheep, cattle and deer farms. Held a Koala bear, saw Kiwi birds and patted a kangaroo. Visited wineries and an olive oil manufacturing plant. Then we travelled to Fiji and enjoyed a resort there. In all three countries, we visited villages of indigenous people. The weather was fine and the food was delicious. Enjoyed specialty of meat pies."

Welcome back Len. We look forward to getting more details on recommendations and solutions and how we can apply them to make our section the most vibrant and effective group in IEEE.

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.

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

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Advertising with the IEEE Boston Section affords you access to a highly educated, highly skilled and valuable consumer. Whether you are looking to reach students with a bright future and active minds, or whether you are reaching households with priorities that may include a family, planning for vacations, retirement, or like-values, the IEEE Boston Section is fortunate to enjoy a consistent relationship.

The IEEE Boston Section provides education, career enhancement, and training programs throughout the year. Our members, and consumers, are looking for valuable connections with companies that provide outstanding products. For qualified advertisers, the IEEE Boston Section advertising options are very flexible. Through our affiliate, we will even help you design, develop, and host your ads for maximum efficiency. A few important features of the IEEE Boston Section

IEEE Boston Section is the largest, most active, and technically diverse section in the U.S.

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

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Reliability Society – 5:00PM, Thursday, 1 November

Laser Exfoliation Removal of Conformal Coatings

Norman Armendariz, Ph.D., Raytheon Engineering Fellow



The IEEE Boston Reliability Chapter cordially invites you to attend a joint meeting and plant tour with SMTA Boston Chapter and iMAPs organizations on November 1, 2017.

Laser Exfoliation Removal of Conformal Coatings From CCA PCB

Pad Surfaces and Design for Rinsability

Circuit Cards Assemblies-CCAs are manufactured to meet Class 3 military-grade requirements –they must work the first time, every time. Certain electronic components from recent production builds were detected with cleaning residue remaining, and it appears that the component housing design is a major factor that determines whether a component entrains & entraps residues. To ensure protection to moisture or extreme environments, the CCA undergoes a conformal coating process on CCA exposed surfaces. Prior to conformal coat, the surface of the CCA is semi aqueous chemically cleaned to provide a surface condition suitable for the coating to properly adhere. However, If the cleaning solutions get entrained / entrapped within the components, residual contamination may cause materials degradation of the components, which may limit the electrical performance of the device. As a result, a study was initiated to understand the susceptibility of entrainment / entrapment of cleaning residues on 28 different components, each with various component cover / attachment constructions and vent open areas.

CCAs-circuit card assemblies for military applications require a high level of performance and reliability, and typically undergo a CC-conformal coating process after SMT-surface mount technology assembly to protect the circuit card and attached

electrical components from exposure to moisture and harsh environments. However, certain areas of the CCA or PCB-printed circuit board metallized surfaces are desired to be free of conformal coating and are required to be clean, solderable and electrically / thermally conductive. Current conformal coating de-masking processes are time consuming and labor intensive. A more cost effective and automated laser-aided exfoliation method was evaluated and successfully demonstrated to remove parylene C conformal coatings from ENIG-plated Cu pads. The parylene was removed within a precise pad area, and tested to be solderable to enable subsequent wire-soldering and consistent sealant coverage in a cost-effective manner. This paper will discuss the “physics” of laser ablation, laser exfoliation, materials interactions, test and characterization methods used to evaluate and validate the laser-aided removal processes on actual production CCA product.

Norman Armendariz, Ph.D. of Raytheon Company

Dr. Armendariz is an Engineering Fellow at Raytheon responsible for materials engineering design, materials analysis, process equipment development, and production support associated with the manufacturing of CCA- circuit card assemblies used in missiles, smart munitions, ground based radars, and mobile sensors across multiple US and international sites. Norm has over 20 years of industrial experience, having worked for Lockheed/NASA, Motorola, TI and Intel, and as Director of Labs / Asst. Engr. Prof. at American University. He holds an interdisciplinary PhD in Chemical Engr. from New Mexico State University, MS in Materials Science Engr. from the University of Illinois at Urbana-Champaign, and BS Metallurgical Engr. from Colorado State University, with 9 US patents and 27 peer-reviewed publications.

Registration/Arrival Details: (US Citizens Only)

* Pre-registration is required, walk-ins will not be able to pass the guard at the gate.

* Raytheon is a secure facility – escort is required at all times while on the premises

* YOU MUST bring proof of US Citizenship to avoid any entry issues. this can be a valid driver's license, passport, or government issued photo ID.

* You will need to provide first, middle and last name along with company affiliation during registration

* Head count limit is 60, first come first serve, please register early.

* You must register with online RSVP to get on the attendee list! or copy this url to your browser - <https://events.vtools.ieee.org/m/47564>

Cost:

* SMTA, iMAPS & IEEE Members who RSVP in advance: \$20

* Non-Members: \$25

* Cost includes: Dinner, tour, networking and presentations

* Payment will be accepted at the door. Cash, checks or credit cards accepted.

Agenda:

5:00 PM Attendee Registration

5:15 PM Raytheon Facility tours

6:00 PM Dinner in Raytheon, Andover Cafeteria

7:00 PM Boston Chapter Welcome -- SMTA Chapter President Michael Jansen

7:10 PM Raytheon Welcome

7:25 PM Laser Exfoliation Removal of Conformal Coatings From CCA PCB Pad Surfaces, Norman Armendariz, Ph.D., Engineering Fellow

8:30 PM Q&A and Adjourn

Meeting Location: Raytheon Company, 350 Lowell Street, Andover, Massachusetts


University of New Hampshire

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IEEE Boston Section Online Courses:

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

Verilog101:Verilog Foundations

Full course description and registration at ,
<http://ieeeeboston.org/verilog-101-verilog-foundations-online-course/>

System Verilog 101: Design Constructs

Full course description and registration at ,
<http://ieeeeboston.org/systemverilog-101-sv101-design-constructs-online-course/>

System Verilog 102: Verification Constructs

Full course description and registration at ,
<http://ieeeeboston.org/systemverilog-102-sv102-verification-constructs-online-course/>

High Performance Project Management

Full course description and registration at ,
<http://ieeeeboston.org/high-performance-project-management-online-course/>

Introduction to Embedded Linux Part I

Full course description and registration at ,
<http://ieeeeboston.org/introduction-to-embedded-linux-part-i-el201-online-course/>

Embedded Linux Optimization - Tools and Techniques

Full course description and registration at ,
<http://ieeeeboston.org/embedded-linux-optimization-tools-techniques-line-course/>



Embedded Linux Board Support Packages and Device Drivers

Full course description and registration at ,
<http://ieeeeboston.org/embedded-linux-bsps-device-drivers-line-course/>

Software Development for Medical Device Manufacturers

Full course description and registration at ,
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Fundamental Mathematics Concepts Relating to Electromagnetics

Full course description and registration at ,
<http://ieeeeboston.org/fundamental-mathematics-concepts-relating-electromagnetics-line-course/>

Reliability Engineering for the Business World

Full course description and registration at ,
<http://ieeeeboston.org/reliability-engineering-business-world-line-course/>

Entrepreneurs' Network – 6:30PM, Tuesday, 7 November

FROM ZERO TO FUNDED:

What do you need to get seed / angel investment

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.

Entrepreneurs and the businesses they are starting have evolved. Start-ups today don't need to build a manufacturing plant to start a business. They need less money to build a product prototype, prove that it works, prove there is a market for their product and show a potentially profitable business model before scaling the business.

What will make the lives of entrepreneurs seeking funding easier?

An angel investor who understands the experimental nature of the idea, believes in the business focus, the model, the team to execute the plan and pivot where needed and an entrepreneur to focus on building an organization in today's environment addressing a real customer need in a market of decent size while carrying out the business vision.

Whether you're a businessperson with a great concept or an entrepreneur getting ready to raise seed investment for your company, from Zero to Funded will offer you the following:

How to create an investor-friendly financial model for your business

Angel investor vs a VC, the differences and merits
What goes on behind the scenes when angel, seed or VC investors

Contemplate whether or not to fund a venture

How to work with your investors and what to expect after they invest

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:



GRAHAM BROOKS, Partner, .406 Ventures - joined .406 Ventures in 2007 after nine years of technology-oriented operating, investing and start-up experience and has been a Partner at .406 Ventures, LLC since September 2014. Graham specializes in building early stage companies and loves working

with both experienced and first-time entrepreneurs helping them to grow their visions in industry changing companies; go-to-market development and execution, sales team structure and early company strategy. He is a member of the Board of Directors of Bedrock Data, Connotate, Attend.com, CoPatient, Inc. and Board observer to other companies. He is also a member of the Board of Directors of the MIT enterprise Forum. He holds

degrees from Princeton and the Dartmouth Tuck School. #BigData, #HealthIT, #DigitalVideo and #AdTech



LISA FRUSZTAJER, Product Marketing & Project Management, Avid Technology - has navigated all ends of the technology world over the last twenty years, first working at Sun Microsystems, then helping grow a small software startup called KYOS, then joining Avid Technology.

Lisa currently focuses on angel investing, consulting projects, and running a real estate management company. Lisa's background is an eclectic blend of marketing, engineering and project management, in technology, manufacturing, higher education and financial services. She is a lead investor of the Portfolia Enterprise Fund, which combines investor education with immediate diversification across early stage companies. She serves on the Board of Trustees at a secondary school and has been a board member of other education-focused nonprofits. Lisa was educated at the University of Chicago, the London School of Economics, and Columbia Business School



MITCHELL SANDERS, PhD, Managing Director Innovation and Board Member, Alira Health – is a serial entrepreneur with more than 30 years preclinical animal models and clinical product development in advanced wound care. He secured an aggregate of \$35M in

development funding, and grants for Alira Health and ECI Biotech. In 2015 Mitch joined Alira Health full time to help expand their newly formed and rapidly growing Global Medical Affairs Division and was promoted to Managing Director of Drug and Device Discovery Lab (3DL) now rebranded as the Innovation Services Division.

Mitch is an expert in clinical and translational re-

search and is a reviewer for the Wound Healing Society (WHS), Wounds International, Tissue Engineering, CIMIT, MassVentures, MIT, WPI, Tech Sandbox, Piranha Pond, SBANE and the Venture Forum. He holds an MS and PhD from WPI in molecular biology and biomedical sciences with 2 Postdocs at the Whitehead Institute/ MIT in biochemistry and pathogen genetics. Mitch is also an AALAS certified Laboratory Animal Technician and has over 30 year of expertise in performing pre-clinical wound healing and surgical models at ECI Biotech, Boston University, and UMASS Medical School.

Moderator:



HOWARD SHOLKIN, Principal, Sholkin Consulting - has more than 40 years of journalism and marketing communication experience. In 2014, he formed Sholkin Consulting to deliver strategy and tactical marketing services to influence an organization's prospects, grow its business, and elevate a firm's brand and its products and services. He joined International Data Group (IDG)—the world's leading technology media, event, and research company—as director of corporate communications in 2003 providing PR support for Founder and Chairman Pat McGovern and subsidiaries. Sholkin was later promoted to a director's position for communication and marketing programs for the CEO of IDG Communications, the media and events subsidiary, and for the CEO of IDG Global Solutions.

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, financings, 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

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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Photonics, Aerospace and Electronics Systems, Electron Devices, Geoscience and Remote Sensing Societies
 7:00PM Thursday, 9 November

Metamaterial Advances for Radar and Communication

Dr. Eli Brookner, Raytheon Company. (Retired)



This talk will be given in tutorial form so that those not familiar with metamaterials can understand it. All that is needed is a first two years of undergraduate engineering. What is metamaterials will be explained in simple terms followed by its advances. Metamaterial antennas have progressed considerably in the last

few years. Kymeta had demonstrated December 2014 the transmission to satellites and back at K-band using metamaterial antennas which employed metamaterial resonators to control the electronic beam steering. No phase shifters were used. A clear explanation of how this antenna works is given. Kymeta expects to have its Ku-band metamaterial antenna commercially available in 2017. First use is planned at K-band (10-15 GHz) on vessels anywhere in the world for high speed internet using satellites. PARC, a Xerox Co., has developed a metamaterial antenna 2.4 GHz for use in cell towers. They plan to also use a higher frequency version for self driving cars employing artificial intelligence (AI). (The metamaterial group of PARC has recently been spun off as Metawave.) Echodyne has

developed metamaterial arrays for radar. The Army Research Laboratory in Adelphi MD has funded the development of a metamaterial 250-505 MHz antenna with a $\lambda/20$ thickness.

Complementing this a conventional tightly coupled dipole antenna (TCDA) has been developed which provides a 20:1 bandwidth with a $\lambda/40$ thickness. Target cloaking has been demonstrated at microwaves over a narrow band using metamaterials. With cloaking the

KYMETA MSA*-T ANTENNA DEMONSTRATED

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*METAMATERIAL SURFACE ANTENNA TECHNOLOGY

electromagnetic wave signal transmitted by a radar goes around the target making it invisible. Thus we could get the Invisible Man. Cloaking has also been demonstrated at L-band with a 50% bandwidth using fractals. It has also been demonstrated for a flat plate at normal incidence using fractals. Stealthing by absorption using a thin flexible and stretchable metamaterials sheet has been demonstrated to give 6 dB absorption over the band from 8-10 GHz, larger absorption over a narrower band. Using fractals material < 1 mm thick simulation gave a 10 dB reduction in backscatter from 2 to 20 GHz, ~20 dB reduction from 9 to 15 GHz. Good results were obtained for all incidence angles for V and H polarizations. Cloaking is being worked on at MIT for stealthing against sonar signals. Using metamaterial

METAMATERIAL STEALTH 75% ABSORPTION 8-10 GHZ

META-SKIN*

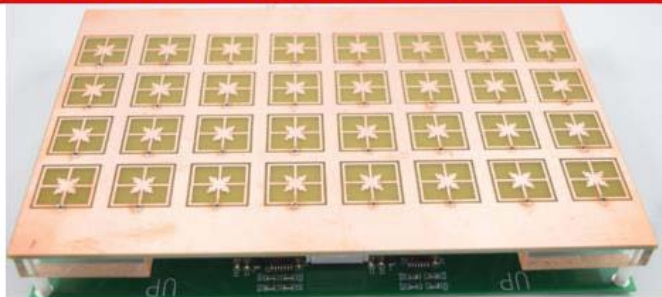


*EMBEDS INSIDE SILICONE SHEET ROWS OF SPLIT-RING RESONATORS
CONTAINING LIQUID METAL ALLOY GALINSTAN MADE OF GALLIUM, INDIUM, TIN.
(PROF. JIMING SONG & ASSOC. PROF. LIANG DONG OF IOWA STATE UN.)

one can focus 6X beyond diffraction limit at 0.38 μm (Moore's Law marches on); 40X diffraction limit, $\lambda/80$, at 375 MHz. Has been used in cell phones to provide antennas 5X smaller ($1/10\text{th}$ □) having 700 MHz-2.7 GHz bandwidth. Provided isolation between antennas having 2.5 cm separation equivalent to 1m separation. Used for phased array wide angle impedance matching (WAIM). It has been found that n-doped graphene has a negative index of refraction. Metamaterials not new, Marconi had a 1919 patent using it and the ancient cathedrals used it with nanoparticles to get the brilliant colors in their windows. Amazing.

Dr. Eli Brookner: MEE & DrSc Columbia Un '55 & '62;

PARC* 2.4 GHZ METAMATERIAL ARRAY FOR CELL TOWERS. PLAN mm VERSION AUTONOMOUS CARS



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[HTTP://BLOGS.PARC.COM/2015/10/SELF-DRIVING-CARS-NEED-BETTER-DIGITAL-EYES-TO-DETECT-PEDESTRIANS/](http://blogs.parc.com/2015/10/self-driving-cars-need-better-digital-eyes-to-detect-pedestrians/)

BEE CCNY, '53. Raytheon 1962-2014 (retired) ; Principal Engineering Fellow; worked on radars for air traffic control, military defense, space & navigation: on ASDE-X, ASTOR RADARSAT II, AGRB, major Space Based Radar programs, NAVSPASUR, COBRA DANE, PAVE PAWS, MSR, COBRA JUDY Replacement, THAAD, SIVAM, SPY-3, Patriot, BMEWS, UAWR, SRP, Pathfinder, Upgrade for >70 ARSRs, AMDR, Space Fence, 3DELRR. Before Raytheon: Columbia Un Electronics Research Lab. [now RRI], Nicolet, & Rome AF Lab; Awards: IEEE 2006 Dennis J. Picard Medal for Radar Technology & Application; IEEE '03 Warren

ECHODYNE RADARS USING METAMATERIAL ARRAYS

MESA-D-DEV K-BAND RADAR:



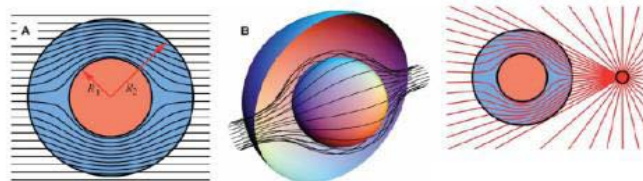
MESA-DAA K-BAND RADAR:



ECHODYNE WEB PAGE)

White Award; IEEE AESS Outstanding Organizational Leadership Award, 2017; Journal of Franklin Institute Premium Award best paper, 1966; IEEE Wheeler Prize for Best Applications Paper, 1998. Fellow: IEEE, AIAA, & MSS. 4 books: Tracking, Phased Arrays & Radar.

METAMATERIALS STEALTHING OR CLOAKING INVISIBLE MAN



>10,000 attended courses in 25 countries. Banquet & keynote speaker 13 times. > 230 publications. > 100 invited. 6 papers in Books of Reprints. 9 patent.

Meeting Location: MIT Lincoln Laboratory, 244 Wood Street, Cafeteria.

Life Members & New Hampshire Life Members - 4:00PM, Wednesday, 15 November

Climate Change: Are We Losing the Carbon-Free Energy Market to China?

By Paul H. Carr, PhD, IEEE Life Fellow



Refreshments 3:30PM

Meeting Location: Lincoln Lab Cafeteria, 244 Wood Street, Lexington, MA 02421

The global carbon-free energy market, valued at \$6 trillion, is increasing exponentially. This is because emissions from fossil fuel burning have raised carbon dioxide concentrations

35% higher than in the last millions of years. These emissions are warming our planet via the Greenhouse Effect and increasing weather extremes, like higher intensity hurricanes.

In 1995, the US had 43% of the solar manufacturing market compared to China at 1%. Now the US market share has declined to 10%, as compared to China's 30%. China now dominates wind turbines with 27% of the market share with the US at 9%. Although China is the world's largest carbon emitter, the per capita emissions of the US are the biggest, twice those of China and Europe.

Solar energy is available only 26% of the time and wind 33%. Nuclear is 24/7. The energy returned divided by the energy invested (EROI) in manufacturing and construction for nuclear plants is 47 times that of solar and 19 times that of wind.

Fear of nuclear reactors is hurting our environment. We are decommissioning them faster than the increase in wind and solar. To make up for this net decrease, we are increasing our burning of fossil fuels, raising carbon dioxide emissions which are warming our planet.

Westinghouse's nuclear reactors being built in S. Carolina and in Georgia have gone bankrupt. China has

23 nuclear plants under construction and 33 planned. Bill Gates' TerraPower nuclear pilot plant is being built in China with the Chinese National Nuclear Corp. This traveling wave reactor converts depleted uranium, a by-product of the nuclear-fission process, into usable fuel, solving the nuclear waste storage problem.

Biographical Sketch of Paul H. Carr: BS MIT, PhD Brandeis U, IEEE Life Fellow. From 1967 to 1995, he led the Component Technology Branch of the Air Force Research Laboratory, Bedford, MA. His branch developed the surface acoustic wave (SAW) technology used in compact, signal-processing filters for radar, cell phones, and TV. Two former branch member were Dr. Ken Laker and Dr. Tom Szabo. Ken Laker in 1999 was elected president of the IEEE. Tom Szabo's Diagnostic Ultrasound Imaging: Inside Out (2003) has been cited over 1000 times. After Dr. Carr's retirement from AFRL, he taught philosophy courses at U Mass Lowell that inspired his book, *Beauty in Science & Spirit* (2006).

He published "Weather extremes from anthropogenic global warming" in *Natural Science*, Jan 2013 and participated in an IEEE Climate Discussion/Debate on NewTV in August 2014. He championed the www.iras.org conference on climate change on Star Island off Portsmouth, NH in June 2017.

His web page: www.MirrorOfNature.org

The meeting will be held at the Lincoln Lab Main Cafeteria, 244 Wood Street, Lexington, MA at 4:00 PM.

Refreshments will be served at 3:30 PM. Please use the Wood Street Gate.

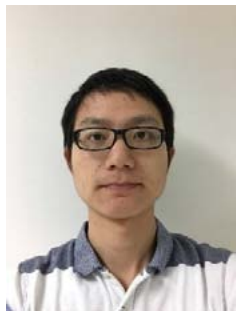
For directions go to <http://www.ll.mit.edu/>

For other information, contact Paul H. Carr, 603 413 6566

Electromagnetic Compatibility Society – 6:00PM, Thursday, 16 November

Insights into EMC Chamber Designs: How to Achieve an Optimized Chamber for Accurate EMC Measurements

Dr. Zubiao Xiong, RF Engineer, ETS-Lindgren, Cedar Park, Texas



IEEE Boston EMC Chapter is pleased to present a Hands-On Seminar on EMC Chamber Design Insights into EMC Chamber Design: How to Achieve an Optimized Chamber For Accurate EMC Measurements

Time:

6:00PM: Complimentary Dinner

6:45PM Presentation on EMC Chamber Design

7:45PM: Demonstration of the Time Domain Measurement Technique per ANSI C63.25 for Test Site Validation and Diagnostics (see technical program and speaker bio below)

8:15PM: Adjourn/Optional NTS Lab Tour

Location: NTS, 1146 Massachusetts Ave., Boxborough, MA 01719

Onsite Contact: Clayton Forbes, NTS Operations Manager, 978-266-1001

Register: [Click here to register on line.](#)

Please register no later than Friday, November 10 in order to ensure adequate seating and catering.

Thank you to our meeting sponsors!



Abstract: This presentation will provide background information to consider when determining the optimal chamber design for

varied applications. Since chambers involve a considerable investment, taking the time up front to weigh options for the best design is very cost-effective in the long run. Topics presented include a review of EMC standards since the first task is generally to identify which standards the chamber will be used to test in accordance with. General design guidelines, performance simulation ability and accuracy, and optimizing a design for a limited space will be reviewed. Finally, with existing chambers, guidelines will be provided for those considering retrofitting a chamber with new absorber. Troubleshooting tips will also be provided should an existing chamber fail to meet performance expectations.

Demonstration Overview: A demonstration of the time domain measurement technique per the draft ANSI Standard C63.25 in a 3 meter semi-anechoic EMC chamber will follow the presentation. The live demonstration shows the effectiveness of the measurement process, the data post-processing, and analysis of the results. Time domain site VSWR is post-processed through statistical techniques, and data is shown to correlate to the CISPR method. Attendees will see how time domain measurements provide an efficient and cost effective way to validate chamber performance as well as indicate precisely where a chamber may have problems meeting performance expectations.

Dr. Zubiao Xiong is an RF engineer with ETS-Lindgren, located in Cedar Park, Texas. He obtained his B.Eng. and Ph.D. (both degrees in Electronic Information Engineering) from the Huazhong University of Science and Technology, China in 2003 and 2009, respectively. After that, he joined the University of Houston as a research fellow, focusing on the research of computational electromagnetics and its applications in biomedical engineering and electromagnetic compatibility. He developed the simulation software for predicting and

analyzing the performance of anechoic chambers, and then joined ETS-Lindgren in September 2016. Dr. Zubiao Xiong is an active member of the working group addressing IEEE-STD-1128 on RF Absorber Evaluation. His current research interests include EMC and

microwave chamber design, novel RF absorber material development, and time domain measurements for site validation and antenna calibration. He may be reached at zubiao.xiong@ets-lindgren.com.

Computer Society and GBC/ACM – 7:00PM, Thursday, 16 November

It's Time for a New Old Language

Guy L. Steele Jr., Oracle Labs



The most popular programming language in computer science has no compiler, interpreter, or complete specification. It is remarkably concise. It grew over decades; today, dozens of variations are in use. Its complexity has reached the point where it needs to be re-explained every time it is used, but too often it is

not; instead, each variant is more or less taken for granted. This has led to ambiguities and inconsistencies. Much effort has been spent in hand-translating, in both directions, between this language and other languages that do have compilers, primarily for the purpose of implementing yet other languages. The language could well describe parallel computation, but this fact has gone unexploited. In this talk we will summarize the history of the language, highlight variations and problems that have arisen, and propose specific solutions. It is high time that this language be taken seriously, so that all the best tools and techniques of our trade may be applied to it also.

Guy Steele is a Software Architect for Oracle Labs and Principal Investigator of the Programming Language Research Group. His research interests include programming language design and implementation, algorithms, compiler design, distributed systems, functional programming, object-oriented

programming, automatic storage management (including garbage collection), floating-point arithmetic, interval arithmetic, hardware/software codesign, parallel algorithms, parallel computer architectures, and pseudorandom number generation.

He received his A.B. in applied mathematics from Harvard College (1975), and his S.M. and Ph.D. in computer science and artificial intelligence from MIT (1977 and 1980). Prior to becoming a member of Oracle Labs, he was an assistant professor of computer science at Carnegie-Mellon University; a member of technical staff at Tartan Laboratories in Pittsburgh, Pennsylvania; a senior scientist at Thinking Machines Corporation in Cambridge, Massachusetts; and a Distinguished Engineer and then a Sun Fellow at Sun Microsystems Laboratories.

He is author or co-author of five books: *Common Lisp: The Language* (Digital Press, first ed. 1984, second ed. 1990); *C: A Reference Manual* (Prentice-Hall, first ed. 1984, fifth ed. 2002); *The Hacker's Dictionary* (Harper&Row, 1983), which has been revised as *The New Hacker's Dictionary*, edited by Eric Raymond with introduction and illustrations by Guy Steele (MIT Press, first ed. 1992, third ed. 1996); *The High Performance Fortran Handbook* (MIT Press, 1994); and *The Java Language Specification* (Addison-Wesley, first ed. 1996, second ed. 2000, third ed. 2005; Java SE 7 ed. 2013;

Java SE 8 ed. 2014). All are still in print. He has been praised for an especially clear and thorough writing style in explaining the details of programming languages.

He has published more than two dozen papers on the subject of the Lisp language and Lisp implementation, including a series with Gerald Jay Sussman that defined the Scheme dialect of Lisp. One of these, "Multiprocessing Compactifying Garbage Collection," won first place in the ACM 1975 George E. Forsythe Student Paper Competition. Other papers published in CACM are "Design of a LISP-Based Microprocessor" with Gerald Jay Sussman (November 1980) and "Data Parallel Algorithms" with W. Daniel Hillis (December 1986); the latter has been cited over 1100 times. He has also published papers on many other subjects, including compilers, parallel processing, constraint languages, and pseudorandom number generation. One song he composed has been published in CACM ("The Telnet Song", April 1984).

He has been given the ACM Grace Murray Hopper Award (1988), the ACM SIGPLAN Programming Languages Achievement Award (1996), the Dr. Dobb's Journal Excellence in Programming Award (2005), and the Harry H. Goode Memorial Award (2007). He led the team that received a 1990 Gordon Bell Prize honorable mention for achieving the fastest speed to that date for a production application: 14.182 Gigafllops. He is a AAAI Fellow (1990), ACM Fellow (1994), Member of the National Academy of Engineering of the United States of America (2001). Fellow of the American Academy of Arts and Sciences (2002), and IEEE Fellow (2011).

He has served on accredited standards committees X3J11 (C language) and X3J3 (Fortran), and served as chairman of X3J13 (Common Lisp). He was also a member of the IEEE committee that produced the IEEE Standard for the Scheme Programming Lan-

guage, IEEE Std 1178-1990. He was a representative to the High Performance Fortran Forum, which produced the High Performance Fortran specification in May, 1993. At Thinking Machines Corporation he co-developed the languages Connection Machine Lisp, C*, and Connection Machine Fortran. At Sun Microsystems (and now at Oracle) he has advised the evolution of the Java programming language; he also led the design of Fortress, an object-oriented mathematical language intended to support high-performance computing. He designed the original EMACS command set and was the first person to port TeX.

He has served on Ph.D. thesis committees for twelve students. He has served as program chair for the 1984 ACM Lisp Conference and for the 15th ACM POPL conference (1988) and 23rd ACM POPL conference (1996); he has also served on program committees for more than 30 other conferences.

At Oracle Labs he is responsible for research in language design and implementation strategies, and architectural and software support for programming languages.

This joint meeting of the Boston Chapter of the IEEE Computer Society and GBC/ACM will be held in MIT Room 32-G449 (the Kiva conference room on the 4th floor of the Stata Center, building 32 on MIT maps) . You can see it on this map of the MIT campus.

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

Entrepreneurs' Network, Cambridge Meeting, 6:00PM, Tuesday, 21 November

What are the Elements of Value that Attract Investment?

EMAIL AND DIGITAL MARKETING FOR EARLY STAGE COMPANIES

Meeting location: Pivotal Labs, 255 Main St., 6th Floor, Cambridge, MA

For early stage companies constrained by small budgets and limited resources, digital marketing promises to produce fast and impressive results. With a myriad of techniques and platforms available in the marketplace, it is crucial to make the right choices and execute optimally for the best ROI. This session will bring together experts with extensive experience advising and executing B2C and B2B digital marketing campaigns and strategies for businesses from startups to Fortune 10 companies.

Join us to learn how informed and effective use of digital marketing can provide the promotion and prospects to build your startup!

AGENDA:

6:00 -7:00 pm – Networking

7:00 -7:10 pm - Announcements

7:10 -7:25 pm - E Minute - Up to 3 Startup companies' presentations

7:25 -8:15 pm - Three expert speakers on the night's topic

8:15 -8:30 pm - Q & A

8:30 -9:00 pm - Networking including meeting speakers

Below please meet the panel of accomplished executives and experts our moderator and meeting organizers:

SPEAKERS:

LOUIS GUDEMA Founder and President, revenue



+ associates (<http://www.revenue-associates.biz/>)

Louis Gudema helps companies significantly increase their revenue through measurable improvements in sales and marketing through his firm, revenue + associates. Previously, he created award-winning internet marketing agency Magic Hour Communications, oversaw the development of its MagicWand Web CMS, and built Magic Hour into one of the top three or four companies in its national Web SaaS market. He mentors startups at MIT and has worked with companies from startups to the Fortune 10. His clients have included IBM, EMC, PTC, Cognos, Endeca, SpeechWorks, ViziApps, and Groton School.

Louis developed the Bullseye Marketing Framework. He has written on marketing for many leading business blogs including the Harvard Business Review, HubSpot, MarketingProfs, IDG Connect Marketer, TechTarget, and many others. He speaks frequently at regional and national conferences and has been interviewed on many national podcasts. He is LinkedIn member 58,795 (out of over 500 million), and also active on Facebook and Twitter.



TARA GRECO Marketing evangelist, angel investor.

Tara is a marketing evangelist and angel investor in start-ups including medtech, biotech, edtech, CPG, sustainability and women-led startups. She excels at leading organizations, building brands, min-

ing research for insights, and developing new platforms as she has for CoSlide, Care Academy, JFK Library Foundation, RoboSail, VoltreePower, Playrific, Bare Tree Media, Turbine (Warner Bros.), TJX, Stride Rite, Atari, Crayola, Mattel, Tyco Toys, and K'NEX. Tara enjoys leading teams and fostering a spirit of excellence. Tara holds an MBA in Marketing from Temple University and a BS in Business from Skidmore College.



KELLEY LYNN KASSA B2B Digital marketing executive

Kelley Lynn Kassa is an accomplished marketing executive who has worked with blue chip technology companies, publicly traded mid-sized organizations, and innovative startups. She focuses on designing and implementing integrated digital

campaigns that incorporate both outbound and inbound marketing tactics. Kelley has a passion for optimizing marketing automation platforms and email systems to create effective and engaging email marketing and nurture campaigns. She has extensive experience working with Marketo, Pardot, and HubSpot, along with prior experience with Eloqua and ExactTarget. Kelley combines email campaigns with blog content, keyword-optimized landing pages, engaging fulfillment pieces and targeted call-to-action campaigns for maximum results. Kelley has a B.S. in Mass Communications from Boston University.



Moderator

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.



Organizer:

HOWARD SHOLKIN, Principal, Sholkin Consulting

Howard has more than 40 years of journalism and marketing communication experience. In 2014, he formed Sholkin Consulting to deliver strategy and tactical marketing

services to influence an organization's prospects, grow its business, and elevate a firm's brand and its products and services. He joined International Data Group (IDG)—the world's leading technology media, event, and research company -- as director of corporate communications in 2003 providing PR support for Founder and Chairman Pat McGovern and subsidiaries. Sholkin was later promoted to a director's position for communication and marketing programs for the CEO of IDG Communications, the media and events subsidiary, and for the CEO of IDG Global Solutions.

FURTHER INFORMATION:

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.

LOCATION: Pivotal Labs, 255 Main St., 6th FL, Cambridge. This building is in Kendall Square, just a couple doors down from the Cambridge Marriott heading toward Boston.

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 or day of, you are welcome to register and pay at the door.

PARKING: The nearest parking garage is at One Broadway. The fee is \$10 after 5pm, you need to be out by 10pm.

Details at: <https://www.parkme.com/lot/115647/one-broadway-garage-cambridge-ma>



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Consultants Network – 6:30PM, Tuesday, 28 November

2018 Officer Election

We are approaching the end of the year and so must elect officers for 2018. On November 28, 6:30 PM, an election will be held at Ken's Steak House, 95 Worcester Rd. (Route 9), Framingham, MA 01701.

The declared candidates are
 Chairman: Frederick Beihold
 Vice-Chairman: Open
 Treasurer: Charlie Sweet
 Secretary: Open

Note that there are 2 positions for which there are no declared candidates. All C-Net members in good standing are eligible to vote or to run for any of these positions, contested or not. Please consider running.

The election will be followed by a free dinner where you can socialize with your fellow consultants. This will be our last event of 2017.

Hope to see you there.

Determining and Communicating Project Value Return on Investment (ROI)

ROI Value Modeling™ for Decision Making

Communicate Right, Reliable, and Responsible REAL ROI Business Cases

Date & Time: Wednesday, December 12; 8:30AM - 5:00PM (7.5 hours of instruction!)

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

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, December 6 , 2017**

Payment received by Nov. 29

IEEE Members	\$220
Non-members	\$245

Payment received after Nov. 29

IEEE Members	\$245
Non-members	\$265

<http://ieeeboston.org/determining-communicating-project-value-investment-roi>

Making You a Leader - Fast Track

Become the Leader You Want and Need

Date & Time: Monday, December 11; 8:30AM - 5:00PM (7.5 hours of instruction!)

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

Speaker: Robin Goldsmith, President, GoPro Management

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

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

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

PARTICIPANTS WILL LEARN:

- Leadership characteristics and practices that are essential for project and personal success.
- Differences between management and leadership, how they conflict, and why leaders are so rare.

- Behaviors leaders use to influence others, up and down, to want to do what the leader wants them to do
- Special techniques personal development clinics use to change lifetime learning and make leaders.
- How to employ those special techniques in a follow-on mini-clinic to develop the leadership skills they need to make their projects successful.

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

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

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, December 4, 2017**

Payment received by Nov. 27

IEEE Members	\$220
Non-members	\$245

Payment received after Nov. 27

IEEE Members	\$245
Non-members	\$265

<http://ieeeboston.org/making-leader-fast-track-become-leader-want-need/>



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2017 IEEE WIE USA EAST FORUM Call for Participation

November 30 – December 2, 2017 Baltimore, MD



Presentation Topics

- Mentoring the next generation of female leaders
- Strategies for increasing equity in power and decision making
- Women as leaders in education, industry, and government
- Development: communication skills in written and spoken word, effective dialog
- Cross-cultural aspects of leadership
- What it takes to be a great leader - qualities that all successful leaders share
- Shaping the future by female leaders
- Training vs inherent skills: can leadership be learned?
- Work-Life balance: family systems traditions and changes
- Leadership development for women: overcoming stereotypes
- The design, implementation, and evaluation of leadership from a structural perspective
- Helping girls and young women become leaders - motivating to empower, empowering to motivate
- Exploring the attrition gap - why do women leave the engineering field and what can be done to prevent it

Not a WIE member?

Our active community of female and male engineers is involved in career building, networking, and community outreach.

Join Now

Submission Deadline

Presentation topic abstract suitable for program (up to 150 words), and extended abstract for evaluation (up to 2 pages) due 24 July 2017.

For more information, visit:

<http://sites.ieee.org/wie-forum-usa-east/calls-for-participation/>



Deadline: extended to November 1, 2017!!!

Call for Papers and Posters

2018 IEEE International Symposium on Technologies for Homeland Security

2 – 3 May 2018 DoubleTree Hotel, Crystal City, VA
<http://ieee-hst.org/>

Sponsor:



Call for Papers & Posters

The 18th annual IEEE Symposium on Technologies for Homeland Security (HST '18), will be held 2 – 3 May 2018, in the greater Washington D.C. area. This symposium brings together innovators from leading academic, industry, businesses, Homeland Security Centers of Excellence, and government agencies to provide a forum to discuss ideas, concepts, and experimental results.

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

Secure Cyberspace

Enhance Biometrics & Forensics

Secure Land and Maritime Borders

Prevent Terrorism & Manage Incidents

We are currently seeking technical paper and poster session submissions in each of the areas noted above. Papers examining the feasibility of transition to practice will also be considered. *This year, papers focused on DHS high-priority technology gaps will be of particular interest.* All areas will cover the following common topics:

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

Contact Information

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

Important Dates

Paper Extended Abstract and Poster Abstract Deadline:	October 16, 2017
Paper, Poster Acceptance Notification	December 15, 2017
Final Paper Submission Deadline:	March 30, 2018

All deadlines are by midnight Eastern Time.

Organizing Committee

General Chairs:	James Flavin, MIT Lincoln Laboratory Jordan Feidler, MITRE
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Karen Panetta, Tufts University
Rich Moro, Raytheon
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Secure Cyberspace
Claire Applegarth, MITRE
Mark Peters, MITRE

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

- Software Testing
 - Unit-Level Testing
 - System-Level Testing
 - Code Coverage Tools
 - gcov
 - Automated Testing
 - Some Embedded Linux Test Recommendations
 - DebugFS
 - Configuring DebugFS
 - DebugFS Capabilities
 - Advanced Logging
 - LogFS
 - Using Logwatch and Swatch
 - Using syslogd and syslog-ng
 - Tracing
 - ptrace and strace

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

Kexec and Kdump

- Improving Boot Performance
- Boot Time Optimization
- The Linux Fastboot Capability
- Building a Smaller Linux
- Building a Smaller Application
- Filesystem Tips and Tricks
- Some Notes on Library Usage
- Improving Kernel Performance

Kernel Hacking

CONFIG_EMBEDDED

Configuring printk

Test Code

Configuring Kernel and IO Scheduling

Improving CPU Performance

Run Queue Statistics

Context Switches and Interrupts

CPU Utilization

Linux Performance Tools for CPU

Process-Specific CPU Performance Tools

Stupid Cache Tricks

Improving System Memory Performance

Memory Performance Statistics

Linux Performance Tools for Memory

Process-Specific Memory Performance Tools

More Stupid Cache Tricks

Improving I/O and Device Driver Performance

Disk, Flash and General File I/O

Improving Overall Performance Using the Compiler

Basic Compiler Optimizations

Architecture-Dependent and Independent Optimization

Code Modification Optimizations

Feedback Based Optimization

Application Resource Optimization

The Hazard of Trust

An Iterative Process for Optimization

Improving Development Efficiency

The Future of Linux Performance Tools

Some Final Recommendations

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

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

Software Development for Medical Device Manufacturers (Online Edition)

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

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

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

Module 1

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

Module 2

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

Module 3:

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

- Design Reviews

Module 4:

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

Speaker Bio:

Steven R. Rakitin has over 40 years experience as a software engineer including 25 years of experience in the medical device industry. He has worked with over 85 medical device manufacturers worldwide, from startups to Fortune 100 corporations. He has written several papers on medical device software risk management as well as a book titled: Software Verification & Validation for Practitioners and Managers.

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

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

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

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

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

Registration Fee: 150

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

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

Course chapters

1. Vector Basics
2. Dot Product

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

Instructor's Bio:

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

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

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

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

Registration Fee: 320

Course Description

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

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

Course Outline

Basics – Measurements
Business Model
Design Model (HW and SW)

HALT/RDT/Predictions
Manufacturing Model
Early Life Failures
Wear Out and Mid Life Crisis
Advanced Reliability

Course Objective

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

Instructor's Bio

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

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

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

Introduction to Embedded Linux

(Online Edition)

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

Course Summary:

This first of a 2-part series introduces the Linux Operating System and the use of Embedded Linux Distributions. The course focuses on the development and creation of applications in an Embedded Linux context using the Eclipse IDE. The first part of the course focuses on acquiring an understanding of the basic Linux Operating System, highlighting areas of concern for Embedded Linux applications development using Eclipse. The latter part covers the methods for booting Embedded Linux distributions including embedded cross-development and target board considerations.

Who Should Attend:

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

Course Objectives:

To provide a basic understanding of the Linux OS and the Eclipse IDE framework.

To gain an understanding of the complexities of Embedded Linux Distributions and their use in embedded systems.

To give students confidence to apply these concepts to their next Embedded Linux project

Hardware and Software Requirements

The student should have a working Linux desktop environment either directly installed or in a virtualization environment. The desktop Linux should have the GNU compiler and binary utilities (binutils) already installed. A working Eclipse C/C++ instal-

lation 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 Tlera, 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.

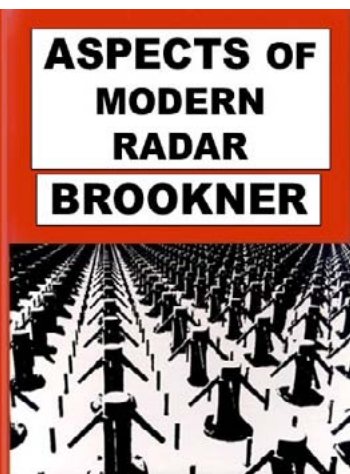
Last Notice Before Course Begins, Please Register Now!!!)

Radar Basics and Amazing Recent Advances

Date & Time: 6 – 9PM, Mondays, Nov. 6, 13, 20, Dec. 4, Jan. 8, 22, 29, Feb. 5
(If needed snow/makeup days Feb. 12, 26) (24 hours of instruction!)

Location: Location: MITRE Corporation, 202 Burlington Rd., Bedford, MA
(Rt 3, Exit 26 , 2.3 mi from Rt 128/95)

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



The following book plus over 15 paper reprints are provided FREE with your registration:

1. "Aspects of Modern Radar", Dr. Eli Brookner (Editor), Artech House, Hardcover, 432 pages, 1988, List price: \$159. The 1st chapter gives the best easy to read introduction to radar. It covers all aspects of radar: transmitters, receiver, antennas, signal processing, tracking, clutter derivation of radar equation in easy terms and definition of dB. The 2nd chapter gives detailed descriptions of different radar systems like: Cobra Dane, Pave Paws, BMEWS, Series 320 3D radar, OTH radars and dome antenna. The book has a catalog giving the detailed parameters for over 200 radars from around the world. The remaining chapters cover AEGIS SPY-1, Hybrid and MMIC circuits, ultra low sidelobe antennas (ULSA), mmw, radar cross section and Doppler weather radars. The material in the book is easy to access and as a result the text serves as a handy reference book.

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

This course is an updated version of the Radar Technology course given previously. Those who have taken the Radar Technology previously should find it worthwhile taking this revised version. New material includes latest on solid state devices and transmitters including GaN, SiC, SiGe; Breakthroughs in Radar — \$10 T/R module, Digital Beam Forming (DBF), Packaging, Disruptive Technology, Metamaterials, radar on a chip, 256 element phased array on a chip, Memristors, Graphene. Also covered are radar height-range coverage diagram using the powerful SPAWAR's AREPS program. AREPS

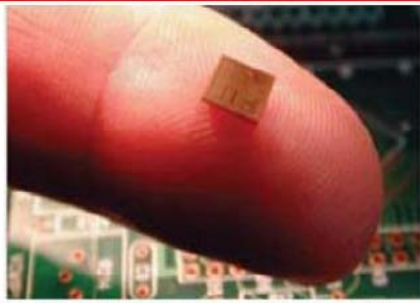
provides coverage for arbitrary propagation conditions (ducts [evaporation, surface, or elevated], subrefraction and superrefraction) and terrain conditions based on DTED map data. AREPS now accounts for surface roughness scattering and evaluates sea and land clutter backscatter versus range. Attendees will be told how to obtain AREPS FREE. Valued at over \$7,000. Also new is coverage of Anomalous Propagation and what to do about it. Finally also covered is the new Multiple-Input Multiple-Output (MIMO) explained in simple physical terms.

Updated course is framed around FREE book described above. Also given out free are supplementary notes consisting of copies of >800 slides plus over 15 paper reprints by Dr. Brookner.

For the beginner, basics such as the radar equation,

MTI (Moving Target Indicator), pulse doppler processing, antenna-scanning techniques, pulse compression, CFAR, RAC and SAW devices, dome antenna, CCDs, BBDs, SAW, SAW monolithic convolvers, microstrip antennas, ultra-low antenna sidelobes (<-40 dB), stacked beam and phased array systems, (1-D, 2-D, Limited Field of View [LFOV]), Moving Target Detection (MTD) are all explained in simple terms. For both the novice and experienced covered are tracking, prediction and smoothing in simple terms (mystery taken out of GH, GHK and Kalman filters); the latest developments and future trend in solid state, tube and digital processing technologies; synthetic aperture radar (SAR); Displaced Phase Center Antenna (DPCA); Space-Time Adaptive Processing (STAP); digital beam forming (DBF); Adaptive-Adaptive Array Processing for jammer suppression with orders of magnitude reduction in computation; RECENT AMAZING RADAR BREAKTHROUGHS

SINGLE CHIP 77GHz RADAR



(G. KLARI, ET AL., "SINGLE CHIP MM RADAR", MICROWAVE J., 1-14-15;
R. J. Evans et al., "Consumer Radar," *Int. Radar Conf.*, Adelaide, 9/2013, pp. 21-26)

Lecture 1, Nov. 6
FUNDAMENTALS OF Radar: Part 1: Very brief history of radar, major achievements since WWII: PHASED ARRAYS: Principles explained with COBRA DANE used as example. Near

and Far Field Defined, Phased Steering, Subarraying, Array Weighting, Monopulse, COBRA DANE slide tour (10 story building).

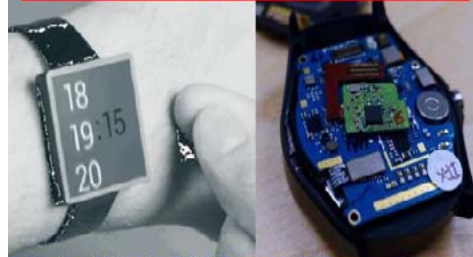
FUNDAMENTALS OF Radar: Radar equation derived. FREQUENCY TRADEOFFS: Search vs Track, Range and Doppler Ambiguities, Detection in Clutter. Blind Velocity region, range eclipsing, Environmental Factors, Dependence of clutter model on grazing angle and size radar resolution cell discussed, Weibull clutter, Polarization Choice.

Lecture 2, Nov. 13

FUNDAMENTALS of Radar: Part 2: Antenna Pattern Lobing in Elevation due to multipath, Detection of Low Flying Low Cross-Section targets, Ground Multipath Elevation Angle Error Problem and ways to cope with it, e.g., use of an even difference pattern Off-Axis Monopulse,

GOOGLE RADAR IN SMART WRIST WATCH

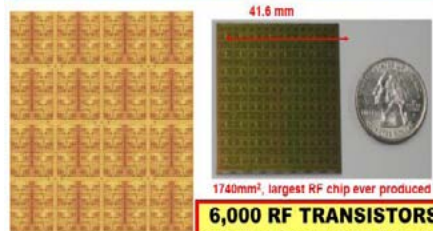
FITS ON PINKY TOE NAIL
4 ANTENNAS; 0.05W DC POWER



<http://spendergast.blogspot.com/2016/05/googles-project-soli-demos-mmwave-micro.html>
<http://www.theverge.com/2016/5/20/11720876/google-soli-smart-watch-radar-atap-io-2016>

surface-based ducts, evaporation ducts. Determination of radar coverage using new AREPS program. ANTENNA SCANNING SYSTEMS: Fixed Beam System: Wake Measurement Radar; 2-D Radars, 3-D Radars: Stacked Beam: Marconi Martello, Smart-L, SMART-ELLO, ARSR-4; 1-D Frequency Scanning: ITT Series 320; 1-D Phased Scanning: TPS-59, GE-592, RAT-31DL; Phased-Frequency Scanners: Raytheon Fire Finder and Plessey AR320.

256 (16X16) - ELEMENT SINGLE CHIP 60 GHZ TX/RX PHASED ARRAY



6,000 RF TRANSISTORS
100K FOR BIAS/CONTROL

S. ZINIR & G. M. REBEIZ, IEEE IMS, MAY, 2016

IEEE WSC: Millimeter-wave Systems

Lecture 3, Nov. 20

FUNDAMENTALS of Radar: Part 4: ULTRA LOW ANTENNA SIDELOBES (40 dB down or more). MOVING TARGET INDICATOR (MTI): Two-Pulse Canceller, Pulse Doppler Process-

ing; MOVING TARGET DETECTOR (MTD); Optimum Clutter Canceller, Space-Time Adaptive Processing (STAP), Airborne MTI (AMTI), Displaced Phase Center Antenna (DPCA).

Lecture 4, Dec. 4

SIGNAL PROCESSING: Part 1: What is PULSE COMPRESSION? Matched Filters; Chirp Waveform Defined; ANALOG PROCESSING: Surface Acoustic Wave (SAW) Devices: Reflective Array Compressor (RAC), Delay Lines, Bandpass Filters, Oscillators, Resonators;

Complex Monopulse, Two Frequency Radar Systems: Marconi L- and S-band S631, Signaal/Thales

(Holland), Flycatcher X and Ka System; Tube and Solid State OTH. PROPAGATION: standard, superrefraction, subrefraction,



USING TUBES \$35 STICK WOULD:

- COST \$130B (\$1/TUBE)
- REQUIRE 130 GW (1W/TUBE) OR 130 NUCLEAR POWER PLANTS
- WOULD STACK TO 9X DISTANCE TO THE MOON

ECHODYNE RADARS USING METAMATERIAL ARRAYS

MESA-D-DEV K-BAND RADAR: FACILITY/BORDER PROTECTION

RANGE >500M FOR MAN TARGET
± 60° AZ, ± 40° EL

MESA-DAA K-BAND RADAR: UAV DETECTION &

RANGE 3KM
± 60° AZ, ± 40° EL

(ECHODYNE WEB PAGE)

STEALTH DEFEATING QUANTUM RADAR

- MAKES USE OF QUANTUM ENTANGLEMENT
- DETECTION OF SINGLE PHOTON
- CAN BE USED TO DETECT CANCER CELLS
- ELECTRONICS TECHNOLOGY GROUP CORPORATION (CETC) OF CHINA
- TECHNOLOGY USED IN CHINA QUANTUM SATELLITE



[HTTPS://WWW.RT.COM/NEWS/358664-CHINA-QUANTUM-RADAR-TEST/](https://www.rt.com/news/358664-china-quantum-radar-test/)

IMCON Devices; Analog Programmable Monolithic SAW Convolver; BBD/CCD. What are they?

Lecture 5, Jan. 8

SIGNAL PROCESSING: Part 2: DIGITAL PROCESSING: Fast Fourier Transform (FFT); Butterfly, Pipeline and In-Place Computation

explained in simple terms; Maximum Entropy Method (MEM) Spectral Estimate; State-of-the-art of A/Ds, FPGAs and Memory; Signal Processor Architectures: Pipeline FFT, Distributed, Systolic; Digital Beam Forming (DBF). Future Trends.

Lecture 6, Jan. 22

SYNTHETIC APERTURE RADAR (SAR): Strip and Spotlight SAR explained in simple terms.

TUBES: Basics given of Magnetron, Cross Field Amplifiers, Klystrons, Traveling Wave Tubes, Gyro Tubes.

TREND TOWARD SOLID STATE PHASED-ARRAY TRANSMITTERS: Discrete All Solid State PAVE PAWS and BMEWS radars; advantages

over tube radars; MMIC (Monolithic Microwave Integrated Circuitry; integrated circuitry applied to microwave components): THAAD, SPY-3, IRIDIUM, XBR, JLENS. Solid State 'Bottle' Transmitters: ASR -11/ DARS, ASR-23SS, ASDE-X. Extreme MMIC.

Breakthroughs and Trends in Radar and Phased-Arrays: Radar on a chip, 258 element phased array on a chip, new revolutionary metamaterial for electronically scanned arrays and target stealthing, Moore's Law marches forward, quantum anti-stealth radar, you have heard of orthogonal H and V polarization which can double channel data rate, there are an infinite other polarizations called orbital angular momentum (OAM).

SS* AIR TRAFFIC CONTROL RADARS



*SS=SOLID STATE
**J. WANG,
E. BROOKNER,
RAYTHEON US PATENT
2009/0096662 A1



Lecture 7, Jan. 29

TRACKING, PRE-DICTION AND SMOOTHING: $\alpha\beta\gamma$ (GHK) Filter; Kalman Filter. All explained in simple physical terms.

Lecture 8, Feb. 5

HOW TO LOOK LIKE A GENIUS IN DE-

TECTION WITHOUT REALLY TRYING: Simple procedure for determining detection. Covered are beam shape, CFAR, mismatch losses.

The Following is Included in Your Registration:

	Value
Textbook	\$159
15 Reprints	\$300
Over 800 Vugraphs	\$120

Decision (Run/Cancel) Date for this Course is Friday, October 27, 2017

Payment received by October 24

IEEE Members	\$300
Non-members	\$340

Payment received after October 24

IEEE Members	\$340
Non-members	\$370

Practical RF PCB Design: Wireless Networks, Products and Telecommunications

Date & Time: Thursday & Friday, December 14 & 15; 9AM - 4:30PM
(13 hours of instruction!)

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

Speaker: Henry Lau, Lexiwave Technology

Overview: One of the most demanding consumer products in the market is the wireless telecommunication product. A well-designed Radio Frequency Printed Circuit Board (RF PCB) contributes significantly to the success of any wireless product as the layout of the PCB greatly affects the performance, stability and reliability of the product. In today's highly competitive wireless products market with increasingly compressed development time-frame, there is a strong demand for RF professionals who possess the knowledge and experience to design top-performing RF PCBs in less number of iterations. What matters is whether your level of competence is up to the required standard to meet such demand.

Audience: RF Designers, Wireless Product Designers, Field Application Engineers, Design Managers and related professionals.

Benefits: This course aims to provide participants with an insightful training on RF PCB design from a practical, industrial perspective. Participants will be led through a systematic, theoretical presentation with case studies on commercial products in the training. The course will be conducted by an RF expert with rich industrial experience. It is suitable for RF professionals who want to keep up-to-date their skills and knowledge in RF PCB design and stay competitive.

OUTLINE

1. Printed circuit board design for RF circuits

From product design, circuit design to PCB design
Layer stack-up assignment
Grounding methods and techniques
Interconnects and I/O
Bypassing and decoupling
Partitioning methods

2. Printed circuits board design for other circuits

Clock circuits
Base-band circuits
Audio circuits
Power supplies
Impedance-controlled circuits

3. PCB design for EMC/EMI compliance

EMC/EMI compliance
Grounding methods
Decoupling methods
Shielding methods

4. Additional Design Techniques

Production concerns
Systematic product design approach
RF Modules
Evaluation boards
Other RF concerns
Casing design

5. Case studies

Expertise:

Henry Lau received his M.Sc. and MBA degrees from UK and USA respectively. He has more than 25 years of experience in designing RF systems, products and RFICs in both Hong Kong and US. He worked for Motorola and Conexant in US as Principal Engineer on developing RFICs for cellular phone and silicon tuner applications. Mr Lau holds five patents all in RF designs. He is currently running Lexiwave Technology, a fables semiconductor company in Hong Kong and US designing and selling RFICs, RF modules and RF solutions. He has also been teaching numerous RF-related courses internationally.

*notes, lunch and coffee breaks
included with registration*

**Decision (Run/Cancel) Date for this Courses is
Monday, December 4, 2017**

Payment received by November 29

IEEE Members	\$405
Non-members	\$435

Payment received after November 29

IEEE Members	\$435
Non-members	\$455

<http://ieeeboston.org/practical-rf-pcb-design-wireless-networks-products-telecommunications-fall-2017>

Call for Course Speakers/Organizers

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

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

The Boston Section is one of the largest and most technically divers sections of the IEEE. We have over 20 active chapters and affinity groups.

If you have an expertise that you feel might be of interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is

<http://ieeeboston.org/course-proposals/>

Alternatively, you may contact the IEEE Boston Section office at ieeebostonsection@gmail.com or 781 245 5405.

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

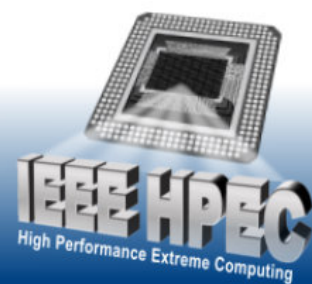
CALL FOR PAPERS



2018 IEEE High Performance Extreme Computing Conference (HPEC '18)

Twenty-second Annual HPEC Conference

25 - 28 September 2018
Westin Hotel, Waltham, MA USA



www.ieee-hpec.org

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The IEEE High Performance Extreme Computing Conference (HPEC '18) will be held in the Greater Boston Area, Massachusetts, USA on 25 – 28 September 2018. The HPEC charter is to be the premier conference in the world on the confluence of HPC and Embedded Computing.

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

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

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:

Submission Deadline: **May 18, 2018**
Notification of Acceptance: **July 1, 2018**
Camera Ready Deadline: **August 1, 2018**

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.

Advanced Embedded Linux Optimization

Time & Date: 6 - 9PM, Mondays, Jan. 8, 15, 22 & 29, 2018 (12 hours of instruction!)

Location: Woburn, MA area near to Rt. 95/128

Speaker: Mike McCullough, RTETC, LLC

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

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

Course Objectives

- To understand 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.

Course Schedule Day 1

Getting Started with Embedded Linux
 Embedded Linux Training Overview
 Terminology
 Linux Versioning
 The GPL
 Building the Kernel Source Code
 Embedded Linux Kernels
 BSPs and SDKs
 Linux References (Books and Online)
 A Development Cycle Focused on Performance
 A Basic Optimization Process
Basic Debugging Review
 Embedded Applications Debug
 GDB, GDB Server and the GDB Server Debugger
 Other Debuggers
 An Eclipse Remote Debug Example
 Debugging with printk, syslog, syslogd and LTTng
System-Level Debug
 System-Level Debug Tools
 The /proc and /sys Filesystems
 Basic Logging
 KDB and KGDB
 Crash Dumps and Post-Mortem Debugging
Debugging Embedded Linux Systems
 Backend Debuggers
 In-Circuit Emulators
 Hardware Simulators
 Analyzers

Course Schedule Day 2

Requirements Development

Performance Requirements
Derived Requirements
Testability and Traceability
Reviewing Requirements
 Designing for Performance
Design for Test (DFT)
Agile Software Design
Software and Linux Decomposition
Memory Management
CPU and OS Partitioning
Design Reviews
 Coding for Performance
Coding Standards and Consistency
Languages, Libraries and Open Source
Components
Learning Magic Numbers
Letting Compilers Work For You
Global, Static and Local Variables
Code Reviews

 Software Testing
Unit-Level Testing
System-Level Testing
Code Coverage Tools
gcov
Automated Testing
Some Embedded Linux Test Recommendations
 DebugFS
Configuring DebugFS
DebugFS Capabilities
 Advanced Logging
LogFS
Using Logwatch and Swatch
Using syslogd and syslog-ng
 Tracing
ptrace and strace
New Tracing Methods
SystemTap
Ftrace, Tracepoints and Event Tracing
Tracehooks and utrace
 Profiling
Basic Profiling
gprof and Oprofile
Performance Counters
LTTng

Another DDD Example
 Manual Profiling
Instrumenting Code
Output Profiling
Timestamping

Course Schedule Day 3

Addressing Performance Problems
Types of Performance Problems
Using Performance Tools to Find Areas for
Improvement
Application and System Optimization
CPU Usage Optimization
Memory Usage Optimization
Disk I/O and Filesystem Usage Optimization
 Measuring Embedded Linux Performance
Some Ideas on Performance Measurement
Common Considerations
Uncommon Considerations
Using JTAG Methods
BootLoader Measurements
Boot Time Measurements
 The Perf Tool
Origins of Perf
The Perf Framework
Perf Commands and Using Perf
Listing Events
Counting Events
Profiling with Perf
Static Tracing with Perf
Dynamic Tracing with Perf
Perf Reporting
 Performance Tool Assistance
Recording Commands and Performance
System Error Messages and Event Logging
Dynamic Probes
Jprobes and Return Probes
Kernel Probes
Kexec and Kdump
 Improving Boot Performance
Boot Time Optimization
The Linux Fastboot Capability
Building a Smaller Linux
Building a Smaller Application
Filesystem Tips and Tricks

Some Notes on Library Usage

Course Schedule Day 4Improving 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 theCompiler

Basic Compiler Optimizations

Architecture-Dependent and Independent Optimization

Code Modification Optimizations

Feedback Based Optimization

Application Resource Optimization

The Hazard of Trust

An Iterative Process for Optimization

Improving Development Efficiency

The Future of Linux Performance Tools

Some Final Recommendations

Lecturer – 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 Thursday, December 28, 2017

Payment received by December 26**IEEE Members \$395****Non-members \$415****Payment received after December 26****IEEE Members \$415****Non-members \$435**

<http://ieeeboston.org/advanced-embedded-linux-optimization-2>

IEEE Boston Section Social Media Links:**Twitter:** <https://twitter.com/ieeeboston>**Facebook:** <https://www.facebook.com/IEEEBoston>**YouTube:** <https://www.youtube.com/user/IEEEBostonSection>**Google+:** <https://plus.google.com/107894868975229024384/>**LinkedIn:** <https://www.linkedin.com/groups/IEEE-Boston-Section-3763694/about>

Embedded Linux Board Support Packages and Device Drivers

Date & Time: 6 - 9PM; Mondays, Nov. 13, 27, Dec. 4, 11 & 18 (15 hours of instruction!)

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

Speaker: Mike McCullough, RTETC, LLC

Course Summary - This 5-day technical training 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.

Course Schedule Day 1

Getting Started with Embedded Linux

Embedded Linux Training Overview
Linux Terminology, History and the GPL
Building the Kernel Source Code
Embedded Linux Kernels
BSPs and SDKs
Linux References (Books and Online)
BSP Requirements
U-Boot and Bootloader Development

Embedded Linux BSP Development Basics

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

Embedded Linux SDK Basics

The 3 Pieces of an SDK
Embedded Linux Distributions and the GNU Compiler Collection (GCC)
Other Embedded Linux Development Tools

Library Support, Glibc and Alternatives
SDK Deployment and Support

Course Schedule Day 2

Debugging

GDB, GDB Server and the GDB Server Debugger
Other Debug and Test Tools
An Eclipse Remote Debug Example
Advanced Debug with printk and syslogd

System-Level Debug

System-Level Debug Tools
The /proc and sys Filesystems
Advanced Logging Methods
KGDB and KDB
Crash Dumps

Debugging Embedded Linux Systems

Configuring Embedded Linux

Config Methods
Config Syntax
Adding Code to the Linux Kernel

Bootting Embedded Linux

Processor Startup
Initial Functions
The initcalls
Using __init Functions
NFS Booting

Root File Systems

RAMdisk Booting with initrd
RAMdisk Booting with initramfs
initrd vs initramfs
Root File System Development
Busybox Development
Building a RAMdisk for an initrd
Building a RAMdisk for an initramfs
Flash File System Development

Course Schedule Day 3

Testing and Debug of Embedded Linux BSPs

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

Measuring Embedded Linux BSP Performance

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

The Original UNIX Device Driver Model

The fops and file structs
The inode and dentry structs
Major and Minor Numbers
Embedding Channel Information
Deferring Work
The /proc Filesystem
Configuring the Device Driver
A Simulated Device Driver
Modularization Revisited

Course Schedule Day 4

The Evolution of a New Driver Model

The Initial Object-Oriented Approach
Platform Devices and Drivers
A Generic Subsystem Model

The Generic Subsystem Model in Detail

Subsystem Registration
The Probe and Init Functions
The Show and Store Functions
User Access via the /sys Filesystem
Configuring the New Device Driver

The udev Linux Application

Comparing the Two Driver Models

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

Hybrid Device Drivers

Other fops Functions
 The Need for ioctl

Linux Device Driver Subsystems

Direct Connect Device Drivers
 Serial/Console Drivers, I2C & SPI
 Real-Time Clocks and Watchdogs
 GPIO and the Pinmux
 Flash MTDs and Direct Memory Access
 USB, Power and CPU Management
 Video and Audio
 PCI and VME
 Block Devices
 RAMdisk and Flash Filesystems
 MMCs and SD Cards

Network Device Drivers

MAC and PHY Device Drivers
 net_device and net_device_stats
 Network Device Initialization
 Device Discovery and Dynamic Initialization
 Network Interface Registration
 Network Interface Service Functions
 Receiving and Transmitting Packets
 Notifier Chains and Device Status Notification

Course Schedule Day 5Unwired 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

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 Course is
 Friday, November 3, 2017**

Payment received by November 1

IEEE Members	\$450
Non-members	\$490

Payment received after November 1

IEEE Members	\$490
Non-members	\$525

Writing Agile User Story and Acceptance Test Requirements -

Cut Creep Overruns, Disappointment, and Embarrassment

Date & Time: Tuesday, December 12; 8:30AM - 5:00PM (7.5 hours of instruction!)

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

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

**REQUIREMENTS ARE REQUIREMENTS—
OR MAYBE NOT**

User stories are backlog items, features
 Chicken and egg relation to use cases
 Issues and inconsistencies
 Business vs. product/system requirements
 “Levels Model” of requirements
 Other mistaken presumptions
 Requirements overview
 Where user stories should fit, do fit instead
 Conversation conundrum

WRITING MORE SUITABLE USER STORIES

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

AND USER STORY ACCEPTANCE TESTS

Missed and unclear criteria
 Turning criteria into tests, issues
 How many tests are really needed
 Test design techniques
 Checklists and guidelines
 Decision trees, decision tables
 Boundary testing
 Testing is main means to control risk

Defects and new user stories
 Testing that user story focus misses
 Reactive vs. proactive risk analysis
 Given, when, then format

Exercise: Write User Story Acceptance Criteria

Exercise: Design their Tests

Exercise: Review Your User Stories/Tests

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

**Decision (Run/Cancel) Date for this Courses is
 Tuesday, December 5, 2017**

Payment received by Nov. 28

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<http://ieeeboston.org/writing-agile-user-story-acceptance-test-requirements-2>



Risk Management Methods for Test Projects

Make Sure the Most Important Testing Is Done in Limited Available Time

Date & Time: Thursday, December 14; 8:30AM - 5:00PM (7.5 hours of instruction!)

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

Speaker: Robin Goldsmith, President, GoPro Management

Testing is our primary means of reducing risks related to systems and software. All testing is risk-based in that there are more potential tests than we have time and resources to run, so we choose those that address higher risks. The difficulty is adequately identifying the potential risks, for which a number of structured techniques are described. Risk management involves obtaining, directing, and controlling resources for continuously planning, strategizing, identifying, analyzing, prioritizing, preventing, responding to, mitigating, monitoring, controlling, and reporting risk. Key types of risks and identification approaches are distinguished. Powerful Proactive Testing™ techniques are demonstrated that enhance conventional reactive testing risk analysis to enable testing higher risks not only more but earlier. Exercises aid learning by allowing participants to practice applying practical methods to realistic examples.

Participants will learn:

- The elements of risk and risk response, and their relation to software development and testing.
- Importance of distinguishing business, management, functional, and technical risk causes and effects.
- Alternative methods for identifying, analyzing, classifying, and prioritizing the several types of risks.
- Proactive Testing™ methods that enhance conventional reactive testing risk identification, response.
- Monitoring, evaluating, adjusting, and reporting on risk activities, findings, and results.

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

1 NATURE AND IMPORTANCE OF RISK

Murphy's Law; O'Brien's Law
 Relation of risk to software and testing
 Classical risk management
 Impact and probability risk elements
 Classical risk mitigation, contingency plans
 Costs, ease of detecting, controlling vs. harm
 Quantifying qualitative risk, tricks and traps
 Types, classifications of risks
 Threats, vulnerabilities, triggers
 Risk identification analysis methods
 Business, functional, and operational risks
 Direct and indirect forms of injury
 Management and technical risks
 Effects vs. causes risk identification
 Monitoring, controlling, reporting risks

2 PROJECT MANAGEMENT RISKS

Most frequently encountered risks
 Changing requirements and scope creep
 Lack of management support, priorities
 Typically unrecognized interrelationships
 Features/quality, resources, schedule risks
 Software risks—or just poor management
 Sizing implications for software QA/testing
 Traditional checklists for project managers
 Evaluating risk factor checklists usefulness
 Software risk taxonomy
 Monitoring and managing risk as a project

3 CONVENTIONAL RISK ANALYSIS

Testing riskier features, components more
 Costs, additional testing resources vs. fixed
 System, development practices checklists
 Design analysis vs. prioritizing test cases
 Common subjective risk judgment methods
 Rating vs. ranking, setting objective criteria
 Reporting, gaining agreement on risks

Differentiating user and technical views
 Risk analysis in test designs and test cases
 Risks of not testing some things
 Metrics to monitor effectiveness, efficiency
 Anticipating and measuring operational risks
 Risk management roles and responsibilities
 Reporting risk status, expected and actual
 Categorizing actuals, improving over time

4 PROACTIVE RISK-BASED TESTING

Why typical risk-based testing is reactive
 Proactive Testing™ Life Cycle
 Structured model of test planning
 Multiple levels, points of risk analysis
 Prioritization demands knowing the choices
 Project-level proactive risk analysis
 Identifying overlooked project-specific risks
 Refocusing on tests that reduce the key risks
 Letting testing drive development
 Gaining user, manager, developer support
 Identifying and analyzing lower-level risks

**Decision (Run/Cancel) Date for this Courses is
 Thursday, December 7, 2017**

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<http://ieeeboston.org/risk-management-methods-test-projects/>

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

Developing Reusable Test Designs

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

Date & Time: Friday, December 15; 8:30AM - 5:00PM (7.5 hours of instruction!)

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

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

Participants will learn:

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

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

PROACTIVE TEST DESIGN BENEFITS

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

IDENTIFYING NEEDED TEST DESIGNS

Functional (black box) testing
 Three-level approach to functional testing
 Keys for thoroughness
 Breaking down to manageable pieces
 Functionality Matrix technique
 Use case perspective
 Technical software actions
 Test design specifications that are needed

DESIGNING TESTS MORE THOROUGHLY

How designing adds thoroughness
 Traditional test design still misses a lot
 Focused brainstorming for a better start
 Checklists and guidelines to fill the gaps

Tests based on data formats
 Coverage of data and process models
 Decision trees and tables
 Concerns common to all types of testing
 Equivalence classes and partitioning
 Ranges and boundary testing
 GUI and navigation issues
 Often-overlooked other dimensions to test
 Formal/informal test design specifications
 Extracting the reusable elements
 Enhancing with system-specific tests
 Link to driving effective automated tests

Other essential test case component
 Finding and creating test data
 Test script and matrix formats
 Simple and sophisticated automation

**Decision (Run/Cancel) Date for this Courses is
 Friday, December 8, 2017**

Payment received by Dec. 1

IEEE Members \$220

Non-members \$245

Payment received after Dec. 1

IEEE Members \$245

Non-members \$265

SPECIFYING (REUSABLE) TEST CASES

Translating test designs into test cases
 Selecting scaled subset based on risk
 Reusable test case specifications

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

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.