

BOSTON



THE REFLECTOR

ISSUE #4
APRIL 2018

HOMELAND SECURITY
SYMPOSIUM -
CALL FOR PAPERS;

P.19

2019 IEEE PHASED
ARRAY SYMPOSIUM
CALL FOR PAPERS

P.20

ONLINE
COURSE
LISTING

P.54

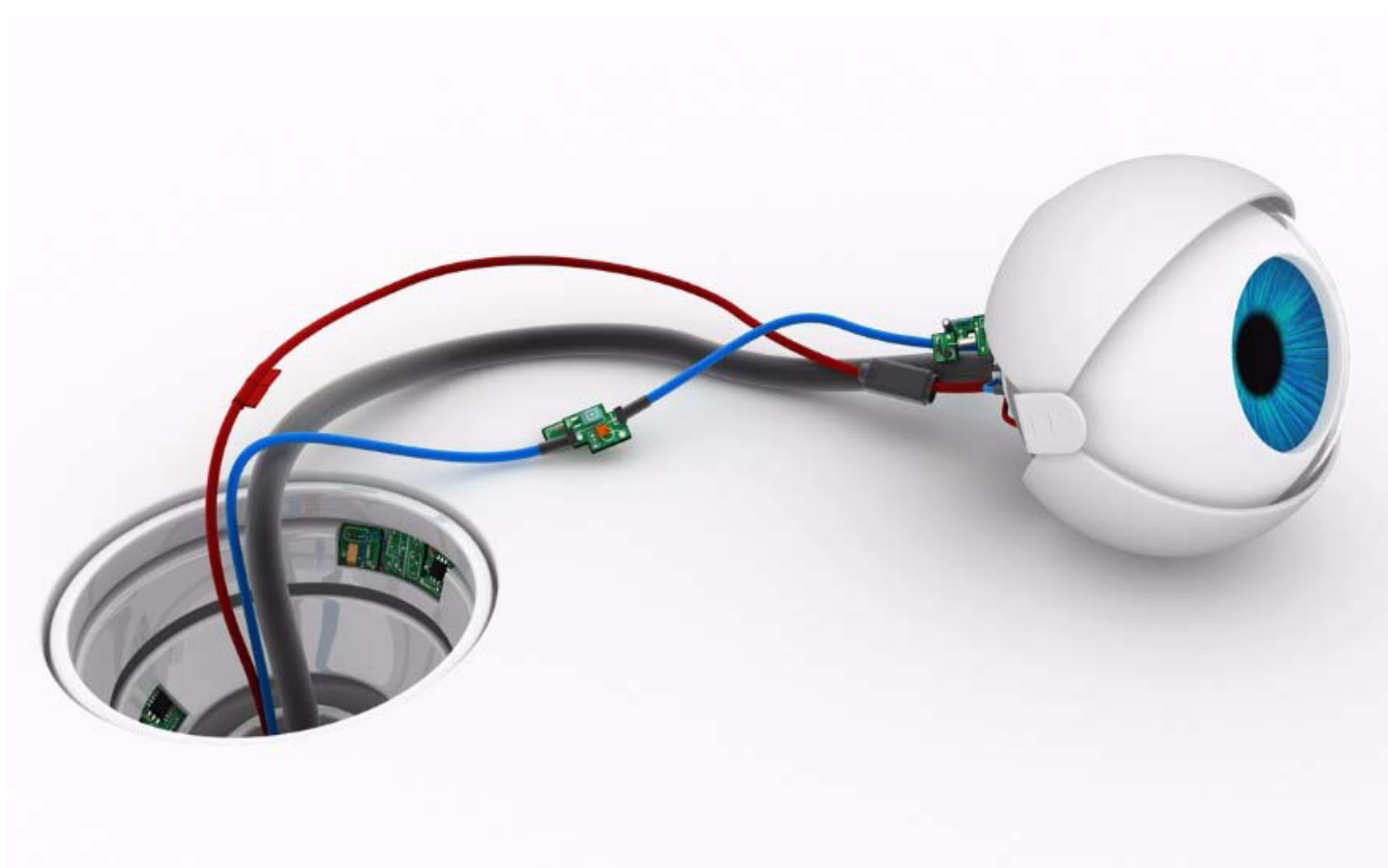


TABLE OF CONTENTS

Editorial: "Drones...<CORRECTION> GDPR", by Kevin Flavin, Electronics Communications Team Chair.....	Page 3	Making You a Leader - Fast Track!	Page 23
Spring Course Flyer	Page 5	Proactive User Acceptance Testing	Page 25
Microwave Theory & Techniques Society ..	Page 6	Writing Agile User Story and Acceptance Test Requirements	Page 27
Entrepreneurs' Network	Page 8	Developing Reusable Test Designs	Page 29
Antennas & Propagation, Microwave Theory & Techniques, Photonics, Electron Devices, Geoscience & Remote Sensing, and Communications Societies	Page 10	Software Development for Medical Device Manufacturers	Page 31
Computer Society	Page 11	Embedded Linux Board Support Packages and Device Drivers	Page 33
Photonics Society	Page 12	Fundamentals of Real-Time Operating Systems (online course)	Page 36
Life Members	Page 13	Embedded Linux Board Support Packages and Device Drivers (online course)	Page 39
Call for Course Speakers/Organizers	Page 13	Embedded Linux Optimization: Tools and Techniques (online course)	Page 42
Reliability Society	Page 14	Software Development for Medical Device Manufacturers (online course)	Page 45
Entrepreneurs' Network	Page 15	Fundamental Mathematics Concepts Relating to Electromagnetics (online course)	Page 46
Call for Articles	Page 16	Reliability Engineering for the Business World (online course)	Page 47
Consultants' Network	Page 17	Introduction to Embedded Linux (online course)	Page 48
2018 IEEE/MIT Undergraduate Technology Research Conference	Page 18	Design Thinking for today's Technical Work	Page 50
2018 IEEE International Symposium on Technologies for Homeland Security (HST), Call for Papers	Page 19	2018 IEEE High Performance Extreme Computing Conference (HPEC) Call for Papers	Page 52
2019 IEEE International Symposium on Phased Array Systems and Technology - Call for Papers	Page 20	IEEE Boston Section Online Course Listing	Page 54
Determining and Communicating Project Value Return on Investment (ROI)	Page 21		



Drones....<CORRECTION> GDPR

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

Amazon has patented Gesture-Recognizing Drones, humans will be able to 'flag-down' a drone.

Inspection Drones can detect unmarked Gas Wells for PA Highway Project.

What began as an article about drones this month has changed to something more pressing and a much greater impact. Not only for large companies, but probably more substantively for smaller companies and organizations.

Originally we had scheduled an article about drones, and the impact across the industry.

However, with less than 60 days until GDPR or General Data Protection Regulation (EU 2016/679) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=cele-x%3A32016R0679>) becomes effective, the priority of the editorial shifted to this topic.

The European Commission (EU) recently passed legislation in 2016, that becomes effective on 25 May 2018, regulating the processing of personal data relating to individuals in the EU by an individual, company, or organization.

This regulation covers the communication between EU citizens and you, or your company, or your organization, with the exception of 'household use'. It's important to note that the EU Commission's website describes the 'household use' as your address book and invitations sent for a dinner party, for example. Unless you are on that level of familiarity with everyone in your address book or email list, then there is some work for you to do.

While on the surface it seems as though these guidelines only apply to individuals from the EU, it is critical to note that EU nationals are covered by this regulation while they are working or traveling abroad, regardless of the location of their work or whom they work for.

The ramifications of GDPR are, therefore, global. An article in Forbes reports that more than \$7.8 billion USD will be spent to become compliant. Generally, companies and organizations are going to apply the same rules to all the personal data because it will be too difficult to cull out just the EU application portions. Hence, North American, Asian, South American, African, etc will most likely see the same forms, and terms and privacy statements as the EU nationals are served.

The penalty for failure is up to 4% of annual global turnover, or 20 million euro, whichever is greater. Further, even if your records 'are not in order as defined by article 28, the penalty is up to 2% of annual global turnover. For the non-accounting set, turnover is revenue, before expenses.

As a person signing up for a newsletter or notification from a website, basically, each communication you receive from then on will involve multiple 'opt-ins' and notifications of terms that you will need to agree to.

Why did the EU do this?

From my personal opinion, I am not surprised, but I am surprised at how quickly they acted. Data vulnerability is a problem. Considering the revelations this week about Cambridge Analytica and Facebook, I don't think it's a master leap to see that this sort of protection is desperately needed for the common citizenry. Let's not

forget the Equifax breaches, and also this week, the Orbitz travel site's credit card exposures.

So, break down the winners and losers of this new law.

1. Companies and organizations

Pain: If we assume that all legal-minded and legitimate businesses adhere to the spirit of the law, then they will have spent a lot of money to keep the current relationships that they have nurtured over the years, or at least bought from an email list vendor.

Gain: However, marketers should see an increase in efficiency related to the new laws. Think about this, of those potential customers that don't 'opt-in' to the new communication, those subscribers were just 'noise' to the real engagement between your customers and you. The remaining potentials on your email lists, for example, will be high-probability potentials, and your costs per new sale should be lower.

2. Dear Reader, or Common Citizenry, beyond just EU nationals

Pain: the incessant clicking and reading of terms to opt back into an email list that you want, love, and need. It's going to be a hassle, especially since we've become accustomed to waving our phone over a device to pay for things, or looking at the phone for it to turn on. Life is going to sloooow down. Except for the illegal spammers (see below).

Gain: fewer worries about lost information. Schadenfreude from the penalties that sloppy and careless organizations will need to pay for not taking care of 'their house'. Hopefully, you don't also fall into this category. Probably most importantly, a cleaner email inbox.

3. Direct mail companies

Pain: Reminding organizations that mail is still a thing, and its viable.

Gain: Validation that direct mail is still a thing, with few competitors, and amazing knowledge about the customer demographics.

4. Spammers

Pain: closing the local offices in the EU, or any western country for risk of getting caught.

Gain: fewer competitors from the local EU. Since the spammers can hide 'offshore' and spoof their email domains, etc. They won't care about getting penalized because they will never pay the penalty and will be gone before the first hint of an investigation.

Sure, there are many more winners and losers in this scenario. I haven't touched on the consulting firms that will assist organizations, they will win as they work with and help their clients to adapt. However, the clients, the organizations that will need to adhere to the new rules will also win. They should be less breaches, with more controls over information because of this regulation, the weaker organizations will be penalized and will disappear as they lose clients to the better prepared organizations.

Regulations tend to be pretty good for an open capitalist society. Regulations lay down the rules, creating boundaries within which to compete. But this discussion is for another day. Today is not that day. Today we prepare for May 25th. Go!



The Institute of Electrical and Electronics Engineers, Inc.

Spring 2018 Professional Development and Education Program

www.ieeeboston.org

Phased-Array and Adaptive-Array

Fundamentals and their Recent Advances

Dates and Time: Eight Monday Evenings,
March, 19, 26, April 2, 9, 30, May 7, 14, 21
(Snow/make-up dates) June 4 or 11
6:00PM - 9:00PM

MITRE Corporation, Bedford, MA

Fundamentals of Real-Time Operating Systems

Dates and Time: Mondays, March 19, 26, April 2, 9
6:00PM - 9:00PM

More Digital Signal Processing for Wireless Communications

Dates and Time: Wednesdays, March 28, April 4, 11, 18 and 25
6:00PM - 9:00PM

Software Development for Medical Device Manufacturers

Dates and Time: Wednesday, April 11 and Thursday, April 12
8:30AM - 4:30PM

Embedded Linux BSPs and Device Drivers

Dates and Time: Mondays, April 16, 23, 30 and May 7
6:00PM - 9:00PM

Making You A Leader Fast Track - Become the Leader You Want and Need

Date and Time: Monday, June 18
8:30AM - 5:00PM

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

Date and Time: Tuesday, June 19
8:30AM - 5:00PM

Determining and Communicating Project Value Return On Investment (ROI) - Communicate Right, Reliable, and Responsible REAL ROI Business Cases

Date and Time: Wednesday, June 20
8:30AM - 5:00PM

Proactive User Acceptance Testing - Confident Competence - The Testing Users Need to Be Confident the Software they Depend on Works

Date and Time: Thursday, June 21
8:30AM - 5:00PM

Developing Reusable Test Designs - Be an Instant Expert-Run More, and More Thorough, Tests in Less Time

Date and Time: Friday, June 22
8:30AM - 5:00PM

Online Courses

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

- Verilog 101: Verilog Foundations
- Systems Verilog 101 (SV101) Design Construct
- Systems Verilog 102 (SV102) Verification Constructs
 - High Performance Project Management
 - Introduction to Embedded Linux
- (Discounts available if register for all three Verilog Courses)
- Software Development for Medical Device Manufacturers
 - Reliability Engineering for the Business World
- Fundamental Mathematical Concepts Relating to Electromagnetics
 - Embedded Linux Optimization
 - Embedded Linux BSPs and Device Drivers
 - Design Thinking for Technical Work

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

Microwave Theory and Techniques Society, 6:00PM, Monday, 2 April

Automotive Radar – A Signal Processing Perspective on Current Technology and Future Systems

Speaker: Dr. Markus Gardill, InnoSenT GmbH (IEEE MTT Distinguished Microwave Lecturer)



*We will also be holding MTT-S chapter officer elections at this meeting. Please contact Chris Galbraith (galbraith@ieee.org) if you are interested in volunteering for a position on the chapter's executive committee.

Radar systems are a key technology of modern vehicle safety & comfort systems. Without doubt it will only be the symbiosis of Radar, Lidar and camera-based sensor systems which can enable advanced autonomous driving functions soon. Several next generation car models are such announced to have more than 10 radar sensors per vehicle, allowing for the generation of a radar-based 360° surround view necessary for advanced driver assistance as well as semi-autonomous operation. Hence the demand from the automotive industry for high-precision, multi-functional radar systems is higher than ever before, and the increased requirements on functionality and sensor capabilities lead to research and development activities in the field of automotive radar systems in both industry and academic worlds.

Current automotive radar technology is almost exclusively based on the principle of frequency-modulated continuous-wave (FMCW) radar, which has been well known for several decades. However, together with an increase of hardware capabilities such as higher carrier frequencies, modulation bandwidths and ramp slopes, as well as a scaling up of simultaneously utilized transmit and receive channels with independent modulation features, new degrees of freedom have been added to traditional FMCW radar system design and signal processing. The anticipated presentation will accordingly introduce the topic with a review on the fundamentals of radar and FMCW radar. After introducing the system architecture of traditional and modern automotive FMCW

radar sensors, with e.g. insights into the concepts of distributed or centralized processing and sensor data fusion, the presentation will dive into the details of fast-chirp FMCW processing – the modulation mode which is used by the vast majority of current automotive FMCW radar systems. Starting with the fundamentals of target range and velocity estimation based on the radar data matrix, the spatial dimension available using modern single-input multiple-output (SIMO) and multiple-input multiple-output (MIMO) radar systems will be introduced and radar processing based on the radar data cube or higher-dimension radar-data tensors is discussed. Of interest is the topic of angular resolution – one of the key drawbacks which e.g. render Lidar systems superior to radar in some situations. Consequently, traditional and modern methods for direction of arrival estimation in FMCW radar systems are presented, starting from traditional monopulse-like algorithms to modern sparse reconstruction techniques. Besides other topics such as blindness, rain & snow and near-field detection the presentation will then introduce the great challenge of FMCW radar system interference. While FMCW radar interference is a challenge which can be handled using adaptive signal processing in today's systems, it will become a severe problem with the increasing number of radar-sensors equipped vehicles in dense traffic situations in the near future and a solution to the expected increase in interference is still an open question.

It is this problem of interference, together with some added functionality, which motivated the proposal of alternative radar waveforms such as pseudo-random or orthogonal-frequency division multiplexing (OFDM) radar for automotive radar systems. Although not yet of great interest from an industrial perspective, the fundamentals and capabilities of both technologies will be introduced in the remainder of the anticipated presentation.

Markus Gardill (S'11-M'15) was born in Bamberg, Germany in 1985. He received the Dipl.-Ing. and Dr.-Ing. degree in systems of information and multimedia technology/electrical engineering from the Friedrich-Alexander-University Erlangen-Nürnberg, Germany, in 2010 and 2015, respectively.

In 2010, he joined the Institute for Electronics Engineering at the Friedrich-Alexander-University Erlangen-Nürnberg as a research assistant and teaching fellow. From 2014 to 2015 he was head of the team Radio Communication Technology. In late 2015 he joined the Robert Bosch GmbH as an R&D engineer for optical and imaging metrology systems and leading the cluster of non-destructive testing for the international production network. In 2016 he joined InnoSenT GmbH as Senior Software Developer for automotive radar signal processing algorithms.

During his affiliation with the Institute for Electronics Engineering he taught Circuits & Systems for Communication, Digital Electronic Systems, Programmable Electronic Systems, and Wireless Automotive Electronics. He currently is lecturer for Wireless Automotive Electronics at the Friedrich-Alexander University Erlangen-Nürnberg.

His main research interest includes radar and communication systems, antenna (array) design, and signal processing algorithms. His particular interest is spatio-temporal processing such as e.g. beamforming and direction-of-arrival estimation with a focus on combining the worlds of signal processing and microwave/electromagnetics.

Dr. Gardill is a member of the IEEE Microwave Theory and Techniques Society (IEEE MTT-S) and serves as a member of the IEEE MTT-S Technical Coordinating Committee Digital Signal Processing (MTT-9). He regularly acts as reviewer and TPRC member for several journals and conferences. He is selected as Distinguished Microwave Lecturer (DML) for the DML term 2018-2020 with a presentation focusing automotive radar systems.

Refreshments at 5:30 PM, meeting/talk begins at 6:00PM.

Meeting Location: MIT Lincoln Laboratory Forbes Rd cafeteria (directions link: <https://www.ll.mit.edu/about/mapForbesRoad.html>)

Advertise with us!!!

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

IEEE Boston Section Rate Card

<http://ieeeboston.org/advertise-ieee-boston-section/>

IEEE Boston Media Kit

<http://ieeeboston.org/advertise-ieee-boston-section/>

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

Entrepreneur's Network – 6:30PM, Tuesday, 3 April

Pointers for Term Sheet Negotiations

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

Company founders getting ready to raise outside financing do not want to give up more equity than absolutely necessary. Investors want more equity for their investment as a reward for the risk they are taking on the young company. Valuation is used to determine a fair trade-off of cash for equity. However, company founders need to consider the issues.

What is a reasonable valuation for a startup?

Must this determination be made when first obtaining funds?

What terms might an entrepreneur see when presented with a Term Sheet and what are the trade-offs when negotiating these?

How do terms impact founders' managerial control of investments and operating decisions?

Our panel, including two legal experts and a former venture capitalist, will discuss these issues concerning valuation and term sheets.

A networking session will precede the meeting, and a question and answer session will follow the panelists' presentations.

Agenda:

6:30-7:30 pm - Networking

7:30-7:40 pm - Announcements

7:40-7:55 pm - E Minute - Up to 3 Startup companies' presentations

7:55-8:45 pm - 3 or 4 expert speakers on the night's topic

8:45-9:00 pm - Q & A

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

E-Minute Presentations: These 90-second presentations enable startup entrepreneurs to gain experience in presenting their summary to expert panels and audiences.

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

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

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

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

Panelists:



Attorney Prithvi Tanwar has a Drake University B.A. in management information systems, and he has been a consultant at Cap Gemini Ernst & Young and at Deloitte. He has a Boston University School of Law J.D. and is a corporate attorney at Foley Hoag LLP working on venture capital financing and emerging companies.

He provides practical, relevant and actionable legal advice based on a clear understanding of his clients' products and business goals. He has helped founding teams incorporate, protect intellectual property, raise capital financing, establish clear and defined internal guidelines and procedures, negotiate commercial agreements, address legal issues that arise in daily operations, and successfully exit. He is very familiar with term sheets and the pitfalls that can arise when negotiating them.

Jeremy Cohen has a Harvard University chemistry degree and was Managing Editor at America's Most Wanted; he has a Northeastern University School of Law J.D. and worked as an Associate at Skadden, Arps, Slate, Meagher & Flo LLP and since January 2012, as



a Gesmer Updegrove LLP corporate attorney. He has extensive experience with securities regulations and preparing securities filings with expertise in the SaaS and FinTech spaces. He has done licensing, contract negotiations, privacy policies, corporate formations, and financing and M&A transactions.

He represents start-ups, emerging tech companies, and small businesses. He helps with M&A transactions including sales, private equity investments and enterprise deals. He knows term sheets intimately and will speak on them from a legal perspective.



Rob Jevon is an investor and startup advisor. He is on the Advisory Board of Yale University's Center for Biomedical Interventional Technology, a medtech innovation initiative. He was a Partner at Boston Millennia Partners from its founding in 1997. He was a venture partner at Boston Capital Ventures from 1996. He

was Managing Director and co-owner of Watch Hill Corporation, an investment firm. He was Controller of Bolt, Beranek and Newman's Communications Division.

Mr. Jevon served as an investor or director in several companies including PHT Corporation (ERT acquired), PreCision Dermatology (Valeant acquired), Collegium

Pharmaceutical (IPO January 2016), MedAptus, Glycofi (Merck acquired), Galt Associates (Cerner acquired), eMed Technologies (Cedara Software acquired), Proteome (Incyte Genomics acquired), iParty (Party City acquired), Lawrence Pumps (Flowserve acquired), and HotJobs (Yahoo acquired). Mr. Jevon has an Amos Tuck School MBA and a Haverford College BA.

Moderator:



Attorney William Mansfield is a patent attorney and is a lawyer in MA & NY; high bar exam scores allowed him to waive into D.C. Circuit U.S. Court of Appeals. He won the CALI Award for perfect grades in an IP course, and he has passed the Fundamentals of Engineering Exam covering all types of

engineering. He assists clients with corporate and IP law using trademarks, trade dress, copyrights, licensing, patents, strategic partnerships, and succession planning.

From 2004, he has worked on legal matters & he has counseled entrepreneurs/startups since 2009 thru Mansfield Law. He has worked on patent prosecution, especially business method, business process, electrical, mechanical, telecommunications, and e-commerce patents. He has filed for global IP protection and has a network of foreign IP professionals.

Organizer: Vince Jones

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>

Antennas & Propagation, Microwave Theory & Techniques, Photonics, Electron Devices, Geoscience and Remote Sensing, and Communications Societies - 6PM, Wednesday, 4 April

Advanced 5G and SATCOM Phased-Arrays and Transceivers Using Silicon Technologies: THE END OF THE MARCONI ERA IS NEAR

Gabriel M. Rebeiz Distinguished Professor, Member of the National Academy, Wireless Communications Industry Endowed Chair, Department of Electrical and Computer Engineering, The University of California, San Diego



During the past 50 years, phased-arrays have been largely developed for the defense sector. Today, due to the increased demand for data, there is a need for base-station and mobile-user phased-arrays which can provide high-capacity data services through directional links. Therefore, there is an amazing investment by the telecom industry

in this sector at highly accelerated time scales (24-36 months) to meet the commercial demand. Today, both digital-beamforming at the element level (sub-6 GHz) and hybrid (i.e. analog/digital) beamforming for the mm-waves bands are being developed for next-generation 5G telecom systems.

These commercial investments are leading to dramatic changes in phased-arrays: High EIRP, high-performance systems at 28 GHz, 39 GHz and even 60 GHz, and with multiple beams, are now available at low-cost (<\$1K). This talk will summarize our work in this area, and present a roadmap for the future.

Prof. Gabriel M. Rebeiz is Member of the National Academy, Distinguished Professor and the Wireless Communications Industry Endowed Chair at the University of California, San Diego. He is an IEEE Fellow, and is the recipient of the IEEE Daniel E. Noble Medal, the IEEE MTT Microwave Prize (2000 and 2014), the IEEE MTT 2010 Distinguished Educator Award and the IEEE Antennas and Propagation 2011 John D. Kraus Antenna Award.

His group has led the development of complex RFICs for phased array applications from X-band to W-band, culminating recently in wafer-scale integration with high-efficiency on-chip antennas. His phased array work is now used by most companies developing complex communication and radar systems. He has graduated nearly 100 PhD students and post-doctoral fellows.

When: April 4 @ 6pm

Where: MITRE Room 2C130 (Building C)

Contact Ian McMichael, imcmichael@mitre.org to be added on guest list

Computer Society and GBC/ACM – 7:00PM, Thursday, 5 April

ALGORAND: A Truly Distributed Ledger

Silvio Micali, MIT



A distributed ledger is a tamperproof sequence of data that can be read and augmented by everyone. Distributed ledgers stand to revolutionize the way a democratic society operates. They secure all kinds of traditional transactions, such as payments, asset transfers, and titling, in the exact order in which they occur and enable totally

new transactions, such as cryptocurrencies and smart contracts. They can remove intermediaries and usher in a new paradigm for trust. As currently implemented, however, distributed ledgers cannot achieve their enormous potential.

Algorand is an alternative, democratic, and efficient distributed ledger. Unlike prior ledgers based on ‘proof of work’, it dispenses with ‘miners’. Algorand requires only a negligible amount of computation. Moreover, its transaction history does not ‘fork’ with overwhelming probability: i.e., Algorand guarantees the finality of all transactions. Finally, Algorand enjoys flexible self-governance. By using its hallmark propose-and-agree process, Algorand can correct its course as necessary or desirable, without any hard forks’.

Silvio Micali received his Laurea in Mathematics from the University of Rome and his PhD in Computer Science from the University of California Berkeley. Since 1983 he has been on the MIT faculty of the EECS department, where he is currently Ford Professor of Engineering. Silvio’s research interests are cryptography, zero knowledge proofs, pseudorandom generation, secure protocols, and mechanism design.

Silvio is the recipient of the Turing Award (in computer science), the Goedel Prize (in theoretical computer science) and the RSA prize (in cryptography). He is a member of the National Academy of Sciences, the National Academy of Engineering, and the American Academy of Arts and Sciences. An overview of some of his accomplishments is online at https://amturing.acm.org/award_winners/micali_9954407.cfm.

Silvio cofounded Peppercoin, a micropayments startup, and CoreStreet, which developed software for authorizing and validating transactions and signed communications. His latest startup Algorand is hoping to transform the blockchain marketplace.

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.


University of New Hampshire

ONLINE GRADUATE CERTIFICATES



Ubiquitous Computing



Wireless Communication Systems

Learn More
online.unh.edu

Photonics Society – 7:00PM, Monday, 9 April

Light Complexity in Time and Space, and the Underlying Physics of Analogies

IEEE Photonics Society Distinguished Lecturer - Prof. Marc Sciamanna, CentraleSupélec, Metz, France



I will review the configurations in which an optical system undergoes dynamical instabilities and how the resulting so-called dynamical complexity drives applications in e.g. secure optical communications, random number generation for cryptography, brain-inspired optical computation, high-resolution imaging and sensing. Concepts such

as deterministic chaos, entropy and fractal that originate from applied mathematics are of increasing interest in photonics. Harnessing these concepts has enabled significant improvement of laser properties including modulation bandwidth, multimode emission and beam quality.

On the other hand, the availability and ease of operation of lasers in a wide range of configuration make them a convenient test bed for exploring basic concepts of nonlinear dynamics. The cross-fertilization of disciplines allows for identifying analogies with phenomena such as extreme events well known in economy and hydrodynamics or neuronal computation and regulatory networks in biology. In addition, nonlinear light-matter interaction yields interesting spatio-temporal instabilities arising from either modulation instability (leading to optical patterns) or from soliton interactions. In this field, the resurging interest in nonlinear propagation of exotic light beams such as accelerating waves and vortices has motivated analogies with dynamics in rotating or curved reference frames including gravitational effects.

Marc Sciamanna graduated in Electrical Engineering (2000) and PhD in Applied Sciences (2004) from the University of Mons (Belgium) and received his “Habilitation à Diriger les Recherches” from the University of Lorraine (France) in 2009. In 2004 he has been appointed as an Assistant, then an Associate (2007) and since 2009 as a Full Professor at Supélec, today named as “CentraleSupélec” and ranked among the top 5 Engineering Schools in France. From 2013 to 2017 he has been the Deputy Director of the LMOPS Laboratory (Optical Ma-

terials, Photonics and Systems). He is coordinating the Master in Photonic and Communication Systems (SPC) at CentraleSupélec. Since 2017 he leads the Chair in Photonics at CentraleSupélec.

Marc SCIAMANNA is a recognized researcher for his contributions to nonlinear dynamics of laser diodes, applications of optical chaos, and the physics of optical instabilities including the formation of optical patterns, the nonlinear propagation of non conventional beams including vortices and Airy beams, and the onset of optical rogue waves.

He has published about 90 journal publications and over 100 publications in conference proceedings, receiving more than 3000 citations in the past 15 years. He has been invited speaker at more than 25 international conferences including two plenary talks at IEEE Winter Topicals 2009 and SPIE Photonics Europe 2014. He has been awarded with the IEEE Photonics Society Graduate Student Fellowship Award in 2002, the SPIE F-MADE Scholarship Award in 2003, and the MIT Technology Review TR35 award in 2007, which awards each year 35 top young innovators being less than 35 years old, here on the topic “Controlling chaos in telecom lasers”. In his country he has been awarded with the Best Researcher Award from Lorraine Region. Since 2016 he is one of the Associate Editors for Optics Letters (Optical Society of America). He regularly serves as Conference Chair and/or Conference Committee member for SPIE Photonics Europe, IEEE International Semiconductor Laser Conference, EOS Annual Meeting. Since 2017 he has been appointed as a member of the Scientific Council for the Office parlementaire d'évaluation des choix scientifiques et technologiques (OPECST) in France.

This meeting begins at 7 PM Monday, April 9th, 2018 and will be located 3 Forbes Road, Lexington, MA, 02420. Note this is a satellite location ~1.5mi away from MIT Lincoln Laboratory. The meeting is free and open to the public. All are welcome. Prior to the seminar there will be

social time and networking from 6:30 – 7:00PM. Dinner will also be provided. The seminar will begin at 7:00PM. For more information contact Ajay Garg, IEEE Boston Photonics Society chair at ajay.sinclair.garg@ieee.org, or visit the IEEE Boston Photonics Society website at www.bostonphotonics.org.

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

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

Life Members - 6:00PM, Wednesday, 11 April

Some Recent Projects at Natick Lab (NSRDEC)

Speaker: Dr Richard Osgood

The abstract and speaker biography were not available at the time of the April Digital Reflector release. Please check the section website at www.ieeeboston.org, for updates.

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.

Reliability Society – 5:30PM, Thursday, 12 April

Integrated FMECA for AGILE Diagnostics and Prognostics Development

Alastair Moubray and Thaddeus (Ted) Mateja, Raytheon Integrated Defense Systems

This presentation discusses an improved business method for leveraging Failure Mode, Effects, and Criticality Analysis (FMECA) with complimentary Built-In-Test Effectiveness (BEA) and Sneak Circuit Analysis (SCA) that are collectively known as Integrated FMECA to assure dependable system design in an Agile development environment. The transformation of the project Reliability/Maintainability (R/M) engineer/analyst's role is described and how it is being influenced by the confluence of Agile with modular open architecture design principles. These design approaches provide for affordable requirement changes during product development, while enabling the evolutionary acquisition, rapid prototyping and fielding of interoperable systems. The Integrated FMECA analyst role of identifier, quantifier, and mitigator of design risks/anomalous system behavior and independent Fault Detection / Isolation design verifier remains. However there are increased expectations to grow and assume the subject matter expert responsibilities of a Diagnostics and Prognostics System Architecture / Requirements Engineer as part of the Agile team.

The presentation includes the realized benefits of using Integrated FMECA during Agile Diagnostics and Prognostics Development for several projects at a major defense firm. It highlights the R/M analyst's new role in the Agile design of dependable open systems using the latest technological advances contained in Developmental, Non-Developmental and Commercial off-the-shelf (COTS) hardware and software to speed up the product development process and deliver affordable best value solutions to both military and commercial customers.

Author Bio: Alastair Moubray is a Senior Systems Engineer at Raytheon Integrated Defense Systems in Marlborough, MA. Alastair has 15 years of experience in RAM-related fields in both military and commercial projects, the last 10 at Raytheon. At Raytheon, he has worked on air, sea, and ground based radar systems, naval combat systems and air defense missile programs. Prior to Raytheon, he worked in Reliability-Centered Maintenance and maintenance training in the petrochemical, utilities,

and food-processing sectors. His background includes Design for Reliability and Maintainability, FRACAS, Maintainability Verification Testing, Reliability and Availability field performance monitoring, Preventive his MSME from the University of Rhode Island in 2010.

Thaddeus (Ted) Mateja is an Engineering Fellow at Raytheon Integrated Defense Systems (IDS) in Tewksbury, MA. Ted has over 4 decades of Reliability, Availability & Maintainability (RAM), System / Specialty Engineering experience over the entire life cycle with ground, sea and space based strategic & tactical sensors, effectors, platforms, BMC4I, system of systems, and life support medical electronics, the last 3 decades at Raytheon. Prior to Raytheon, Ted led RAM technical efforts at General Dynamics/Dynatronics, AVCO Systems, GTE Communications Systems and was the Design Assurance Manager at AVCO Medical Products. He received his BSEE degree from Northeastern University, is an IDS Program Management College graduate, and has an honorary title of 'Steely-Eyed Missileer' in Ballistic Missile Defense. His current interests include ubiquitous computing for pre-emptive maintenance and dependable system design. Ted is also a National Defense Industrial Association member and was the Software Reliability track moderator at 2009 RAMS.

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

Registration: click here Copy and paste link
<http://ewh.ieee.org/r1/boston/rl/events.html>

Directions to MIT Lincoln Laboratory, 3 Forbes Road, Lexington, MA:

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

Entrepreneur's Network, Boston Meeting – 6:00PM, Tuesday, 17 April

Failure Fuels Success – Startup Trials and Tribulations

Meeting Location: *Foley Hoag LLP, 155 Seaport Ave., West Building, 13th Floor, Boston, MA*

Entrepreneurs are driven, energetic visionaries who build successful companies by the force of their will and unerring perseverance to a brilliant idea and the execution of a flawless plan... Well, driven, energetic, brilliant, persevering and visionary may be great, even accurate descriptors for successful entrepreneurs. However, more often than not, the path to success is marked by assessment and re-assessment of science, technology and markets, and the ups and downs that accompany shifts in strategy or a major business plan pivot. Sometimes, success comes from scrapping a plan altogether and re-booting from scratch.

Join us to learn about some of the trials and tribulations of launching a successful start-up. It isn't always pretty, but it always is a rewarding learning experience.

Agenda:

6:30-7:30 pm - Networking

7:30-7:40 pm - Announcements

7:40-7:55 pm - E Minute - Up to 3 Startup companies' presentations

7:55-8:45 pm - 3 or 4 expert speakers on the night's topic

8:45-9:00 pm - Q & A

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

E-Minute Presentations: These 90-second presentations enable startup entrepreneurs to gain experience in presenting their summary to expert panels and audiences.

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

Reservations: Free to ENET members and \$10 for non-members. Members & non-members should pre-register for the meeting online, until midnight the day before the meeting. If you cannot pre-register, you are wel-

come to register at the door.

Directions & Parking information can be found at http://foleyhoag.com/our-firm/offices/boston/directions?fh_lang=en.

Speakers:



Martha Farmer, Founder, President and CEO of North Shore InnoVentures. Marty Farmer is the Founder, President and CEO of North Shore InnoVentures a biotech and cleantech incubator/accelerator based in Beverly MA. She serves as NSIV's representative to a variety of local, regional, state, and industry organizations. Marty has

a Ph.D. in physiology and pharmacology with a specialized background in protein biophysical chemistry, stem cells and medical ethics. Previously, Marty held founding leadership roles at Baxter's Hemoglobin Therapeutics Division and BetaGamma, Inc. and has served as a scientific consultant for numerous cutting edge life science companies. Marty earned a BS in zoology and a PhD in physiology and pharmacology from Duke University, did postdoctoral training at Johns Hopkins University and the Naval Research Laboratory and was a Medical Ethics Fellow at Harvard University.

Yael Schwartz, Founder and CEO of Or-Genix Therapeutics



Yael Schwartz is serving as Entrepreneur in Residence at Worcester Polytechnic Institute and is founder and CEO of Or-Genix Therapeutics, a company developing non-prescription topical products for aging skin and hair for women over 40 years of age. Yael previously founded two companies,

Hygeia Therapeutics and Canterbury Laboratories that were focused on women's health and dermatology. Both were acquired and taken public by RestorGenex

(RESX). At RestorGenex, she was on the board of directors and served as executive vice president of pre-clinical development. She had previously worked at Sepracor (now Sunovion).

In addition to leading her own company, Schwartz serves on the board of trustees of Massachusetts Biomedical Initiatives (MBI), is a co-founder of NEWISE (New England Women in Science Executives Club), and is an honorary member of Phi Lambda Sigma, the pharmacy leadership society and was a recent recipient of the Boston Business Journal Biotech Innovation All-Star Award.



Moderator

Roger Frechette, Principal and Founder, NEPAAssociates

NEPAAssociates offers on-demand executive and business advisory services to life sciences enterprises. Roger has been a volunteer with Boston ENET

since 2014, and also supports area start-ups as a mentor for MassBio's MassCONNECT and the MTTC's Platform Program.

Previously, Roger was Co-Founder of MaxThera, an antibacterial drug discovery company sold to Biota Holdings Limited. Prior to starting MaxThera, he was Project Director at Paratek Pharmaceuticals (Boston), where he led the teams culminating in IND filing for omadacycline (NDA 2018), a new class of antibiotic. Previously, he was Associate Director of Chemistry at RiboGene (Hayward, CA). He began his career as a chemist at the R.W. Johnson Pharmaceutical Research Institute (J&J, Raritan, NJ).

Roger was a Post-Doctoral Fellow at Yale University, earned his PhD in Organic Chemistry from Wesleyan University and his BA in Chemistry from College of the Holy Cross.

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;
ieebostonsection@gmail.com

Consultant's Network – 6:30PM, Tuesday, 24 April

Everything You Wanted to Know About Consulting But Were Afraid to Ask

Meeting Location: Constant Contact, 3rd Floor, 1601 Trapelo Road, Waltham, MA 02451

This meeting will feature our annual panel discussion with six independent consultants who will share their experience and ideas on how start and build a consulting practice.

- Panel Members:
- Frederick Beihold, The Black Oak Group.
Chairman, Boston Consultants Network
- Craig Goldman, CoAutomation
- Steve Golson, Trilobyte Systems
- Larry Nelson, Nelson Research
- Larry Rachman, Innovation Design and Solutions

Moderator: Ronald Goodstein, First Shot Logic Simulation and Design

The panelists will each make introductory remarks, followed by an open discussion. Audience questions and comments are encouraged.

Topics covered will include:

- Should you be a consultant? Pros & cons. Skills, experience, technology, personal preferences
- Specialization vs. generalization
- Business prospecting: sourcing leads; the value of networking
- Proposals, pricing, payment schedule
- On site or off-site
- Finalizing a contract

- Record keeping
- Subcontracting through job shops
- Business structure: Incorporation, sole proprietorship, partnership
- Payment choices: 1099, Corp to Corp, or W2
- Business finances: funding, salaries, operating expenses, benefits, health insurance, retirement
- Your tools vs. client's tools
- Pitfalls to avoid

This meeting is open to the public. There is no charge for Consultants Network members or employees of Constant Contact.

There is a \$5 entrance fee for all others. Casual dress. No registration or reservation is required.

The formal meeting starts at 6:30PM at Constant Contact, 3rd Floor, 1601 Trapelo Road, Waltham, MA 02451.

A no-host, pre-meeting dinner will be held at 5:15PM at Bertucci's, 475 Winter Street, Waltham, MA 02451. Panelists, CNET members, guests and visitors are all invited.

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

Please check the Consultants Network website (boston-consult.com) for meeting details and last-minute updates.



2018 MIT IEEE Undergraduate Research Technology Conference

Call for Submissions



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

SUBMISSION DEADLINE: June 30th, 2018

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

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

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

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



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

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

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

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

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

MEET INNOVATIVE TECHNOLOGY

Sponsored by the MIT IEEE Student Branch and IEEE Boston Section

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



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

Call for Papers and Posters

2018 IEEE International Symposium on Technologies for Homeland Security

23 to 24 October 2018 Crown Plaza, Woburn, MA

<http://ieee-hst.org/>



Co-sponsor:



Call for Papers & Posters

The 18th annual IEEE Symposium on Technologies for Homeland Security (HST '18), will be held 23-24 October 2018, in the greater Boston, MA area. This symposium brings together innovators from leading academic, industry, businesses, Homeland Security Centers of Excellence, and government agencies to provide a forum to discuss ideas, concepts, and experimental results.

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

Cybersecurity

Biometrics & Forensics

Land/ Maritime Borders & Critical Infrastructure Protection

Humanitarian Assistance and Disaster Relief

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

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

Contact Information

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

Important Dates

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

All deadlines are by midnight Eastern Time.

Organizing Committee

General Chairs:	Melissa Choi, MIT Lincoln Laboratory James Flavin, MIT Lincoln Laboratory
Deputy Chair:	Fausto Molinet, Matrix Internationale
Technical Chairs:	Gerald Larocque MIT Lincoln Laboratory Anthony Serino, Raytheon
Local Arrangement Chair:	Bob Alongi, IEEE Boston
Marketing Chair:	Jessica Kelly, Raytheon
Publications Chair:	Adam Norige, MIT Lincoln Laboratory
Sponsorship/Exhibits Chair:	Fausto Molinet, Matrix Internationale
Special Advisor to the Chair:	Lennart Long, EMC Consultant
Registration Chair:	Karen Safina, IEEE Boston

Technical Program Committee Chairs

Humanitarian Assistance and Disaster Relief
Mischa Shattuck, MIT Lincoln Laboratory
Mathew Daggett, MIT Lincoln Laboratory
Enhance Biometrics & Forensics
Eric Schwoebel, MIT Lincoln Laboratory
James L. Wayman, San Jose State University
Land/ Maritime Borders & Critical Infrastructure Protection
John Aldridge, MIT Lincoln Laboratory
Lance Fiondella, UMass, Dartmouth
Rich Moro, Raytheon
Secure Cyberspace
Hong Liu, UMass Dartmouth
Firas Glaïel, Raytheon
Thomas Edgar, Pacific Northwest National Laboratory



CALL FOR PAPERS

2019 IEEE International Symposium on Phased Array Systems and Technology

Revolutionary Developments in Phased Arrays



Sponsors

Platinum

Westin Waltham Hotel, Greater Boston, Massachusetts, USA
www.array2019.org

Gold

Silver

Bronze

Other Sponsors

15–18 October 2019

About the Symposium

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



Suggested Topics

- System Architecture
- Aperture Design
- Antenna Elements
- Beamforming Techniques
- T/R Modules
- Signal Processing for Arrays
- Array Measurements
- Advanced Materials
- Packaging and Manufacturing Techniques
- Applied Computational Electromagnetics
- 5G
- Metamaterials
- Radio Astronomy

See website: www.array2019.org for details

Special Sessions

Please provide suggestions for special sessions to the Technical Program Chair at info@array2019.org

Paper Template and Submission Procedures

Template and submission procedures are available at www.array2019.org/forauthors.htm

General Paper Submission Information

All paper submissions will be peer reviewed and must be received in PDF format via the symposium web site on or before Friday, 15 March 2019. This is a firm deadline. Papers will not be accepted after this date. Papers must be in IEEE dual-column format and must be 2 pages (minimum) to 8 pages (maximum) in length including figures. Additional instructions are on the website www.array2019.org/forauthors.htm

Technical Program Schedule

Please note: Our submission process and dates have been streamlined – plan accordingly.

15 March 2019 – Full paper submission deadline

- Submitted paper must be final and in IEEE dual-column format, not an abstract
- Submitted paper must be 2–8 pages in length including figures

30 April 2019 – Author notification of paper acceptance

1 Sept. 2019 – Conference registration deadline for accepted authors

Conference Committee

Conference Chair:

Jeffrey S. Herd, MIT LL

Vice Chair:

William Weedon, Applied Radar

Technical Program Chair:

Alan J. Fenn, MIT LL

Technical Program Vice Chair:

David Mooradd, MIT LL

Honorary Chair:

Eli Brookner, Raytheon (retired)

Secretary:

Duane J. Matthiesen, Technia

Publicity:

Glenn Meurer, MITRE
Don McPherson, SRC, Inc.

Publications:

Raoul Ouedraogo, MIT LL
Mark McClure, STR

Plenary Session:

Bradley T. Perry, MIT LL
Eli Brookner, Raytheon (retired)

Tutorials:

Will Moulder, MIT LL
Wajih Elsallal, MITRE

Student Program:

Justin Kasemodel, Raytheon
Honglei Chen, Mathworks

International Liaison:

Alfonso Farina, Selex (retired)
Alberto Moreira

Sponsorships

Dan Culkin, NG

Social Media:

Andrew Zai, Humatics Inc.

Special Sessions:

Sean Duffy, MIT LL

Web page:

Kathleen Ballos, Ballos Associates
Ken Kolodziej, MIT LL

5G Advisors:

Jonathan Williams, Teradyne
Tony Fischetti, MACOM

Exhibits Chair:

Matt Faccine, NGC

Local Arrangements/Finance:

Robert Alongi, IEEE Boston

Poster Session:

Pierre Dufilie, MIT LL

Advisors:

Greg Charvat, Humatics Inc.
Greg Arlow, Lockheed Martin

Technical
Co-Sponsors



Our Blog



Determining and Communicating Project Value Return on Investment (ROI)

ROI Value Modeling™ for Decision Making

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

Speaker: Robin Goldsmith, President, GoPro Management

Location: TBD, Woburn - Burlington, MA Area

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

PARTICIPANTS WILL LEARN:

- * The financial information that business decision makers need and demand.
- * ROI and related calculations, strengths, weaknesses, and common pitfalls.
- * Using ROI Value Modeling™ and Problem Pyramid™ to fully identify relevant costs and benefits.

* Quantifying intangibles, risk, flexibility, and opportunity.

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

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

OUTLINE

WHAT MONEY HAS TO DO WITH IT

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

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

DETERMINING MEANINGFUL BENEFITS

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

ESTIMATING CREDIBLE COSTS

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

REPORTING AND MONITORING

Single vs. multiple scenario presentation
 Applying apples vs. apples, when you can't
 Scenario assumptions and parameters
 No change vs. proposed scenarios' ROIs
 Measuring intangibles' monetary effects
 Continual, step-wise, and one-time changes

Percentage-likelihood impact adjustments
 Presenting with spreadsheets
 ROI Value Dashboard™ modeling tool
 Caution about commercial ROI calculators
 Using value modeling to improve decisions
 Dashboard and scorecard-type notification
 Capturing, calibrating with project actuals
 Adjusting appropriately during project

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

**Decision (Run/Cancel) Date for this Courses is
 Wednesday, June 13, 2018**

Payment received by June 6

IEEE Members	\$235
Non-members	\$260

Payment received after June 6

IEEE Members	\$260
Non-members	\$280

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

Making You a Leader - Fast Track

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

Location: Hilton Hotel 2 Forbes Road, Woburn, MA

Speaker: Robin Goldsmith, President, GoPro Management

Location: TBD, Woburn - Burlington, MA Area

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

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

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

PARTICIPANTS WILL LEARN:

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

use to change lifetime learning and make leaders.

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

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

LEADERSHIP CHARACTERISTICS & ROLE

How leadership looks and feels

Management vs. leadership

Leadership components of project success

Basic leadership practices; power sources

Real change leaders in organizations

TEAMS AND LEADERSHIP

Everyone feels leadership is lacking

Everyone thinks s/he is a leader

Results, not actions or intent

Workgroups, teams, and leaders

Situational leadership styles

Coaching and sports analogies to projects

INSPIRING AND MOTIVATING

Gaining commitment to project success

Communicating that influences others

Addressing negativism and groupthink

Conscious and unconscious messages

Greatest management principle

Hierarchy of needs effects on projects

Hygiene factors vs. motivators

Helping project players get their rewards
 Influencing up and down without authority
 Inspiring the extra efforts projects need
 Energizing the project team

SHARED VISIONS

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

WHERE AND HOW LEADERS ARE MADE

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

SETTING AND ACCOMPLISHING GOALS

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

DEFINING THE FOLLOW-ON PROGRAM

Clarifying project leadership objectives
 Breaking into prioritized subgoals
 Establishing rewarding daily achievements
 Special techniques to change habits

CARRYING OUT THE MINI-CLINIC

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

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

**Decision (Run/Cancel) Date for this Courses is
 Monday, June 11, 2017**

Payment received by June 4

IEEE Members	\$235
Non-members	\$260

Payment received after June 4

IEEE Members	\$260
Non-members	\$280

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

Proactive User Acceptance Testing™ -- Confident Competence

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

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

Speaker: Robin Goldsmith, President, GoPro Management

Location: TBD, Woburn - Burlington, MA Area

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

PARTICIPANTS WILL LEARN:

- * Appropriate testing roles for users, developers, and professional testers; and what each shouldn't test.
- * How Proactive Testin™ throughout the life cycle reduces the number of errors left to find in UAT.
- * Key testing concepts, techniques, and strategies that facilitate adaptation to your situation.
- * Systematically expanding acceptance criteria

to an acceptance test plan, test designs, and test cases.

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

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

ROLE OF USER ACCEPTANCE TESTING

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

DEFINING ACCEPTANCE CRITERIA

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

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

DESIGNING ACCEPTANCE TEST PLANS

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

CARRYING OUT ACCEPTANCE TESTS

Differentiating test cases and test data
 Traps that destroy value of acceptance tests
 Warning about conversions
 Documentation, training, Help tests
 Configuration, installation, localization
 Security, backup, recovery tests

Suitability of automating acceptance testing
 Performance, stress, load testing
 Issues on creating test conditions, data
 Capturing results, determining correctness
 User's defect tracking and metrics

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

**Decision (Run/Cancel) Date for this Courses is
 Thursday, June 14, 2018**

Payment received by June 7

IEEE Members	\$235
Non-members	\$260

Payment received after June 7

IEEE Members	\$260
Non-members	\$280

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

Writing Agile User Story and Acceptance Test Requirements

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

Speaker: Robin Goldsmith, President, GoPro Management

Location: TBD, Woburn - Burlington, MA Area

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

PARTICIPANTS WILL LEARN:

- * Major sources of poor requirements that cause defects, rework, and cost/time overruns.
- * How Agile user stories and their acceptance criteria/tests address these issues.
- * Difficulties that still afflict requirements in Agile projects and why they persist.
- * Writing more effective user stories and acceptance criteria/tests.

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

WHO SHOULD ATTEND:

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

AGILE, USER STORY FUNDAMENTALS

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

REQUIREMENTS ARE REQUIREMENTS—OR MAYBE NOT

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

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

WRITING MORE SUITABLE USER STORIES

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

AND USER STORY ACCEPTANCE TESTS

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

Reactive vs. proactive risk analysis
 Given, when, then format

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

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

**Decision (Run/Cancel) Date for this Courses is
 Tuesday, June 12, 2018**

Payment received by June 5

IEEE Members	\$235
Non-members	\$260

Payment received after June 5

IEEE Members	\$260
Non-members	\$280

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

Developing Reusable Test Designs

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

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

Speaker: Robin Goldsmith, President, GoPro Management

Location: TBD, Woburn - Burlington, MA Area

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

Participants will learn:

- How test designs fit into the overall test planning structure and provide special advantages
- Systematic reliably repeatable methods for identifying test designs to test a given system.
- Checklists and guidelines that enable you to spot the conditions traditional methods overlook.
- Converting your project-specific test designs into reusable test designs you can use for other systems.

- Applying reusable test designs to jumpstart your testing with instant expertise and effectiveness.
- Quickly and reliably selecting the subset of test cases suitable for scale and risk.

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

PROACTIVE TEST DESIGN BENEFITS

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

IDENTIFYING NEEDED TEST DESIGNS

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

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

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

DESIGNING TESTS MORE THOROUGHLY

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

SPECIFYING (REUSABLE) TEST CASES

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

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

**Decision (Run/Cancel) Date for this Courses is
 Friday, June 15, 2018**

Payment received by June 8

IEEE Members	\$235
Non-members	\$260

Payment received after June 8

IEEE Members	\$260
Non-members	\$280

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

IEEE Boston Section Social Media Links:

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

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

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

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

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

Software Development for Medical Device Manufacturers -

An intensive two-day course

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

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

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

OVERVIEW

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

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

WHO SHOULD ATTEND

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

COURSE OUTLINE

• Introduction

- Medical Device Definitions – FDA and EU
- Regulatory Roadmap and FDA/EU Device Classification Schemes

–FDA Regulations and Guidance Documents for Software

- Standards – ISO 13485, IEC 62304, ISO 14971, EN-14971, IEC 60601, and IEC 62366-1
- All Software is Defective

- Interpreting Design Controls for Software
 - Software Development Models
 - Design and Development Planning
 - Design Inputs
 - About Requirements...
 - Requirements Exercise
 - Design Outputs
 - Design Reviews
 - Design Verification

• Software Verification Techniques

- Design Validation

• Software Validation Process

- Design Transfer
- Design Changes
- Design History File

• Validation of...

- Software Tools used to develop Medical Device Software
- Software used in Manufacturing
- Software used in Quality Systems

• Risk Management

- Standards and Regulations
- Terms and Concepts
- Risk Management Process
- Risk Management Tools and Techniques

- **Fault Tree Exercise**
 - Data Collection and Analysis
 - Documentation Requirements
- **Summary**
- **Comprehensive reference materials included**

Speaker Bio:

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

He received a BSEE from Northeastern University and an MSCS from Rensselaer Polytechnic Institute. He earned certifications from the American Society for Quality (ASQ) as a Software Quality Engineer (CSQE)

and Quality Auditor (CQA). He is a Senior Life member of IEEE and a member of MassMEDIC. He is on the Editorial Review Board for the ASQ Journal Software Quality Professional.

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

**Decision (Run/Cancel) Date for this Course is
Friday, March 23, 2018**

Payment received by March 19

IEEE Members	\$495
Non-members	\$535

Payment received after March 19

IEEE Members	\$535
Non-members	\$565

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

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>

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

Embedded Linux BSPs and Device Drivers

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

Speaker: Mike McCullough, RTETC, LLC

Location: TBD, Woburn - Burlington, MA Area

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

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

Course Objectives

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

Course Schedule Day 1

Getting Started with Embedded Linux

Linux and the GPL

Building the Kernel Source Code

Embedded Linux Kernels

BSPs and SDKs

Linux References (Books and Online)

Embedded Linux BSP Development Basics

BSP Requirements

U-Boot and Bootloader Development

Basic BSP Development

Files and Filesystem Support

The I/O Subsystem: Talking to Hardware

Memory Management and Paging

Error Handling in Embedded Linux BSPs

Timing and Timers

Interrupt Handling in BSPs

BSP Deployment Issues and Practices

Embedded Linux SDK Basics

The 3 Pieces of an SDK

Embedded Linux Distributions

The GNU Compiler Collection (GCC)

Other Embedded Linux Development Tools

Library Support

Glibc and Alternatives

SDK Deployment and Support

Debugging

GDB, GDB Server and the GDB Server Debugger

Other Debug Tools

An Abatron Board Bring-Up Example

An Eclipse Remote Debug Example

Advanced Debug with printk, syslogd and LTTng

System-Level Debug

System-Level Debug Tools

The /proc Filesystem

Advanced Logging Methods
KGDB and KDB
Crash Dumps

Course Schedule Day 2

Configuring Embedded Linux

Config Methods
Config Syntax
Adding Code to the Linux Kernel
Bootting Embedded Linux
The Linux Boot Process
NFS and RAMdisk Booting
Root and Flash File System Development
Building the RAMdisk
Busybox Development
Testing and Debug of Embedded Linux BSPs
Kernel Debug and Kernel Probes
Kexec and Kdump
The Linux Test Project (LTP)
Performance Tuning Embedded Linux BSPs
User Mode Linux and Virtualization
Measuring Embedded Linux BSP
Performance
Common Considerations
Uncommon Considerations
BootLoader Optimizations
Boot Time Measurements
Effective Memory and Flash Usage
Filesystem Performance Issues
Some Ideas on Performance Measurement

Course Schedule Day 3

The Original Device Driver Model

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

The New Device Driver Model

An Object-Oriented Approach
Platform Devices and Drivers
Subsystem Registration

The Probe and Init Functions
The Show and Store Functions
The /sys Filesystem
Configuring the New Device Driver

Comparing the Two Driver Models

The Flattened Device Tree (FDT)

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

Hybrid Device Drivers

Other fops Functions
The Need for ioctl
A Simulated Char Device Driver
The SIM Device Driver
Initialization
Open and Close
Read and Write
The /proc Driver Interface
MMAP Support

Course Schedule Day 4

Linux Device Driver Subsystems

Serial Drivers
The RTC Subsystem
Watchdogs
I2C & SPI
Block Devices
PCI
USB
VME
Video
Sound
What's Missing?
Memory Technology Devices
What is an MTD?
NAND vs NOR Flash Interfaces
The Common Flash Interface (CFI)
Driver and User Modules
Flash Filesystems
Drivers in User Space
Accessing I/O Regions

Accessing Memory Regions
User Mode SCSI, USB and I2C
UIO

High-Speed Interconnects

PCIe
GigE
iSCSI
Infiniband
FibreChannel
Serial RapidIO

Debugging Device Drivers

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

Performance Tuning Device Drivers

Some Final Recommendations

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

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

Payment received by April 2

IEEE Members	\$395
Non-members	\$430

Payment received after April 2

IEEE Members	\$430
Non-members	\$450

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

Advertise with us!!!

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

IEEE Boston Section Rate Card

<http://ieeeboston.org/advertise-ieee-boston-section/>

IEEE Boston Media Kit

<http://ieeeboston.org/advertise-ieee-boston-section/>

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

Fundamentals of Real-Time Operating Systems (*Online Edition*)



**New
Online
Course**

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

Registration Fee: \$350

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

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

Course Objectives

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

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.

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

Embedded Development Basics

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

Real-Time Operating System Basics

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

RTOS Kernel Overview

Real-Time Scheduling and Task Management
Signals and System Calls
Synchronization

Inter-Process Communications (IPC)
 Interrupt Handling
 Error Handling
 Timing and Timers
 Real-Time Memory Management

Real-Time Scheduling

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

Signals in Embedded RTOSes

System Calls in Embedded RTOSes

Synchronization

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

Inter-Process Communications (IPC)

More Semaphores
 Message Queues
 Shared Memory
 Pipes and FIFOs
 Remote Procedure Calls
 Networking

Interrupts and Exception Handling

Basic Interrupt Process
 VxWorks intLib and exLib
 Routines You Can Call From Interrupt Context

Interrupt Service Routines (ISRs)

VxWorks and Linux ISRs

Bottom Halves in Linux

Deferring Work

Tasklets and Work Queues in Linux
 Helper Tasks

Error Handling

Error Handling Approaches in OS Design

Error Handling in VxWorks

Error Handling in Tasks and Interrupts
 Error Number Format
 Using errnoSet, errnoGet and printErrno
 Creating Your Own Errors

Error Handling in Linux

Standard Error Defines
 errno and perror
 strerror and strerror_r
 Resets, OOPS, Panics and Segmentation Faults

Error Logging Approaches

Timing and Timers

How RTOSes Tell Time
 VxWorks tickLib and timerLib
 Linux Kernel, POSIX and Interval Timers
 Linux High-Resolution Timers (HRTs)
 VxWorks taskDelay
 Linux Sleeping, Sleep Waiting and Spinlocks
 VxWorks Watchdog Timers (wdLib)
 Periodic Execution Example
 Deadline Miss Detection
 Embedded Recommendations for Timing

Memory Management and Paging

The VxWorks Memory Model
 Real-Time Memory Algorithms
 VxWorks memLib and memPartLib
 Linux, Memory and Demand Paging
 Mapping Device Memory in Linux
 The Slab Allocators in Linux
 The Linux /proc Filesystem
 Memory Barriers
 The Linux OOM Killer
 Reserving and Locking Memory
 Memory in Embedded Systems

Device Drivers in VxWorks

File Descriptors
 The VxWorks IO Subsystem
 VxWorks ioLib, fioLib and iosLib

The 5 Basic Device Driver Types

- Char, Block and Network Drivers
- Virtual Drivers and Basic I/O Drivers
- Other Device Drivers
- The VxBus in VxWorks

Device Drivers in Linux

- File Descriptors in Linux
- The UNIX Device Driver Model
- Major and Minor Numbers
- The New Device Driver Model

The VxWorks Boot Process

- VxWorks Boot Example
- Configuration Files
- Application Startup
- VxWorks 7

The Linux Boot Process

- The Root Filesystem in Linux
- Bootloaders and U-Boot
- Configuring Linux
- Embedded Linux Boot Methods
- Building and Booting from SD Cards and eMMC
- Yocto and Poky

Debugging Basics

- How Software Debuggers Work
- Debuggers and Intrusion
- Types of Debugging Approaches
- Process-Level vs System-Level Debug

Process-Level Debug

- GDB, GDB Server and the GDB Server Debugger
- The VxWorks Debug Agent (WDB)
- Other Debug Tools for Linux and VxWorks
- A Remote Debug Example
- Printing and Logging

System-Level Debug

- LTTng and the VxWorks Systems Viewer (Windview)
- System-Level Debug Tools
- The /proc and /sys Virtual Filesystems in Linux
- Linux Kernel Debug
- Linux Crash Dumps

Deploying VxWorks Systems

- VxWorks Systems Customization and Configuration
- VxWorks Field Upgrades

Deploying Embedded Linux Systems

- Linux Systems Customization and Configuration
- Choosing and Building the Root Filesystem
- Module Decisions
- Final IT Work
- Final deployment of Embedded Linux Field Systems

RTOS Trends

Some Final Recommendations

- Getting Help
- Measuring Performance
- Managing Memory
- Things To Remember

Registration will be available by April 15. Look on our website (www.ieeeboston.org) or in the May Digital Reflector

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 *(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/>

Advertise with us!!!

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

IEEE Boston Section Rate Card

<http://ieeeboston.org/advertise-ieee-boston-section/>

IEEE Boston Media Kit

<http://ieeeboston.org/advertise-ieee-boston-section/>

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

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

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

Registration fee: \$250

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

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

Course Objectives

- To understand debugging, profiling and testing high performance Embedded Linux software.
- To provide an overview of Linux application performance measurement and optimization.
- To understand the tools used for performance optimization of Embedded Linux software.

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

Lecturer – Mike McCullough is President and CEO of RTETC, LLC. Mike has a BS in Computer Engineering and an MS in Systems Engineering from Boston University. He has held a variety of software engineering positions at LynuxWorks, Embedded Planet, Wind River Systems and Lockheed Sanders. RTETC, LLC provides real-time embedded training and consulting to many embedded systems companies. RTETC focuses on real-time operating systems (RTOS), Linux and Android solutions for the embedded systems market.

Getting Started with Embedded Linux

Embedded Linux Training Overview

Terminology

Linux Versioning

The GPL

Building the Kernel Source Code

Embedded Linux Kernels

BSPs and SDKs

Linux References (Books and Online)

A Development Cycle Focused on Performance

A Basic Optimization Process

Basic Debugging Review

Embedded Applications Debug

GDB, GDB Server and the GDB Server Debugger

Other Debuggers

An Eclipse Remote Debug Example

Debugging with printk, syslog, syslogd and LTTng

System-Level Debug

System-Level Debug Tools

The /proc and /sys Filesystems

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

Kexec and Kdump

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

Kernel Hacking

CONFIG_EMBEDDED

Configuring printk

Test Code

Configuring Kernel and IO Scheduling

Improving CPU Performance

Run Queue Statistics

Context Switches and Interrupts

CPU Utilization

Linux Performance Tools for CPU

Process-Specific CPU Performance Tools

Stupid Cache Tricks

Improving System Memory Performance

Memory Performance Statistics

Linux Performance Tools for Memory

Process-Specific Memory Performance Tools

More Stupid Cache Tricks

Improving I/O and Device Driver Performance

Disk, Flash and General File I/O

Improving Overall Performance Using the Compiler

Basic Compiler Optimizations

Architecture-Dependent and Independent Optimization

Code Modification Optimizations

Feedback Based Optimization

Application Resource Optimization

The Hazard of Trust

An Iterative Process for Optimization

Improving Development Efficiency

The Future of Linux Performance Tools

Some Final Recommendations

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

IEEE Boston Section Social Media Links:

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

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

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

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

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

Software Development for Medical Device Manufacturers (Online Edition)

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

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

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

Module 1

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

Module 2

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

Module 3:

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

- Design Reviews

Module 4:

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

Speaker Bio:

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

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

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

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

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

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

Registration Fee: \$150

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

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

Course chapters

1. Vector Basics
2. Dot Product

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

Instructor's Bio:

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

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

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

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

Registration Fee: \$320

Course Description

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

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

Course Outline

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

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

Course Objective

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

Instructor's Bio

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

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

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

Introduction to Embedded Linux

(Online Edition)

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

Course Summary:

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

Who Should Attend:

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

Course Objectives:

To provide a basic understanding of the Linux OS and the Eclipse IDE framework.
To gain an understanding of the complexities of Embedded Linux Distributions and their use in embedded systems.
To give students confidence to apply these concepts to their next Embedded Linux project
Hardware and Software Requirements

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

useful for completion of lab exercises. Lab solutions are also provided with the course. An Embedded Linux target hardware platform is useful but not absolutely required for this course.

Additional Reference Materials

Linux Kernel Development by Robert Love
Linux System Programming by Robert Love
Linux Debugging and Performance Tuning by Steve Best
Optimizing Linux Performance by Phillip G. Ezolt
Embedded Linux Primer by Christopher Hallinan
Pro Linux Embedded Systems by Gene Sally
Embedded Linux Development Using Eclipse by Doug Abbott
Linux Device Drivers by Jonathan Corbet et al
Essential Linux Device Drivers by Sreekrishnan Venkateswaran

Course Downloadable Content:

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

The Basics

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

Getting Started

Kernel Source Code
Building the Kernel
Embedded Linux Kernels
Linux 2.6

Basic Kernel Capabilities

Process and Threads Management
Signals and System Calls
Synchronization, IPC and Error Handling
Timing and Timers

Memory Management and Paging
The I/O Subsystem: A Tale of Two Models
Modularization

Debugging

Process-Level and System-Level Debug
GDB and KGDB
GDB Server and Remote Debugging

An Eclipse Debug Example

Other Debug and Test Tools

Other System-Level Debug Approaches

Process & Threads Management

What are Processes and Threads?
Virtual Memory Mapping
Creating and Managing Processes and Threads
Thread-Specific Data (TSD) POSIX
The Native POSIX Threading Library (NPTL)
Kernel Threads

Signals

System Calls

Scheduling

Linux 2.4 and 2.6 Scheduling Models
The O(1) Scheduler
The Completely Fair Scheduler (CFS)

Synchronization

Via Global Data
Via Semaphores, Files and Signals

Inter-Process Communications (IPC)

Message Queues
Semaphores Revisited
Shared Memory
Pipes, FIFOs and Futexes
Remote Procedure Calls
Networking

Error Handling

errno and perror
strerror and strerror_r
oops, panics and Segmentation Faults

Timing

How Linux Tells Time

Kernel, POSIX and Interval Timers
High-Resolution Timers (HRTs)

Memory Management and Paging

Demand Paging and Virtual Memory
Allocating User and Kernel Memory
Mapping Device Memory
The Slab Allocator
The OOM Killer
Memory in Embedded Systems

Modularization

Creating a Module and Module Loading
Dependency Issues
In Embedded Systems

Shared Libraries

A Shared Library Example
Static and Dynamic Libraries

The I/O Subsystem: A Tale of Two Models

The Original Device Driver Model
The Standard I/O Interface
The New Device Driver Model and Kernel Object Classes
Initialization
Platform Devices, Busses, Adapters and Drivers
Comparing the Two Models

Embedded Linux Trends

Development, Monitoring and Testing

Some Final Recommendations

Lecturer:

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

Design Thinking for Today's Technical Work



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

Registration Fee: \$160

Course Description:

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

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

Course Objectives

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

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

Who Would Benefit from this Course

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

Course Modules

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

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

Speaker biography

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

Dr. James L. Poage has been designing future concepts for Air Traffic Control for 25 years, first with the Volpe National Transportation Systems Center and then for the past dozen years as an independent consultant (JLP Performance Consulting). He has taught short courses on Benefit-Cost analysis to the FAA and NASA, as well as spoken at conferences and published in professional journals. Over the past 15 years, Dr. Poage has been applying Design Thinking to his project work; to marketing

his consulting services; and to planning briefings, reports, and courses. His clients have included FAA, NASA, BAE Systems, Engility, Georgia Tech University, San Jose State University, and Saab Sensis. Dr. Poage has co-authored the book, *Flair: Design Your Daily Work, Products, and Services to Energize Customers, Colleagues, and Audiences* (Maven House Press, 2016), with his daughter, Jennifer Poage who works in fashion design. Dr. Poage has a Ph.D. in applied mathematics from the Harvard University School of Engineering and Applied Sciences and a M.S. and B.S. in electrical engineering from Stanford University.

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

Call for Course Speakers/Organizers

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

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

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

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

<http://ieeeboston.org/course-proposals/>. Alternatively, you may contact the IEEE Boston Section office at ieeebostonsection@gmail.com or 781 245 5405.

- 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.

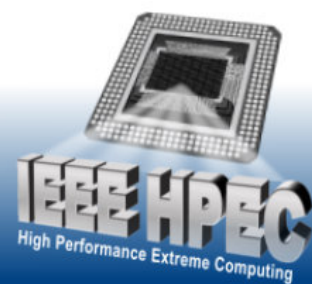
CALL FOR PAPERS



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

Committees

Chairman & SIAM Liaison

Dr. Jeremy Kepner
Fellow, MIT Lincoln Laboratory

Senior Advisory Board Chair

Mr. Robert Bond
CTO, MIT Lincoln Laboratory

Senior Advisory Board

Prof. Anant Agarwal
MIT CSAIL

Prof. Nadya Bliss
Arizona State University

Dr. Richard Games
Chief Engineer, MITRE
Intelligence Center

Mr. John Goodhue
Director, MGHPC

Dr. Bernadette Johnson
Chief Scientist, DIUX

Dr. Richard Linderman
ASDR&E

Mr. David Martinez
Associate Division Head
MIT Lincoln Laboratory

Dr. John Reynders
CIO Moderna

Dr. Michael Stonebraker
Co-founder SciDB and Vertica;
CTO VoltDB and Paradigm4

Publicity Co-Chairs

Dr. Albert Reuther
MIT Lincoln Laboratory
Mr. Dan Campbell
GTRI

CFP Co-Chairs

Dr. Patrick Dreher
MIT
Dr. Franz Franchetti
CMU

Publications Chair

Prof. Miriam Leeser
Northeastern University

Administrative Contacts

Mr. Robert Alongi
IEEE Boston Section

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.



2018

Electronic Design Innovation Conference & Exhibition

Where high frequency meets high speed.

Call for Abstracts Now Open

Be a part of the educational conference focused on what engineers need to know to solve today's technical challenges: EDI CON USA.

All accepted and submitted papers considered for an Outstanding Paper Award and eligible for publication online in Microwave Journal and/or Signal Integrity Journal.

Planned Tracks:

- RF & Microwave Design
- Mobile Front End Design
- Low Power RF & IoT
- 5G Advanced Communications
- Broadband Networks
- Radar & Defense
- Amplifier Design
- Signal Integrity
- Power Integrity
- Electromagnetic Integrity
- Simulation & Modeling
- Test & Measurement

October 17-19, 2018
Santa Clara Convention Center
Santa Clara, CA
EDICONUSA.com

Abstracts Due: May 3rd

Organized by



Official Publications



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

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/>

Design Thinking for Today's Technical Work

<http://ieeeeboston.org/design-thinking-technical-work-line-course/>

Fundamentals of Real-Time Operating Systems

Registration will be available by April 15

