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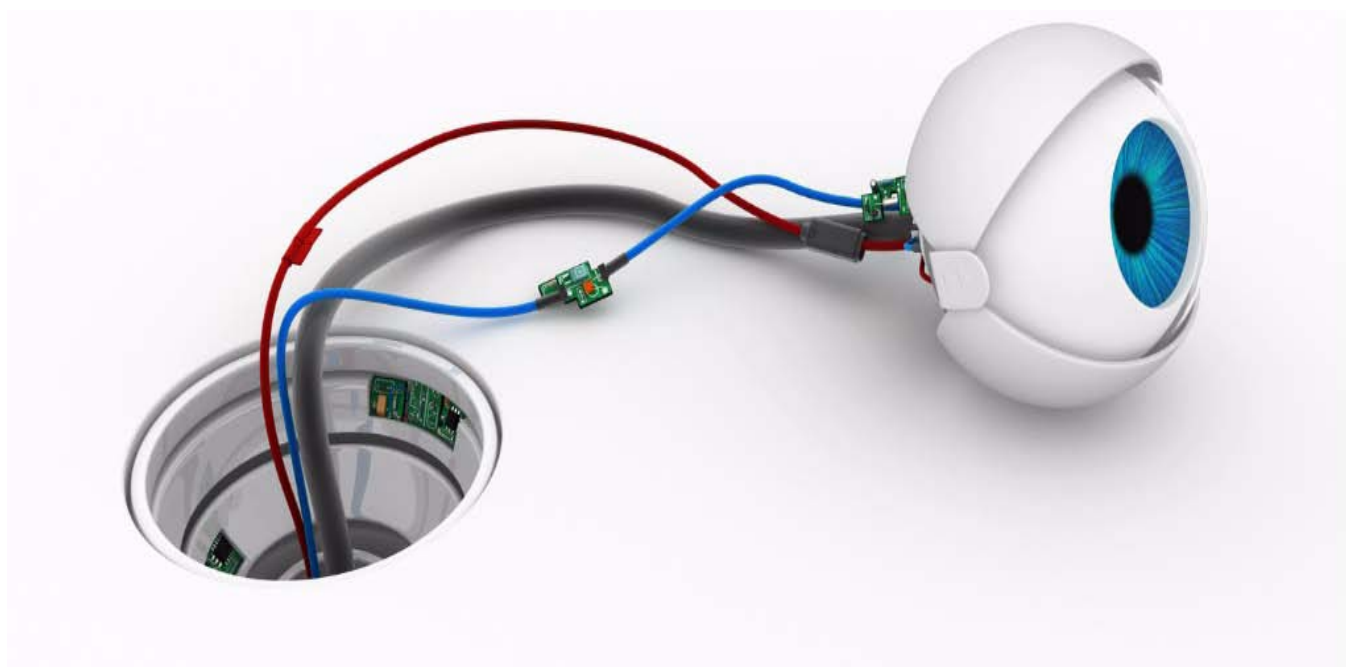
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2018 Outstanding Section Membership
Recruitment Performance

Boston Section

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The Unusual Path to Technology

Kevin Flavin, Chair, Electronic Communication Team

As a parent, my attention has slowly snapped back to school. The forms that I should have filled out in May and June are now due before Labor Day. Included in these emails are announcements sent to many parents regarding new programs to boost STEM in our schools. (STEM means Science, Technology, Engineering, and Mathematics)

STEM reaches into our lives - your smartphone, the card-swipe thing, the automated doors of the grocery store - the underpinning of most of our purchases, whether you're using distributed networking by watching Netflix or distribution tracking of your package through the mail. We don't notice it, or even realize it any more.

This summer, I've had a lot of time to think about how these things work. We've been putting some serious miles on our old vehicles trying to visit colleges for our eldest. During those long miles in Maine, I made a realization that my own family has some serious chops in STEM education and vocation. I venture to say even a solid representation in mathematics, medicine, and, of course, technology.

I know that making the pitch for a STEM career is like the proverbial 'preaching to the choir' in these pages.

Whenever I bring up career choices to my kids, I get the question 'what is STEM again?' I think it's important to expand that question to the applications in our daily lives.

Here's an example, my wife received a BSBA in political science, with a history concentration. Today, her work touches on finding scientists and leaders in biotech. She can rattle off the advances in using genom-

ics to treat diseases faster than I can say "oncology". Sometimes, the interest in a field comes later, I guess.

My own experiences could still be STEM, sort of. Starting in Electrical Engineering, working for a satellite technology company testing the dishes, was definitely on the path of hard tech. Then, I took a detour into a bank, working on modeling the emerging markets. The math fascinated me far more in that role. Now, twenty years later in the financial services industry, I can speak about multiplicative vs. additive performance measurement and attribution. Would those topics fall within the STEM definition? I'm not sure.

Does work for a software company qualify as a STEM field? How about finished carpentry? Does a STEM job require wearing a suit? My best friend has a Civil Engineering degree, most of his classmates wear boots, jeans, and a t-shirt.

Now, I have to ask, what is STEM again?

As a parent of two daughters, I struggle with guiding them toward a STEM career, maybe it's a pride thing, but I'm really not that worried about it - referencing my wife's own journey, things change.

I can, without reservation, say that I wish I had a resource to help me along in that goal. To be fair, I didn't think that I needed advice in raising scientists, but after seeing the new book by our own Karen Panetta and her colleague Katianne Williams, I regret not having this.

Count Us In, by Karen Panetta and Katianne Williams is on my Reading Now list, and I have to reiterate, I wish I had this back then. The book covers how to approach the topic of STEM with girls, whether you're a parent or

any adult with a responsibility to teach and guide children and young adults. The first section, the one I'm deep into right now, breaks out advice for elementary age, middle school age, high school age, and university age. It's a perfect vector on this topic.

I can't recommend the book enough, and with some luck, we're hoping to get an interview with them in an upcoming Digital Reflector.

On a more immediate topic, there's a Women in Engineering Conference coming in November, so register right away! I recommend starting at their twitter account to keep up to date on the latest : <https://twitter.com/IEEEWIEForumUSA>

Now, it's off to finish supply shopping; it's art supplies and an arduino on the list. Wish us luck, and I wish the same for you.

Call for Articles

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

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

Professional development articles should have broad applicability to the engineering community and should not explicitly promote services for which

a fee or payment is required. A maximum length of two to three pages would be best.

To ensure quality, technical submissions will be reviewed by the appropriate technical area(s). Professional articles will be reviewed by the publications committee for suitability. The author will be notified of the reviewers' decision.

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

We are excited about this new feature and hope you are eager to participate!

Submissions should be sent to;
ieeebostonsection@gmail.com

New Massachusetts Law Restricts Non-Compete Agreements

By Robert A. Adelson



Massachusetts has adopted legislation that restricts and regulates non-compete agreements for employees and independent contractors working in Massachusetts. The legislation signed by Governor Charlie Baker on August 10, 2018, takes effect for contracts entered into on and after October 1, 2018.

The biggest change made by the new law is that it prohibits the enforcement of non-compete agreements for “non-exempt employees” (typically hourly workers who are eligible for overtime pay) or for an employee who is terminated without cause or is laid off.

Contracts that the parties enter into up to September 30, 2018 are not affected by the new state law.

However, beginning October 1, 2018, the new law sets limits to enforceability of non-compete agreements that employers may enter into with exempt employees and contractors, provided those employees leave their positions voluntarily or are terminated for cause. In those cases, to be enforceable, such non-compete agreements must meet the following standards:

- not exceed one year in duration after employment termination
- provide the employee some consideration which at a minimum is either “garden pay” or other mutually agreed upon consideration
- be reasonable in scope of prohibited activities and geographic coverage
- be included at the time of job offer or 10 days prior to employment whichever occurs earlier.

Garden pay is an amount at least equal to 50% of highest salary over the employee’s last 2 years of employment (the term derives from its use in England - “payment to tend your garden”). The term “other mutually agreed consideration” is not defined in the law and could be significantly less than 50% of salary. However, many commentators assume that to be safe an

employer would be wise to provide that the mutually agreed amount would need to be more than a mere nominal sum but can be less than normal garden pay.

The provisions for maximum one year in duration and reasonableness of the non-compete in the scope of activities prohibited and its geographical coverage, are largely a continuation of recent court rulings enforcing non-competes in Massachusetts.

Additionally, if the non-compete agreement is not entered into as part of the job offer, the non-competes introduced during employment must be supported by independent consideration. That means consideration that is in addition to the employee being able to keep his or her job.

The legislation expressly excludes any restrictions on these other restrictive covenants whose enforcement will continue to be governed by Massachusetts state common law:

- non-solicitation of customers and suppliers
- non-solicitation of employees
- assignment of inventions
- confidentiality / non-disclosure agreements.

The new law will also not affect non-competes that are part of the sale of a business or non-competes that are part of separation agreements negotiated at the time of employment termination. Thus, if an employee has no right to severance pay at the time of employment termination, then as part of the separation agreement, the employer can introduce a non-compete obligation in addition to the employee’s release as part of the employee’s consideration of the severance pay offered.

Robert A. Adelson, Esq. is a partner at Engel & Schultz, LLP in Boston, MA. He has over 20 years’ experience in business and tax law, and represents small companies, entrepreneurs, executives and consultants. He can be reached at radelson@engelschultz.com

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IEEE Boston Section Fall 2018 Professional Development Program

The Fundamentals of Bioelectronics for Applications in Neuroprosthetics

Date & Time: Friday, October 26, 2018; 800AM - 3:00PM (Go, No-Go date, Oct. 19)
Speaker: Marie Tupaj, Assistant Professor, Middlesex Community College
Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

Description: This course covers the field of bioelectronics, specifically electrode design and implementation, for applications in neuroprosthetics. Electrode materials, electrode array fabrication, electrode modeling, electrical stimulation parameters, bioelectrode charge transfer mechanisms, and interfaces with biological systems are discussed. The fundamental theories of electromagnetism and a history of bioelectromagnetics are reviewed.

Target Audience: This class is designed for engineers transitioning into the field of bioelectronics, electronics engineers interested in neurobiologics, and professionals looking for an understanding of bioelectronics to complete their job function. **See page 28. Full course description at ,**
<http://ieeeboston.org/%20fundamentals-of-bioelectronics-for-applications-in-neuroprosthetics/>

Applications of Python for Digital Design and Signal Processing (Go, No-Go date, Nov. 1)

Time & Date: 6 - 9PM; Thursdays, Nov. 15, 29, Dec. 6, 13 (Note Dec. 6 is a Wednesday)
Speaker: Dan Boschen
Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

Course Summary: This is a bring-your-own laptop, hands-on course in the popular and powerful open source Python programming language. Dan provides simple, straight-forward navigation through the multiple configurations and options, providing a best-practices approach for quickly getting up to speed using Python for solving signal processing challenges. Students will be using the Anaconda distribution, which combines Python with the most popular data science applications, and will be making extensive use of the Jupyter Notebook.

Target Audience: This course is targeted toward users with little to no prior experience in Python, however familiarity with other modern programming languages and an exposure to object-oriented constructs is very helpful. Students should be comfortable with basic signal processing concepts in the frequency and time domain. Familiarity in Matlab or Octave is not required, but the equivalent operations in Python using the Numpy package will be provided for those students that do use Matlab and/or Octave for signal processing applications. **See page 30**
Full course description at , <http://ieeeboston.org/%20python-for-signal-processing/>

DSP for Wireless Communication (Go, No-Go date, Sept. 27)

Time & Date: 6 - 9PM; Thursdays, Oct. 11, 18, 25, 30 (Note Oct. 30 is a Tuesday)
Speaker: Dan Boschen
Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

Course Summary: This course is a fresh view of the fundamental concepts of digital signal processing most applicable to practical real world problems and applications in radio communication systems. This course will build an intuitive understanding of the underlying mathematics through the use of graphics, visual demonstrations, and real world applications in GPS and mixed signal (analog/digital) modern transceivers. This course is applicable to DSP algorithm development with a focus on meeting practical hardware development challenges in both the analog and digital domains, and not a tutorial on working with specific DSP processor hardware.

Target Audience: All engineers involved in or interested in signal processing applications. Engineers with significant experience with DSP will also appreciate this opportunity for an in depth review of the fundamental DSP concepts from a different perspective than that given in a traditional introductory DSP course. **See page 32**
Full course description at ,
<http://ieeeboston.org/%20digital-signal-processing-dsp-wireless-communications/>

continued on next page

Write Right Agile User Stories and Acceptance Test Rights (Go, No-Go date, Dec. 4)**2 - Day Intensive Seminar Workshop**

Time & Date: 8:30AM - 5PM; Tuesday & Wednesday, December 18 -19
Speaker: Robin Goldsmith, Go Pro Management, Inc.
Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

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. **See page 33.**

Full course description at, <http://ieeeboston.org/%20writing-agile-user-story/>

Making You a Leader - Fast Track (Go, No-Go date, Dec. 3)

Date & Time: Monday, December 17; 8:30AM - 5:00PM
Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA
Speaker: Robin Goldsmith, President, GoPro Management

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

However, since clinics usually last about ten weeks, this mini-clinic was devised as a more convenient alternative. This format places responsibility upon the participant to carry out an extended informal follow-on program after completion of the formal seminar workshop session. During the follow-on period, the participant uses time-condensed methods that simulate the lifetime learning which makes a leader. Therefore, commitment to carrying out these exercises is essential for successful transformation.

PARTICIPANTS WILL LEARN:

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

WHO SHOULD ATTEND: This course has been designed for business and systems professionals who want to improve their ability to lead and influence other people. **See page 35.**

Full course description at, <http://ieeeboston.org/%20making-leader-fast-track-become-leader-want-need/>

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

<http://ieeeeboston.org/fundamentals-of-real-time-operating-systems-rt201-on-line-course/>

September Chapter Meeting Summary

Entrepreneur's Network – 6:30PM, Tuesday, 4 September

WINNING – STARTUP SUCCESS STORIES and Lessons learned

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

Real stories of Entrepreneurial challenges, surprises, disappointments, victories and triumph. Learn from the experts: founders who have had the courage and tenacity to step out on their own, and navigate the rough waters of the unknown. If you are thinking of starting your own business, or if you are already a company founder, learn from those who have gone before you. What they have experienced may help you avoid a pitfall or two and accelerate your own company's progress. Why reinvent the wheel when others willingly share their wisdom? A question and answer session follow the presentation, and panelists are available afterwards for responses to individual questions. Meeting Location; Constant Contact, Inc., Reservoir Place, 3rd Floor Great Room, 1601 Trapelo Rd., Waltham, MA. **See Page 8.**

Microwave Theory and Techniques Society – 6:00PM, Monday 10 September

Low Phase Noise Signal Generation utilizing Oscillators, Resonators & Filters and Atomic Clocks -

Prof. Jeremy Everard, University of York. Oscillators are used in almost all consumer and professional electronic systems and the phase noise and jitter set the ultimate performance limit in navigation, communications and RADAR systems. It is therefore essential to develop simple accurate theories and design procedures to produce oscillators offering state of the art performance. This talk will initially discuss the theory and design of a wide variety of oscillators offering the very best performance. Typically, this is achieved by splitting the oscillator design into its component parts and developing new amplifiers, resonators and phase shifters which offer high Q, high power handling and low thermal and transposed flicker noise. Meeting Location: MIT Lincoln Laboratory, 3 Forbes, Road, Lexington, MA 02421 **See Page XX.**

Entrepreneurs' Network - 6:00PM, Tuesday, 11 September 11

Succeeding in Business ...With Someone Else's Money: 10 Rules for Successful Early Stage Investing

Right now, entrepreneurship in general, startups specifically and the investment world of venture capital are super-hot everywhere and especially in "The Startup Capital of America", right here in Boston. In this just maybe overheated summer and fall of high valuations, electric scooter deals and pet food home delivery apps, we thought that it would be best to take a step back and think through the basics of early stage investing from both sides of the table. Join us on September 11th to listen to and engage with Jennifer Jordan and Jack Derby, two veteran investors and entrepreneurs. Location: Draper Labs, Hill Building, One Hampshire Street, Cambridge, MA. **See Page XX.**

Robotics and Automation Society – 6:30PM, Wednesday, 12 September

Collaborative Robotics in Practice: Opportunities, and Challenges -

Taskin Padir is an Associate Professor in the Electrical and Computer Engineering Department at Northeastern University. Collaborative robots that work in close coordination with humans in the same work environments have the potential to transform processes in many application areas including manufacturing, healthcare and logistics. This talk will provide an overview of our ongoing work in this area and discuss both opportunities and challenges to accelerate research and development in collaborative robotics. Meeting Location: Room 140, Interdisciplinary Science and Engineering Complex, 805 Columbus Avenue, Boston. **See Page XX.**

continued next page

Reliability Society – 5:30PM, Wednesday, 12 September

Undersea MVDC Power Distribution System

Dr. Marcel P.J. Gaudreau Diversified Technologies, Inc. (DTI) has developed and fielded a significant advance in remote (undersea) power network technology using high-voltage, solid-state DC-to-DC power conversion. The Region Scale Nodes (RSN) project, part of the National Science Foundation Ocean Observatories Initiative, is an ambitious effort to provide unprecedented power (10 kW at 10 kVDC) and bandwidth (10 Gbps) to several scientific hubs on the seafloor off the coast of Oregon. Meeting Location: MIT Lincoln Laboratory, 3 Forbes Rd, Lexington, Massachusetts, 02421. See Page XX.

Life Members and Aerospace Electronic Systems Society – 4:00PM, Wednesday, September 18

Metamaterials For Low Cost Electronic Scanning, Wideband Conformal Antennas, Cloaking (The Invisible Man), Stealth And Waim -

Dr. Eli Brookner, Raytheon Company (Retired). METAMATERIALS: Metamaterials have gained much interest in recent years because they offer the potential to provide low cost electronic scanning antennas and to provide target stealth. Metamaterials are man-made materials in which an array of structures having a size less than a wavelength are embedded. These materials have properties not found in nature, like a negative index of refraction. Much progress has been made using metamaterials. Meeting Location: The meeting will be held at the MIT Lincoln Laboratory's Main Cafeteria, 244 Wood Street., Lexington, MA at 4:00 PM. See Page XX.

Photonics Society – 7:00PM, Wednesday, 19 September

Dr. Toshiaki Koike-Akino, Mitsubishi Electric Research Laboratories, MA

Toshiaki Koike-Akino received the B.S. degree in electrical and electronics engineering, M.S. and Ph.D. degrees in communications and computer engineering from Kyoto University, Kyoto, Japan, in 2002, 2003, and 2005, respectively. During 2006–2010, he was a Postdoctoral Researcher with Harvard University, and since 2010, he has been with Mitsubishi Electric Research Laboratories, Cambridge, MA, USA. His research interests include digital signal processing for data communications and sensing. He received the IEEE GLOBECOM'08 Best Paper Award and the IEEE GLOBECOM'09 Best Paper Award. Meeting Location: MIT Lincoln Laboratory, 3 Forbes Rd, Lexington, Massachusetts, 02421. See Page XX.

Computer Society and Engineering in Medicine and Biology (EMBS) and Geoscience and Remote Sensing (GRSS) Societies and GBC/ACM – 7:00PM, Thursday, 20 September

The Science and the Engineering of Intelligence - Tomaso Poggio, MIT

In recent years, artificial intelligence researchers have built impressive systems. Two of my former postdocs, Demis Hassabis and Amnon Shashua, are behind two recent success stories of AI: AlphaGo and Mobileye, based on two algorithms originally suggested by discoveries in neuroscience: deep learning and reinforcement learning. To create artifacts that are as intelligent as we are, we need several additional breakthroughs. The first half of the talk will discuss the question of what they may be and where they may come from. I will argue that at the level of the hardware, biophysical properties of dendritic trees suggest more powerful nonlinearities than today's Rectified Linear Units (RELU). Meeting Location: MIT Room 32-G449 (the Kiva conference room on the 4th floor of the Stata Center, Building 32. See Page XX.

Women In Engineering – 6:00PM, Thursday, 27 September

Returning to Work as an Engineering Professional – Discussion & Tips

Please join us for a roundtable presentation and discussion about how to return to work in the STEM sector— with tips and re-entry success stories-- and why the tight labor market and other workplace trends make this a great

Entrepreneurs' Network – 6:30PM, Tuesday, 4 September

WINNING – STARTUP SUCCESS STORIES and Lessons learned

*Location - Constant Contact, Inc., Reservoir Place, 3rd Floor Great Room, 1601 Trapelo Rd., Waltham, MA
PRE-MEETING DINNER at 5:15 PM (sharp) at Bertucci's, Waltham*

Real stories of Entrepreneurial challenges, surprises, disappointments, victories and triumph. Learn from the experts: founders who have had the courage and tenacity to step out on their own, and navigate the rough waters of the unknown. If you are thinking of starting your own business, or if you are already a company founder, learn from those who have gone before you. What they have experienced may help you avoid a pitfall or two and accelerate your own company's progress. Why reinvent the wheel when others willingly share their wisdom? A question and answer session follow the presentation, and panelists are available afterwards for responses to individual questions.

We have three excellent speakers for that evening, all serial entrepreneurs including successful exits in the consumer, high tech and life sciences fields. Each of the speakers will speak of their successes and in doing so will tell how success is measured and how different things made for success in each of these diverse fields.

Agenda:

6:30-7:30 PM - Registration & networking
7:30-7:40 PM - ENET Chairman's announcements
7:40-7:55 PM - E Minute - Up to 3 Startup companies' presentations
7:55-8:45 PM - 3 expert speakers on the night's topic
8:45-9:00 PM - Audience / Speakers Q & A
900-930 PM - Final networking includes meeting presenting speakers

A question and answer session follow the presentation, and panelists will be available afterwards for responses to individual questions. As with every ENET meeting you will also get the chance to network with the panel-

ists and other meeting attendees, both before the start of the meeting and afterwards.

Speakers:



Eric Giler, Chairman and CEO @ Speedy Packets
<http://speedypackets.com/> in Cambridge, Massachusetts. Speedy Packets dramatically improves the efficiency and performance of TCP, the primary protocol for moving content around the Internet – while maintaining end-to-end reliability and fair access. He was previously CEO of WiTricity Corporation which was

founded in 2007 to commercialize a new technology for wireless electricity invented and patented two years earlier by a team of physicists from the Massachusetts Institute of Technology (MIT). Previously, he was the Chairman and Chief Executive Officer of Groove Mobile. Eric was the founder and served as the Chief Executive Officer and President of Brooktrout Inc., a provider of telecom software and hardware platforms, from 1984 through to its successful IPO in 1994 until its acquisition by EAS Group, Inc. in October 2005. He is the author of over 20 patents. Eric holds a Bachelor's of Science degree from Carnegie-Mellon University and a Master's degree in Business Administration from the Harvard Business School. He is also an angel investor



ANITA BREARTON, Founder and CEO of CabinetM, is a serial entrepreneur and active angel investor. Her company, CabinetM

<https://www.cabinetm.com/> is a marketing technology management platform that helps marketers manage their technol-

ogy strategy, implementation and performance.. Anita speaks frequently on marketing practices and stack building. In addition to CabinetM, Anita is a CMS Wire monthly columnist, serves on the board of MassVentures as vice chairman, and is a member of the Golden Seeds angel group where she has invested in companies across multiple industries. Investments include Altruik, Sweetriot, Carnegie Speech, Crimson Hexagon, and FashionPlaytes to name just a few.

An experienced start-up executive, skilled at addressing the strategic operational and marketing challenges faced by high growth, early stage businesses, Anita served as the executive chairman of FashionPlaytes, an online fashion and style destination for tween girls; vice president of corporate marketing at Sycamore Networks, where she took the company from its infancy through its IPO to become a leading player in the Intelligent Optical Networking market; and worked with numerous other organizations to help shape the positioning and go-to-market strategies that enabled these companies to achieve their marketing and revenue goals. An active mentor in the Massachusetts entrepreneurial ecosystem, Anita has participated as a judge in the MassChallenge and MIT 100K business plan competitions, served as board director for the Angel Capital Association and The Sunflower Initiative, and was an executive in residence at Simmons College.



Ulrik Nielsen was Co-founder and Chief Scientific Officer @ Merrimack Pharmaceuticals from 2002 to 2015

<http://www.merrimack.com/>. For the past seven years, he has been part of the executive team where he is responsible for research and early development. Ulrik was instrumental in building the company's Network Biology platform and

oncology pipeline. that is outthinking cancer to ensure that patients and their families live fulfilling lives. Its mission is to transform cancer care through the smart design and development of targeted solutions based on a deep understanding of cancer pathways and biological markers. Merrimack currently has three therapeutics in clinical development. He remains on the Board of Directors of Merrimack and also Silver Creek Pharma-

ceuticals, Inc. where he was previously CEO. During 2015 to 2017, he was the Founder and past President and CEO, of Torque Therapeutics, which is applying breakthrough science to develop a new class of immune cell therapeutics. Prior to joining Merrimack, he was a post-doctoral fellow at Massachusetts Institute of Technology, where he researched the interface among biology, engineering and computational biology. Ulrik received his M.S. and Ph.D. degrees from the University of Copenhagen in molecular biology and trained at the University of California, San Francisco. Ulrika has also undertaken extensive executive business education, including education at Harvard Business School (PLD graduate).

Moderator:



ROBERT ADELSON, business and tax attorney, partner at Boston law firm of Engel & Schultz LLP, and Chairman of The Boston Entrepreneurs' Network. Rob has been an attorney for over 30 years specialized in business, tax, stock and options, employment, contracts, financing, trademarks and intellectual property. Rob began as an associate at major New York City law firms before returning home to Boston in 1985 where he has since been a partner in small and medium sized firms before joining his present firm in 2004. Rob represents entrepreneurs, start-ups and small companies, independent contractors and employees and executives. Rob is a frequent speaker on business law topics and author of numerous articles published in Boston Business Journal, Mass High Tech and other publications. He has been named among the "Top 20 Boston Startup Lawyers" by ChubbyBrain.com, a website that provides tools for entrepreneurs.

Rob has been on the ENET Board since 2002, was Vice Chair 2005-2009, and ENET Chairman since 2009. He was also a Co-Founder and Board member of the 128 Innovation Capital Group (2004 -2015). In 2016, he received the IEEE USA Professional Achievement award for "extreme dedication to the entrepreneurship community." He holds degrees from Boston University, B.A., summa cum laude, Northwestern University (Chicago), J.D., Law Review, and New York University, LL.M. in Taxation. His website - www.ExecutiveEmploymentAttorney.com

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

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

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

Reservations: Please register at <https://boston-enet.org/event-2990367/Registration>. ENET Constant Contact meetings are free to ENET

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

Registration - ENET Member Rate - Free

MDG Member – \$15.00

Non-ENET Member Rate – \$20.00

Student – \$10.00

Register at <https://boston-enet.org/event-2990367/Registration>

Microwave Theory and Techniques Society – 6:00PM, Monday 10 September

Low Phase Noise Signal Generation Utilizing Oscillators, Resonators & Filters and Atomic Clocks

Speaker: Prof. Jeremy Everard, University of York



Oscillators are used in almost all consumer and professional electronic systems and the phase noise and jitter set the ultimate performance limit in navigation, communications and RADAR systems. It is therefore essential to develop simple accurate theories and design procedures to produce oscillators offering state of the art performance.

This talk will initially discuss the theory and design of a wide variety of oscillators offering the very best performance. Typically, this is achieved by splitting the oscillator design into its component parts and developing new amplifiers, resonators and phase shifters which offer high Q, high power handling and low thermal and transposed flicker noise.

Key features of oscillators offering the lowest phase noise available will be shown, for example: a 1.25GHz

DRO produces -173dBc/Hz at 10kHz offset and a noise floor of -186dB and a 10 MHz crystal oscillator shows -123dBc/Hz at 1Hz and -149 at 10Hz.

New compact atomic clocks with ultra-low phase noise microwave synthesizer chains (with micro Hz resolution) will also be briefly described to demonstrate how the long-term stability can be improved.

New printed resonators (and thereby filters) demonstrate Qs exceeding 540 at 5GHz on PCBs and > 80 at 21GHz on GaAs MMICs. These resonators produce near zero radiation loss and therefore require no screening. L band 3D printed resonators demonstrate high Q (> 200) by selecting the standing wave pattern to ensure zero current through the via hole and new ultra-compact versions (4mm x 4mm) have been developed for use inside or underneath the package. Alumina based resonators demonstrating Qs >200,000 at X band have also been produced. Tunable versions (1%) have recently been developed.

As an academic, the aim is to produce the state of the art through insight and understanding, as well as to explain this to others. The author ran the first course on oscillators including a lab class at IMS 09. This was repeated in 2010, 2011. A battery powered lab kit offering 5 experiments with full theoretical and simulation support was provided. The kit also produced the state of the art performance with flicker noise corners around 200Hz. The methodology behind this course will be described. Theory and 5 experiments on the same day was part of the reason for success.

The next generation of oscillators will offer orders of magnitude improvement in performance. Our current attempts to do this will be described.

Speaker bio: Jeremy Everard (M'90) obtained his BSc Eng. from the University of London, King's College in 1976 and his PhD from the University of Cambridge in 1983. He worked in industry for six years at the GEC Marconi Research Laboratories, M/A-Com and Philips Research Laboratories on Radio and Microwave circuit design. At Philips he ran the Radio Transmitter Project Group.

He then taught RF and Microwave Circuit design, Opto-electronics and Electromagnetism at King's College London for nine years while leading the Physical Electronics Research Group. He became University of London Reader in Electronics at King's College London in 1990 and full Professor of Electronics at the University of York in September 1993. At York, he has also taught analogue IC design, filter design, Electromagnetism and RF & microwave circuit design.

In September 2007, he was awarded a five-year research chair in Low Phase Noise Signal Generation sponsored by BAE Systems and the Royal Academy of Engineering.

In the RF/Microwave area his research interests include: The theory and design of low noise oscillators using inductor capacitor (LC), Surface Acoustic Wave (SAW), crystal, dielectric, transmission line, helical and superconducting resonators; flicker noise measurement and reduction in amplifiers and oscillators; high efficiency broadband amplifiers; high Q printed filters with low radiation loss; broadband negative group delay circuits and MMIC implementations.

His research interests in Opto-electronics include: All optical self-routing switches which route data-modulated laser beams according to the destination address encoded within the data signal, ultra-fast 3-wave opto-electronic detectors and mixers for TeraHertz applications and distributed fibre optic temperature sensors. Most recently, atomic clocks using coherent population trapping and ultra-low phase noise microwave flywheel oscillator synthesizer chains with micro Hz resolution have been developed.

He has published papers on: oscillators, amplifiers, resonators and filters, all optical switching, optical components, optical fibre sensors and mm-wave optoelectronic devices and a book on 'Fundamentals of RF Circuit Design with Low Noise Oscillators (Wiley) - New edition in progress -. He has filed Patent applications in many of these areas. He is a member of the IET, London and the IEEE (USA).

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Entrepreneurs' Network - 6:00PM, Tuesday, 11 September

Succeeding in Business ...With Someone Else's Money: 10 Rules for Successful Early Stage Investing

Right now, entrepreneurship in general, startups specifically and the investment world of venture capital are super-hot everywhere and especially in "The Startup Capital of America", right here in Boston. In this just maybe overheated summer and fall of high valuations, electric scooter deals and pet food home delivery apps, we thought that it would be best to take a step back and think through the basics of early stage investing from both sides of the table. Join us on September 11th to listen to and engage with Jennifer Jordan and Jack Derby, two veteran investors and entrepreneurs.

A few slides just to keep focused
Real life time experiences to share around "The 10 Rules"

An opportunity to actively engage in answering the questions you always wanted to ask.

Agenda:

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

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

Speakers:

Jennifer Jordan is an investor and builder. She believes in founders committed to a strong inclusive culture. Her investments leverage the power of data and automation



to transform industries. Most recently she served as VP at MassVentures, an early stage VC focused on Massachusetts high technology companies. Jennifer led the firm's investments in: Ginkgo Bioworks, ClearGov, Spiro.ai, MachineMetrics, and Curoverse (acquired by Veritas Genetics).

Jennifer served on the Board of Directors for ClearGov, Spiro.ai, MachineMetrics, and Board on Track. She currently serves on the Boards of the MIT Enterprise Forum – Cambridge, and Amazing.Community, which helps women re-enter, pivot, or remain in the workforce.

She was a member of the Golden Seeds angel investor network, led Entrepreneurship for the MIT Accelerating Information Technology Innovation program sponsored by Google in Colombia, and is an active a mentor at MIT, Harvard iLab, TechStars, FinTech Sandbox, and MassChallenge.

Jennifer was Corporate VP of Investor Relations at Cadence Design Systems and before that SVP and Sr. Equity Research Analyst growing Black & Company into a mid-tier investment bank acquired by Wells Fargo Securities. She holds the title Goeroe in the Indonesian Martial Art Poekoelan Tjimindie Tulen, an MBA from MIT Sloan, and a Bachelors from Reed College.



Jack Derby, Director, Tufts Entrepreneurship Center, Cummings Family Professor of Entrepreneurship (Jack is both speaker and moderator for this meeting) Jack is responsible for the Tufts University Entrepreneurship Center where he teaches two courses and manages a highly engaged and active center

of professors and students constituting the largest minor on campus. The Center hosts 20+ entrepreneurship events each year culminating in the \$100K New Ventures Competition ranked by Forbes as one of the leading university competitions in the U.S. Jack is passionate about Tufts and its students and has received the Henry and Madeline Fisher Award voted by the students as the most highly ranked teacher on campus.

Prior to forming a management consulting firm, Jack served as CEO of Mayer Electronics, President of CB Sports, President of Litton Industries Medical Systems, CEO of Datamedix and President of Becton Dickinson Medical Systems. For his work as an entrepreneur, co-founding nine companies, Jack was named to Mass High Tech's All-Star Team. He received the Pro Bono Publico award from the Smaller Business Association of New England, the Meritorious Service Award from the Association for Corporate Growth, and the Vincent Fulmer Distinguished Service Award from the MIT Enterprise Forum where he served as Chairman. He's an active board member in a number of companies and with a long investing history as an early stage investor as General Partner at Kestrel Ventures, Chairman of Common Angels and a General Partner at Converge Ventures.

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

Location: Draper Labs, Hill Building, One Hampshire Street, Cambridge, MA

Registration:

<https://boston-enet.org/event-2990477/Registration>

COST AND REGISTRATIONS: ENET meetings are free to ENET members and \$10 for non-members. To expedite sign-in for the meeting, we ask that everyone -- members as well as non-members -- pre-register for the meeting online. Pre-registration is available until midnight the day before the meeting. If you cannot pre-register, you are welcome to register at the door.

REFRESHMENTS: PIZZA, SALAD AND SOFT DRINKS WILL BE SERVED AT THE MEETING.

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

PUBLIC TRANSPORTATION: Kendall Square stop on the Red Line.

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

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Robotics and Automation Society – 6:30PM, Wednesday, 12 September

Collaborative Robotics in Practice: Opportunities, and Challenges



Collaborative robots that work in close coordination with humans in the same work environments have the potential to transform processes in many application areas including manufacturing, healthcare and logistics. This talk will provide an overview of our ongoing work in this area and discuss both opportunities and challenges to accelerate research and development in collaborative robotics.

Taskin Padir is an Associate Professor in the Electrical and Computer Engineering Department at Northeastern University. He received his PhD and MS degrees in electrical and computer engineering from Purdue University. He holds a BS in electrical and electronics engineering from the Middle East Technical University in Turkey. He is the Director of Robotics and Intelligent

Vehicles Research Laboratory (RIVeR Lab). He is also the co-founder of the Robotics Collaborative at Northeastern. His research interests include supervised autonomy for humanoid robots, shared autonomy for intelligent vehicles, and human-in-the-loop control systems with applications in exploration, disaster response, personalized in-home care, and nuclear decommissioning. His projects have been sponsored by NSF, NASA, DOE-EM, DARPA, Mass Seaport Economic Development Council and many industry partners. Professor Padir led project teams for the NASA Sample Return Robot Centennial Challenge, SmartAmerica Challenge and the DARPA Robotics Challenge (DRC). Padir currently leads one of two research groups selected by NASA to develop autonomy for humanoid robot Valkyrie.

Meeting Location: Northeastern University, Room 140, Interdisciplinary Science and Engineering Complex, 805 Columbus Avenue, Boston

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Reliability Society – 5:30PM, Wednesday, 12 September

Undersea MVDC Power Distribution System

Dr. Marcel P.J. Gaudreau Diversified Technologies, Inc.



Dr. Marcel P.J. Gaudreau Diversified Technologies, Inc. (DTI) has developed and fielded a significant advance in remote (undersea) power network technology using high-voltage, solid-state DC-to-DC power conversion. The Region Scale Nodes (RSN) project, part of the National Science Foundation Ocean

Observatories Initiative, is an ambi-

tious effort to provide unprecedented power (10 kW at 10 kVDC) and bandwidth (10 Gbps) to several scientific hubs on the seafloor off the coast of Oregon. Seven independently-controllable 10 kW medium-voltage power converter (MVPC) nodes, designed to last for 25 years, have been in operation for the past six years undersea at depths up to 3,500 m (2.2 miles). Two on-shore DTI 100 kW power supplies provide redundant DC power to an undersea power cable hundreds of kilometers-long operating at 10 kV and up to 100 kW. At each undersea node, DTI's high-voltage solid-state switching technology is used to produce a MVPC which steps the network's 10 kVDC backbone voltage to 375 VDC in order to power each node locally.

Power delivered at this low voltage is available to support a wide range of sensors, electronics, repeaters, motors, or remotely operated vehicles. Beyond pure functionality, the most important specification of the converter is reliability. Repair requires not only bringing the converter to the surface, but also lifting several miles of cable off the seafloor (reconnection must be done dry). Accordingly, the nodes were designed for extreme longevity and resilience, with 90% probability of failure-free operation for 25 years (or a mean time between failures (MTBF) of approximately 2.2 million hours). DTI systems achieve such long lifetimes due to careful engineering, including minimizing component count, derating components, and using proper construction techniques and controls.

AUTHOR BIO: Dr. Marcel P.J. Gaudreau, P.E. is President and Chief Technical Officer of Diversified Technologies, Inc. (DTI), which he founded in 1987. Dr. Gaudreau is the principal inventor of DTI's solid-state PowerMod™ technology, awarded R&D 100 Awards in 1997 and 1999 as one of the most significant new technology products of the year. He has been responsible for advancing the state-of-the-art in solid-state high-power electronics across a variety of applications, including high-power switching power supplies and high-power amplifiers.

Dr. Gaudreau earned his B.S. in physics, from the Massachusetts Institute of Technology (MIT) while building a high precision charge monitoring system for the Bates Linear Accelerator. Dr. Gaudreau acquired his M.S. in Aeronautical and Astronautical Engineering at the Charles Stark Draper Instrumentation Laboratory; and Sc.D. in Electrical Engineering and Computer Science at the MIT Plasma Fusion Center in 1981. Dr. Gaudreau is a Senior Member of the IEEE and a registered Massachusetts Professional Electrical Engineer.

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

Registration:

<http://ewh.ieee.org/r1/boston/rl/events.html>

Directions to 3 Forbes Road, Lexington, MA:

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

*Photonics Society – 7:00PM, Wednesday, 19 September***Dr. Toshiaki Koike-Akino, Mitsubishi Electric Research Laboratories**

Toshiaki Koike-Akino received the B.S. degree in electrical and electronics engineering, M.S. and Ph.D. degrees in communications and computer engineering from Kyoto University, Kyoto, Japan, in 2002, 2003, and 2005, respectively. During 2006–2010, he was a Postdoctoral Researcher with Harvard University, and since 2010, he has been with Mitsubishi Electric Research Laboratories, Cambridge, MA, USA. His research interests include digital signal processing for data communications and sensing. He received the IEEE GLOBECOM'08 Best Paper Award and the IEEE GLOBECOM'09 Best Paper Award.

This meeting begins at 7 PM Wednesday, Sept 19th, 2018 and will be located at 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. Pizza 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 3 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 And Aerospace Electronic Systems Society – 4:00PM, Wednesday, 19 September

Metamaterials For Low Cost Electronic Scanning, Wideband Conformal Antennas, Cloaking (The Invisible Man), Stealth And Waim

Dr. Eli Brookner, Raytheon Company (Retired), IEEE AESS Distinguished Lecture



METAMATERIALS: Metamaterials have gained much interest in recent years because they offer the potential to provide low cost electronic scanning antennas and to provide target stealth. Metamaterials are man-made materials in which an array of structures having a size less than a wavelength are embedded. These materials have properties not found in nature, like a negative index of refraction. Much progress has been made using metamaterials.

For Cloaking and Stealthing of Targets: Target cloaking (making them invisible) has been demonstrated at microwaves over a narrow bandwidth using metamaterials. Cloaking has been demonstrated over a 50% bandwidth at L-band using fractal metamaterials. Stealthing by absorption using a thin flexible and stretchable metamaterial sheet has been shown to provide 6 dB absorption over an 8 to 10 GHz band, with greater absorption over a narrower band. Using fractals sheets < 1 mm thick simulation has shown a 20dB absorption over a band from 10-15 GHz and 10 dB from 2-20 GHz. Good absorption was achieved for all incident angles and polarizations. It looks very promising for stealthing

aircraft and other military targets over a wide band for all aspect angles and polarizations.

For Communication and Radar Antennas: Kymeta



demonstrated transmission to satellites and back using Ku band antennas which use metamaterial resonators in a very novel way to realize electronic steering potentially at low cost. Echodyne and Metawave (formerly Xerox's PARC) have developed metamaterial arrays for radar. How Kymeta and Echodyne antennas work is given. The Army Research Laboratory funded the development of a metamaterial 250 to 505 MHz low profile antenna with a $\lambda/20$ thickness for replacement of the very visible tall whip antennas on HMMWVs thus pro-

**METAWAVE 77 GHZ
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viding greater survivability. Complementing this, a conventional tightly coupled dipole antenna (TCDA) has been developed which provides a 20:1 bandwidth with a $\lambda/40$ thickness. The two together could be employed in escort jammer aircraft like the USA Next Generation

Jammer on the Ea-1G Growler covering the band from VHF to Ku band. They could serve as conformal or low profile antennas on the aircraft.



Other Applications: Metamaterial has been used in cell phones to provide antennas that are 5X smaller ($1/10\text{th } \lambda$) having 700 MHz to 2.7 GHz bandwidth. Under Army funding isolation equivalent to 1 m separation in antennas with 2.5 cm separation has been demonstrated allowing simultaneous transmission and reception for a relay. It has the potential for use in phased array for wide angle impedance matching (WAIM) by placing it between the radiating elements to reduce mutual coupling. Using metamaterial one can focus 6X beyond diffraction limit at $0.38 \mu\text{m}$ (Moore's Law marches on); 40X diffraction limit, $\lambda/80$, at 375 MHz.

The meeting will be held at the MIT Lincoln Laboratory's Main Cafeteria, 244 Wood Street., Lexington, MA at 4:00 PM. Refreshments will be served at 3:30 PM.

Please use the Wood Street Gate and park where directed. Normal entrance to the Main Cafeteria is via the outdoor staircase to the left of reception (follow signs). Please note that there is ongoing construction in the area. If the staircase is closed, or if you would prefer to use the elevator, enter via reception, and you will be escorted by groups down to the Main Cafeteria.

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

For other information, contact Lori Jeromin, 781-981-4152.

Computer Society and Engineering in Medicine and Biology (EMBS) and Geoscience and Remote Sensing (GRSS) Societies and GBC/ACM – 7:00PM, Thursday, 20 September

The Science and the Engineering of Intelligence

Tomaso Poggio, MIT



MIT Room 32-G449 (Kiva)

This talk will be webcast on the MIT CSAIL Youtube channel <http://www.youtube.com/channel/UCYs2iUgk-sAhgoidZwEAimmg/live> beginning at 7pm.

In recent years, artificial intelligence researchers have built impressive systems. Two of my former postdocs, Demis Hassabis and Amnon Shashua, are behind two recent success stories of AI: AlphaGo and Mobileye, based on two algorithms originally suggested by discoveries in neuroscience: deep learning and reinforcement learning. To create artifacts that are as intelligent as we are, we need several additional breakthroughs. The first half of the talk will discuss the question of what they may be and where they may come from. I will argue that at the level of the hardware, biophysical properties of dendritic trees suggest more powerful nonlinearities than today's Rectified Linear Units (RELU's). At the level of the computation, basic aspects of visual intelligence require architectures beyond supervised and unsupervised learning. In the second half of the talk, I will sketch recent theoretical results, based on classical machine learning, to explain why deep networks work as well as they do.

Tomaso Poggio is one of the founders of computational neuroscience. He pioneered models of the fly's visual system and of human stereovision, introduced regularization theory to computational vision, made key contributions to the biophysics of computation and to learning theory, developed an influential model of recognition in the visual cortex and more recently a theory of invariant representations in sensory cortex.

He is the Eugene McDermott Professor in the Department of Brain and Cognitive Sciences and at the Computer Science and Artificial Intelligence Laboratory

(CSAIL). He is a founding member of the McGovern Institute, and is the director of the Center for Brains, Minds, and Machines (CBMM), a multi-institutional collaboration headquartered at the McGovern Institute. He joined the MIT faculty in 1981, after ten years at the Max Planck Institute for Biology and Cybernetics in Tübingen, Germany. He received a Ph.D. in 1970 from the University of Genoa. Poggio is a Foreign Member of the Italian Academy of Sciences and a Fellow of the American Academy of Arts and Sciences. He was awarded the 2014 Swartz Prize for Theoretical and Computational Neuroscience.

The research in the Poggio Lab is guided by the belief that learning is at the core of the problem of intelligence, both biological and artificial. Learning is thus the gateway to understanding how the human brain works and for making intelligent machines. Thus, Poggio Lab studies the problem of learning within a multidisciplinary approach.

Current research in the Poggio Lab is relevant not only for understanding higher brain function, but also for the mathematical and computer applications of statistical learning. Three basic directions of research in his group are: mathematics of statistical learning theory, engineering applications (in computer vision, computer graphics, bioinformatics and intelligent search engines) and neuroscience of visual learning. (1) In the theory domain, he has focused on the foundations of learning theory and on a formal characterization of necessary and sufficient conditions for predictivity of learning. (2) The engineering applications include bioinformatics projects, computer vision for scene recognition and trainable, man-machines interfaces. (3) In the computational neuroscience area, his research is centered on object recognition and, in particular, on a quantitative theory of the ventral stream in the visual cortex underlying object recognition and object categorization. The theory and its computer implementation has become a tool for analyzing, interpreting and planning experi-

ments in extensive collaborations with experimental neuro-scientists. This should lead to a better and more coherent understanding of the neural mechanisms of visual recognition and of the normal and abnormal functions of the cortex.

This joint meeting of the Boston Chapters of the IEEE Computer, Engineering in Medicine and Biology (EMBS) and Geoscience and Remote Sensing (GRSS) Societies and GBC/ACM will be held in MIT Room 32-G449 (the Kiva conference room on the 4th floor of the Stata

Center, building 32 on MIT maps). You can see it on this map of the MIT campus.

Up-to-date information about this and other talks is available online at <http://ewh.ieee.org/r1/boston/computer/>.

You can sign up to receive updated status information about this talk and informational emails about future talks at <http://mailman.mit.edu/mailman/listinfo/ieee-cs>, our self-administered mailing list.

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Women In Engineering – 6:00PM, Thursday, 27 September

Returning to Work as an Engineering Professional – Discussion & Tips

Please join us for a roundtable presentation and discussion about how to return to work in the STEM sector— with tips and re-entry success stories-- and why the tight labor market and other workplace trends make this a great time to get back in.

FlexProfessionals, a staffing company focused on part-time and flexible work opportunities for experienced professionals, will be our expert presenters. With many years of experience helping women get back into

the workforce after a career break, FlexProfessionals, in addition to sharing insights, tips and resources for pursuing part-time or flexible positions, will preview the flexible and part-time STEM-based opportunities they currently have available at companies.

The presentation and discussion will begin at 6:00 followed by time for networking.

Meeting Location: Morse Barnes-Brown & Pendleton located at 230 Third Avenue, 4th Floor, Waltham, MA

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...let the countdown begin
8 MORE WEEKS UNTIL HPEC '18

Welcome to HPEC 2018

The IEEE High Performance Extreme Computing Conference (HPEC 18) will be held in the Greater Boston Area, Massachusetts, USA on 25 - 27 September 2018. The HPEC charter is to be the premier conference in the world on the confluence of HPC and Embedded Computing.

TECHNICAL PROGRAM



[Conference Registration](#) is now open! Early Bird Conference Registration Cut-off date is August 27, 2018

[Online Hotel Reservation](#) is now open! September in New England is a busy time, so please book your room early!



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>



2018 IEEE International Symposium on Technologies for Homeland Security (HST)

23 - 24 October 2018

Westin Hotel, Waltham, MA USA



www.ieee-hst.org

Keynote Speakers:

Paul McHale, President, Civil Support International, LLC.

*Erin Coughlan de Perez, Manager, Climate Team,
Red Cross Crescent Climate Centre*

Technical Tracks:

- *Humanitarian Assistance & Disaster Relief*
 - *Cyber Security*
- *Land/Maritime Border & Critical Infrastructure Protection*
 - *Biometrics & Forensics*

100 plenary, invited, oral and poster papers!

Networking receptions!

Save travel costs with this international IEEE conference held locally!

Save \$\$\$ and register early...deadline September 24, 2018!

***Breakfast, coffee breaks, lunches, reception, over 100 technical papers
Proceeding included with registration!***



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

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
- 5 G
- 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/call-for-papers

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/call-for-papers

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

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Our Blog



Radar Conference 2019

Boston



Revolutions in Radar

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About the Conference

22-26 April 2019

Westin Waterfront Hotel
Boston, Massachusetts, USA

www.radarconf19.org

A radar revolution is underway, made possible by the rapid evolution of digital electronics, and powered by new innovative architectures, advanced components, novel waveforms and sophisticated processing techniques. Please join us in historic Boston, birthplace of the original American Revolution, as we continue this new revolution in radar technology. The beautiful Westin Waterfront hotel, located in the heart of Boston's seaport district, will make the perfect venue for the international community as we meet to share the latest advances in radar. The conference will include three days of parallel technical sessions, and two days of tutorials with ample opportunity to interact with international radar experts from around the world.

Tutorials and Special Sessions

Please submit suggestions for tutorial topics or special sessions to the Technical Program Chair at info@radarconf2019.org

Suggested Topics

- Radar phenomenology
- Antenna technology
- Radar Electronics
- Over the horizon radar (OTHR)
- Bistatic, multistatic & passive radar
- Networked & distributed radar
- Commercial radar
- mm-wave & THz radar
- Environmental Sensing
- Airborne & space based
- SAR and ISAR imaging
- ATR and classification
- Tracking
- Cognitive methods
- Waveform diversity
- Spectrum sharing
- Electronic warfare
- Emerging Systems and Technology

Paper Submission Procedures

See website for details

Important Dates	
Special Session Proposals Due	17 Aug 2018
Tutorial Submissions Due	30 Aug 2018
Paper Submissions Due	17 Oct 2018
Notification of Acceptance	14 Jan 2019
Paper Submission Due	25 Feb 2019

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Andrew Zai

The Fundamentals of Bioelectronics for Applications in Neuroprosthetics

Date & Time: Friday, October 26, 2018; 800AM - 3:00PM

Speaker: Marie Tupaj, Assistant Professor, Middlesex Community College

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

Description: This course covers the field of bioelectronics, specifically electrode design and implementation, for applications in neuroprosthetics. Electrode materials, electrode array fabrication, electrode modeling, electrical stimulation parameters, bioelectrode charge transfer mechanisms, and interfaces with biological systems are discussed. The fundamental theories of electromagnetism and a history of bioelectromagnetics are reviewed.

Target Audience: This class is designed for engineers transitioning into the field of bioelectronics, electronics engineers interested in neurobiologics, and professionals looking for an understanding of bioelectronics to complete their job function.

Outline

Module #1: Electromagnetics in Biological Systems

The introductory lecture will identify and describe electromagnetic fields in biology and explain the effects of electric fields when applied to biological tissue and living systems. Topics covered: Maxwell's Equations, bioelectromagnetics, biological effects (i.e., tissue growth, regeneration, cell communication) and biological mechanisms (i.e., action potentials, impulse propagation, ion channel and receptor activation) of electrical stimulation, and charge transfer to biological systems.

Module #2: Bioelectronics: Electrode Materials and Fabrication

The second lecture will discuss electrode materials,

electrode configurations, and electrode fabrication techniques. Topics include: key electrode properties (biocompatibility, mechanics, surface chemistry, charge transfer), common electrode materials (gold, carbon, PEDOT), electrode designs (capacitors, coils, microelectrode arrays), microelectrode array structure, electrode arrays (microwires, polymer arrays), and electrode microfabrication techniques (sputtering).

Module #3: Bioelectronics: Electrode Characterization and Testing

Topics of this lecture include: electrode characterization techniques (impedance, wettability, roughness, surface IR, conductivity, resistance, thickness), and electrode rejuvination.

Module #4: Bioelectronics: Electrode Modeling and Stimulation

Topics include: electrode modeling with COMSOL, field applications (functional electrical stimulation, pulses, fields, etc.), stimulation parameters, neurotransmission, neural recordings (local field potentials, noise), and safety (device/product safety, material safety).

Module #5: Neuroprosthetic Implantation and Biological Interfaces

This lecture discusses electrode implantation, applications, and use. Topics include: electrode sterilization techniques, biomaterial interfaces, short term and long term cell-tissue responses, neuroprosthetic products (Cochlear implants, vagus nerve stimulation, deep brain stimulation, TEMS, chronic pain, non-invasive brain electrical stimulation), and wireless devices.

Upon Completion of This Course You Will:

- Understand electric fields effects on cells and the optimal parameters for a biological response
- Learn bioelectrode design and fabrication techniques

About the Instructor:

Marie Tupaj is a biomedical scientist and engineer with 10 years' experience in biomaterials, bioelectronics, and nerve cell biology. Marie has a B.S. in electrical engineering and a Ph.D. in biomedical engineering from Tufts University. As a doctoral student, Marie designed electrodes for encouraging nervous tissue development and developed silk based biomaterial conduits for peripheral nerve regeneration. These projects were supported by the NIH and the Armed Forces Institute of Regenerative Medicine. As a postdoctoral fellow, Marie fabricated miniaturized biosensors and chemically modified surfaces for applications in neuroprosthetics.

Marie has worked at high tech and biotech companies in the Boston area including Sun Microsystems, Organogenesis, and Histogenics Corporation. She is currently an Assistant Professor at Middlesex Community College in Bedford, MA.

**Decision (Run/Cancel) Date for this Courses is
Friday, October, 19 2018**

Payment received by Oct. 12

IEEE Members	\$225
Non-members	\$250

Payment received after Oct. 12

IEEE Members	\$250
Non-members	\$275

<http://ieeeboston.org/%20fundamentals-of-bioelectronics-for-applications-in-neuroprosthetics/>

Call for Course Speakers/Organizers

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

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

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

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

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

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

Applications of Python for Digital Design and Signal Processing

Time & Date: 6 - 9PM; Thursdays, Nov. 15, 29, Dec. 5 13 (Note Dec. 5 is a Wednesday)

Speaker: Dan Boschen

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

Course Summary

This is a bring-your-own laptop, hands-on course in the popular and powerful open source Python programming language. Dan provides simple, straight-forward navigation through the multiple configurations and options, providing a best-practices approach for quickly getting up to speed using Python for solving signal processing challenges. Students will be using the Anaconda distribution, which combines Python with the most popular data science applications, and will be making extensive use of the Jupyter Notebook.

The course begins with basic Python data structures and constructs, including key "Pythonic" concepts, followed by an overview and use of popular packages for scientific computing enabling rapid prototyping for system design. Once a basic working knowledge of the language is established, students will create example designs including a sigma delta converter and direct digital synthesizer both in floating point and fixed point. This will include considerations for cycle and bit accurate models useful for digital design verification (FPGA/ASIC), while bringing forward the signal processing tools for frequency and time domain analysis.

Target Audience:

This course is targeted toward users with little to no prior experience in Python, however familiarity with other modern programming languages and an exposure to object-oriented constructs is very helpful. Students should be comfortable with basic signal processing concepts in the frequency and time domain. Familiarity in Matlab or Octave is not required, but the equivalent

operations in Python using the Numpy package will be provided for those students that do use Matlab and/or Octave for signal processing applications.

A laptop (Mac or PC) preconfigured with Anaconda is required; the specific installation instructions will be emailed to students prior to the start of class.

Benefits of Attending/ Goals of Course:

Each student that completes the course will have the tools in place to immediately put Python to use in their current work environment for scientific computing applications. After this course, you will love using Python as much as Dan does!

Topics / Schedule:

Class 1:

Intro to core Python constructs, functions, iterators, reading/writing data files, Jupyter Notebooks.

Class 2:

Using popular packages including Itertools, Numpy, Scipy, Matplotlib, Pandas, h5py.

Class 3:

Implementation examples including Sigma Delta Converter and DDS, bit/cycle accurate models, analysis.

Class 4:

Continuation of examples with class constructs and using the Spyder IDE, debugging techniques.

Speaker's Bio:

Dan Boschen has a MS in Communications and Sig-

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

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

**Decision (Run/Cancel) Date for this Courses is
Thursday, November 1, 2018**

Payment received by Nov. 1

IEEE Members \$325

Non-members \$350

Payment received after Nov. 1

IEEE Members \$350

Non-members \$375

<http://ieeeboston.org/%20python-for-signal-processing/>

Call for Articles

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

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

Professional development articles should have broad applicability to the engineering community and should not explicitly promote services for which a fee or payment is required. A maximum length of two to three pages would be best.

To ensure quality, technical submissions will be reviewed by the appropriate technical area(s). Professional articles will be reviewed by the publications committee for suitability. The author will be notified of the reviewers' decision.

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

We are excited about this new feature and hope you are eager to participate!

Submissions should be sent to;
ieeebostonsection@gmail.com

DSP for Wireless Communication

Time & Date: 6 - 9PM; Thursdays, Oct. 11, 18, 25, 30 (**Note Oct. 30 is a Tuesday**)
Speaker: Dan Boschen
Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA

Course Summary:

This course is a fresh view of the fundamental concepts of digital signal processing most applicable to practical real world problems and applications in radio communication systems. This course will build an intuitive understanding of the underlying mathematics through the use of graphics, visual demonstrations, and real world applications in GPS and mixed signal (analog/digital) modern transceivers. This course is applicable to DSP algorithm development with a focus on meeting practical hardware development challenges in both the analog and digital domains, and not a tutorial on working with specific DSP processor hardware.

Target Audience:

All engineers involved in or interested in signal processing applications. Engineers with significant experience with DSP will also appreciate this opportunity for an in depth review of the fundamental DSP concepts from a different perspective than that given in a traditional introductory DSP course.

Benefits of Attending/ Goals of Course:

Attendees will build a stronger intuitive understanding of the fundamental signal processing concepts involved with digital filtering and mixed signal communications system design. With this, attendees will be able to implement more creative and efficient signal processing architectures in both the analog and digital domains.

Topics / Schedule:

Class 1:

Correlation, Fourier Transform, Laplace Transform

Class 2:

Sampling and A/D Conversion, Z –transform, D/A Conversion

Class 3:

IIR and FIR Digital filters, Direct Fourier Transform

Class 4:

Windowing, Digital Filter Design, Fixed Point vs Floating Point

Class 5:

Fast Fourier Transform, Multirate Signal Processing, Multi-rate Filters

Speaker's Bio:

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

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

Decision (Run/Cancel) Date for this Courses is Thursday, October 4, 2018

Payment received by Sept. 27

IEEE Members	\$350
Non-members	\$385

Payment received after Sept. 27

IEEE Members	\$385
Non-members	\$420

<http://ieeeboston.org/%20digital-signal-processing-dsp-wireless-communications/>

Write Right Agile User Stories and Acceptance Test Rights

2 - Day Intensive Seminar Workshop

Time & Date: 8:30AM - 5PM; Tuesday & Wednesday, December 18 - 19

Speaker: Robin Goldsmith, Go Pro Management, Inc.

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

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
 Exercise: Re-review Your User Stories
 Exercise: Re-review their Acceptance Criteria
 Exercise: Write another User Story
 Exercise: Review Your New User Story

WRITING MORE SUITABLE USER STORIES

Focus on what provides value
 Users, customers, and stakeholders
 Exercise: Identify Overlooked Stakeholders
 Problem Pyramid™ tool to get on track
 Exercise: Find Value
 Exercise: Using the Problem Pyramid™
 Exercise: Business Requirement User Stories
 Issues identifying requirements
 Exercise: Size a User Story
 Strategies for splitting user stories
 Exercise: Split a User Story

AND USER STORY ACCEPTANCE TESTS

Confirming vs. defining requirements
 Suitability of using for quality factors
 Differences from test-first unit tests
 Missed and unclear criteria
 Turning criteria into tests, issues
 How many tests are really needed
 Given, when, then format
 Exercise: Write User Story Acceptance Criteria
 Exercise: Design their Tests
 Exercise: Review Your User Stories/Tests

TESTING CONCEPTS

Should tests equal requirements
 How testing actually works
 Defining correctness independently
 Test-first illusion
 UAT vs. User Story Acceptance Test
 Demo illusory UAT
 Test design techniques
 Checklists and guidelines
 Decision trees, decision tables
 Boundary testing
 Testing is main means to control risk
 Reactive vs. proactive risk analysis
 Putting Agile TDD on steroids
 Exercise: Applying Proactive Risk Analysis

PRODUCT OWNER VS. BUSINESS ANALYST

Business analysis discovers requirements
 Product owner (PO) role created by Agile
 Essential PO characteristics
 Skills/knowledge for authority
 Product owner viewed as the analyst
 Should a business analyst (BA) be the PO
 Rethinking the PO role
 Exercise: Designing a Better PO Role

(HIDDEN) BACKLOG ISSUES

What is a backlog item
 What else often also are backlog items
 Apples, oranges, and fruitcakes impacts
 Different needs and purposes
 Different appropriate artifacts
 User stories for prioritization on value
 Features for product delivery
 Tasks for estimating, performing work
 Addressing quality factors
 Dealing with defects
 Agile's difficulty scaling and integrating
 Sprint 0
 Spikes
 Exercise: Design a Better Backlog

CONVERSATION CONUNDRUM

Placeholder metaphor
 Developer as BA, pros and cons
 Data gathering and analysis
 Planning an effective interview
 Controlling with suitable questions
 Then a miracle occurs...
 Exercise: Design a Better Conversation

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

**Decision (Run/Cancel) Date for this Courses is
 Tuesday, December 11, 2018**

Payment received by Dec. 4

IEEE Members	\$445
Non-members	\$465

Payment received after Dec. 4

IEEE Members	\$465
Non-members	\$485

Making You a Leader - Fast Track

Date & Time: Monday, December 17; 8:30AM - 5:00PM

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

Speaker: Robin Goldsmith, President, GoPro Management

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

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

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

PARTICIPANTS WILL LEARN:

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

they need to make their projects successful.

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

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, December 10, 2018**

Payment received by Dec. 3

IEEE Members	\$235
Non-members	\$260

Payment received after Dec. 3

IEEE Members	\$260
Non-members	\$280

<http://ieeeboston.org/%20making-leader-fast-track-become-leader-want-need/>

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

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

<http://ieeeboston.org/fundamentals-of-real-time-operating-systems-rt201-on-line-course/>

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

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

Registration Fee: \$350

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

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

Course Objectives

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

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

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

Course Schedule

Getting Started with Embedded Linux

Embedded Linux Training Overview
Linux Terminology, History and the GPL
Building the Kernel Source Code
Embedded Linux Kernels
BSPs and SDKs

Linux References (Books and Online)

BSP Requirements

U-Boot and Bootloader Development

Embedded Linux BSP Development Basics

Basic BSP Development

Files and Filesystem Support

The I/O Subsystem: Talking to Hardware

Memory Management and Paging

Error Handling in Embedded Linux BSPs

Timing and Timers

Interrupt and Exception Handling in BSPs

BSP Deployment Issues and Practices

Embedded Linux SDK Basics

The 3 Pieces of an SDK

Embedded Linux Distributions and the GNU Compiler

Collection (GCC)	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
Bootting Embedded Linux	The Generic Subsystem Model in Detail
Processor Startup	Subsystem Registration
Initial Functions	The Probe and Init Functions
The initcalls	The Show and Store Functions
Using __init Functions	User Access via the /sys Filesystem
NFS Booting	Configuring the New Device Driver
Root File Systems	The udev Linux Application
RAMdisk Booting with initrd	Comparing the Two Driver Models
RAMdisk Booting with initramfs	The Flattened Device Tree (FDT)
initrd vs initramfs	openBoot and its Effect on Embedded Linux
Root File System Development	The Device Tree Script (dts) File
Busybox Development	The Device Tree Compiler (dtc)
Building a RAMdisk for an initrd	The Device Tree Blob (dtb) File
Building a RAMdisk for an initramfs	Building a dtb File
Flash File System Development	Hybrid Device Drivers
	Other fops Functions
Testing and Debug of Embedded Linux BSPs	The Need for ioctl
Kernel Debug and Kernel Probes	Linux Device Driver Subsystems
Kexec and Kdump	Direct Connect Device Drivers
The Linux Test Project (LTP)	Serial/Console Drivers, I2C & SPI
Performance Tuning Embedded Linux BSPs	Real-Time Clocks and Watchdogs
Virtualization	GPIO and the Pinmux
Measuring Embedded Linux BSP Performance	Flash MTDs and Direct Memory Access
Common Considerations	USB, Power and CPU Management
Uncommon Considerations	Video and Audio

PCI and VME
Block Devices
RAMdisk and Flash Filesystems
MMCs and SD Cards
Network Device Drivers
MAC and PHY Device Drivers
net_device and net_device_stats
Network Device Initialization
Device Discovery and Dynamic Initialization
Network Interface Registration
Network Interface Service Functions
Receiving and Transmitting Packets
Notifier Chains and Device Status Notification
Unwired Device Drivers
Wireless Device Drivers (WiFi, WLAN)
Bluetooth and BlueZ
Infrared and IrDA
Cellular from 2G to 5G

Drivers in User Space
Accessing I/O and Memory Regions
User Mode SCSI, USB and I2C
UIO
High-Speed Interconnects
PCIe
iSCSI
Infiniband
FibreChannel
Debugging Device Drivers
kdb, kgdb and JTAG
Kernel Probes
Kexec and Kdump
Kernel Profiling
User Mode Linux
Performance Tuning Device Drivers
Some Final Recommendations

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

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

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 System Memory Performance
Improving Boot Performance	Memory Performance Statistics
Boot Time Optimization	Linux Performance Tools for Memory
The Linux Fastboot Capability	Process-Specific Memory Performance Tools
Building a Smaller Linux	More Stupid Cache Tricks
Building a Smaller Application	Improving I/O and Device Driver Performance
Filesystem Tips and Tricks	Disk, Flash and General File I/O
Some Notes on Library Usage	Improving Overall Performance Using the Compiler
Improving Kernel Performance	Basic Compiler Optimizations
Kernel Hacking	Architecture-Dependent and Independent Optimization
CONFIG_EMBEDDED	Code Modification Optimizations
Configuring printk	Feedback Based Optimization
Test Code	Application Resource Optimization
Configuring Kernel and IO Scheduling	The Hazard of Trust
	An Iterative Process for Optimization
Improving CPU Performance	Improving Development Efficiency
Run Queue Statistics	The Future of Linux Performance Tools
Context Switches and Interrupts	Some Final Recommendations
CPU Utilization	
Linux Performance Tools for CPU	
Process-Specific CPU Performance Tools	
Stupid Cache Tricks	

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

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Software Development for Medical Device Manufacturers (Online Edition)

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

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

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

Module 1

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

Module 2

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

Module 3:

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

- Design Reviews

Module 4:

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

Speaker Bio:

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

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

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

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

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

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

Registration Fee: \$150

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

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

Course chapters

1. Vector Basics
2. Dot Product

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

Instructor's Bio:

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

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

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

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

Registration Fee: \$320

Course Description

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

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

Course Outline

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

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

Course Objective

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

Instructor's Bio

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

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

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

Introduction to Embedded Linux

(Online Edition)

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

Course Summary:

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

Who Should Attend:

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

Course Objectives:

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

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

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

Hardware and Software Requirements

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

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

Additional Reference Materials

Linux Kernel Development by Robert Love

Linux System Programming by Robert Love

Linux Debugging and Performance Tuning by Steve Best

Optimizing Linux Performance by Phillip G. Ezolt

Embedded Linux Primer by Christopher Hallinan

Pro Linux Embedded Systems by Gene Sally

Embedded Linux Development Using Eclipse by Doug Abbott

Linux Device Drivers by Jonathan Corbet et al

Essential Linux Device Drivers by Sreekrishnan Venkateswaran

Course Downloadable Content:

Video Lecture

Hands-On Lab Instructions

Hands-On Lab Solutions

Additional Related Materials

The Basics

Linux Terminology, History and Versioning

The Linux Community: Desktop & Embedded

The GPL

Linux References (Books and Online)

Getting Started

Kernel Source Code

Building the Kernel

Embedded Linux Kernels

Linux 2.6

Basic Kernel Capabilities

Process and Threads Management

Signals and System Calls

Synchronization, IPC and Error Handling

Timing and Timers

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

Debugging

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

An Eclipse Debug Example

Other Debug and Test Tools

Other System-Level Debug Approaches

Process & Threads Management

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

Signals

System Calls

Scheduling

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

Synchronization

Via Global Data
Via Semaphores, Files and Signals

Inter-Process Communications (IPC)

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

Error Handling

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

Timing

How Linux Tells Time

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

Memory Management and Paging

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

Modularization

Creating a Module and Module Loading
Dependency Issues
In Embedded Systems

Shared Libraries

A Shared Library Example
Static and Dynamic Libraries

The I/O Subsystem: A Tale of Two Models

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

Embedded Linux Trends

Development, Monitoring and Testing

Some Final Recommendations

Lecturer:

Mike McCullough is President and CEO of RTETC, LLC. Mike has a BS in Computer Engineering and an MS in Systems Engineering from Boston University. A 20-year electronics veteran, he has held various positions at Tiler, 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

(Online Edition)

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.

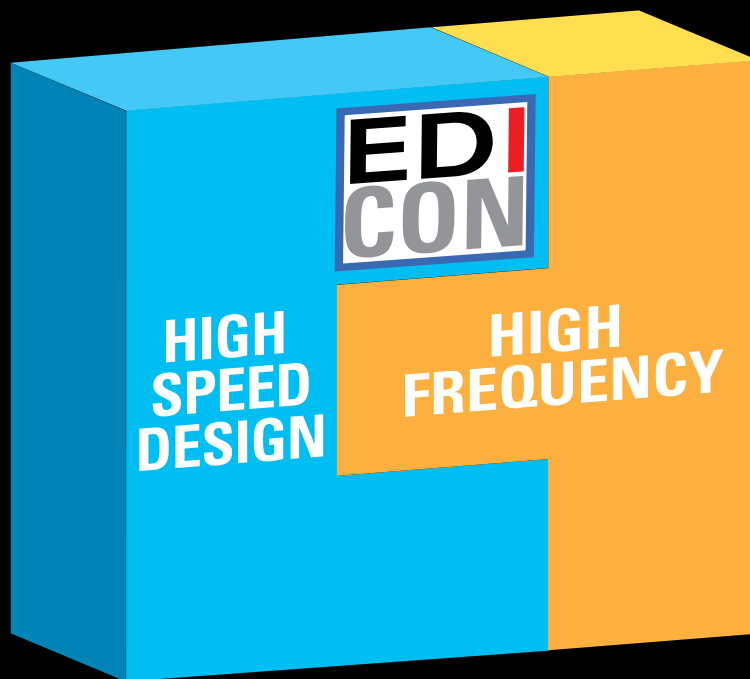
If you have an expertise that you feel might be of interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is

<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.

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