

BOSTON



2019 IEEE SYMPOSIUM
ON PHASED ARRAY
SYSTEMS AND
TECHNOLOGY

P.18

2019 HIGH
PERFORMANCE
EXTREME COMPUTING
CONFERENCE

P.19

2019 IEEE SYMPOSIUM
ON TECHNOLOGIES
FOR HOMELAND
SECURITY

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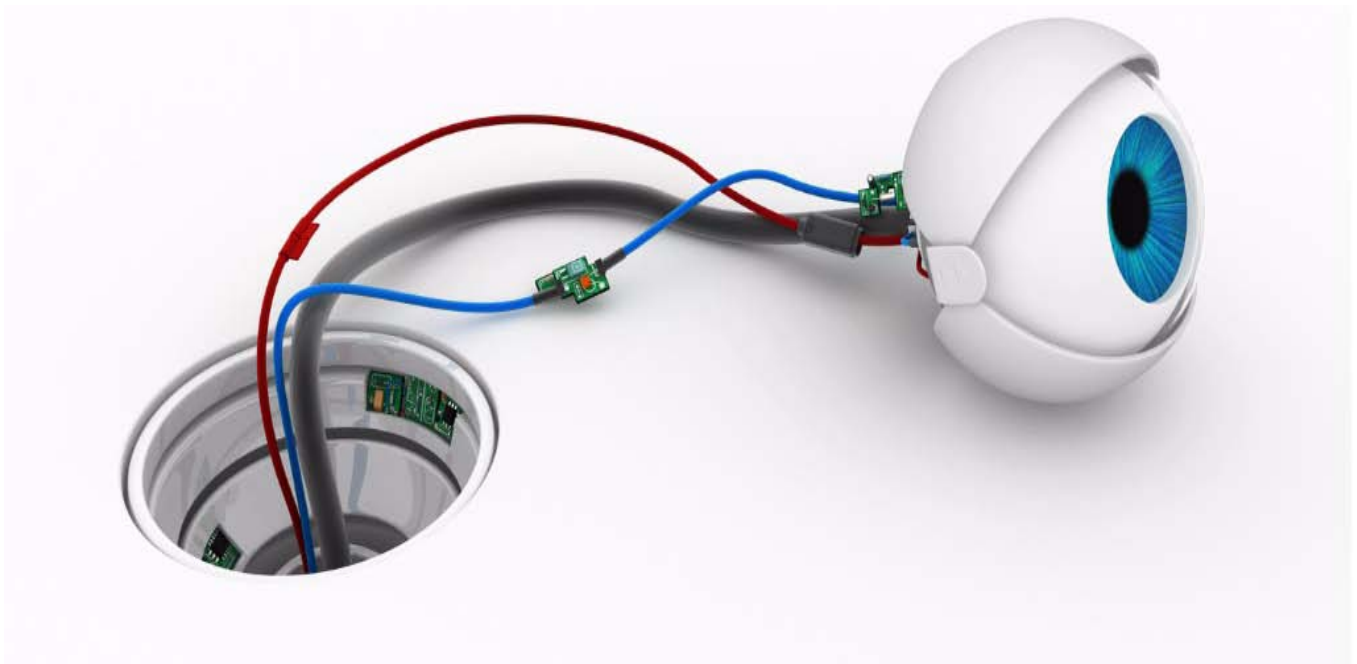
COMMUNICATIONS
SOCIETY CHAPTER

P.12

THE REFLECTOR

ISSUE #9

SEPTEMBER 2019



**2018 Outstanding Section Membership
Recruitment and Retention Performance**

Boston Section

 **IEEE**
*Advancing Technology
for Humanity*

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Encounters with Electricity

by Gil Cooke, 2019 Chair, IEEE Boston Section

The first part of my editorial will be about the Section's milestones program. The second part will be about the release of Fred Stark Pearson's biography, a superstar engineer-entrepreneur who was historically connected with Boston.

Boston's Milestone Program

Our milestone program has been very successful over the years. That's because our electric heritage covers a long time period and we've always had many bright innovators and engineers throughout. Our electrical history covers a time span of about 150 years. Each of the current milestones have been well received by IEEE members and the general public. The following collage of photographs taken at these events speaks for itself. Unfortunately three milestone ceremonies were not photographed, including the Shannon Information Theory dedicated at MIT in 2016. no



The Boston Section should continue to participate in the IEEE milestone program. Although we have been involved in this program from the very beginning, there are many more achievements that deserve to be nominated for recognition by the IEEE. Boston's Executive Committee has slackened off over the last few years for good reasons. First the so-called 'History and Milestone Committee' has dissolved. There are few volunteers interested in historical topics. These volunteers should have the interests and the time to lead the proposed milestone from nomination to final installation. The required research and documentation for a nomination to be successful is well beyond Google. Backup references are often old and hard to find. Meetings and some travelling are involved. Finding the best location for any proposed plaque can be full of surprises especially where an organization has multiple departments and jurisdictions. If corporate architects are involved, don't expect them to welcome your idea to locate the plaque in their atrium. Complete IEEE Guidelines are available to help manage each step of the process. As can be expected, money is often an issue but there are grants available and sponsors which can be solicited. Years ago the History and Milestone Committee was a good vehicle to contact electrical contractors and other groups for financial contributions.

Anyway, in spite of all these obstacles, with readers' encouragement, I believe the Boston Section will continue its involvement with milestones. Other Sections like those on the West Coast are trying to catch up to us. We have many opportunities to choose. Those listed next have been mentioned over the years as worthy candidates:

:

- Raytheon repurposing their magnetron to the

first microwave oven

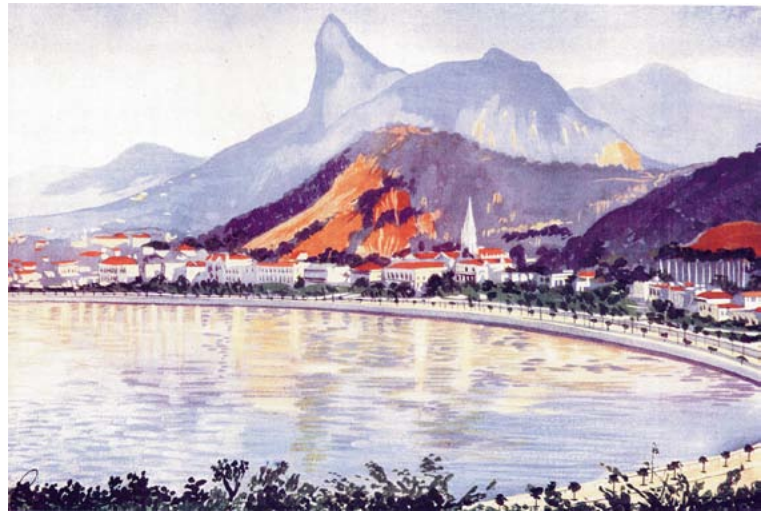
- Submarine Signaling Company of Boston's – network of submarine bells
- First commercial fm broadcasting in New England - the Yankee Network
- First large private marine radio system by United Fruit Company
- The crystal set by GW Pickard, Amesbury MA, 1906
- L-Street Power Station – first to establish frequency controls
- 'VisiCalc'

Announcing the Release of Fred Stark Pearson's Biography

This next topic is NOT a shameless plug to sell books. The information about the release of this new book is relevant because Fred Stark Pearson was in fact one of us. He was a member of the AIEE (1894) before the Boston Section was established in 1903. He was born in Lowell and a graduate engineer from Tufts College. Historically, Fred Stark Pearson engineered Boston's landmark electric mass transit system, the so-called, 'T', which at the time was the world's first and largest, designated in 2004 as an IEEE Milestone. He then left the area to become a global engineer-entrepreneur on three continents. During his career overseas he was received by the royals at Buckingham Palace because of his great engineering deeds for the Empire. His career ended in Spain where a memorial was erected in his honor.

The Pearson Memorial in Barcelona is located in the beautiful district of Pedralbes. I believe this is the only monument memorializing an American engineer. I thought you would like to know that if you visit Barcelona, be aware that certain streets like 'Avenida Pearson' were named after him.

He and his wife Mabel drowned aboard the Lusitania in 1915. He was only 54 when he died, yet his accomplishments on three continents helped reshape the world at the turn of the 19th Century. The book tells the "Lost" Story of Engineer-Entrepreneur Fred Stark Pearson and describes his work in Boston, New York City, Brazil, Mexico, Texas, Canada, and Spain.



An early postcard shows a portion of Rio's streetlights overlooked by Mount Corcovado.

When Fred and Mabel first visited Brazil in 1887, they rode a cog railway to the top of Mount Corcovado. At the time of his visit, he envisioned how this colonial city with its narrow crowded streets could one day be transformed into the city it is today by using modern streetlights, underground system, telephone, consumer gas, replacement of mules with electric streetcars, upgrading the cog railway with electric trams, and supplying the city with hydroelectric energy. He later returned to Brazil and did just that with Rio de Janeiro Tramway, Light and Power Company.

After years of research, his biography is finally available on Amazon.com. The title is "The Existential Joys of Fred Stark Pearson (1861-1915): Engineer, Entrepreneur, Envisioner". Its about this young engineer who stood head and shoulders above most of his contemporaries. An innovator who built systems and built businesses from the emerging inventions of the age, Pearson could claim to have been the central figure in creating the pioneer transit systems in Boston and New York as well as building entire electric utility systems, generating plants, mining, and railroad systems, and more across three continents. Little known today, Pearson was the ultimate 'mover and shaker' of his time, masterminding businesses in North and South America and in Europe; setting standards for quality, reliability, and public service while earning handsome profits for himself and his investors. Because of his tragic death, along with his beloved wife Mabel, on the Lusitania in 1915, his potential was only partially realized and his

legacy obscured. A driven man, and a family man, Pearson's good works – and great accomplishments – are finally brought back into focus through a masterful biography of the man and the enterprises he created and shaped.

In closing I would like to acknowledge Kevin Flavin for informing me that Fred Stark Pearson is recognized to-

day as the co-founder of Brookfield Asset Management, a huge global enterprise listed on Wall Street.

The paperback edition of "The Existential Joys of Fred Stark Pearson (1861-1915): Engineer, Entrepreneur, Envisioner" is available for purchase on Amazon.com. Special Edition ISBN 978-1-7332378-0-2. Paperback 8.5 x 11 inches; page count 373. 150 images in color.

IEEE Boston Section Social Media Links:

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

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

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

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

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

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

Python Applications for Digital Design and Signal Processing (14.5 hours of instruction!)**Time & Date:** 8:30AM - 5:00PM, Thursday & Friday, September 26 & 27**Location:** Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA**Speaker:** Dan Boschen

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 the Jupyter Notebooks for a rich, interactive experience.

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.

Full description page 20 or <http://ieeeboston.org/python-for-signal-processing/>

DSP for Wireless Communications (13 hours of instruction!)**Time & Date:** 6:00 - 9:00PM, Tuesdays, October 1, 8, 15, 22 & 29**Location:** Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA**Speaker:** Dan Boschen

Course Summary This course is a fresh view of the fundamental concepts of digital signal processing applicable to the design of mixed signal design with A/D conversion, digital filters, operations with the FFT, and multi-rate signal processing. This course will build an intuitive understanding of the underlying mathematics through the use of graphics, visual demonstrations, and 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.

Full Description see page 22 or

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

DSP for Software Radio (13 hours of instruction!)**Time & Date:** 6:00 - 9:00PM, Wednesdays, Oct. 30, Nov. 6, 13, 20 & Dec. 4**Location:** Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA**Speaker:** Dan Boschen

Course Summary This course builds on the IEEE course “DSP for Wireless Communications” also taught by Dan Boschen, further detailing digital signal processing most applicable to practical real-world problems and applications in radio communication systems. Students need not have taken the prior course if they are familiar with fundamental DSP concepts such as the Laplace and Z transform and basic digital filter design principles. The course title has been changed with some minor additions but this is the same course that was previously taught titled “More DSP for Wireless Communications”, with the addition of Python demonstrations using Jupyter Notebooks.

Full Description see page 24 or

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

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

Entrepreneurs' Network– 6:30PM, Tuesday, September 3

Entrepreneurial Bootstrapping Basics

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

Entrepreneurs often think that the only way to grow their business is to raise capital from VCs or angel investors. While outside capital can fuel growth, it also carries a considerable cost in terms of time expended, loss of equity, and loss of control. Surveys indicate that for the year ended 2011, of the 543,000 new business created in the U.S., only 29,626 (that is, only 5%) received VC or angel investor funding at the seed or early-stage startup phase. And for many companies, the lack of VC or angel investment did not impede growth. Meeting: Location: Constant Contact, Inc., Reservoir Place, 3rd Floor Great Room, 1601 Trapelo Rd., Waltham, MA. **See Page 10.**

Communications Society – 7:00PM, Thursday, September 5

Title: 5G, Spectrum Sharing and the Cloud – three transformative technology drivers in Wireless Networks - Deepak Das.

This meeting is preceded by dinner with our guest speaker at Bertucci's, 475 Winter St, Waltham, MA at 5:30 PM. Wireless Networks face an increasingly formidable challenge to keep pace with growing application demands in many verticals – high data rate VR-based applications in entertainment and medicine, high fidelity low latency applications in finance, highly secure high connection volume applications to handle IoT use cases, to name a few. This has to be achieved at massive scale and low cost – nothing short of genuinely disruptive technologies and shift in mind-set will suffice. Meeting Location: Verizon Technology Center, 60 Sylvan Rd., Waltham, MA 02451. **See Page 12.**

Reliability Society – 5:30PM, Wednesday, September 11

Introduction to Thermal Imaging using Infrared Technology - Jeff Steele

This talk is targeted to people that have not used or are new to Thermal Imaging. We will discuss the physics of how thermal imaging works and some of the common misconceptions. We will explore the various camera/sensor types, how they are different from each other, optics/lenses and the applications that leverage their strengths. We will finish with how the images can be analyzed and exported to other applications for further analysis or report generation. Meeting Location: MIT Lincoln Laboratory, 3 Forbes Rd, Lexington, MA 02421. **See Page 13.**

Life Members – 4:00PM, Wednesday, September 11

Technology-focused Advocacy: Find Your Voice/Catalyze Change

Today, technology and politics are so inextricably intertwined that understanding technology is essential to address many of today's most vexing, complicated issues. Technologists are needed not only to supply technological context for these issues, but also to provide their problem solving expertise. Examples of public policy areas in critical need of technological input include cybersecurity, immigration, energy policy, manufacturing, artificial and augmented intelligence, robotics, and autonomous vehicles. In addition, engaging in policy development allows technologists to understand and apply larger context to their lives' work. The meeting will be held at MIT Lincoln Laboratory's Main Cafeteria, 244 Wood Street., Lexington, MA at 4:00 PM. **See Page 14.**

Entrepreneurs' Network – 6:00PM, Tuesday, September 17

Project? Hobby? ... or Company?

Great startups begin with intrepid entrepreneurs, bursting with creativity, energy - and the ability to cope with sleep deprivation is often helpful. Also, an essential component of a successful startup is a great idea – an idea that can be commercialized or monetized in some way. Some successful companies have been spawned from a hobby - say, for example, Mark Zuckerberg's online student directory and photo sharing program - or an interesting research project that can be massaged into a commercial product, like HUMIRA® (adalimumab), from Cambridge Antibody Technology. However, not all projects or hobbies will ever be anything more than an interesting tool or a pleasant way to pass the time. Our panel of experts will help to clarify what it takes to make a company. Meeting Location: Draper, Hill Building, One Hampshire Street, Cambridge, MA. **See Page 15.**

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

People Skills and Strategies for Engineers – Diane Darling

In many cases you are the smartest one in the room. So how do you best communicate your brilliance, get others onboard, and accomplish the task at hand whether it's raising venture capital, finding team members, or making a pitch to a prospect? Join IEEE Consultants Network, Boston Section, for an informative and lively conversation that will help you succeed both personally and professionally. In order to overcome her fear of public speaking, Diane Darling took acting and standup comedy classes. That out-of-the-box and strategic mindset has been a contributing factor to her success. She was even the commencement speaker at MIT Charm School (yes there is such a thing). Meeting Location: Constant Contact, Reservoir Place - 1601 Trapelo Road, Waltham, MA 02451, in the Great Room on the third floor. **See page 17.**

Call for Course Speakers/Organizers

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

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

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

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

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

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

Entrepreneurs' Network— 6:30PM, Tuesday, September 3

Entrepreneurial Bootstrapping Basics

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

Entrepreneurs often think that the only way to grow their business is to raise capital from VCs or angel investors. While outside capital can fuel growth, it also carries a considerable cost in terms of time expended, loss of equity, and loss of control. Surveys indicate that for the year ended 2011, of the 543,000 new business created in the U.S., only 29,626 (that is, only 5%) received VC or angel investor funding at the seed or early-stage startup phase. And for many companies, the lack of VC or angel investment did not impede growth.

In August 2012, Inc. Magazine published its list of the 500 Fastest Growing Private Companies in the U.S., and 77% of the founders of those companies set up using only their own personal savings, with two-thirds needing less than \$100,000 to get started. And while 34% stated that access to external capital has been essential for growth, 42% have not utilized external funding in developing their business. Also, 74% have financed their growth over the past three years largely through cash flow from operations.

So, how do you do it? In a word – Bootstrapping. That is - using your own resources and effectively managing your cash flow to internally generate the funds that you need to operate your startup business.

Apple, Google and HP all began in garages with free rent and we will hear from three experienced CEOs who have also built their business using bootstrapping techniques without VC or angel investment until they achieved important milestones and were well on their way. In some cases, they progressed all the way through to a successful acquisition exit without external funding.

Agenda:

- 6:30-7:30 PM - Registration & networking
- 7:30-7:40 PM - ENET Chairperson's announcements
- 7:40-7:55 PM - E Minute - Up to 3 Startup companies' presentations
- 7:55-8:45 PM - 4 expert speakers on the night's topic
- 8:45-9:00 PM - Audience / Speakers Q & A

9:00-9:30 PM - Final networking includes meeting presenting speakers

A question and answer session follow the presentation, and panelists will be available afterward 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 afterward.

Speakers:



Igor Belagorudsky, President @ FastCTO, Co-founder and President @ KwipShare

Igor is an Angel Investor; Startup Founder, Mentor, Advisor and Consultant, and above all, a technical, hands-on professional with over 20 years of experience. Serial entrepreneur having most recently scaled Erecruit from a team of 3 to over 120, through several rounds of investments and to a successful sale for \$62.8M. Active in the Boston startup scene as a founder, advisor, pitch competition judge and angel investor. Confident full stack enterprise architect in several technology ecosystems. Trusted leader and mentor of professional services and R&D teams in multiple timezones and industries. Big believer in smart and transparent teams, open communication across the entire organization and leadership by example. Outside of work, avid skier, slow runner, decent hiker and dad.



Cheryl Hajjar, Founder & CEO @ Indigo Pixies and CEO @ Maid Brite Residential & Commercial Cleaning.

Cheryl is a serial entrepreneur, Cheryl has started multiple businesses in her career. From the start up phase to the revenue phase, Cheryl has a great understanding of how to grow a company. She has won grant funding in accelerator programs from MIT, E forAll and the University of Southern New Hampshire as well as raised funding from investors. Her children's toy company, Indigo Pixies is endorsed by Harvard Business School

University of Southern New Hampshire as well as raised funding from investors. Her children's toy company, Indigo Pixies is endorsed by Harvard Business School

and was also featured in the Mom Invented Handbook. Cheryl also owns Maid Brite Cleaning; a residential and commercial cleaning company that services the Greater Merrimack Valley and Southern New Hampshire. Cheryl is also a former National fitness competitor, published songwriter, children's book author and public speaker. She lives in Bradford, Ma. with her 16 year old son Dylan and fiancé, Jayson.



Tony Coufal, CTO @ IIoT-Oxys Corporation.

Tony is a multicultural leader with over 20 years' experience building and growing cutting edge technology focused service companies in the US and LATAM markets. He operated businesses in IT/ Telecom, Microwave and Cellular networks, Construction, Electrical, HVAC, Security to name a few. Today he is CTO

of IIoT-Oxys Corporation where he helps develop and implement IIoT, Edge, and AI based solutions for manufacturing in the Pharma/Biotech/Medtech, Automotive Manufacturing, Aerospace and Defense, and Agriculture Industries.



Karen Miller, Co-founder @ DoInk (DK Pictures, Inc).

Karen is a serial technology entrepreneur whose previous company she co-founded, DOME Imaging Systems, Inc. a medical imaging company, was sold successfully to Planar Systems, returning \$70M on a \$2M angel investment after earlier bootstrapping. Since then, Karen

co-founded DoInk, a leading educational app company. The Green Screen by Do Ink app was featured in iTunes as a "Best New App" in Education two weeks after its release and is now a top iOS app downloaded in over 120 countries. The Animation and Drawing by Do Ink app was selected an "App Store Essential."

Moderator:



Robert Adelson, business and tax attorney, partner @ Engel & Schultz LLP (Boston) and Chair Emeritus @ Boston Entrepreneurs' Network (ENET).

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, startups 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 2009-2019. 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
Co-Organizers: Eric S. Johansson and Jeffrey Piltch

eMinute Presentations will be 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.

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

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-3454806>

This meeting is 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. Attendees must arrive before 7:30 pm. Entrance is locked after 7:30 pm.

REFRESHMENTS: Snacks and soft drinks will be served at the meeting

Communications Society – 7:00PM, Thursday, September 5

5G, Spectrum Sharing and the Cloud – Three Transformative Technology Drivers in Wireless Networks

Speaker: Deepak Das, Federated Wireless



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

Wireless Networks face an increasingly formidable challenge to keep pace with growing application demands in many verticals – high data rate VR-based applications in entertainment and med-

icine, high fidelity low latency applications in finance, highly secure high connection volume applications to handle IoT use cases, to name a few. This has to be achieved at massive scale and low cost – nothing short of genuinely disruptive technologies and shift in mindset will suffice.

Deepak Das, PhD, has 20 years of experience in the Telecom and Wireless industry. In different roles at British Telecom, Bell Labs, Airvana, Azimuth Systems and now at Federated Wireless, he has worked on driving wireless technology and Standards, and building innovative access and core network solutions for 3G/4G and now 5G networks. A large part of his focus at Federated Wireless has centered on developing truly Cloud-native wireless network services.

He has several publications in IEEE journals and more than 15 granted or filed US patents.

Please circulate to interested parties.

Venue Note. This is our venue at the new Verizon Technology Center Campus in Waltham.

The meeting begins at 7 PM at the new meeting auditorium at the Verizon Technology Center. The address is 60 Sylvan Road, Waltham, MA 02451. The entrance is by the far corner – with the picnic tables out front – and not the tower or the new building. It is most easily reached by the West Street entrance.

Important Note: Verizon Technology Center requests the names of the meeting attendees in advance of the meeting. If you plan to attend, please send a note via e-mail with your name to John Nitzke at RF@ieee.org by Wednesday, September 4th.

The meeting is preceded by dinner at Bertucci's, 475 Winter St, Waltham at 5:30 PM. The speaker will be joining us at dinner. Please let Bob Malupin know if you plan to attend the dinner at Bertucci's. Bob can be contacted at Robert.Malupin@VerizonWireless.com.

Directions to Bertucci's restaurant in Waltham: Take Exit 27B on I95/128, heading west on Winter Street. After exiting, stay all the way to the right and take the first right turn into the shopping plaza.

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

Reliability Society – 5:30PM, Wednesday, September 11

Introduction to Thermal Imaging using Infrared Technology

Jeff Steele



This talk is targeted to people that have not used or are new to Thermal Imaging. We will discuss the physics of how thermal imaging works and some of the common misconceptions. We will explore the various camera/sensor types, how they are different from each other, optics/lenses and the applications that leverage their strengths. We will finish with how the images can be analyzed and exported to other applications for further analysis or report generation.

Jeff Steele has worked in the field of Measurement and Testing for over 30 years. He has a BS in Electrical and Computer Engineering from Clarkson University. He currently is employed by FLIR Systems, a leader in Thermal Imaging technology.

Registration:

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

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

Directions to 3 Forbes Road, Lexington, MA:

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

Call for Articles

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

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

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

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

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

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

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

Submissions should be sent to;
ieebostonsection@gmail.com

Life Members – 4:00PM, Wednesday, September 11

Technology-focused Advocacy: Find Your Voice/Catalyze Change

Maura K. Moran, a partner at Cambridge Technology Law



Today, technology and politics are so inextricably intertwined that understanding technology is essential to address many of today's most vexing, complicated issues. Technologists are needed not only to supply technological context for these issues, but also to provide their problem solving expertise. Examples of public policy areas in critical need of technological input include

cybersecurity, immigration, energy policy, manufacturing, artificial and augmented intelligence, robotics, and autonomous vehicles. In addition, engaging in policy development allows technologists to understand and apply larger context to their lives' work.

We will discuss technology-focused policy development and advocacy, using development of Artificial Intelligence (AI) policy at the IEEE and IEEE-USA as a test case. Specifically, we will discuss the world-wide impacts that AI are expected to have and the ethical challenges that incorporating AI into society raises. We will also discuss the elements of a long-term ethically-based AI strategy that will foster a robust AI industry (including a well-qualified AI workforce), support AI-related R&D, ensure public safety and public acceptance of AI, and, especially in the case of IEEE-USA, that will promote an AI-friendly environment in the U.S. to ensure the continued leadership of the U.S. in AI.

Maura K. Moran, a partner at Cambridge Technology Law, Cambridge, MA, advises on Intellectual Property (IP), technology transfer, licensing, and strategic alliances. She conducts patent prosecution for software, robotics, and AI-related technologies, and is registered to practice law in MA and at the U.S. Patent and Trademark Office.

Maura was the 2016 – 2017 Vice President for Government Relations for IEEE-USA, which advocates to the

U.S. Government on behalf of the more than 180,000 U.S. members of the IEEE. During her term, she led IEEE-USA's first Transition Team Outreach Initiative for alerting Presidential and Congressional campaign transition teams as to the issues that are important to IEEE's U.S. members. Maura was also a candidate for IEEE-USA's 2019 President-Elect. Through IEEE-USA, Maura has co-authored multiple position statements, amicus briefs (in support of certiorari and on the merits), and comments to the U.S. Patent and Trademark Office (USPTO).

Maura is active in IEEE's Boston Women in Engineering Chapter, the IEEE Boston Robotics and Automation Society Boston Chapter, the Women's Bar Association of Massachusetts, and the Venture Café, which supports the global innovation community through programs, mentoring, and networking.

Maura holds a B.S. Mathematics from the University of Dayton, a J.D. from Boston University School of Law, and has completed graduate coursework in Electrical Engineering at Northeastern University. Maura has practiced law with major law firms and through her own firm. She has served as inside counsel for ZOLL Medical Corporation, FINsix Corporation, ADE Corporation (now acquired by KLA-Tencor Corporation) and Digital Equipment Corporation (now acquired by Hewlett Packard).

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

Refreshments will be available at 3:30 PM. Please use the Wood Street Gate to the Laboratory. Follow signs from outside reception to the Main Cafeteria (elevators are available via reception).

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

Entrepreneurs' Network – 6:00PM, Tuesday, September 17

Project? Hobby? ... or Company?

Is it a project, hobby or company?

Great startups begin with intrepid entrepreneurs, bursting with creativity, energy - and the ability to cope with sleep deprivation is often helpful. Also, an essential component of a successful startup is a great idea – an idea that can be commercialized or monetized in some way. Some successful companies have been spawned from a hobby - say, for example, Mark Zuckerberg's on-line student directory and photo sharing program - or an interesting research project that can be massaged into a commercial product, like HUMIRA® (adalimumab), from Cambridge Antibody Technology. However, not all projects or hobbies will ever be anything more than an interesting tool or a pleasant way to pass the time. Our panel of experts will help to clarify what it takes to make a company. Join us for a compelling discussion and some great networking.

Agenda:

6:00-7:00 PM - Registration & networking
 7:00-7:10 PM - ENET Chairman's announcements
 7:10-7:25 PM - eMinute - Up to 3 startup companies' presentations
 7:25-8:15 PM - Three 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 follow the presentation, and panelists will be available afterward 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 afterward.

Panel

Ania Knap, Ph.D., Founder – Ania Creative Designs

Ania started her post-graduate career as a scientist at Yale, with a professor who received a Nobel Prize while she was there. She moved on from the academic

excitement to the pharmaceutical business, beginning at Ciba-Geigy/Novartis and eventually worked into the biotech arena where she cofounded MaxThera, an antibacterial therapeutic startup. After exiting MaxThera, she turned her attention to artistic pursuits and is now developing a rug hooking business from what had previously been a hobby interest and side hustle. In its early conception, Ania Creative Designs, a.k.a. ACD was mostly focused on the creation and sales of artistically designed and handmade jewelry. That focus has shifted over the years, and today, the ACD mission encompasses exploring, creating, inspiring, and teaching the art and science of rug hooking and dyeing. Ania inspires others to hook rugs and enables them to succeed. Together with Monique Frechette, she writes a blog on the subject entitled, "My Mother's a Hooker."



Ilsa Webeck, MBA, Founder, MedTech Strategies

Ilsa, founded MedTech Strategies, a boutique, strategic research consulting firm, with the knowledge that all companies, regardless of their size, need to develop a product/service value proposition and understand the business of healthcare to be successful. She works with companies on technology initiatives focused on identifying value and actionable outcomes for growth. Her past roles include corporate planning, product management, and early product strategy at Johnson & Johnson's DePuy Spine, Biogen, and Health Advances. Ilsa holds a BA in Biology from Dartmouth College and an MBA from the Tuck School of Business. She is an invited lecturer at the Boston Biomedical Innovation Center and is a member of the Medical Development Group (MDG) board.



Michael Morisy, Co-founder and Chief Executive of the MuckRock Foundation. MuckRock Foundation is a non-profit government transparency startup based in Cambridge, MA. MuckRock works with over 2,700 newsrooms around the world to help request, analyze, and share information key to helping society understand



our world. In addition to newsrooms, MuckRock's portfolio of open source services are accessible to all, helping advocates, researchers, and ordinary people better understand their communities.

Previously, Michael was an editor at the Boston Globe, where he launched the paper's technology vertical. He has been awarded a Reynolds Journalism Institute Fellowship at the University of Missouri, the John S. Knight Journalism Fellow at Stanford University, and the Edmond J. Safra Center for Ethics Network Fellow at Harvard University. Michael graduated in 2007 from Cornell University with a degree in English.

Moderator



Maureen Mansfield, ALM
CSO, MANSFIELD LAW ~ Protect Your Passion ~

Vice-Chair, IEEE Boston Entrepreneurs' Network (IEEE Boston ENET)

Maureen is passionate about protecting passions and implementing strategies to protect, build, scale, and commercialize startups, inventions, and early-stage companies with MANSFIELD LAW ~ Protect Your Passion ~.

Her experience helps entrepreneurs build innovative products and services, often with cutting-edge technologies. Maureen co-founded and bootstrapped a startup to a funding event that launched during her graduate studies. After sharing her startup story at ENET, Maureen was asked to volunteer and now serves as a Vice-Chair, Alliance Partners. After starting her career with her dream job, she has helped companies, from family-owned businesses to Fortune 50s, on projects of local, national, and international scope, in both the public and private sectors. During this journey, many companies enjoyed their most successful years to date as Maureen initiated and implemented systems that improved business processes, analytics, and contract compliance, often discovering new, profitable markets while building efficiencies for both the companies and their clients, saving time and money to bottom lines. Through prior board appointments at nonprofits,

Maureen co-founded two charities that continue today. Maureen holds several BAs in selective programs from The University of Iowa and earned a Masters with honors from Harvard University. Scholarships and Dean's Lists enabled Maureen to complete her degrees. Also, Maureen holds certificates in Project Management.

You can follow Maureen on Twitter @MaureenManALM. eMinute Presentations will be 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.

Registration:

ENET Member – Free

Non-ENET Member – \$10.00

Please register at

<https://boston-enet.org/event-3454831/Registration>

This meeting is 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 this meeting.

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

PUBLIC TRANSPORTATION: Kendall Square stop on the Red Line.

PARKING: Evening discounted parking available at Blue, Yellow, and Green Parking Garages <http://greaterbostonparking.com/kendall.html>. Metered parking is often available after 6 pm.

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

People Skills and Strategies for Engineers

Diane Darling



In many cases you are the smartest one in the room. So how do you best communicate your brilliance, get others onboard, and accomplish the task at hand whether it's raising venture capital, finding team members, or making a pitch to a prospect?

Join IEEE Consultants Network, Boston Section, for an informative and lively conversation that will help you succeed both personally and professionally.

In order to overcome her fear of public speaking, Diane Darling took acting and standup comedy classes. That out-of-the-box and strategic mindset has been a contributing factor to her success. She was even the commencement speaker at MIT Charm School (yes there is such a thing).

A pioneer in social networking, McGraw-Hill commissioned Diane Darling to write the definitive book on networking in 2003 (before Facebook or LinkedIn) called *The Networking Survival Guide*. It went into a 2nd printing just 90 days after the book hit the shelves.

Collectively her books have been translated into 9 languages.

She has taught at Harvard Business School, 20th Century Fox, Cisco Systems, Bank of America, University of Texas Law School to name a few clients.

She has appeared on NBC Nightly News, in *The Wall Street Journal*, *San Francisco Chronicle*, and *The Boston Globe*. She is a member of the CEO Club. Currently she blogs on LinkedIn.

She has lived in the Philippines, Thailand, Colorado, Indiana, Alabama and now in Boston, MA. Her travels include all seven continents and approximately 60 countries.

Contact info: Diane@DianeDarling.com or 617.308.0405

PLEASE NOTE: The meeting is open to the public. No charge for Consultants Network members or employees of Constant Contact; \$5 entrance fee for all others. Casual dress.

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

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

Driving Directions to Constant Contact

Follow I-95/route 128 to Trapelo Rd in North Waltham, Waltham. Take exit 28 from I-95/route 128. (<https://goo.gl/maps/tvn3l>)

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

For more information, e-mail or contact the Chairman, Frederick Beihold, at 508-405- 0499. email@blackoakshop.com



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- Wideband Array Apertures
- Dr. Hans Steyskal: A Tribute to his Life and Contributions to Phased Array Systems and Technology

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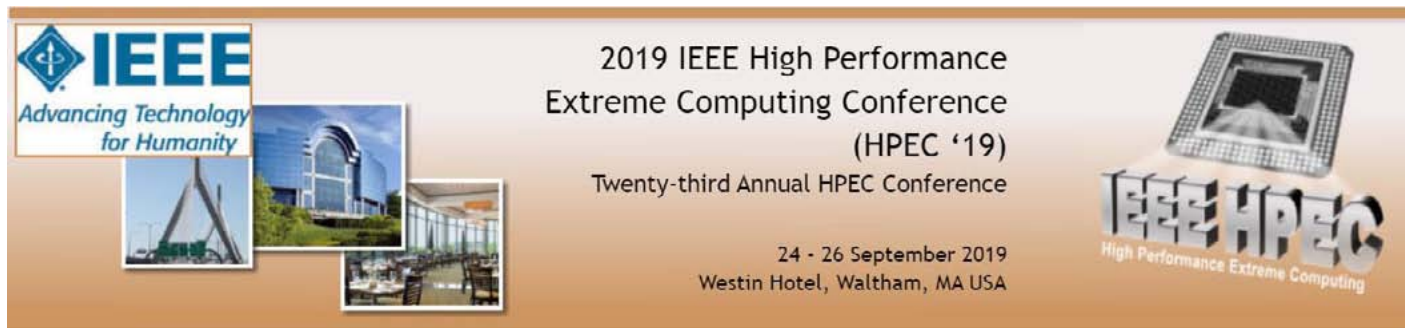
Robert Alongi, IEEE Boston

Poster Session:

Pierre Duflie, MIT LL

Advisors:

Greg Charvat, Humatics Inc.
Greg Arlow, Lockheed Martin



HPEC 2019 Technical Program

3 MORE WEEKS UNTIL HPEC '19

Welcome to HPEC 2019

The IEEE High Performance Extreme Computing Conference will be held in the Greater Boston Area, Massachusetts, USA on 24 - 26 September 2019. The HPEC charter is to be the premier conference in the world on the confluence of HPC and Embedded Computing.



[Conference Registration](#) is now open!



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

IEEE-HPEC.ORG



2019 IEEE International Symposium on Technologies for Homeland Security

information@ieee-hst.org

November 5 - 6, 2019 Woburn, MA USA

MARK YOUR CALENDAR!

**HST Symposium Coming
5 – 6 November 2019**

The 19th annual IEEE Symposium on Technologies for Homeland Security (HST '19),

will be held

5 - 6 November, 2019

in Woburn MA USA.

This symposium brings together innovators from leading academic, industry and business, Homeland Security Centers of Excellence, and government programs to provide a forum to discuss ideas, concepts, and experimental results.

Produced by IEEE with technical support from IEEE, IEEE Boston Section, and IEEE-USA and organizational support from MIT Lincoln Laboratory and Raytheon, this year's event will once again showcase selected technical papers and posters highlighting emerging technologies in:



Humanitarian Assistance & Disaster Relief



Land/Maritime Borders & Critical Infrastructure Protection



Biometrics & Forensics



Cyber Security



Frontier and Emerging Technologies

See IEEE-HST.ORG for more details or [click here](#) to join the 2019 HST mailing list for up-to-date news!



machine learning
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computer systems
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find out more at urtc.mit.edu

2019 MIT IEEE Undergraduate Research Technology Conference

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IEEE/ACM

3 Days of Keynotes, Technical Sessions & Workshops/ Product Demos



SPEAKERS



Joe Madden



Mike Violette



Anil Pandey



Caroline Chan



Eli Brookner



Eric Bogatin



James Drewniak



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September 10-12, 2019

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Python Applications for Digital Design and Signal Processing

(14.5 hours of instruction!)

Time & Date: 8:30AM - 5:00PM, Thursday & Friday, September 26 & 27
Location: Crowne Plaza Hotel, 15 Middlesex Canal Park Road, Woburn, MA
Speaker: Dan Boschen

Course Summary

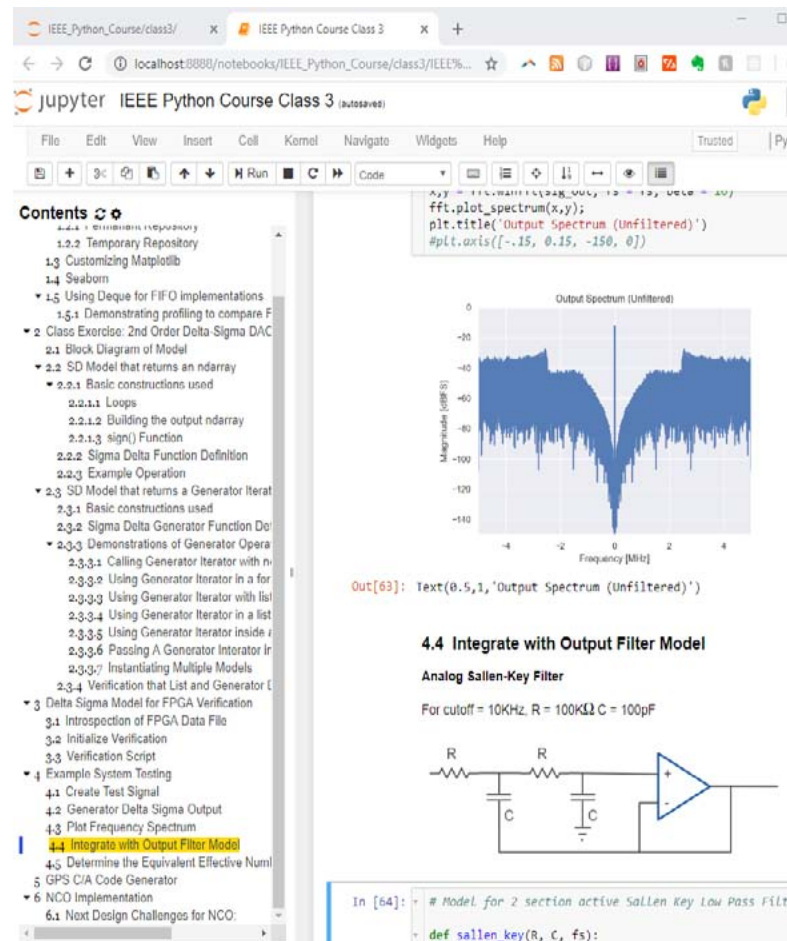
This is a bring-your-own laptop, hands-on course in the popular and powerful open source Python programming language.

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 the Jupyter Notebooks for a rich, interactive experience.

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.

Jupyter Notebooks: This course makes extensive use of Jupyter Notebooks which combines running Python code with interactive plots and graphics for a rich user experience. Jupyter Notebooks is an open-source web-based application (that can be run locally) that allows users to create and share visually appealing documents containing code, graphics, visualizations and interactive plots. Students will be able to interact with the notebook contents and use “take-it-with-you” results for future applications in signal processing.

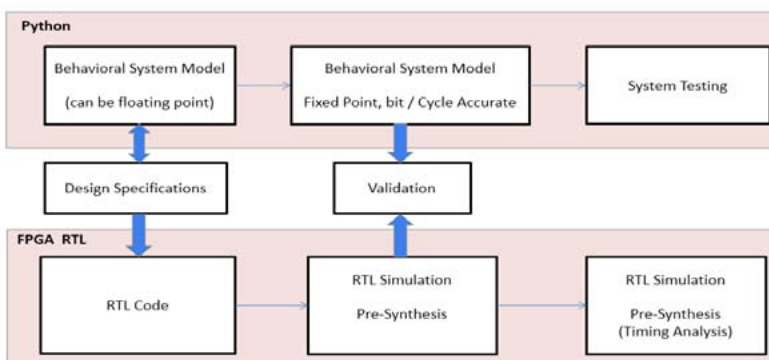


Target Audience: This course is targeted toward users with little to no prior experience in Python, however familiarity with other modern programming languages and an exposure to object-oriented constructs is very helpful. Students should be comfortable with basic signal processing concepts in the frequency 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.

Biography: Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 25 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 Symmettricom) leading design efforts for advanced frequency and time solutions.

Python for Verification



For more background information, please view Dan's Linked-In page.

Course Schedule and Topics

Thursday, September 26

8am-8:30am Registration/sign-in, coffee

8:30am-10am - Intro to Jupyter Notebooks, the Spyder IDE and the course design examples including Delta Sigma Converters, GPS Code Generators, and Numerically Controlled Oscillators. Core Python constructs.

15 minute break

10:15am-12:00 pm - Intro to Jupyter Notebooks, continued

45 minute lunch

12:45pm-2:45pm - Core Python constructs, functions, reading writing data files.

15 minute break

3:00pm-5:00pm Core Python constructs, functions, reading writing data files, continued.

Friday, September 27

8:30am-10am - Signal processing simulation with popular packages including NumPy, SciPy, and Matplotlib.

15 minute break

10:15am-12:00 pm Signal processing simulation with popular packages including NumPy, SciPy, and Matplotlib, continued.

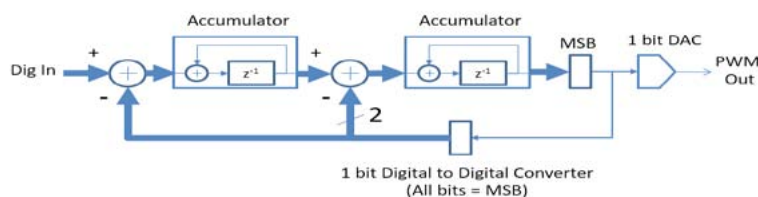
45 minute lunch

12:45pm-2:45pm - Bit/cycle accurate modelling and analysis using the design examples and simulation packages

15 minute break

3:00pm-5:00pm - Bit/cycle accurate modelling and analysis using the design examples and simulation packages, continued, Final questions.

2nd Order Delta Sigma DAC



notes, lunch and coffee breaks included with registration

Decision (Run/Cancel) Date for this Courses is Monday, September 16

Payment received by September 7

IEEE Members \$450

Non-members \$495

Payment received after September 7

IEEE Members \$515

Non-members \$535

DSP for Wireless Communications

(13 hours of instruction!)

Time & Date: 6:00 - 9:00PM, Tuesdays, October 1, 8, 15, 22 & 29

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

Speaker: Dan Boschen

Course Summary:

This course is a fresh view of the fundamental concepts of digital signal processing applicable to the design of mixed signal design with A/D conversion, digital filters, operations with the FFT, and multi-rate signal processing. This course will build an intuitive understanding of the underlying mathematics through the use of graphics, visual demonstrations, and 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.

Now with Jupyter Notebooks!

This long-running IEEE Course has been updated to include Jupyter Notebooks which incorporates graphics together with Python simulation code to provide a “take-it-with-you” interactive user experience. No knowledge of Python is required but the notebooks will provide a basic framework for proceeding with further signal processing development using that tools for those that have interest in doing so.

This course will not be teaching Python, but using it for demonstration. A more detailed course on Python itself is covered in a separate IEEE Course “Python Applications for Digital Design and Signal Processing”.

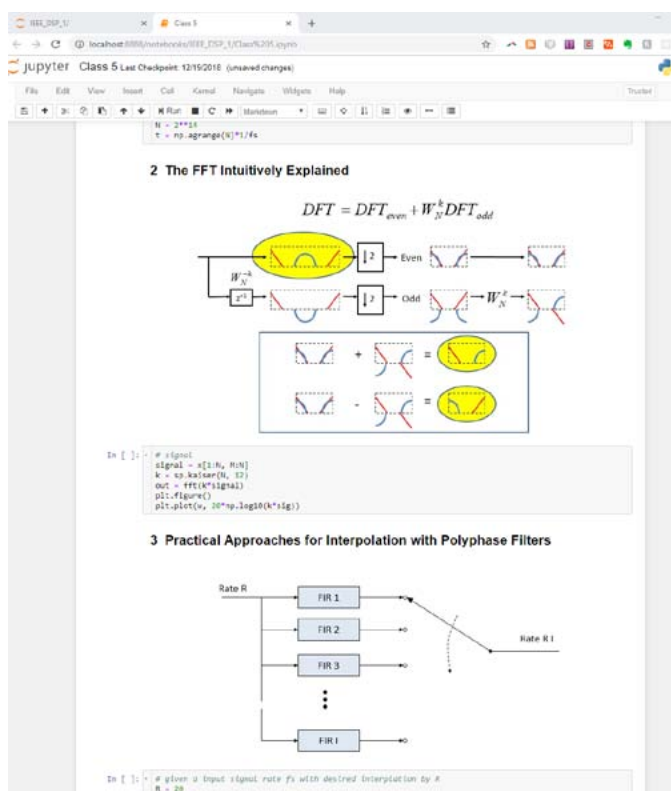
Students will be encouraged but not required to bring a laptop to class, and all set-up information for installation will be provided prior to the start of class.

Target Audience:

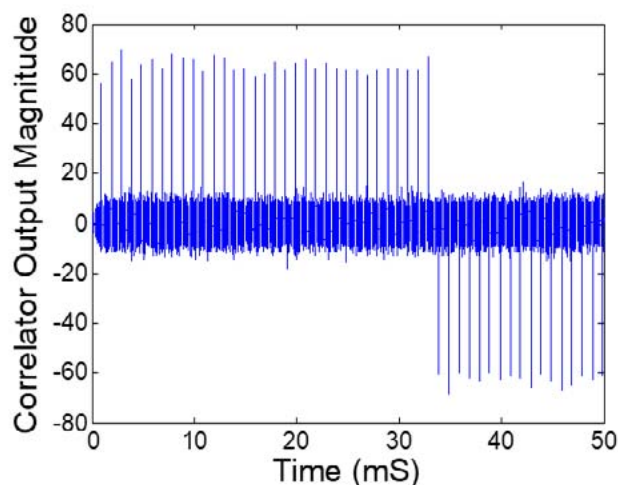
All engineers involved in or interested in signal processing applications. Engineers with significant experience with DSP will also appreciate this opportunity for an in-depth review of the fundamental DSP concepts from a different perspective than that given in a traditional introductory DSP course.

Benefits of Attending/ Goals of Course:

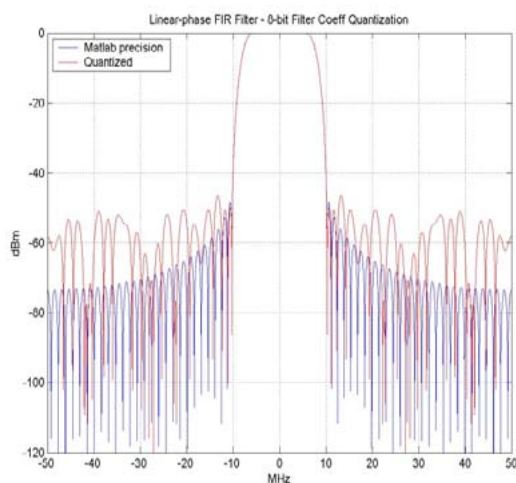
Attendees will build a stronger intuitive understanding of the fundamental signal processing concepts involved with digital filtering and mixed signal analog and digital design. With this, attendees will be able to implement more creative and efficient signal processing architectures in both the analog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



Sliding Correlation



Linear Phase FIR Filter (8-bit quantized filter coefficients)

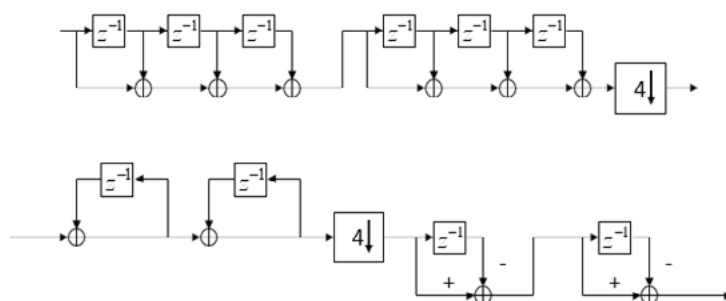


Class 5: Fast Fourier Transform, Multi-rate Signal Processing, Multi-rate Filters

Speaker's Bio:

Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 25 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

Multi-stage CIC



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/dan-boschen>

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

Decision (Run/Cancel) Date for this Courses is Friday, September 27

Payment received by Sept. 19

IEEE Members \$350

Non-members \$385

Payment received after Sept. 19

IEEE Members \$385

Non-members \$420

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

DSP for Software Radio

(13 hours of instruction!)

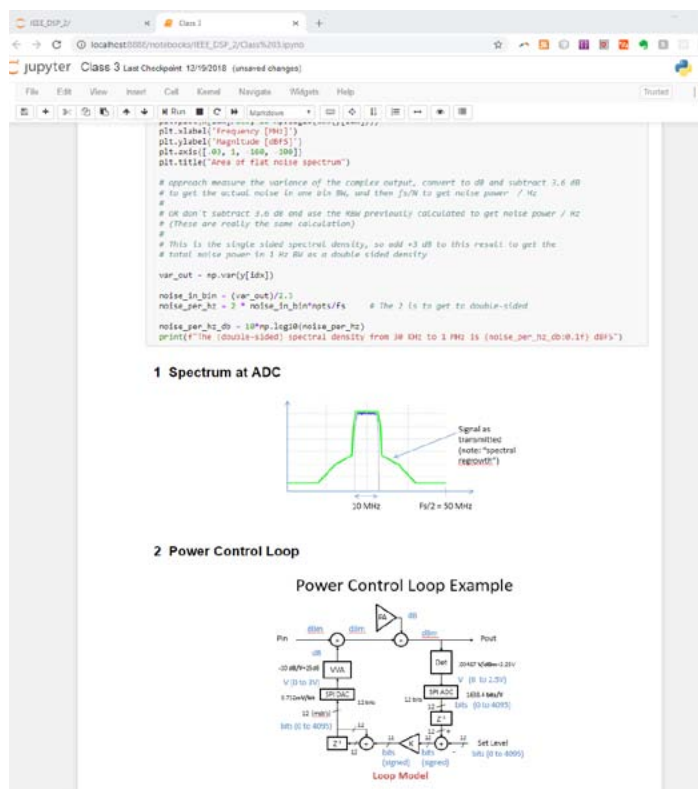
Time & Date: 6:00 - 9:00PM, Wednesdays, Oct. 30, Nov. 6, 13, 20 & Dec. 4

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

Speaker: Dan Boschen

Course Summary

This course builds on the IEEE course “DSP for Wireless Communications” also taught by Dan Boschen, further detailing digital signal processing most applicable to practical real-world problems and applications in radio communication systems. Students need not have taken the prior course if they are familiar with fundamental DSP concepts such as the Laplace and Z transform

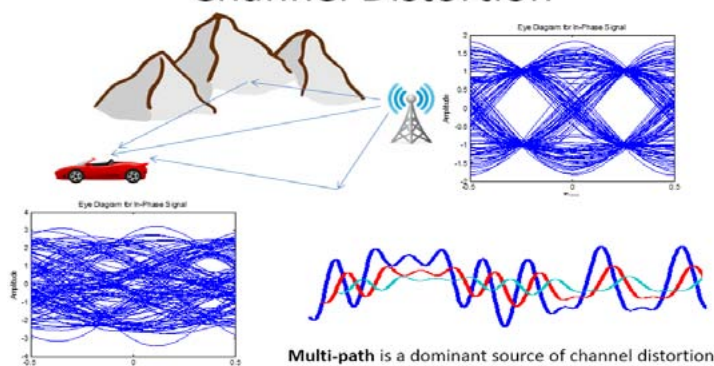


and basic digital filter design principles. The course title has been changed with some minor additions but this is the same course that was previously taught titled “More DSP for Wireless Communications”, with the addition of Python demonstrations using Jupyter Notebooks.

This course brings together core DSP concepts to address signal processing challenges encountered in

radios and modems for modern wireless communications. Specific areas covered include carrier and timing recovery, equalization, automatic gain control, and

Channel Distortion



considerations to mitigate the effects of RF and channel distortions such as multipath, phase noise and amplitude/phase offsets.

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

Now with Jupyter Notebooks!

This long-running IEEE Course has been updated to include Jupyter Notebooks which incorporates graphics together with Python simulation code to provide a “take-it-with-you” interactive user experience. No knowledge of Python is required but the notebooks will provide a basic framework for proceeding with further signal processing development using that tools for those that have interest in doing so.

This course will not be teaching Python, but using it for demonstration. A more detailed course on Python itself

Benefits of Attending/ Goals of Course:

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

Topics / Schedule:

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

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

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

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

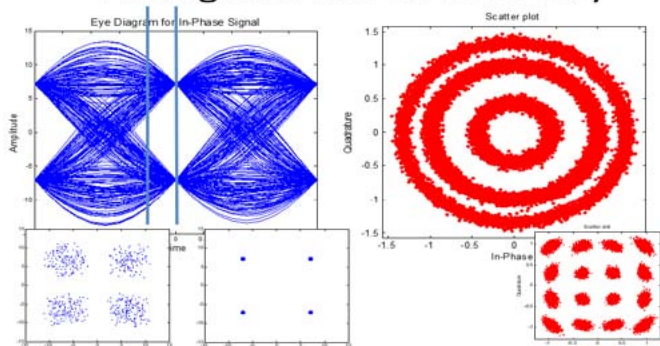
Class 5: RF Signal Impairments, Equalization and Compensation, Linear Feedback Shift Registers

Speaker's Bio:

Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 25 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/dan-boschen>

Timing and Carrier Recovery



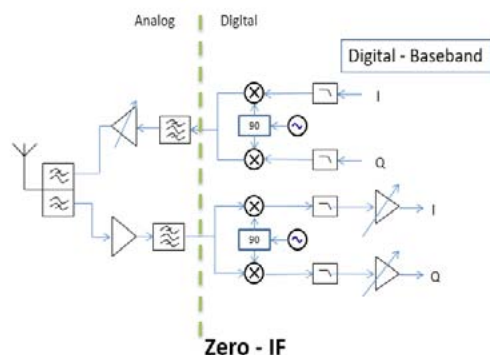
is covered in a separate IEEE Course "Python Applications for Digital Design and Signal Processing".

Students will be encouraged but not required to bring a laptop to class, and all set-up information for installation will be provided prior to the start of class.

Target Audience:

All engineers involved in or interested in signal processing for wireless communications. Students should have either taken the earlier course "DSP for Wireless Communications" or have been sufficiently exposed to basic signal processing concepts such as Fourier, Laplace,

Radio Architectures



and Z-transforms, Digital filter (FIR/IIR) structures, and representation of complex digital and analog signals in the time and frequency domains. Please contact Dan at boschen@loglin.com if you are uncertain about your background or if you would like more information on the course.

Decision (Run/Cancel) Date for this Courses is Wednesday, Monday, October 21

Payment received by Oct. 17

IEEE Members	\$340
Non-members	\$375

Payment received after Oct. 17

IEEE Members	\$375
Non-members	\$440