

# BOSTON



# THE REFLECTOR

ISSUE #10  
OCTOBER 2018

TECHNOLOGIES  
FOR HOMELAND  
SECURITY  
SYMPOSIUM

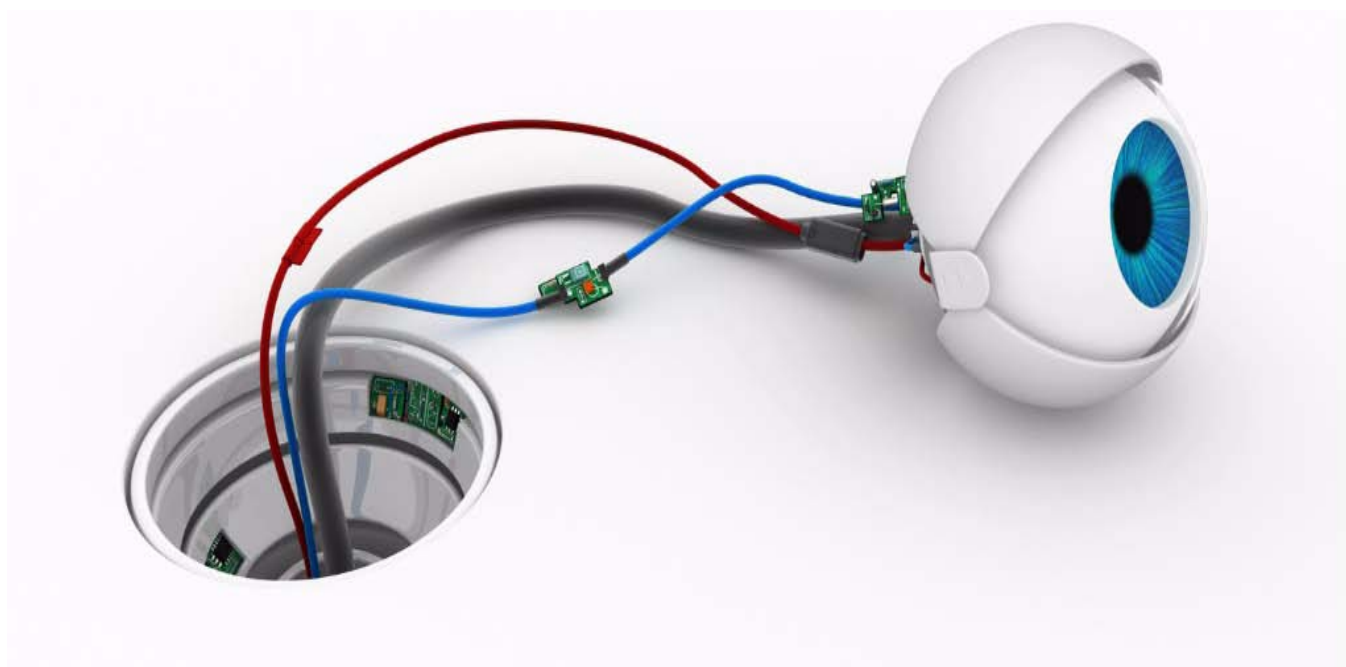
**P.23**

2019 IEEE PHASED  
ARRAY SYMPOSIUM  
CALL FOR PAPERS

**P.24**

IEEE/MIT UN-  
DERGRADUATE  
RESEARCH TECH.  
CONFERENCE

**P.21**



2018 Outstanding Section Membership  
Recruitment Performance

**Boston Section**

**2018 IEEE INTERNATIONAL SYMPOSIUM  
ON TECHNOLOGIES FOR  
HOMELAND SECURITY**

**OCTOBER 23 - 24, 2018  
CROWNE PLAZA HOTEL, WOBURN**

**WWW.IEEE-HST.ORG**

**P.23**

 **IEEE**  
*Advancing Technology  
for Humanity*

## TABLE OF CONTENTS

|                                                                                                                                                     |                                  |                                                                                        |                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Editorial<br>+Artificial Intelligence Can Save Us, or Not?",<br>by Kevin Flavin, Chair, IEEE Boston Section<br>Electronics Communications Team..... | <a href="#">Page 3</a>           | The Fundamentals of Bioelectronics for Applications in<br>Neuroprosthetics .....       | <a href="#">Page 26</a><br>(Last Notice Before Courses Begins!!!) |
| Fall 20108 Course Program Summary .....                                                                                                             | <a href="#">Pages 6 &amp; 7</a>  | Call for Course speakers/Organizers .....                                              | <a href="#">Page 27</a>                                           |
| Online Course Summary Listing .....                                                                                                                 | <a href="#">Page 8</a>           | Applications of Python for Digital Design and Signal<br>Processing .....               | <a href="#">Page 28</a>                                           |
| Monthly Chapter Meeting Summary .....                                                                                                               | <a href="#">Pages 9 &amp; 10</a> | Call for Technical/Interest Articles .....                                             | <a href="#">Page 29</a>                                           |
| Entrepreneurs' Network .....                                                                                                                        | <a href="#">Page 11</a>          | DSP for Wireless Communications .....                                                  | <a href="#">Page 30</a><br>(Last Notice Before Courses Begins!!!) |
| Electromagnetic Compatability Society .....                                                                                                         | <a href="#">Page 14</a>          | Write Right agile User Stories and<br>Acceptance Test Rights .....                     | <a href="#">Page 31</a>                                           |
| Entrepreneurs' Network .....                                                                                                                        | <a href="#">Page 15</a>          | Making You a Leader - Fast Track .....                                                 | <a href="#">Page 33</a>                                           |
| Robotics and Automation Society .....                                                                                                               | <a href="#">Page 17</a>          | Fundamentals of Real-Time Operating Systems<br>(online course) .....                   | <a href="#">Page 35</a>                                           |
| Women in Engineering and Young Professionals<br>(Boston and New Hampshire Sections) .....                                                           | <a href="#">Page 18</a>          | Embedded Linux Board Support Packages and Device<br>Drivers (online course) .....      | <a href="#">Page 38</a>                                           |
| Life Members (Boston and New Hampshire) .                                                                                                           | <a href="#">Page 19</a>          | Embedded Linux Optimization: Tools and Techniques<br>(online course) .....             | <a href="#">Page 41</a>                                           |
| Microwave Theory & Techniques Society .....                                                                                                         | <a href="#">Page 20</a>          | Software Development for Medical Device<br>Manufacturers (online course) .....         | <a href="#">Page 44</a>                                           |
| 2018 IEEE/MIT Undergraduate Technology Research<br>Conference .....                                                                                 | <a href="#">Page 21</a>          | Fundamental Mathematics Concepts Relating to<br>Electromagnetics (online course) ..... | <a href="#">Page 45</a>                                           |
| 2018 IEEE International Symposium on Technologies<br>for Homeland Security .....                                                                    | <a href="#">Page 23</a>          | Reliability Engineering for the Business World<br>(online course) .....                | <a href="#">Page 46</a>                                           |
| 2019 IEEE International Symposium on Phased Array<br>Systems and Technology - Call for Papers ....                                                  | <a href="#">Page 24</a>          | Introduction to Embedded Linux (online course) .....                                   | <a href="#">Page 47</a>                                           |
| 2019 IEEE Radar Conference - Call for Papers .....                                                                                                  | <a href="#">Page 25</a>          | Design Thinking for Today's Technical Work .....                                       | <a href="#">Page 49</a><br>(online course)                        |
|                                                                                                                                                     |                                  | Practical RF PCB Design: Wireless Networks,<br>Products and Telecommunications .....   | <a href="#">Page 51</a>                                           |



# Artificial Intelligence Can Save us, or Not?

Kevin Flavin - Chair, IEEE Boston Section Electronics Communications Team,

Depending on who you listen to, Artificial Intelligence will either kill us all, or save us from ourselves.

I'd hate to pull a 'back in my day', but my first experience with Artificial Intelligence (and Fuzzy Logic) involved learning LISP and seeing my professor get replaced with a graduate student because the professor went to Washington D.C. to work on a secret project for Ronald Reagan. I don't know how much of that last part was true, but it was college and the story was more interesting to tell at parties.

Today, however, there are so many disciplines within what is called Artificial Intelligence, it's sometimes difficult to tell the difference between them. The IEEE has many source documents on the latest news and deeper technical topics, like Artificial Intelligence, of course (<http://theinstitute.ieee.org/technology-topics/artificial-intelligence>).

As successful ideas often do, they attract investment - sometimes just to see what can come of the idea. In the case of AI, the investments don't seem to be diminishing, but increasing in both scale and scope. For many years, Artificial Intelligence has been simply a theoretical exercise, but now, the balance seems to be shifting to applications.

The practical use of Artificial Intelligence cannot be overlooked, even for the military. The research arm, DARPA, has assigned levels of intelligence and application, called Waves, that they are using to define their goals and missions for the application of Artificial Intelligence (<https://www.darpa.mil/news-events/2018-09-07>)

Corporations have been leveraging Artificial Intelligence for years. There are hundreds of startups that have received billions in investments, too. Large corporations have created special projects, and in if the projects are successful, offer them as products, like IBM and their Artificial Intelligence platform Watson.

A new collaboration between MIT Media Lab and the IEEE Standards Association has formed "to facilitate responsible participant design, data agency and metrics of economic prosperity." (<http://theinstitute.ieee.org/resources/ieee-news/ieee-standards-association-and-mit-media-lab-form-council-on-extended-intelligence>)

If your company, or any organization, isn't large enough to sink a deep investment into this technology and theory, there are still ways you can apply to your own organization. These ideas would work for mid or small company, non-profit research, or even a solo practitioner:

1. Read, read, read about the technology, even just to get used to the nomenclature.
2. Look for other organizations like yours and find out what and how they are using it.
3. Review your own processes, is there a ready-built technology solution that you could use easily and with little disruption with your process - in case you need to rip it out quickly if it doesn't work!
4. Iterate over and over again, measuring your successes and failures to learn.

Here are some low-hanging-fruit to consider as a first foray into Artificial intelligence in your organization:

1. Customer support - chatbots are simple to install, and they are pretty smart about answering simple and common questions for customers. Don't for-

get to track the questions - there may be larger issues at play.

2. Sales support - chatbots shine here as well, with common and easy answers only a click away. Tracking these questions could provide ideas for new features in your products and services - or highlight problems that should be fixed. Your marketing team would like to track these to provide new marketing opportunities to reach more prospective customers.
3. Human Resources - chatbots are a quick solution for documentation for employees, or light training, say for filling out expense forms. In addition, some of the more sophisticated systems help hiring by applying rules and responses for getting to a higher quality candidate pool to interview with.

4. Equipment - even the smallest office probably has equipment that wears out over time, and tracking wear-and-tear and scheduling maintenance is easy enough for an automated system.
5. For certain organizations, integrating the supply-chain into your own production is invaluable, and Artificial Intelligence can simplify this also. There may be an opportunity to integrate your customers into the same supply chain, simplifying their processes also.

Regardless of your goals, Artificial Intelligence is a very powerful tool, if used correctly.

So, be careful. We don't want to be saved by Sarah Connor at some point in the future.



**Tufts** UNIVERSITY | School of Engineering

**EARN YOUR ENGINEERING M.S. DEGREE**  
in as little as one year or at your own pace.

**Learn More >>**

Doctoral Degrees & Certificates also available.

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

23 - 24 October 2018

Westin Hotel, Waltham, MA USA



**[www.ieee-hst.org](http://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!*

## IEEE Boston Section Fall 2018 Professional Development Program

### The Fundamentals of Bioelectronics for Applications in Neuroprosthetics

Last Notice

**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) Last Notice

**Time & Date:** 6 - 9PM; Thursdays, Oct. 11, 18, 25, 30, Nov. 6 (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://ieeeboston.org/verilog-101-verilog-foundations-online-course/>

## System Verilog 101: Design Constructs

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

## System Verilog 102: Verification Constructs

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

## High Performance Project Management

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

## Introduction to Embedded Linux Part I

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

## Embedded Linux Optimization - Tools and Techniques

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

## Embedded Linux Board Support Packages and Device Drivers

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

## Software Development for Medical Device Manufacturers

Full course description and registration at ,  
<http://ieeeboston.org/software-development-medical-device-manufacturers-line-course/>

## Fundamental Mathematics Concepts Relating to Electromagnetics

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

## Reliability Engineering for the Business World

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

## Design Thinking for Today's Technical Work

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

## Fundamentals of Real-Time Operating Systems

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

## October Chapter Meeting Summary

### **Entrepreneur's Network – 6:30PM, Tuesday, 2 October**

#### **Entrepreneurial Bootstrapping Basics**

Starting a company to transform a great idea into a product or service can be fun and exciting. It usually requires lots of hard work and, often, lots of money too. Entrepreneurs not blessed with a trust fund, wealthy relatives, or a winning Powerball scratch ticket, have to get that money from somewhere. Venture capital or angel investors can be helpful if the new company fits in with their investment strategy and interests, but this is expensive money that is very picky, usually impatient, and can be as elusive as a winning lottery ticket. Meeting Location: Constant Contact, Inc., Reservoir Place, 3rd Floor Great Room, 1601 Trapelo Rd., Waltham, MA. [See Page 13](#)

### **Electromagnetic Compatibility Society, 7:00PM, Wednesday, 3 October**

#### **Fundamentals and Recent Advances in Power Integrity**

Dr. Ishan Erdin, Eng. Design Manager, Celestica, Canada, presenting on the one of the most popular subjects for EMC engineers. Starting from a qualitative introduction of power noise analysis, current design techniques will be reviewed with application to low voltage-high current data communication systems. The limitations of industrially accepted analysis techniques will be discussed with practical work-arounds. Some recent developments about the multipin optimization of decoupling capacitors will be discussed on sample cases. Meeting Location: Bose Corp., 100 The Mountain Road, Framingham, MA. [See Page 14](#)

### **Entrepreneur's Network Cambridge Meeting - 6:00PM, Tuesday, 9 October**

#### **Successful Marketing Strategies for Startups**

Digital is at the heart of most marketing and communication programs, which has complicated life for entrepreneurs who are not steeped in how to attract prospects and retain customers. The internet-infused marketing options include web site, social media and blogging, email, search engine optimization, and more. Meeting Location: Draper, Hill Building, One Hampshire Street, Cambridge, MA. [See Page 15](#)

continued next page

### **Robotics and Automation Society - 6:30PM, Wednesday, 10 October**

**Get an inside look at Toyota Research Institute's robotics efforts, and learn how you can be part of their call for innovation!**

**Join IEEE's RAS** chapter at Toyota Research Institute's (TRI) offices in Cambridge, MA for a free evening event, featuring a presentation by TRI's chief science officer Dr. Eric Krotkov. Driven by TRI's mission to improve the quality of human life, the robotics group is focused on developing technologies that improve perception, movement, manipulation, and reasoning for service robots that can assist with in-home care. Learn more about TRI's goals, how it fits into the larger Toyota family, and the research the robotics group is pursuing. Meeting Location: Toyota Research Institute, Binney Street, 1 Kendall square, Building 100, Suite 1-201, Cambridge, Massachusetts, 02139. [See Page 17.](#)

### **Boston and N.H. Sections - Women in Engineering and Young Professionals – 11:30AM – Sunday, 14 October**

#### **Hike Mount Major Brook Trail**

Sick and tired of sitting all day in front of a computer dreaming of a day where you can escape the office? Dreading the long New England winter? Yes, I know the feeling. So let's get out of that office, stretch our legs, and see some beautiful fall foliage before the blizzard 2018 shuts us all in. WIE/YP is hosting a hiking event at Mount Major. This is a moderate loop of 4 miles (total) and 1,100 feet elevation with a rewarding view. Meeting Location: Alton, N.H. [See Page 18.](#)

### **Life Members Boston and N.H. Sections – 4:00PM, Wednesday, Oct 17**

#### **Electronics fueled the 2000 US budget surplus. Will AI help or hinder?**

Paul H. Carr, IEEE Life Fellow. The "dot-com" digital technology boom together with governmental tax increases resulted in the 1998 - 2001 federal budget surpluses. Will emerging artificial intelligence, AI, and deep learning technology help the US recover from the budget deficits we have had since 2001? Meeting Location: MIT Lincoln Laboratory, 244 Wood St, Lexington, MA. [See Page 19.](#)

### **Microwave Theory and Techniques Society – 6:00PM, Monday, 22 October**

#### **Nonresonating Modes Do It Better!**

Dr. Simone Bastioli, RS Microwave, [sbastioli@rsmicro.com](mailto:sbastioli@rsmicro.com)

The innovative concept of nonresonating modes and how this has been recently exploited to extend the performance and capabilities of the state-of-art of microwave filter technology will be presented in this talk. Although the concept is presented by mostly focusing on filters, as these are the components where this new technique has found large application over the past few years, all general features are explained and illustrated in detail thus potentially paving the way for new applications involving other passive microwave components. Meeting Location: MIT Lincoln Laboratory, 3 Forbes, Road, Lexington, MA 02421. [See Page 20.](#)

Entrepreneurs' Network – 6:30PM – Tuesday, 2 October

# Entrepreneurial Bootstrapping Basics

Starting a company to transform a great idea into a product or service can be fun and exciting. It usually requires lots of hard work and, often, lots of money too. Entrepreneurs not blessed with a trust fund, wealthy relatives, or a winning Powerball scratch ticket, have to get that money from somewhere. Venture capital or angel investors can be helpful if the new company fits in with their investment strategy and interests, but this is expensive money that is very picky, usually impatient, and can be as elusive as a winning lottery ticket.

Non-dilutive funding, generally in the form of grants from government agencies or private foundations, or even corporate partnerships and winning business plan competitions, can give an entrepreneur the opportunity to launch a company and to build value without having to give up control or equity.

If equity investment ultimately becomes necessary, having built and demonstrated value can be quite beneficial in negotiations with investors.

The panel will share their insights and experiences regarding non-dilutive funding – join us for inspiration and networking.

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

## Speakers:

### Abiche Dewilde, Ph.D., Co-Founder, CSO, and President, InVitroMetrix



Abiche Dewilde, Ph.D., is a Co-Founder, CSO, and President of InVitroMetrix. The company was founded to create a self-contained, cell-based, multi-well research device for drug discovery. Dr. Dewilde has technical expertise in biomedical engineering and performed post-doctoral work leading to the proto-

type design of the company's biosensors. Her expertise is in device development for cell research in drug discovery, oncology, and liver toxicology. Since starting her company, Dr. Dewilde has been involved in the company's inception, formation, and strategic pathway.

### Sarah Milby, Founder and CEO, Valor Performance, Inc.



Sarah Milby is the Founder and CEO of Valor Performance, Inc., an enterprise software company that supports global organizations in strategically igniting and sustaining peak performance in executive and sales teams. Sarah has been an Entrepreneur in Residence (EIR) at F-Prime

Capital Partners. As Vice President of Business Development and Partnerships at Grokker, Sarah launched the enterprise division, and she led health plan relationships for Castlight Health from a startup through an IPO.

Sarah holds a BA from Yale University, a MPA from Harvard University's Kennedy School of Government, and a MBA from Stanford University's Graduate School of Business.

As a change agent in sales effectiveness, digital health, and talent development, Sarah offers a unique combination of leadership roles across industries. Tonight, Sarah brings her entrepreneurial and EIR background to the topic of bootstrapping a startup to a funding event.

### Michael Segal, Founder, CTO, Boston Materials, LLC



Michael is one of the founders of Boston Materials, a company commercializing a new three-dimensionally reinforced carbon fiber composite. After graduating as a Mechanical Engineer from Northeastern University in 2016, Michael and his partner embarked on a journey to enable the construction

of lighter, damage tolerant, and cost-effective components. By developing a product that bridges the gap between new-age composite materials and old-school metals, Boston Materials aims to accelerate breakthroughs in the pressure vessel, wind energy, automotive, and aerospace industries.

**K. Tibor Toth, CAIA, Managing Director of Investments, Massachusetts Clean Energy Center, and Reviewer, SBIR/STTR Awards, National Science Foundation**



Tibor has over 20 years of private equity and venture capital investment and entrepreneurial experience, including closing investments in over 20 cleantech startups since joining the Massachusetts Clean Energy Center (MassCEC) in 2013 to lead the Investments Division. MassCEC invests equity and debt in early-stage and growing clean energy technology companies, provides incentives for the adoption of renewable energy and develops programs to prepare workers for the next generation of clean energy jobs. Tibor has focused in the clean energy sector since early 2010, when he joined a clean energy company, QGEN, as its CFO. Previously, Tibor worked at Babson Capital, Ascent Venture Partners, Lee Capital, and Berkshire Partners. Tibor is an Adjunct Professor at Brandeis University's International Business School and serves on several corporate and non-profit boards. Tibor holds business and engineering degrees from MIT and Northwestern University.

**Moderator**

Michael S. Chester, President, International Manufacturing Consultants, and Past Chairman, Boston Entrepreneurs' Network (ENET)



Mike has co-founded high tech, clean tech, and medical device startups in both the US and China, and he has obtained non-dilutive funding from the Chinese government. He

now advises startups in clean tech, biotech, and manufacturing. Before becoming an entrepreneur, Mike spent 16 years with IBM designing robots and automation, marketing and selling IBM products to manufacturing companies, setting up global operations and supply chains, and founding an IBM consulting organization for manufacturing clients that he grew into a \$20M business. He lived in China from 1986-1987 while consulting to companies owned by the Machine Building Ministry and teaching graduate courses at Hunan University.

Mike earned his BS in Electrical Engineering and MS in Computer Engineering from Syracuse University and his MBA from Union College. He is a past Chair of The IEEE Boston Entrepreneurs' Network, has served on the board of APICS Boston, and was a member of the planning committee of the MIT Enterprise Forum for over 10 years. Mike is a frequent speaker at conferences on Global Entrepreneurship, Supply Chains, Manufacturing, and China business. He is judge and mentor to companies competing in the Mass Challenge, Clean Tech Open, and other business plan competitions. Mike and his sons have competed on the TV show Robot Wars with their robotic rabbit, "Bunny Attack."

**Co-Organizer**



Maureen Mansfield, ALM, CSO, MANSFIELD LAW ~Protect Your Passion~, and Vice Chair, Boston Entrepreneurs' Network (ENET)

Maureen is passionate about protecting passions and implementing business development strategies to build and scale startups, and emerging growth companies with MANSFIELD LAW ~Protect Your Passion~. She brings experience with entrepreneurship, strategy, business development, and contract compliance to entrepreneurs, inventors, creatives, and small businesses working on innovative inventions, artistic endeavors, and cutting-edge technologies. During her graduate studies, Maureen co-founded a startup that bootstrapped to a funding event. After sharing her story at ENET's meeting on bootstrapping, Maureen was asked to volunteer and has been promoted to a Vice Chair.

From beginning her career with her dream job, a TV reporter, Maureen has worked for small, family-owned companies to Fortune 100s on projects, both in the private and public sectors, of local, national, and interna-

tional scope. She has helped many companies enjoy their most successful year to date with sales and by initiating innovative work processes and analytics that saved time and money, often reducing fraud. Maureen co-founded two charities, one for an alumni nonprofit and one for a professional organization, that continue today.

Maureen earned a BA in Journalism and Mass Communication and a BA in Communication Studies, Film and Video Broadcasting and Theatre Arts Tracks, both selective programs from The University of Iowa. She earned a Masters of Liberal Arts (ALM) in Management, emphasis in Finance and Control with honors, from Harvard University. Scholarships from Dean's Lists and other programs inspired her to complete her degrees. Maureen also holds certificates in Project Management. You can follow Maureen on Twitter @Maureen-ManALM.

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-3070514/Registration>. 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.

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-3070514/Registration>.  
PRE-MEETING DINNER at 5:15 PM (sharp) at Bertucci's, Waltham

## 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](mailto:ieeebostonsection@gmail.com)**

*Electromagnetic Compatibility Society, 7:00PM, Wednesday, 3 October*

# Fundamentals and Recent Advances in Power Integrity

Dr. Ishan Erdin, Eng. Design Manager, Celestica, Canada, presenting on the one of the most popular subjects for EMC engineers:



Starting from a qualitative introduction of power noise analysis, current design techniques will be reviewed with application to low voltage-high current data communication systems. The limitations of industrially accepted analysis techniques will be discussed with practical work-arounds. Some recent developments about the multipin optimization of decoupling capacitors will be discussed on sample cases.

Ihsan Erdin received the M. Sc. degree from Middle East Tech. U, Ankara, Turkey in 1993 and the Ph.D. degree from Carleton University in 2001, both in electrical engineering. From 1995 to 1996, he was a research fellow at Defense Research Development (DRDC) Ottawa. From 2000 to 2007, he worked as an SI/PI engineer at Nortel. Since 2007, he has been working in the same job function at Celestica Engineering Design Services in Ottawa. He is an adjunct faculty member with the Electronics Department of Carleton University since 2007. Dr. Erdin is a member of the Professional Engineers Ontario and a senior member of IEEE. He also serves as a member of Signal and Power Integrity Technical Committee (TC-10) of EMC Society. His research interests are analytical and computational methods in electromagnetics, EMI on printed/integrated

circuit structures, analysis of power noise and signal integrity. He has published over 30 technical papers in peer-refereed journals and conferences on EM analysis of PCBs, signal and power integrity.

**Meeting Details:** The meeting of the EMC Society will be held on Wednesday, October 3, 2018 at Bose Corp., 100 The Mountain Road, Framingham, MA.

The technical presentation will commence at 7:00PM following a social hour at 6:00 PM. Food is provided.

**DIRECTIONS TO BOSE CORPORATE HEADQUARTERS:** The address is; 100 The Mountain Road, Framingham, MA, 01701 From Mass Pike (I-90); Take Exit 12 (Route 9 West) toward Worcester. Keep left at the fork on the ramp and get on Route 9 West. At the first set of lights take a right onto California Ave. (sign reads "Framingham Technology Park"). Go straight, over the railroad tracks, and through the next set of lights. The road curves around to a stop sign at the foot of the mountain. Take a left onto the Mountain Road and follow it to the next stop sign at the top of the mountain. The tall glass building before you is the Bose Corporate Center. Take a right at the stop sign, drive past the front of the Corporate Center and then park. For more information, please contact Mike Royer at [Michael\\_Royer@bose.com](mailto:Michael_Royer@bose.com)

## 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>

*Entrepreneurs' Network Cambridge Meeting, 6:00PM, Tuesday, 9 October*

# Successful Marketing Strategies for Startups

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

Digital is at the heart of most marketing and communication programs, which has complicated life for entrepreneurs who are not steeped in how to attract prospects and retain customers. The internet-infused marketing options include web site, social media and blogging, email, search engine optimization, and more.

If you're not sure where to start or what to add to the marketing you're doing, learn more about the options and how to get started. In this meeting, you'll:

Understand what you need to do to draw up a plan.

Determine what marketing components are must have vs. nice to have to influence your prospects.

Assess what options may deliver the most impact for reasonable costs.

Learn tips for taking your plan from completion to implementation.

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:

Stephanie Creech - VP Marketing, Smarketing Insitute, [smarketinginstitute.org](http://smarketinginstitute.org)



Stephanie Creech is a small business marketer and designer. Throughout the years Stephanie has been tasked with all aspects of small business marketing from designing marketing materials, building websites and landing pages, to setting up social media profiles and developing outreach strategies, including building email campaigns and designing promotional material. If its marketing related, then chances are good that she has the experience to guide you to success. Stephanie is quick and eager to learn new technology and incorporate the latest marketing trends into her existing client's plans. From building a plan to implementing a solution, Stephanie understands all the moving pieces to a successful small business marketing effort to building and develop brands



Janet Mesh - CEO & co-founder, Aimal, [aimtal.com](http://aimtal.com)

Janet is the CEO + Co-founder of Aimal, a digital marketing agency based in Boston. Janet works closely with small to mid-size organizations to provide digital + content marketing services, including social media marketing and advertising, blog strategy and management, search engine optimization, and email marketing. When she's not writing or mastering the latest social media algorithms, you can find Janet traveling or trying a new restaurant in Boston.



Chris Ciunci - Founder & CEO, TribalVision, [tribalvision.com](http://tribalvision.com)

As founder and CEO of TribalVision, my role is to help small and mid-size companies market smarter. As a marketing department for hire, TribalVision is a flexible, cost-effective alternative to the traditional marketing solutions available to the business community. Before founding TribalVision, I was a CMO and Vice President

of a \$275MM Bank in charge of a multi-million dollar marketing budget.

Outside of work, I love to play with my two boys, play tennis and read anything marketing related I can get my hands on.

Tom Langford - Director Communications and Public Relations, Abiomed, [abiomed.com](http://abiomed.com)



Tom has more than 20 years of communications experience as a journalist, at a Harvard-affiliated academic medical center, at a leading healthcare communications firm, and at a global medical device company.

In his current position as director of communications at Abiomed, the maker of the world's smallest heart pump, Tom leads the company's internal, external and executive communications. Previously, Tom was a vice president at the communications consultancy Feinstein Kean Healthcare (part of Ogilvy), where he directed strategy and execution for a number of clients in the healthcare space. Tom also worked in the office of Communications and Public Affairs at Brigham and Women's Hospital in Boston and was a television news reporter and anchor for 15 years.

Tom has a degree in broadcast journalism from the S.I. Newhouse School of Public Communications at Syracuse University and holds a Master of Business Administration from Northeastern University.

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.

Registration:

<https://boston-enet.org/event-3027820/Registration>

**COST AND REGISTRATIONS:** This ENET 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 THE MEETING.

**LOCATION:** Draper, 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 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. Street parking is often available around 6pm. Also, \$10 parking is available after 6pm at Yellow Garage

[https://en.parkopedia.com/parking/garage/kendall\\_center\\_yellow\\_garage/02142/cambridge/](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](https://en.parkopedia.com/parking/garage/kendall_center_blue_garage/02142/cambridge/dd)

Registration: ENET Member - Free; Non-ENET Member – \$10.00

Register at: <https://boston-enet.org/event-3027820/Registration>

*Robotics and Automation Society - 6:30PM, Wednesday, 10 October*

## Get an inside look at Toyota Research Institute's robotics efforts, and learn how you can be part of their call for innovation!

Dr. Eric Krotkov, Chief Science Officer, Toyota Research Institute

Join IEEE's RAS chapter at Toyota Research Institute's (TRI) offices in Cambridge, MA for a free evening event, Wednesday, October 10, 2018 from 7-8.30pm featuring a presentation by TRI's chief science officer Dr. Eric Krotkov. Driven by TRI's mission to improve the quality of human life, the robotics group is focused on developing technologies that improve perception, movement, manipulation, and reasoning for service robots that can assist with in-home care. Learn more about TRI's goals, how it fits into the larger Toyota family, and the research the robotics group is pursuing.

Following his presentation, Dr. Krotkov will be joined by Jim Adler, managing director of TRI's venture capital subsidiary Toyota AI Ventures for an interactive discussion about their first call for innovation. Launched earlier this summer, the call for innovation is designed to find and fund entrepreneurs that are solving key technology challenges in areas like artificial intelligence, automated driving, and robotics. The first call is focused on mobile manipulation technologies for assistive robots that can help people in and around the home, and Toyota AI Ventures is looking to invest up to \$2M in one or more startups. Don't miss this chance to find out more about the call for innovation, and to get answers to your questions about how TRI and Toyota AI Ventures are engaging with robotics startups.

Dr. Eric Krotkov serves as the Chief Science Officer of the Toyota Research Institute, where he directs research for the company, with responsibility for Robotics, Accelerated Materials Discovery and Design, and the University program.

Before joining Toyota, Dr. Krotkov founded Griffin Technologies, a consulting and software firm specializing in robotics and machine perception. From 2001 to 2015, Griffin consulted on robotics and for the Defense Advanced Research Projects Agency (DARPA) and other Government agencies.

From 1999 to 2001, Dr. Krotkov served as Vice President for Software at Cytometrics, a medical imaging technology start-up. Responsible for image analysis research and for product software, he helped the company grow from 10 people to 125.

From 1997 to 1999, Dr. Krotkov served as a program manager at DARPA, where he created the Tactical Mobile Robotics program. The TMR program developed man-packable robots used for defusing road-side bombs in areas of armed conflict including Iraq and Afghanistan, and made early investments in Simultaneous Localization and Mapping (SLAM). Dr. Krotkov led other programs developing automation systems for surface ships and navigation systems for submarines.

From 1988 to 1997, as a faculty member of the Robotics Institute at Carnegie Mellon University, Dr. Krotkov taught and researched computer vision, machine perception, and mobile robotics, with a focus on planetary rovers.

Dr. Krotkov earned his Ph.D. degree in Computer and Information Science from the University of Pennsylvania, for pioneering work in active computer vision. Dr. Krotkov earned his B.A. degree magna cum laude from Haverford College.

Jim Adler, Managing Director, Toyota AI Ventures

Jim Adler is the founding managing director of Toyota AI Ventures, and an executive advisor at Toyota Research Institute (TRI). He also serves on the Investment Committee of JetBlue Technology Ventures and on the Department of Homeland Security Data Privacy and Integrity Advisory Committee.

Jim joined Toyota AI Ventures from TRI, where he served as vice president of data and business development. Prior to that, Jim was vice president of products and marketing at Metanautix, a big data analytics

startup funded by Sequoia Capital and Workday that was acquired by Microsoft.

Previously, Jim was the vice president of data systems and chief privacy officer at Intelius, which was acquired by H.I.G. Capital. In addition, he founded VoteHere, a pioneer in cryptographic secure and secret online voting for public elections that was funded by Cisco and HP, among others. Jim started his career as a rocket engineer for Lockheed Martin.

He received his bachelor's degree in electrical engineering with high honors from the University of Florida,

and a master's degree in electrical and computer engineering from the University of California, San Diego.

Meeting Location: Toyota Research Institute, Binney Street, 1 Kendall square, Building 100, Suite 1-201, Cambridge, Massachusetts, 02139.

Parking: There is a for-fee parking lot at 389 Binney Street, Cambridge, MA, located just across the street from One Kendall Square

Please register at:

[https://ieee\\_boston\\_ras\\_tri.eventbrite.com](https://ieee_boston_ras_tri.eventbrite.com)

## **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>

*Boston and N.H. Sections - Women in Engineering and Young Professionals – 11:30AM – Sunday, 14 October*

## **Hike Mount Major Brook Trail**

Sick and tired of sitting all day in front of a computer dreaming of a day where you can escape the office? Dreading the long New England winter? Yes, I know the feeling. So let's get out of that office, stretch our legs, and see some beautiful fall foliage before the blizzard 2018 shuts us all in. WIE/YP is hosting a hiking event at

Mount Major. This is a moderate loop of 4 miles (total) and 1,100 feet elevation with a rewarding view.

Location: Alton, N.H.

Registration: <https://events.vtools.ieee.org/m/174707>

*Life Members - Joint Meeting of Boston and NH – 4:00PM, Wednesday, 17 October*

# Electronics fueled the 2000 US budget surplus

## Will AI help or hinder?

Paul H. Carr, IEEE Life Fellow



The “dot-com” digital technology boom together with governmental tax increases resulted in the 1998 - 2001 federal budget surpluses. Will emerging artificial intelligence, AI, and deep learning technology help the US recover from the budget deficits we have had since 2001?

AI should make more jobs for technologists and expand our economy. What about other skilled professionals like radiologists, who are being displaced by the AI that can do a better job? The McKinsey Global Institute report, “Jobs lost, jobs gained: Workforce transitions in a time of automation (2017),” predicted that up to 33% of our workers will have to find new jobs by 2030.

Joseph Aoun, President of Northeastern University, in his book *Robot-Proof: Education in an Age of Artificial Intelligence* advocates educating people to invent, create, and discover—filling needs that even the most sophisticated robot cannot do. Workers will need both computer and human communication skills and psychology learned in the humanities. Basic income pilot programs in Ontario Canada and Silicon Valley are underway to help those whose jobs are eliminated by AI

Would government “trickle up” economic policy be more effective than present “trickle down” in increasing income equality?

Biographical Sketch of Paul H. Carr: BS MIT, PhD Brandeis U, IEEE Life Fellow. From 1967 to 1995, he led the Component Technology Branch of the Air Force Research Laboratory, Bedford, MA. His branch developed the surface acoustic wave (SAW) technology used in compact, signal-processing filters for radar, cell phones, and TV. Two former branch member were Dr. Ken Laker and Dr. Tom Szabo. Ken Laker in 1999 was elected president of the IEEE. Tom Szabo’s *Diagnostic Ultrasound Imaging: Inside Out* (2003) has been cited over 1000 times. After Dr. Carr’s retirement from AFRL, he taught philosophy courses at U Mass Lowell that inspired his book, *Beauty in Science & Spirit* (2006). In 2017 he presented, “Climate Change: Are We Losing the Carbon-Free Energy Market to China?” His web page: [www.MirrorOfNature.org](http://www.MirrorOfNature.org)

The meeting will be held at the Main Cafeteria at MIT Lincoln Laboratory, 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/>

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

*Microwave Theory and Techniques Society – 6:00PM, Monday, 22 October*

# Nonresonating Modes Do It Better!

**Dr. Simone Bastioli, RS Microwave, [sbastioli@rsmicro.com](mailto:sbastioli@rsmicro.com)**



The innovative concept of nonresonating modes and how this has been recently exploited to extend the performance and capabilities of the state-of-art of microwave filter technology will be presented in this talk. Although the concept is presented by mostly focusing on filters, as these are the components where this new

technique has found large application over the past few years, all general features are explained and illustrated in detail thus potentially paving the way for new applications involving other passive microwave components.

After a brief discussion highlighting the importance of microwave filters from a system perspective, the main concept of the talk will be introduced by defining what is a nonresonating mode and by illustrating what are the benefits of this approach. The concept is then gradually explained by using some waveguide as well as planar SIW examples, as the rectangular waveguide technology is where these modes were first observed; most importantly, these examples have been proved to considerably ease the understanding of the concepts from both students and non-experts perspectives. The general multimode environment of these structures is described step-by-step and several animations are introduced during the explanation thus really allowing the audience to absorb the more general multimode concept that otherwise often remain an obscure myth for many microwave engineers.

The presentation is then extended to the most various filter technologies, such as conventional coaxial structures, dielectric resonators based architectures, as well as more original mixed technologies. The presentation will also cover few examples regarding different applications such as three-port junctions for duplexing purposes, and showing how actually some well-established four-port components have indeed always “unconsciously” exploited some form of nonresonating

modes. Several manufacturing examples of actual products developed at RS Microwave (Dr Bastioli’s affiliation) are going to be presented along this talk, thus also satisfying the more practical taste of an industry audience.

Simone Bastioli (S’10–M’11) received the Ph.D. degree in electronic engineering from the University of Perugia, Italy, in 2010.

He is the Acting Chief Engineer at RS Microwave Company Inc., Butler, NJ, United States, where he is responsible for the design and development of innovative microwave filters, multiplexers, switched filters banks, as well as more complex sub-assemblies for military applications.

Dr. Bastioli is a current IEEE Young Professional (YP), and he was the recipient of the 2012 IEEE Microwave Prize for the invention of TM dual-mode cavities and nonresonating modes. He is the vice chair of the MTT-8 Filters and Passive Components Technical Committee, and he serves as an Associate Editor of the IEEE Microwave Magazine. In 2008, he was awarded with the Best Student Paper Award (First Place) at the IEEE MTT-S International Microwave Symposium (IMS) held in Atlanta, GA, USA, and with the Young Engineers Prize at the European Microwave Conference held in Amsterdam, The Netherlands. In 2009, he was the recipient of the Hal Sobol Travel Grant presented at the IEEE MTT-S IMS held in Boston, MA, USA. He was also awarded the Young Scientist Distinction by the Polish Academy of Science at the 2014 MIKON International Conference held in Gdansk, Poland. His work resulted in several publications in international journals and conferences, as well as several patent applications

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

5:30 PM refreshments, talk begins at 6:00 PM



IEEE


<http://ieeescrpts.mit.edu/conference>

Meet Innovative Technology

# IEEE MIT UNDERGRADUATE 2018 RESEARCH TECHNOLOGY CONFERENCE

**October 5 - 7, 2018 Cambridge, Massachusetts USA**

Technical Papers, Posters Presentation, Lightning Talks

## REGISTRATION

IS NOW

## OPEN!

<https://ieeemit-urtc2018.eventbrite.com>

## 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](http://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](mailto: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.



*The Institute of Electrical and Electronics Engineers, Inc.*

## Fall 2018 Professional Development and Education Program

[www.ieeeboston.org](http://www.ieeeboston.org)

### Digital Signal Processing for Wireless Communications

Dates and Time: Thursdays, October 11, 18, 25, Tuesdays, October 30 and November 6  
6:00PM - 9:00PM

### Fundamentals of Real-Time Operating Systems

Dates and Time: Mondays, October 15, 22, 29 and November 5  
6:00PM - 9:00PM

### Fundamentals of Bioelectronics for Applications in Neuroprosthetics

Date and Time: Friday, October 26  
8:00AM - 4:00PM

### Introduction to Embedded Linux

Dates and Time: Mondays, November 12, 19, 26 and December 3  
6:00PM - 9:00PM

### Applications of Python for Digital Design and Signal Processing

Dates and Time: Thursdays, November 15, 29, Wednesday, December 5 and Thursday, December 13  
6:00PM - 9:00PM

### Making You A Leader Fast Track

Date and Time: Monday, December 17  
8:00AM - 5:00PM

### Write Right Agile User Stories and Acceptance Tests Right - 2-Day Intensive Seminar Workshop

Dates and Time: Tuesday, December 18 and Wednesday, December 19  
8:00AM - 5:00PM

### Practical RF PCB Design, Wireless Networks, Products and Telecommunications

Dates and Time: Tuesday, December 18 and Wednesday, December 19  
9:00AM - 4:30PM

### Online Courses

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

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

(Discounts available if register for all three Verilog Courses)

All Courses are being held at the Crowne Plaza Hotel, 15 Middlesex Canal Park Drive, Woburn

For more information on these courses and other local IEEE activity see our website at [www.ieeeboston.org](http://www.ieeeboston.org), email: [ieeebostonsection@gmail.com](mailto:ieeebostonsection@gmail.com), or call 781-245-5405

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

23 - 24 October 2018

Westin Hotel, Waltham, MA USA



**[www.ieee-hst.org](http://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](http://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](http://www.array2019.org) for details

#### Special Sessions

Please provide suggestions for special sessions to the Technical Program Chair at [info@array2019.org](mailto:info@array2019.org)

#### Paper Template and Submission Procedures

Template and submission procedures are available at [www.array2019.org/call-for-papers](http://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](http://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

#### Conference Chair:

Jeffrey S. Herd, MIT LL

#### Vice Chair:

William Weedon, Applied Radar

#### Technical Program Chair:

Alan J. Fenn, MIT LL

#### Technical Program Vice Chair:

David Mooradd, MIT LL

#### Honorary Chair:

Eli Brookner, Raytheon (retired)

#### Secretary:

Duane J. Matthiesen, Technia

#### Publicity:

Glenn Meurer, MITRE  
Don McPherson, SRC, Inc.

#### Publications:

Raoul Ouedraogo, MIT LL  
Mark McClure, STR

#### Plenary Session:

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

#### Tutorials:

Will Moulder, MIT LL  
Wajih Elsallal, MITRE

#### Student Program:

Justin Kasemodel, Raytheon  
Honglei Chen, The MathWorks

#### International Liaison:

Alfonso Farina, Selex (retired)  
Alberto Moreira

#### Sponsorships

Dan Culkin, NGC

#### Social Media:

Andrew Zai, Humatics Inc.

#### Special Sessions:

Sean Duffy, MIT LL

#### Web page:

Kathleen Ballos, Ballos Associates, Kenneth E. Kolodziej, MIT LL

#### 5G Advisors:

Jonathan Williams, Teradyne Tony Fischetti, MACOM

#### Exhibits Chair:

Matt Facchine, NGC

#### Local Arrangements/Finance:

Robert Alongi, IEEE Boston

#### Poster Session:

Pierre Dufilie, MIT LL

#### Advisors:

Greg Charvat, Humatics Inc.,  
Greg Arlow, Lockheed Martin

Technical  
Co-Sponsors



# Radar Conference 2019

Boston



*Revolutions in Radar*

## Sponsors

### Platinum



**Raytheon**



### Silver



## About the Conference

**22-26 April 2019**

Westin Waterfront Hotel  
Boston, Massachusetts, USA

[www.radarconf19.org](http://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](mailto: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 |

## Organizing Committee

### General Chair

Eric Evans  
MIT Lincoln Laboratory (MIT LL)

### Deputy Chairs

Mark Russell, Raytheon  
Eric Reinke, Northrup Grumman  
Richard Buck, Lockheed Martin

### Vice Chair

Jennifer Watson, MIT LL

### Technical Chair

Dan Rabideau, MIT LL

### Technical Vice Chair

Dan Bliss, Arizona State University

### Exhibits

Pamela Evans, MIT LL

### International

Alfonso Farina, Selex (ret.)  
Hugh Griffiths, U. College of London

### Plenary

Eli Brookner, Raytheon (ret.)  
Frank Robey, MIT LL

### Publications

Jeffrey Herd, MIT LL  
Vito Mecca, MIT LL

### Publicity

Mabel Ramirez, MIT LL  
David Mooradd, MIT LL

### Tutorials

James Ward, MIT LL  
Katherine Rink, MIT LL

### Student Program

Julie Jackson, AFIT

### Sponsorships Chair

Jonathan Towle, Raytheon

### Business Manager:

Robert Alongi, IEEE Boston

### Website

Andrew Zai

***Last Notice Before Course Begins, Please Register now!!!***

# The Fundamentals of Bioelectronics for Applications in Neuroprosthetics

**Date & Time:** Friday, October 26, 2018; 800AM - 3:00PM  
(6 hours of instruction!)

**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 rejunvenation.

### ***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**

|                     |              |
|---------------------|--------------|
| <b>IEEE Members</b> | <b>\$225</b> |
| <b>Non-members</b>  | <b>\$250</b> |

**Payment received after Oct. 12**

|                     |              |
|---------------------|--------------|
| <b>IEEE Members</b> | <b>\$250</b> |
| <b>Non-members</b>  | <b>\$275</b> |

<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](http://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](mailto: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](mailto:ieeebostonsection@gmail.com)**

***Last Notice Before Course Begins, Please Register now!!!***

# DSP for Wireless Communication

**Time & Date:** 6 - 9PM; Thursdays, Oct. 11, 18, 25, 30, Nov 6. (Note Oct. 30 and Nov. 6 are **Tuesday**) (14 hours of instruction!)

**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  
(14 hours of instruction!)

**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**

|                     |              |
|---------------------|--------------|
| <b>IEEE Members</b> | <b>\$445</b> |
| <b>Non-members</b>  | <b>\$465</b> |

**Payment received after Dec. 4**

|                     |              |
|---------------------|--------------|
| <b>IEEE Members</b> | <b>\$465</b> |
| <b>Non-members</b>  | <b>\$485</b> |

<http://ieeeboston.org/%20writing-agile-user-story/>

# Making You a Leader - Fast Track

**Date & Time:** Monday, December 17; 8:30AM - 5:00PM  
(7 hours of instruction!)

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

**Speaker:** Robin Goldsmith, President, GoPro Management

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

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

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

## **PARTICIPANTS WILL LEARN:**

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

they need to make their projects successful.

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

## LEADERSHIP CHARACTERISTICS & ROLE

How leadership looks and feels  
Management vs. leadership  
Leadership components of project success  
Basic leadership practices; power sources  
Real change leaders in organizations

## TEAMS AND LEADERSHIP

Everyone feels leadership is lacking  
Everyone thinks s/he is a leader  
Results, not actions or intent  
Workgroups, teams, and leaders  
Situational leadership styles  
Coaching and sports analogies to projects

## 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**

|                     |              |
|---------------------|--------------|
| <b>IEEE Members</b> | <b>\$235</b> |
| <b>Non-members</b>  | <b>\$260</b> |

#### **Payment received after Dec. 3**

|                     |              |
|---------------------|--------------|
| <b>IEEE Members</b> | <b>\$260</b> |
| <b>Non-members</b>  | <b>\$280</b> |

<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/>

**IEEE Boston Section Social Media Links:**

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

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

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

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

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

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

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

***Registration Fee: \$350***

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

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

## **Course Objectives**

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

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

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

## **Course Schedule**

Getting Started with Embedded Linux

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

Linux References (Books and Online)

BSP Requirements

U-Boot and Bootloader Development

Embedded Linux BSP Development Basics

Basic BSP Development

Files and Filesystem Support

The I/O Subsystem: Talking to Hardware

Memory Management and Paging

Error Handling in Embedded Linux BSPs

Timing and Timers

Interrupt and Exception Handling in BSPs

BSP Deployment Issues and Practices

Embedded Linux SDK Basics

The 3 Pieces of an SDK

Embedded Linux Distributions and the GNU Compiler

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

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

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

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

## ***Advertise with us!!!***

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

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

IEEE Boston Section is the largest, most active, and technically diverse section in the U.S. Comprised of Engineers, scientists and professionals in the electrical and computer sciences and engineering industry

### **IEEE Boston Section Rate Card**

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

### **IEEE Boston Media Kit**

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

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

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

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

**Registration fee: \$250**

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

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

## Course Objectives

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

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

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

Getting Started with Embedded Linux

Embedded Linux Training Overview

Terminology

Linux Versioning

The GPL

Building the Kernel Source Code

Embedded Linux Kernels

BSPs and SDKs

Linux References (Books and Online)

A Development Cycle Focused on Performance

A Basic Optimization Process

Basic Debugging Review

Embedded Applications Debug

GDB, GDB Server and the GDB Server Debugger

Other Debuggers

An Eclipse Remote Debug Example

Debugging with printk, syslog, syslogd and LTTng

System-Level Debug

System-Level Debug Tools

The /proc and /sys Filesystems

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

|                                        |                                                     |
|----------------------------------------|-----------------------------------------------------|
| Kexec and Kdump                        | Improving 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/>

## IEEE Boston Section Social Media Links:

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

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

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

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

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

# Software Development for Medical Device Manufacturers (Online Edition)

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

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

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

## Module 1

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

## Module 2

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

## Module 3:

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

- Design Reviews

## Module 4:

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

## **Speaker Bio:**

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

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

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

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

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

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

***Registration Fee: \$150***

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

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

## **Course chapters**

1. Vector Basics
2. Dot Product

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

## **Instructor's Bio:**

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

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

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

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

**Registration Fee: \$320**

## Course Description

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

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

## Course Outline

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

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

## Course Objective

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

## Instructor's Bio

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

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

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

# Introduction to Embedded Linux

## (Online Edition)

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

### Course Summary:

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

### Who Should Attend:

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

### Course Objectives:

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

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

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

Hardware and Software Requirements

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

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

### Additional Reference Materials

Linux Kernel Development by Robert Love

Linux System Programming by Robert Love

Linux Debugging and Performance Tuning by Steve Best

Optimizing Linux Performance by Phillip G. Ezolt

Embedded Linux Primer by Christopher Hallinan

Pro Linux Embedded Systems by Gene Sally

Embedded Linux Development Using Eclipse by Doug Abbott

Linux Device Drivers by Jonathan Corbet et al

Essential Linux Device Drivers by Sreekrishnan Venkateswaran

Course Downloadable Content:

Video Lecture

Hands-On Lab Instructions

Hands-On Lab Solutions

Additional Related Materials

### The Basics

Linux Terminology, History and Versioning

The Linux Community: Desktop & Embedded

The GPL

Linux References (Books and Online)

### Getting Started

Kernel Source Code

Building the Kernel

Embedded Linux Kernels

Linux 2.6

### Basic Kernel Capabilities

Process and Threads Management

Signals and System Calls

Synchronization, IPC and Error Handling

Timing and Timers

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

## **Debugging**

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

## **An Eclipse Debug Example**

## **Other Debug and Test Tools**

## **Other System-Level Debug Approaches**

## **Process & Threads Management**

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

## **Signals**

## **System Calls**

## **Scheduling**

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

## **Synchronization**

Via Global Data  
Via Semaphores, Files and Signals

## **Inter-Process Communications (IPC)**

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

## **Error Handling**

errno and perror  
strerror and strerror\_r  
oops, panics and Segmentation Faults

## **Timing**

How Linux Tells Time

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

## **Memory Management and Paging**

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

## **Modularization**

Creating a Module and Module Loading  
Dependency Issues  
In Embedded Systems

## **Shared Libraries**

A Shared Library Example  
Static and Dynamic Libraries

## **The I/O Subsystem: A Tale of Two Models**

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

## **Embedded Linux Trends**

Development, Monitoring and Testing

## **Some Final Recommendations**

## **Lecturer:**

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

# Practical RF PCB Design: Wireless Networks, Products and Telecommunications

**Date & Time:** Thursday & Friday, December 18 & 19; 9AM - 4:30PM  
(13 hours of instruction!)

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

**Speaker:** Henry Lau, Lexiwave Technology

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

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

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

## OUTLINE

### 1. Printed circuit board design for RF circuits

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

### 2. Printed circuits board design for other circuits

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

### 3. PCB design for EMC/EMI compliance

EMC/EMI compliance  
Grounding methods  
Decoupling methods  
Shielding methods

### 4. Additional Design Techniques

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

### 5. Case studies

**Expertise:**

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

*notes, lunch and coffee breaks  
included with registration*

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

**Payment received by December 4**

**IEEE Members \$405**

**Non-members \$435**

**Payment received after December 4**

**IEEE Members \$435**

**Non-members \$455**

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

## 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.

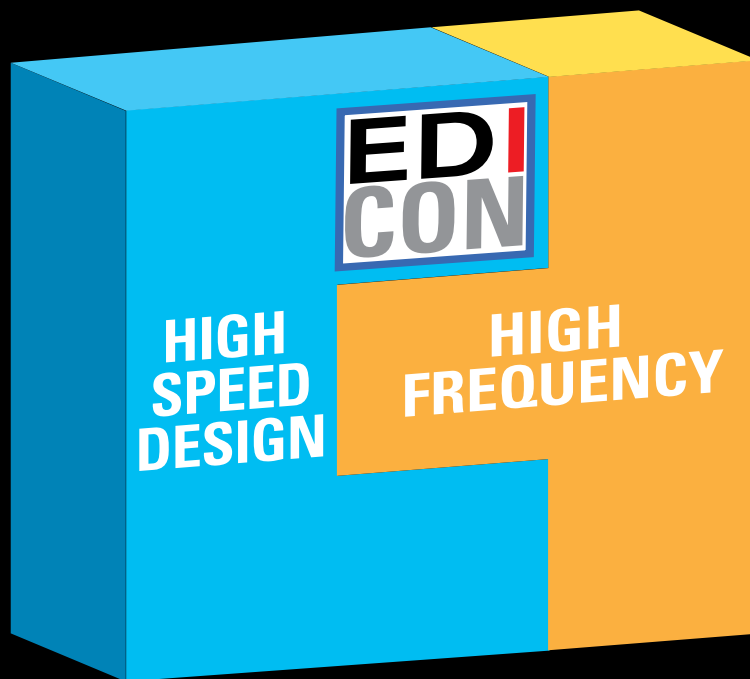
The Reflector is published the first of each month. The target submission deadline for the articles should be five weeks before the issue date (e.g., June 1st issue date; article submission is April 27). This will allow sufficient time for a thorough review and notification to the author.

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

**Submissions should be sent to;  
ieeebostonsection@gmail.com**

# Register Now! @ [EDICONUSA.COM](http://EDICONUSA.COM)

*Register by August 31 to take advantage of early bird discounts.*



## The Only Event That Brings Them Both Together

**Hands-On, Practical, Problem Solving...Let's Get To Work**

- Exhibition of Industry Leading Exhibitors
- Technical Conference with Papers, Workshops, Panels, Plenary Keynotes and EDI CON University

**October 17-18, 2018  
Santa Clara  
Convention Center  
Santa Clara, California**



**EDI CON** 2018  
Electronic Design Innovation  
Conference & Exhibition  
*Where high frequency meets high speed.*

**Microwave  
Journal**

**Signal Integrity**  
Signal Integrity • Power Integrity • EMC/EMI  
**Journal**

**h h** horizon  
house®