



# THE REFLECTOR

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2024 IEEE INTERNATIONAL  
SYMPOSIUM ON PHASED  
ARRAY SYSTEMS AND  
TECHNOLOGY

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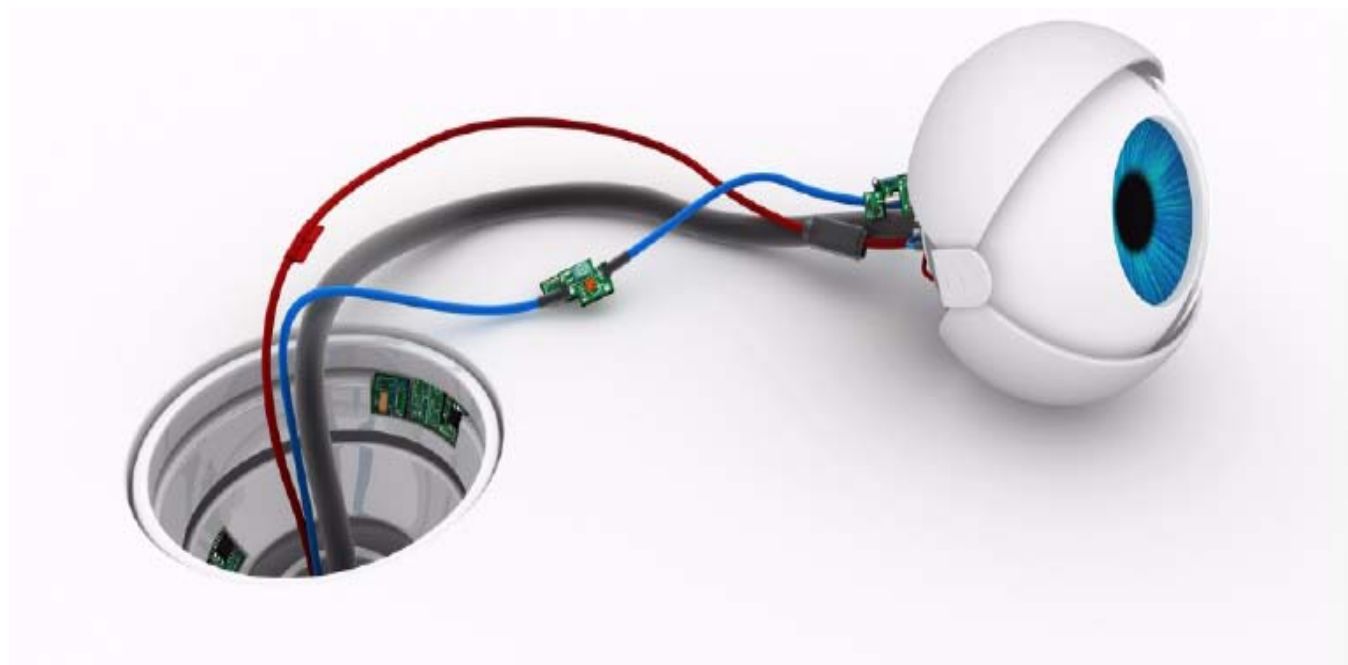
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## Remembering Hal

by Karen Panetta, Reflector Editor

In 1994, Dr. Arthur Winston invited me to an IEEE Boston Section meeting. It was held at a Lexington, MA hotel. I had been an IEEE member as an undergraduate student and young professional but had never engaged at the section level.

When I arrived, I was given a warm welcome by all the attendees. We began the meeting as a fabulous dinner was being served and then the meeting was called to order.

I sat next to a gentleman who kept interrupting the proceedings to proclaim, "Robert's rules of order."

After several of his interruptions declaring, "Point of order!", I was honestly terrified to open my mouth for fear I would also get "point of ordered". I had never attended such a formal meeting when I was employed in industry, and I certainly didn't get invited to many high-profile meetings as a new assistant professor. I had no idea that IEEE meetings followed protocols to keep discussions productive and maintain collegiality via Robert's Rules of Order.

In my naivety, I mustered up the courage to ask the gentleman, "Who is Roberts?"

Rather than laugh at me for being so clueless, he said, "This is why it's great you are becoming active in the Boston Section, and I expect you to become Chair of the section in the future!"

That gentleman was Hal Goldberg. That was the first time we met, but Hal knew that Arthur had great respect for me. Since Arthur already recognized my potential, Arthur's judgement was good enough for Hal to decide

that I would someday become a good leader for IEEE Boston.

However, Hal wasn't about to allow me to get there without the hard work and evidence that I deserved to lead the best IEEE section in the world!



Hal was our long-time IEEE Boston Reflector Newspaper Editor. He started this role back in the days when we still used postal mail, the non-electronic kind, to send out our publications.

Hal was tough and set very high expectations of everyone, including himself. He watched my career flourish and always kept me involved in one of his IEEE projects. He had me join his editorial board of the IEEE Reflector newspaper, despite me not being a writer or even interested in writing for the Reflector.

One day, Hal announced that he wanted a competition where each member of the editorial board would submit an editorial and he would print the best one and make the winner his successor to the Editor position he held for decades. He expected everyone to participate and we did. I don't recall what I wrote about, but I remember feeling I did a good job considering that writing wasn't one of my favorite past-times.

I could have tried to get out of the assignment using one of the many creative excuses, I had learned from my students, but I knew nothing would get past Hal. Instead, I decided to take on Hal's challenge and accepted to endure the inevitable lumps I would receive from Hal's constructive feedback.

I still remember Hal's comments regarding my editorial. I learned many new words like "esoteric", and "germane", but what stuck with me was his opening comment. Most of us reviewing other people's work are trained to first emphasize the positive before delivering the bad news. Hal wasn't like "most of us," and he didn't mince words.

He said, "You write like crap!"

I consoled myself by saying I felt relieved because now he would never want someone who "writes like crap" to assume his beloved editor role, but Hal always had a master plan in play. After the initial decapitation of my ego, he told me that I had some good ideas and just needed more practice and lots and lots of revising.

He then went on to name me the Editor of the IEEE Boston Reflector newspaper. I was shocked and to this day, I wondered if he had no other choice because everyone else didn't want to follow in his mammoth footsteps or if he knew I would end up cherishing the role.

In 2011, I assumed the role of the IEEE Boston Chair. Hal was delighted. I often think he found satisfaction being correct in his predictions, but I also think he had knowingly and deliberately planted a seed in my brain to make me believe I could rise to challenge. I think he was simply trying to motivate and encourage me. Incidentally, the IEEE Boston Section won the IEEE large section award for 2011. Hal was quite pleased with the outcome.

Hal was a brilliant strategist and innovator. Together, Hal and Arthur, along with colleague Jerome Levy, shared the Bernard M. Gordon Prize, an award given annually by the National Academy of Engineering to recognize innovation in engineering and technology education.

Hal thrived on generating "good" controversy and wrote passionately in his editorials about his position on just about everything. He would receive many heated let-

ters in response to his articles. I found it curious that he would be excited and happy about receiving them.

Hal had two rules regarding editorials. First, responses, good or bad from readers are great because it means people are reading the IEEE Reflector and that means they can't help but see all the other great content provided in the IEEE Reflector. His second rule, was: "Do not engage or respond to the letter writers."

I understand what Hal's intent was with respect to rule 2. Namely, engaging in verbal fisticuffs with someone wasn't the editor's role. Despite his rule, I still respond to acknowledge and thank anyone who takes the time to write, provided they are human and not robot generated. I know Hal is smiling at me when I am a wimp and break Goldberg's rule 2.

In 2007, I became the Editor-in-Chief for the IEEE Women in Engineering Magazine, and the magazine has won over 20 awards for its publication excellence. I recall telling Hal that I consider this a wonderful achievement for someone who writes like "crap". He laughed hysterically and was very proud of me.

We lost Hal a few weeks ago and I knew I had to write this editorial about him. Hal would give me a hard time about not proofreading it, or that making him the subject matter in this article was not germane to the core of IEEE Boston.

However, I would push back and prove him wrong by telling him that he was the heart of IEEE Boston Section and that his mentoring, and unconventional motivational methods helped many of us achieve goals and aspirations that many others only dream of accomplishing. That is why IEEE Boston thrives and exists, to help our members grow and flourish. Hal helped us and now it's our turn to help others.

Hal, thank you for everything.

## Consumer Technology Society Call for Volunteers!

We are currently looking for volunteers who would be interested in pushing forward the mission of the Consumer Technology (CT-S), Boston Chapter. The chapter is looking for volunteers to help organize chapter meetings and help meet the needs of the local CT-S member needs.

The Boston Section is organizing chapters into groups of similar technical interest areas to pool their resources for easier and better chapter collaboration in planning the chapter events.

**If you have interest in volunteering for a chapter leadership position or are interested in learning more about what these volunteer positions may entail, please send an email to Karen Safina in the IEEE Boston Section office at, [ieeebostonsection@gmail.com](mailto:ieeebostonsection@gmail.com)**

Aakash Deliwala, Chair, IEEE Boston Consumer Technology Chapter

## Engineering in Medicine & Biology Society Call for Volunteers!

We are currently looking for volunteers who would be interested in pushing forward the mission of the Engineering in Medicine & Biology Society (EMBS), Boston Chapter. The EMBS - Boston Chapter was recently approved in July 2021, and we're looking to make a significant impact in the area of Biomedicine, Bioengineering, and Biotechnology in the region. The chapter is looking for volunteers to help organize chapter meetings and help meet the needs of the local EMBS members.

The Boston Section is organizing chapters into groups of similar technical interest areas to pool their resources for easier and better chapter collaboration in planning the chapter events.

**If you have interest in volunteering for a chapter leadership position or are interested in learning more about what these volunteer positions may entail, please send an email to Karen Safina in the IEEE Boston Section office at, [ieeebostonsection@gmail.com](mailto:ieeebostonsection@gmail.com).**

Aseem Singh, Marie Tupaj, Co-Chairs, Boston EMBS Chapter



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[iee.org/membership](https://iee.org/membership)

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PROFESSIONAL DEVELOPMENT

CAREER ADVANCEMENT

# IEEE Boston Section Online Courses:

(Students have 180 day access to all online, self-paced courses)

## Electronic Reliability Tutorial Series

Full course description and registration at ,  
<http://ieeeboston.org/electronic-reliability/>

## 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/>

## CALL FOR PAPERS



# IEEE International Symposium on Phased Array Systems and Technology

15 - 18 October 2024  
Hynes Convention Center  
Boston, Massachusetts, USA  
[www.ieee-array.org](http://www.ieee-array.org)



## Sponsors and Exhibitors

### Contact:

[sponsorships@  
ieee-array.org](mailto:sponsorships@ieee-array.org)

## 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 offer a unique opportunity for members of the international community to interact with colleagues in the field of phased array systems and technology.

The committee is thrilled to announce two major changes to the symposium to better reflect the interest and pace of technology development: (1) moving to the larger [Hynes Convention Center](#) in the Back-Bay neighborhood of Boston; and (2) increasing the symposium frequency to a two-year cadence.

## Be a Symposium Sponsor or Exhibitor

For sponsorship and exhibit opportunities please reach out to Mark McClure and Marc Angelucci at: [sponsorships@ieee-array.org](mailto:sponsorships@ieee-array.org).

## Suggested Topics

- 5G Arrays
- Array Design
- Array Measurements
- Array Signal Processing
- Automotive Arrays
- Beamforming & Calibration
- Digital Array Architectures
- Dual Polarized Arrays
- Low Cost Commercial Arrays
- MIMO Arrays
- Medical Applications
- Metamaterial Phased Arrays
- mmWave and Terahertz
- T/R Modules
- Low Frequency Arrays
- SATCOM Arrays
- Weather Arrays
- Wideband Arrays

## Paper Template and Submission Procedures

Template and submission procedures are available at:  
<https://ieee-array.org/call-for-papers>.

## Important Dates

- Full paper submission (2-8 pages including figures): 13 May 2024
- Author notification: 22 July 2024
- Author registration deadline: 01 Sept 2024

We are looking forward to seeing you at this next gathering.

## Committee

### Symposium Chairs

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## Technical Co-Sponsors



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# IEEE Video Series

A collaborative discussion panel featuring esteemed members from the Institute of Electrical and Electronics Engineers has convened in 2021 to produce educational video presentations that embrace IEEE's mission of advancing technology for humanity.

Among the programs they've produced include "Electric Vehicles: Fun Saving Our Planet", "Greener Power For More Electric Vehicles", "Overcoming Nuclear Fears To Achieve Net Zero CO2 By 2050" and "Achieving a Net Zero Carbon Future", "Green Energy's Economic Progress", and "Net-Zero CO2 with Nuclear, Hydrogen and Geothermal". Projects currently in production include the expansive topic of futurology, with a focus on increasing the efficiency and transformation of aging electrical power generating stations and infrastructure to accommodate nuclear power; reviewing the viability of alternative energy (such as geothermal, wind and solar); and focusing on 'cleaner' fossil fuels that are more environmentally-friendly to slow the rate of climate change.

These shows are produced and directed by Lennart E. Long, IEEE Senior Life Member from the Executive Committee and Past Chair of the Boston Section; Dr. Paul H Carr, BS, MS, MIT; PhD Brandeis U, IEEE Life Fellow; Dr. Ted Kochanski, SB (MIT), Ph.D (U.Texas, Austin), IEEE Global Education for Microelectronic Systems and former Boston Section Chair; and Dr. Ken Laker, B.E. (Manhattan College), M.S. and Ph.D. (New York University), IEEE Life Fellow and past President of IEEE.

The panel is moderated by five-time Boston/New England Emmy Award-winner and television personality and star of "The Folklorist," John Horrigan. These video programs with presentations and discussions can be accessed at the IEEE Boston Section video portal at <https://vimeo.com/user18608275>.

We are looking for any IEEE members that would like to appear on the program in the role of presenter or discussion expert. Simply reach out to Robert Alongi at the Boston Section at, [ieebostonsection@gmail.com](mailto:ieebostonsection@gmail.com).

## Call for Articles

Now that the Reflector is all electronic, we are expanding the content of the publication. One of the new features we will be adding are technical, professional development, and general interest articles 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 or general interest 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/interest articles will be reviewed by the Publications Committee for suitability. The author will be notified of the reviewers' decision.

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

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

**Submissions should be sent to;**  
**[ieebostonsection@gmail.com](mailto:ieebostonsection@gmail.com)**

# 27th Annual IEEE High Performance Extreme Computing Virtual Conference 25 - 29 September 2023

## CALL FOR PAPERS

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Northeastern University

**Administrative Contact**

*Mr. Robert Alongi*  
IEEE Boston Section

The IEEE High Performance Extreme Computing Conference (HPEC '23) will be held virtually 25 – 29 September 2023. The HPEC charter is to be the premier conference in the world on the confluence of HPC and Embedded Computing.

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

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

**HPEC accepts two types of submissions:**

1. Full papers (up to 6 pages, references not included. Additional pages can be purchased for \$200/page).
2. Extended abstracts (up to 2 pages, references included).

**IMPORTANT DATES:**

Submission Deadline: **JUL 07, 2023**  
Notification of Acceptance: **AUG 15, 2023**  
Camera Ready Deadline: **AUG 31, 2023**

Submissions to HPEC '23 will be accepted through the CMT submission site at:

<https://cmt3.research.microsoft.com/HPEC2023/>

Preference will be given to papers with strong, quantitative results, demonstrating novel approaches or describing high quality prototypes. Authors of full papers can mark their preference for a poster display or an oral presentation. Presenters who wish to have hardware demonstrations are encouraged to mark their preference for a poster display. Accepted extended abstracts will be displayed as posters. Papers can be declared "student paper" if the first author was a student when doing the presented work and will be eligible for the "IEEE HPEC Best Student Paper Award." Papers should not be anonymized. All paper and extended abstract submissions need to use the approved IEEE templates. Full paper submissions with the highest peer review ratings will be published by IEEE in the official HPEC proceedings and may be available on IEEE eXplore. All other accepted submissions and extended abstracts are published on [ieee-hpec.org](http://ieee-hpec.org).

Vendors are encouraged to sign up for vendor booths. This will allow vendors to present their HPEC technologies in an interactive atmosphere suitable for product demonstration and promotion. We welcome input ([hpec@ieee-hpec.org](mailto:hpec@ieee-hpec.org)) on tutorials, invited talks, special sessions, peer reviewed presentations, and vendor demos. Instructions for submitting will be posted on the conference web site shortly.

[IEEE-HPEC.org](http://IEEE-HPEC.org)

*Power & Energy Society – 6:30PM, Tuesday, August 22 (Refreshments start at 6:00pm; Talk begins at 6:30pm)*

# Synchronized Waveform Measurement and Applications in Power Systems

Speaker: Farnoosh Rahmatian, Ph.D., P.Eng., Fellow IEEE, Co-Founder & President, NuGrid Power Corp

**Location:** *Wentworth Institute of Technology  
Beatty 426 (Building: Beatty Hall) 550 Huntington  
Ave, Boston, MA 02115 (Free Parking at West Park-  
ing Lot)*

Synchronized power system measurements, particularly synchronized phasor measurements, have received a lot of attention in the recent years for wide area situational awareness and various other functions. Phasors, however, effectively filter out a lot of information that may be useful for other applications, particularly in the presence of power system disturbances and heavy deployment of inverter-based resources (IBR). Waveforms, depending on sampling rate/resolution, provide a more granular and authentic representation of voltage and current in power systems. With the recent advancements in grid sensor technologies, it is now possible to obtain time-synchronized waveform measurements from various points on a power system in order to obtain “synchrowaveforms.” Synchrowaveforms open the door for a more advanced power system monitoring, situational awareness, and system performance assessment. Synchro-waveforms have innovative applications in both apparatus and power system management.

Areas of particular interest are asset monitoring, incipient fault detection/location, protection, as well as control. Faster synchro-waveforms also can play a critical role in monitoring inverter-based resources (IBR), their dynamics and their responses to system disturbances. In this presentation, Dr. Rahmatian will provide an overview of advanced voltage and current sensors providing synchro-waveforms and their potential application, with focus on grid resiliency. The presentation will be fo-

cused on one or two applications, i.e. accurate fault location and high-frequency harmonics detection near IBRs.



Dr. Rahmatian is the Co-Founder and President of NuGrid Power Corp. He has contributed to several techniques for power system measurement and automation over the past 30 years. He is a Professional Engineer and a Fellow of the IEEE for contribution to optical voltage and current sensors. Farnoosh has served as a past Chair of the IEEE Power & Energy Society's (PES) Technical Council, active at PES Power System Relaying and Control as well as Power System Instrumentation and Measurements committees. He is also active in CIGRE (Distinguished Member), IEC, and NASPI (North American Synchrophasor Initiative). His present technical focus is on wideband optical sensors, synchronized measurement systems, digital substations, integration challenges of distributed energy resources, high-speed measurement of voltage and current, travelling-wave-based fault location, and grid resiliency efforts. Dr. Rahmatian has over 100 technical papers and 12 patents to his credit.

*Free and Open to the Public; RSVP is appreciated.*

*Visit the IEEE PES Boston Chapter website for further details - <https://site.ieee.org/boston-pes/>  
For any questions regarding this presentation or any IEEE PES Boston Technical Meetings, please contact:  
Risa Karanxha ([risa.karanxha@nationalgrid.com](mailto:risa.karanxha@nationalgrid.com)) or  
Christopher Sweeny ([christopher.sweeny@1898andco.com](mailto:christopher.sweeny@1898andco.com))*

*Consultants Network – 6:30PM, July to September 2023*

## **Boston CNET Mid-Year Membership Drive**

**MEMBERSHIP DRIVE - 50% OFF MEMBERSHIP FROM JULY TO SEPTEMBER**

Location: Your home

Registration: Membership Meeting - <https://boston-consult.org/event-5341482>

For a limited time get 50% off membership: Membership

IEEE Member \$40.00

Non IEEE Member \$50.00

No need to register for this event. Your participation in Boston CNET is appreciated, just click the Membership link. Reasons to join CNET? See the membership page link for member benefits.

Membership

This is a limited time offer. Your membership is good till the end of 2023.

Were you a prior member of Boston CNET? This is a cost effective way to rejoin CNET for 2023 and enjoy member benefits. Please help fund Boston CNET for 2023. Become a member again - Membership.

We are listening to our members; please send us concerns or comments on how we can best meet your needs via the contacts page. If you have questions, please let us know. What can we do to entice you to join Boston CNET? We return phone calls; all officers respond to membership needs and requests. Officers and Contacts

This is part of a larger membership drive that will kick off in July. We hope to see you at one of our upcoming events. Please see our events page at this link for a list of upcoming events. Events

Thank you,

Boston CNET Board of Directors

### **IEEE Boston Section Social Media Links:**

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

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

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

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

# Introduction to Neural Networks and Deep Learning (Part I)

## Web-based Course with live Instructor!

**Times & Dates:** 9AM - 12:30PM ET, Saturday, October 21, 2023

**Speaker:** CL Kim

**Course Format:** Live Webinar, 3.5 hours of instruction!

**Series Overview:** Neural networks and deep learning currently provides the best solutions to many problems in image recognition, speech recognition, and natural language processing.”

Reference book: “Neural Networks and Deep Learning” by Michael Nielsen, <http://neuralnetworksanddeeplearning.com/>

This Part 1 and the planned Part 2, (to be confirmed) series of courses will teach many of the core concepts behind neural networks and deep learning.

More from the book introduction: We’ll learn the core principles behind neural networks and deep learning by attacking a concrete problem: the problem of teaching a computer to recognize handwritten digits. ...it can be solved pretty well using a simple neural network, with just a few tens of lines of code, and no special libraries.”

“But you don’t need to be a professional programmer.”

The code provided is in Python, which even if you don’t program in Python, should be easy to understand with just a little effort.

### Benefits of attending the series:

- \* Learn the core principles behind neural networks and deep learning.
- \* See a simple Python program that solves a concrete problem: teaching a computer to recognize a handwritten digit.
- \* Improve the result through incorporating more and more core ideas about neural networks and deep learning.
- \* Understand the theory, with worked-out proofs of fundamental equations of backpropagation for those interested.
- \* Run straightforward Python demo code example.

The demo Python program (updated from version provided in the book) can be downloaded from the speaker’s GitHub account. The demo program is run in a Docker container that runs on your Mac, Windows, or Linux personal computer; we plan to provide instructions on doing that in advance of the class.

(That would be one good reason to register early if you plan to attend, in order that you can receive the straightforward instructions and leave yourself with plenty of time to prepare the Git and Docker software that are widely used among software professionals.)

**Course Background and Content:** This is a live instructor-led introductory course on Neural Networks and Deep Learning. It is planned to be a two-part series of courses. The first course is complete by itself and covers a feedforward neural network (but not convolutional neural network in Part 1). It will be a pre-requisite for the planned Part 2 second course. The class material is mostly from the highly-regarded and free online book “Neural Networks and Deep Learning” by Michael Nielsen, plus additional material such as some proofs of fundamental equations not provided in the book.

### Outline:

Feedforward Neural Networks.

- \* Simple (Python) Network to classify a handwritten digit
- \* Learning with Stochastic Gradient Descent
- \* How the backpropagation algorithm works
- \* Improving the way neural networks learn:
  - \*\* Cross-entropy cost function
  - \*\* Softmax activation function and log-likelihood cost function
  - \*\* Rectified Linear Unit
  - \*\* Overfitting and Regularization:
    - \*\*\* L2 regularization
    - \*\*\* Dropout
    - \*\*\* Artificially expanding data set

**Pre-requisites:** There is some heavier mathematics in learning the four fundamental equations behind backpropagation, so a basic familiarity with multivariable calculus and matrix algebra is expected, but nothing advanced is required. (The backpropagation equations can be also just accepted without bothering with the proofs since the provided Python code for the simple network just make use of the equations.) Basic familiarity with Python or similar computer language.

**Speaker Background:** CL Kim works in Software Engineering at CarGurus, Inc. He has graduate degrees in Business Administration and in Computer and Information Science from the University of Pennsylvania. He had previously taught for a few years the well-rated IEEE Boston Section class on introduction to the Android platform and API.

**Decision (Run/Cancel) Date for this Course is  
Friday, October 13, 2023**

| Payment      | on/by Oct 6 | After Oct 6 |
|--------------|-------------|-------------|
| IEEE Members | \$95        | \$110       |
| Non-members  | \$115       | \$130       |

[https://ieeeboston.org/event/neuralnetworks/?instance\\_id=3453](https://ieeeboston.org/event/neuralnetworks/?instance_id=3453)

## 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.

# Digital Signal Processing (DSP) for Software Radio (Note New Dates!)

**Dates & Times:** Live Workshops: 6 - 7:30PM EST; Thursdays, September 28, October 5, 12, 19, 26  
First Video Release and orientation, 6 - 6:30PM September 21, 2023  
Additional videos released weekly in advance of that week's live session!

**Speaker:** Dan Boschen

**Location:** Zoom

Attendees will have access to the recorded session and exercises for two months (until January 16, 2024) after the last live session ends!

This is a hands-on course providing pre-recorded lectures that students can watch on their own schedule and an unlimited number of times prior to live Q&A/Workshop sessions with the instructor. Ten 1.5 hour videos released 2 per week while the course is in session will be available for up to two months after the conclusion of the course.

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

This course brings together core DSP concepts to address signal processing challenges encountered in radios and modems for modern wireless communications. Specific areas covered include carrier and timing recovery, equalization, automatic gain control, and considerations to mitigate the effects of RF and channel distortions such as multipath, phase noise and amplitude/phase offsets.

Dan builds an intuitive understanding of the underlying mathematics through the use of graphics, visual demonstrations, and real-world applications for mixed

signal (analog/digital) modern transceivers. This course is applicable to DSP algorithm development with a focus on meeting practical hardware development challenges, rather than a tutorial on implementations with DSP processors.

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

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

**All set-up information for installation of all tools used will be provided prior to the start of class.**

**Target Audience:** All engineers involved in or interested in signal processing for wireless communications. Students should have either taken the earlier course "DSP for Wireless Communications" or have been sufficiently exposed to basic signal processing concepts such as Fourier, Laplace, and Z-transforms, Digital filter (FIR/IIR) structures, and representation of complex digital and analog signals in the time and frequency do-

if you are uncertain about your background or if you would like more information on the course.

### Benefits of Attending/ Goals of Course:

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

### Topics / Schedule:

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

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

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

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

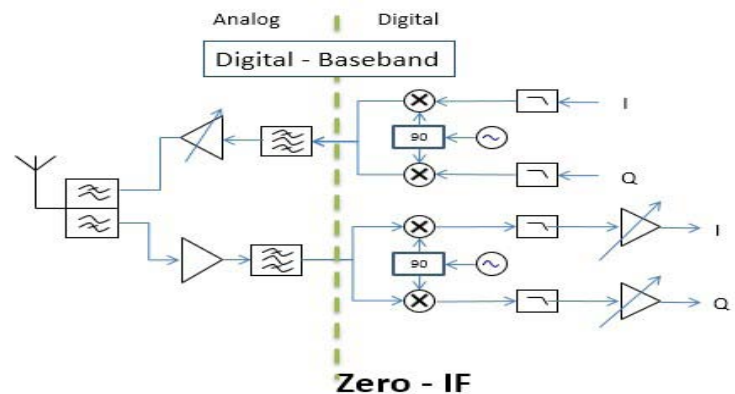
**Class 5:** RF Signal Impairments, Equalization and Compensation, Linear Feedback Shift Registers

### Speaker's Bio:

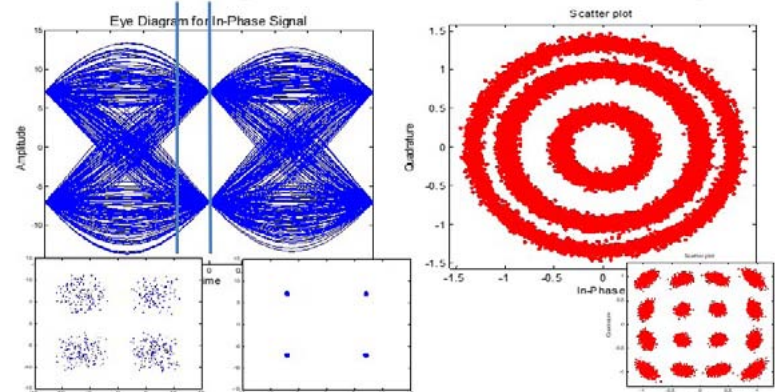
Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 25 years of experience in system and hardware design for radio transceivers and modems. He has held various positions at Signal Technologies, MITRE, Airvana and Hittite Microwave designing and developing transceiver hardware from baseband to antenna for wireless communications systems and has taught courses on DSP to international audiences for over 15 years. Dan is a contributor to Signal Processing Stack Exchange <https://dsp.stackexchange.com/>, and is currently at Microchip (formerly Microsemi and Symmetricom) leading design efforts for advanced frequency and time solutions.

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

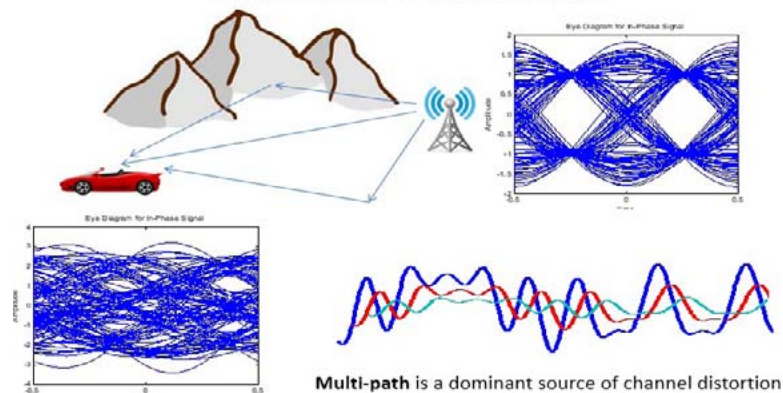
## Radio Architectures



## Timing and Carrier Recovery



## Channel Distortion



**Decision (Run/Cancel) Date for this Course is  
Monday, September 18, 2023**

|                     |              |
|---------------------|--------------|
| <b>IEEE Members</b> | <b>\$190</b> |
| <b>Non-members</b>  | <b>\$210</b> |

[https://ieeeboston.org/event/dpswradio/?instance\\_id=3429](https://ieeeboston.org/event/dpswradio/?instance_id=3429)

# Mark Your Calendar!



**Every Wednesday in October 2023**  
**4 Focused Tracks With**  
**Free Seminars**

**Oct. 4**  
Signal  
Integrity/Power  
Integrity

**Oct. 11**  
5G/  
Wi-Fi/  
IoT

**Oct. 18**  
PCB/  
Interconnect/  
EMC-EMI

**Oct. 25**  
Radar/  
Automotive/  
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