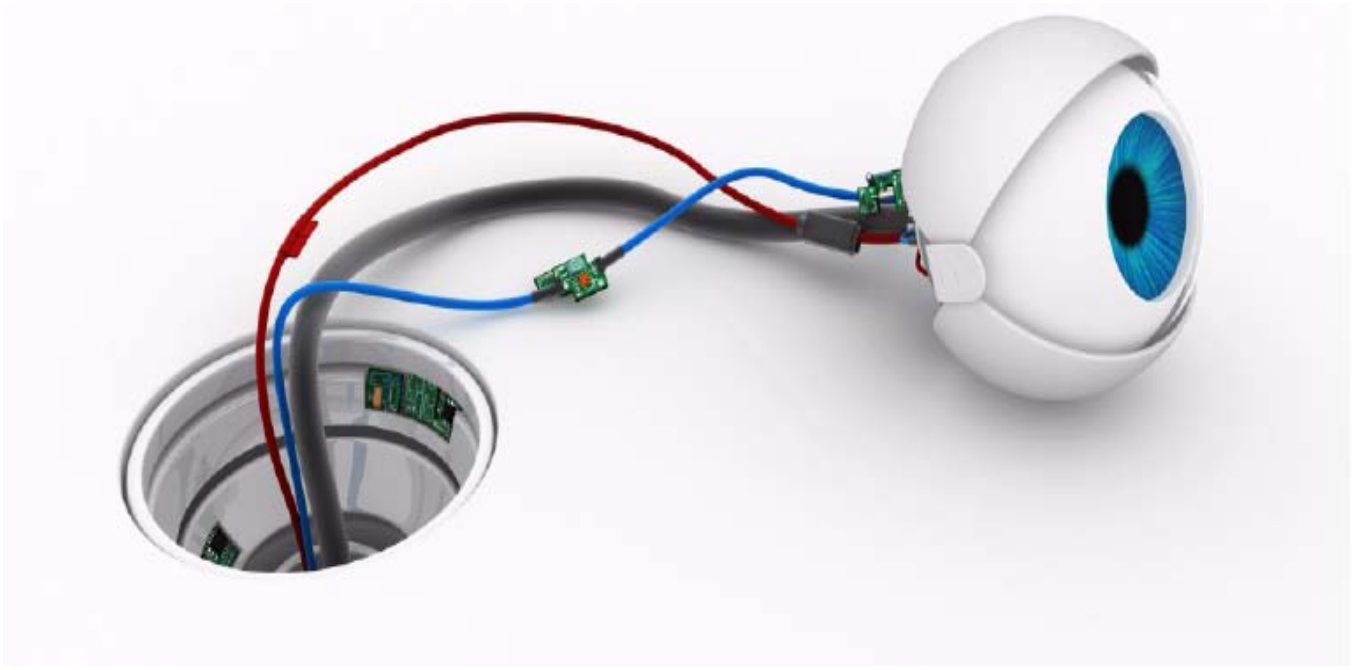
BOSTON

THE REFLECTOR

ISSUE #7
JULY 2023



IEEE
Advancing Technology for Humanity

TABLE OF CONTENTS

Something to Be Proud Of

By Ramon De la Cruz, IEEE Boston Section Past Chair 2020

With our very busy lives, at work, at home or at public places, it's quite common to keep focus on the task at hand, particularly while trying to get things done while surrounded by lots of people who are also trying to do the same.

The hustle and bustle of highly populated places doesn't contribute to creating opportunities to meet or socialize with otherwise complete strangers of all walks of life, demographics and ages.

To make matters worse, smart phones and portable devices compel people to withdraw into their own virtual world.

Long are the days when strangers greeted each other out of courtesy or started a casual conversation while congregated for some reason.

The young no longer talk with the old, and people now seem to choose to ignore each other.

Is this the new way society members will -fail to- interact with each other? Hopefully not.

Are there still common interests that can bring people along? Fortunately, there still are.

One common interest organization that since its inception has been and continues bringing together people with the common interest for Advancing Technology for Humanity is IEEE.

The IEEE influence on people continues to inspire and touch people in many ways.

Hardly a week goes by that -out of the blue- a complete stranger will strike up a conversation and acknowledge it was because they saw me wearing my IEEE baseball cap.

This has happened in my hometown, out of state, and more recently while on vacation in the UK.

During my visit in London, on my way to the Natural History Museum while walking by the Imperial College London, stopped to take a few pictures and noticed the sign for the Dyson Building of Design Engineering. An international student -who walked by- recognized the IEEE logo and stopped to tell me "Nice Picture..."

Such comment turned into a brief conversation that would have become taking a tour of the Dyson Building of Design Engineering if I hadn't been in a rush, to make my museum ticket admission time.

Once again, people recognizing the IEEE logo started communicating mainly because the IEEE brand recognition brought them together and that happens to be one of the calls of the IEEE.

Being an active volunteer member with the Boston Section makes it even more special.

I hope you'll join us to become an active volunteer and help carry the mission and vision of the IEEE Boston Section.

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

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.

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

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

Sponsors and Exhibitors

Contact:
sponsorships@ieee-array.org

Technical Co-Sponsors

Media Sponsor

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.

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
Sean Duffy (C), MIT LL
Wajih Elsallal (VC), MITRE

Technical Program Chairs
David Mooradd (C), MIT LL
Glenn Hopkins (VC), GTRI

Special Sessions Chairs
Matt Faccine, NGC
Kenneth E. Kolodziej, MIT LL

Plenary Session Chair
Will Moulder, MIT LL
William Weedon, Applied Radar

Student Program
Matilda Livadaru, Raytheon Tech
Justin Kasemodel, Raytheon Tech

Tutorials
Cara Kataria, MIT LL
Frank Vliet, TNO

Sponsorship and Exhibits
Marc Angelucci, LMC
Mark McClure, STR

Digital Platforms Chairs
Pierre Dufilie, Raytheon Tech
Jacob Houck, GTRI
Mark Fosberry, MITRE
Shireen Warnock, MIT LL

Publications/Publicity
Philip Zurek, MIT LL
Jack Logan, NRL
Elizabeth Kowalski, MIT LL

Poster Sessions Chair
Honglei Chen, MathWorks

Advisors
Daniel Culkin, NGC
Alan J. Fenn, MIT LL
Jeffery S. Herd, MIT LL
Bradley Perry, MIT LL

Arrangements/Administration
Robert Alongi, IEEE Boston
Kathleen Ballos, Ballos Assoc.

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, ieeebostonsection@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;
ieeebostonsection@gmail.com

CALL FOR PAPERS

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:	**IMPORTANT DATES**:
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).	Submission Deadline: **JUL 14, 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.

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) 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

Magnetics Society – 11:00AM, Monday, July 10

Magnetic Hardening in Low-Dimensional Ferromagnets

Distinguished Lecturer Speaker: Prof. J. Ping Liu, University of Texas at Arlington, Arlington, TX, USA

Location: Northeastern University Dana 442 and Zoom

To Register: https://events.vtools.ieee.org/m/365695

How “hard” (coercive) a ferromagnet can be has been a puzzle for a century. Seven decades ago, William Fuller Brown offered his famous theorem to correlate coercivity with the magnetocrystalline anisotropy fields in ferromagnetic materials. However, the experimental coercivity values have been far below the calculated levels given by the theorem, which is called Brown’s coercivity paradox. Researchers have attempted to solve the paradox with sustained efforts; however, the paradox remains unsolved, and coercivity still cannot be predicted and calculated quantitatively by modeling.

Progress has been made in the past 20 years in understanding coercivity mechanisms in nanoscale low-dimensional ferromagnets. In fact, ferromagnetism is a size-dependent physical phenomenon, as revealed by theoretical studies. However, nanoscale ferromagnetic samples with controllable size and shape have been available only in recent times. By adopting newly developed salt-matrix annealing, surfactant-assisted milling, and improved hydrothermal and chemical solution techniques, we used a bottom-up approach to produce nanostructured magnets and have successfully synthesized monodisperse ferromagnetic Fe–Pt, Fe–Co, and Sm–Co nanoparticles and Co nanowires with extraordinary properties, which are strongly size- and shape-dependent. A study on size-dependent Curie temperature of the L10 ferromagnetic nanoparticles with sizes down to 2 nm has experimentally proved a finite-size effect. A systematic study of nanowires with extremely high coercivity above their magnetocrystalline anisotropy fields has opened a door to the solution of Brown’s paradox.

J. Ping Liu (Fellow, IEEE) received the Ph.D. degree in physics from the University of Amsterdam, Amsterdam, The Netherlands, in 1994.

For the past four decades, he has worked in the research and development of permanent magnets and related magnetic materials in China, Europe, and USA. He is currently a Distinguished University Professor with The University of Texas at Arlington, Arlington, TX, USA. His current research has been focused on hard magnetic nanoparticles, thin films, and bulk nanocomposites, as reported in his more than 320 peer-reviewed journal articles, review articles, and books, including Nanoscale Magnetic Materials and Applications (Springer, 2009), Skyrmions: Topological Structures, Properties, and Applications (CRC Press, 2016), and Permanent Magnets: The History and Future (Science Press, 2020). He has supervised more than 50 graduate students and post-doctoral researchers.

Dr. Liu is an elected fellow of the American Physical Society. He received the Outstanding Achievement Award at the 25th International Workshop on Rare-Earth and Future Permanent Magnets and Their Applications in 2018.

Entrepreneurs' Network – 7:00PM, Thursday, July 13

ENET 2023 Boston Harbor Sunset Networking Cruise

Location: Rowes Wharf, Boston, MA

More information and registration will be posted soon - https://bostonenet.org/events/enet-2023-boston-harbor-sunset-networking-cruise/#!event-register/2023/7/13/enet-2023-boston-harbor-sunset-networking-cruise

ENET and our cruise partners look forward to the continuation of our annual year-end networking tradition with this year's "EntrepreneurSHIP 2023" Boston Sunset Cruise. Our last cruise in July 2022 sold out. With pent-up demand, we expect a sell-out to occur again this year. Please book early to not get left behind. We are looking forward to another great event cruising the Boston Harbor!

IEEE Boston Entrepreneurs' Network will hold its 19th annual Sunset Cruise & Networking Evening on Boston Harbor aboard the M/V Music City Queen, on Thursday, July 13, 2023. We board the boat at 6:45 p.m., and cruise from 7:15-9:30 p.m., with additional networking on the boat dockside until 9:45 pm. The event includes a light dinner catered again this year by the well-respected Off the Vine Catering, who received many compliments for the food the last several years. There will also be a cash bar.

Our ENET Sunset Cruise on Boston Harbor will be an enjoyable, casual wrap-up for the ENET 2022-23 season, our 32nd year. We again expect over 150 attendees and guests. To enhance the networking opportunities, we have invited all ENET speakers whose presentations you enjoyed during the past year's sessions. We will also be joined by members and guests of several other Massachusetts technology-based entrepreneurial groups, who are partnering with ENET for this "EntrepreneurSHIP 2023."

We will be cruising on the Mass Bay Lines' M/V Music City Queen, an ornamental 19th century sternwheeler named for city on Cumberland River (Nashville): perfect for our year-end gala. Two decks are climate controlled for year-round comfort. The MV/Music City Queen is berthed at Rowes Wharf, behind the Boston Harbor Hotel on Atlantic Avenue in Boston. Parking is available for $10 at International Place garage across the street from Rowes Wharf and there are two "T" stops nearby.

REGISTER: For questions, contact Dave Hall, Boat Cruise Coordinator. His email is dhall@dlhsales.com or if necessary call 603-494-0753.

COST: Early Bird Rates (available until June 30)
$35. per person: ENET Member and one member guest
$45. per person: Non-ENET Members

Standard Rates (after June 30)
$45. per person: ENET Member and one member guest
$55. per person: Non-ENET Members
Your seat can be saved only by paid-up registration!

PARKING INFO: Low-cost parking is available after 5:00 pm at 1 International Place garage for just $10.00, just across Atlantic Ave. from Rowes Wharf. Go to https://parking.com/boston/lot/1-international-place/parking-coupon and print the coupon to bring with you (you need the coupon for the reduced rate – also please print out this coupon only after July 1 so it will not have expired) and there are two T stops within a ten-minute walk (Aquarium and South Station).

Earlier attendees have really enjoyed this great event. We hope you will join us July 13th!

SPACE IS LIMITED. So, you are encouraged to register soon so you won't miss out.

CANCELLATION POLICY: Any cancellation on or before June 25, 2023 will receive a full refund of amounts paid for the cruise. Any cancellation after June 25, 2023 up to July 11, 2023, 10:00pm will receive a full credit toward future ENET events or membership.

COVID POLICY: The Entrepreneurship 2023 will adhere to all requirements of the City of Boston for the health and safety of our passengers and crew. These include any then applicable requirements occasioned by Covid-19 and any new variants. On the chance that a new Covid-19 outbreak makes the cruise inappropriate, in the sole discretion of ENET in consultation with our cruise partners, ENET has the ability to cancel the cruise on short notice to the cruise company and caterer. ENET is grateful to both of those vendors for their flexibility. Should such a cancellation occur, all funds received would be refunded.

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

Call for Course Speakers/Organizers

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

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

The Boston Section is one of the largest and most technically divers sections of the IEEE. We have over 20 active chapters and affinity groups.
If you have an expertise that you feel might be of interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is **http://ieeeboston.org/course-proposals/** . Alternatively, you may contact the IEEE Boston Section office at ieeebostonsection@gmail.com or 781 245 5405.

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

DSP for Wireless Communications

Dates & Times: Live Workshops: 6:00 - 7:30PM ET, Thursdays, July 27, August 3, 10, 17, 24
First Video Release, July 20, 2023, (Orientation) 6:00 - 6:30PM
Additional videos released weekly in advance of that week's live session

Speaker: Dan Boschen

Location: Zoom Webinar

New Format Combining Live Workshops with Pre-recorded Video - 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...until October 24, 2023.

Course Summary

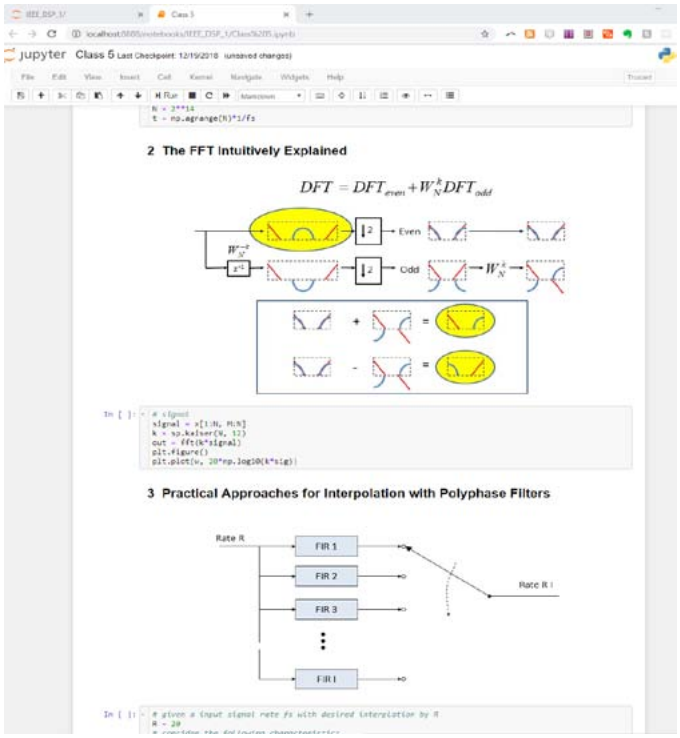
This course is a fresh view of the fundamental and practical concepts of digital signal processing applicable to the design of mixed signal design with A/D conversion, digital filters, operations with the FFT, and multi-rate signal processing. This course will build an intuitive understanding of the underlying mathematics through the use of graphics, visual demonstrations, and applications in GPS and mixed signal (analog/digital) modern transceivers. This course is applicable to DSP algorithm development with a focus on meeting practical hardware development challenges in both the analog and digital domains, and not a tutorial on working with specific DSP processor hardware.

Now with Jupyter Notebooks!

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

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

Students will be encouraged but not required to load all the Python tools needed, and all set-up information for installation will be provided prior to the start of class.



Target Audience:

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

Benefits of Attending/ Goals of Course:

Attendees will build a stronger intuitive understanding of the fundamental signal processing concepts involved with digital filtering and mixed signal analog and digital design. With this, attendees will be able to implement more creative and efficient signal processing architectures in both the analog and digital domains. The knowledge gained from this course will have immediate practical value for any work in the signal processing field.

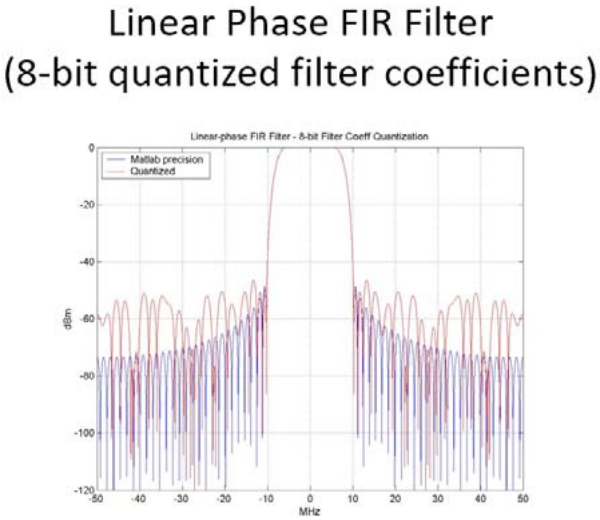
Topics / Schedule:

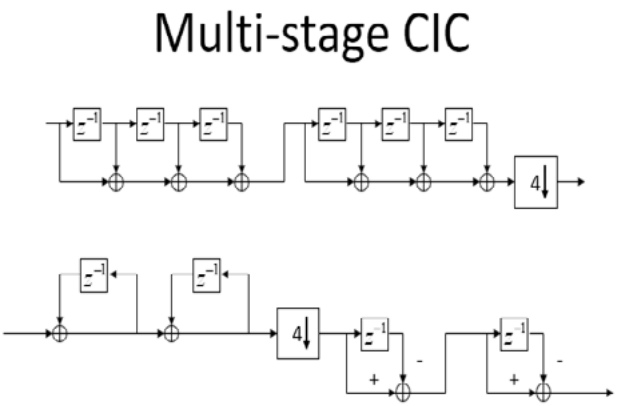
Class 1: Correlation, Fourier Transform, Laplace Transform
Class 2: Sampling and A/D Conversion, Z –transform, D/A Conversion
Class 3: IIR and FIR Digital filters, Direct Fourier Transform
Class 4: Windowing, Digital Filter Design, Fixed Point vs Floating Point
Class 5: Fast Fourier Transform, Multi-rate Signal Processing, Multi-rate Filters

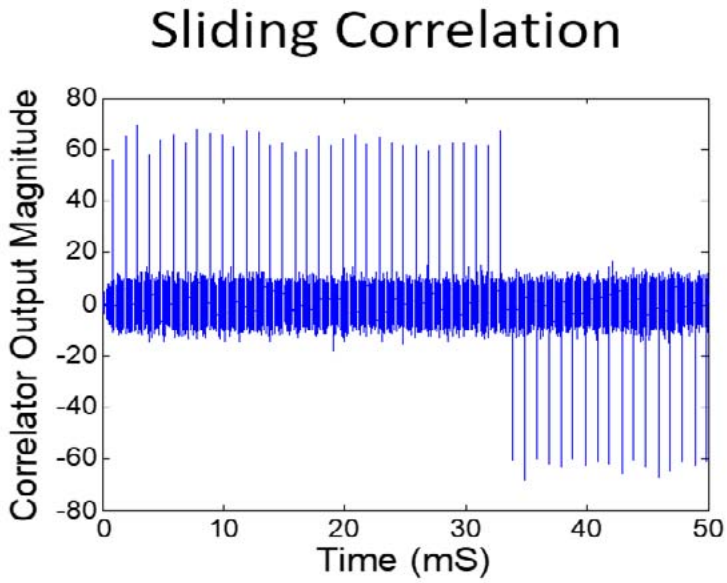
Speaker's Bio:

Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 25 years of experience in system and hardware design for radio transceivers and modems. He has held various positions at Signal Technologies, MITRE, Airvana and Hittite Microwave designing and developing transceiver hardware from baseband to antenna for wireless communications systems. Dan is currently at Microchip (formerly Microsemi and Symmetricom) leading design efforts for advanced frequency and time solutions.

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







Decision (Run/Cancel) Date for this Course is Monday, July 17, 2023

IEEE Members	**$190**
Non-members	**$210**

https://ieeeboston.org/event/digital-signal-processing-webinar/?instance_id=3435

Digital Signal Processing (DSP) for Software Radio

Dates & Times: **Live Workshops: 6 - 7:30PM EST; Thursdays, October 19, 26, November 2, 9, 16**
First Video Release and orientation, 6 - 6:30PM October 12, 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

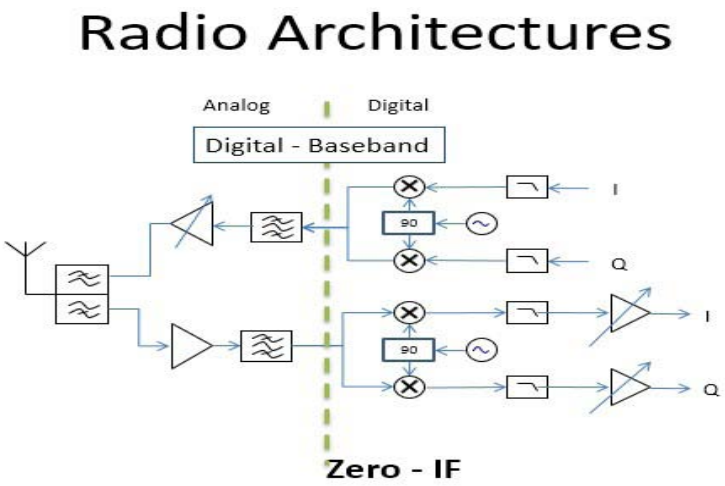
Class 5: RF Signal Impairments, Equalization and Compensation, Linear Feedback Shift Registers

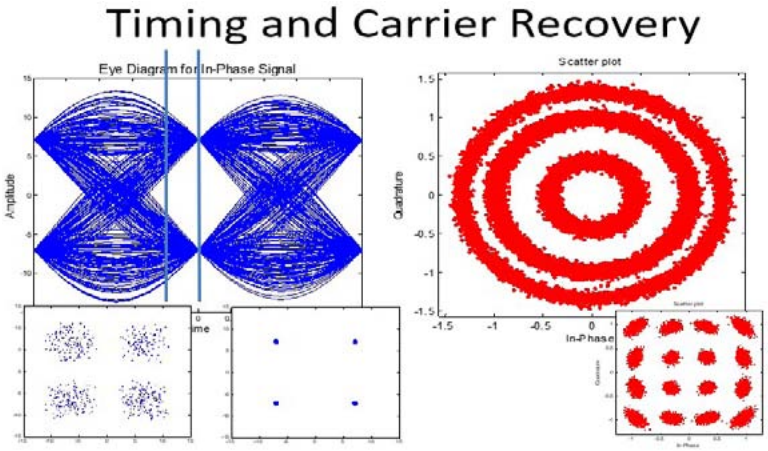
Speaker's Bio:
Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 25 years of experience in system and hardware design for radio transceivers and modems. He has held various positions at Signal Technologies, MITRE, Airvana and Hittite Microwave designing 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.

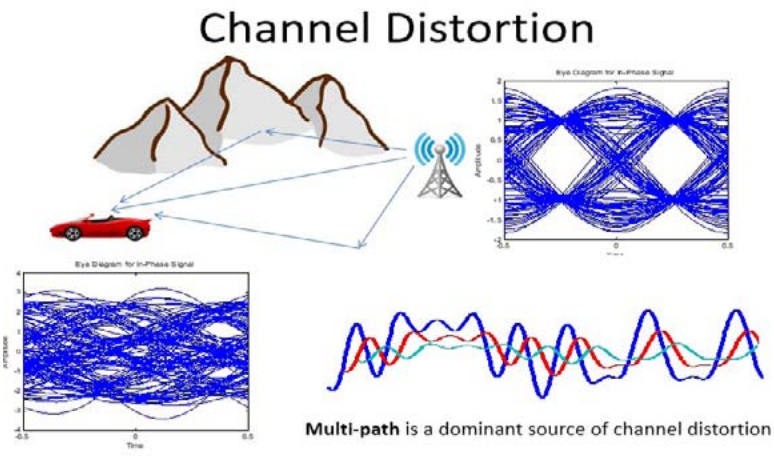
Decision (Run/Cancel) Date for this Course is Monday, October 9, 2023

IEEE Members	**$190**
Non-members	**$210**

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







https://ieeeboston.org/event/dspswradio/?instance_id=3429