



THE REFLECTOR

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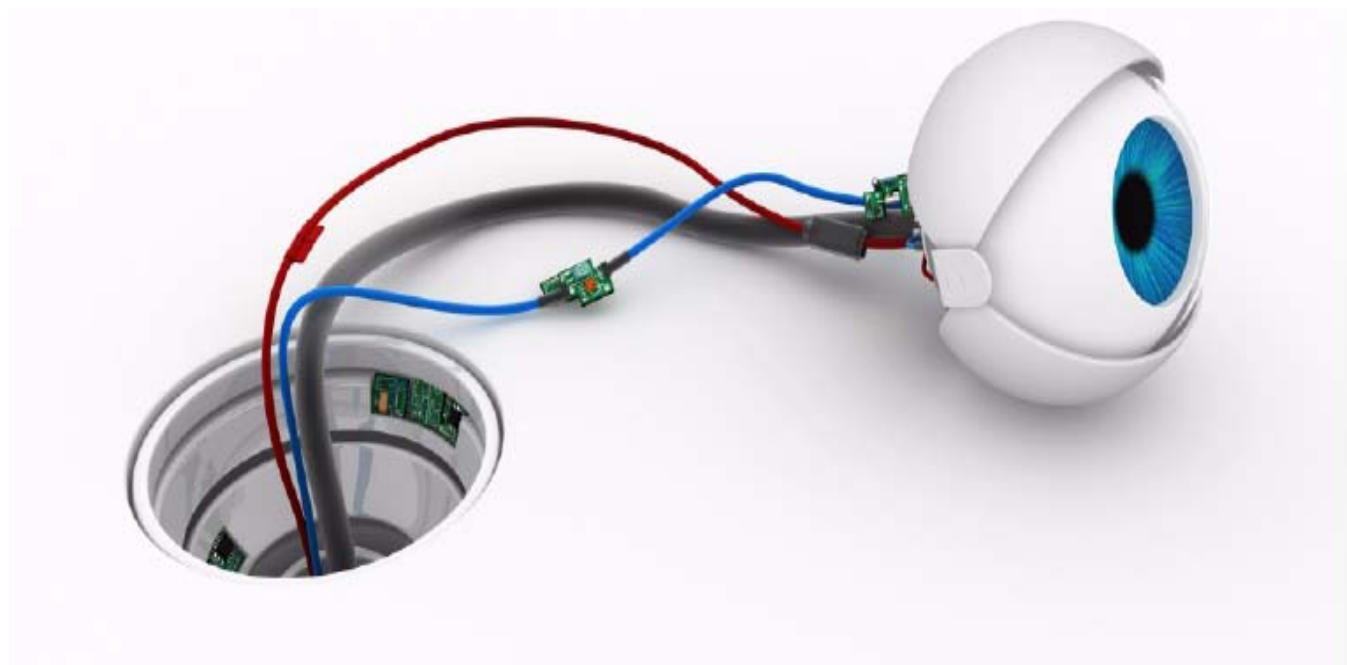


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STEM Workforce for the Future

by David Mendonca, Secretary/Treasurer, IEEE Boston Section

While the U.S. National Science Board's 2022 report on "The State of U.S. Science and Engineering" is laced with some sobering observations, it also offers ample opportunities for optimism--if we choose to see them.

On the one hand, while the U.S. continues to hold a plurality of global research and development (R&D) at 27%, a shift is underway to other countries and regions. At the same time, the U.S. is continuing to underutilize the potential science, technology, engineering, and mathematics (STEM) labor force: efforts are urgent needed to attract and retain females, as well as certain minority groups--African-Americans, Hispanics, and Native American and Alaska Natives--in order to tap this vast trove of opportunity.

Part of the solution to increasing and diversifying the U.S. STEM labor force must surely lie in illuminating and pursuing problems that are not only societally relevant and technically challenging, but that also speak to the lived experiences of individuals from under-represented groups. These problems are numerous, and many of them are urgent. Widening income inequities, combined with new and evolving risks from climate change, pose disproportionate risks to minority communities. Fundamental advances in materials and sys-

tems science and engineering are needed to address high-profile problems associated with aging infrastructures that threaten the provision of essential services, such as water and electricity, to communities. New approaches to science and engineering education must be pursued that begin with questions of ethics and values in determining how best to shape technology's role in society.

For these advancements to happen, we as a society must make way for new ideas, new concepts, new points of view--even when they challenge existing paradigms. As scientists and engineers, this means new approaches to measurement, modeling and design, yielding methods and technologies that are rigorously tested and validated against established scientific criteria. Pursuing this approach may require us to step outside our comfort zones, to confront our reticence--but also to rejoice in the joys and accomplishments of advancement and to embrace the consequences of its close cousin, failure. I personally am excited to see the energy and chutzpah that some of our younger colleagues are bringing to STEM. I urge us as a society to encourage these voices, and to help them realize their visions for a better world. We all stand to benefit.



2024 IEEE INTERNATIONAL SYMPOSIUM ON PHASED ARRAY SYSTEMS AND TECHNOLOGY

Returning to Boston in the Fall of 2024

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 present a unique opportunity for members of the international community to interact with colleagues in the field of Phased Array Systems and Technology.



Important Dates and Call for Papers will be posted to the Symposium Web Site after May 1, 2023!

IEEE-ARRAY.org

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 pay-

ment 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



What + If = IEEE

420,000+ members in 160 countries.
Embrace the largest, global, technical community.

People Driving Technological Innovation.

iee.org/membership

#IEEEmember



KNOWLEDGE

COMMUNITY

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/>

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 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 Course Speakers/Organizers

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

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

The Boston Section is one of the largest and most technically diverse sections of the IEEE. We have over 20 active chapters and affinity groups. If you have an expertise that you feel might be of

interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is

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

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

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

CALL FOR PAPERS

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Senior Advisory Board Chair

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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.

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

Entrepreneurs' Network – 7:00PM, Tuesday, March 7

How to Scale Your Startup

Science and Technology Center, Lasell University, Newton, MA

REGISTER! <https://bostonenet.org/events/how-to-scale-your-startup/#registration-form>

Attendees will have the option to join us in-person at Lasell University, Newton, MA or online via Zoom.

Sales are starting to take off! Customers love your product! How can you obtain that next round of financing that will support this future growth?

- How do you establish a business model that can scale?
- How do you implement the scale-up of your business?
- What resources will you need, such as new talent in sales, marketing, development, and manufacturing, strategic partners and financing?
- How do you attract those investors who could make your scale up possible?
- How do you scale to a successful exit or a liquidity event?

We will be answering these questions in “How to Scale Your Startup”.

Our presenters include an entrepreneur who recently obtained funding to scale his startup, an entrepreneur who successfully scaled and then sold his startup for \$860 million and is now a member of an Angel Investor group; and a leader of an accelerator which trains startups how to scale.

More information:

This is a hybrid event. You may choose to participate in-person or online.

In-person Participation (check-in begins at 6:00 PM):

LOCATION: Science & Technology Center, Lasell University, Newton, MA (google map: <https://tinyurl.com/2twh785c>) Conveniently located at the junction of Rte 90 and 95.

PARKING: Free parking is available.

REFRESHMENTS: Pizza and sandwiches will be served.

Online Participation:

ZOOM LINKS will be sent to all registrants after registration.

COST AND RESERVATIONS: This event is free for ENET members and \$10 for non-members. Click here to learn how to become a member. To expedite sign-in for the event, we ask that everyone — members as well as non-members — pre-register. If you cannot pre-register, you are welcome to register in person at the door while seats are available.

Event Schedule

6:00 pm ET 7:00 pm - In-person registration and networking

7:00 pm ET – Introduction - ENET Chairperson's announcements

7:10 pm ET - eMinute Pitch - Up to 3 Startup pitches

7:25 pm ET - Expert Panel - 4 expert speakers on the night's topic

8:10 pm ET - Q & A - Moderator and Audience Q & A with the speakers

8:30 pm ET – Networking - Panelists will be available afterward for responses to individual questions.

Speakers:



Tyler Bouchard - Co-Founder and CEO, Flexxbotics

Tyler co-founded Flexxbotics, a software company dedicated to making automation equipment more productive, with Tyler Modelski in 2018 and has grown the team to 11 individuals. Before Flexxbotics he spent

most of his career in senior commercial roles for factory automation and motion control organizations, where he learned to solve and sell complex automation and motion control solutions. He attended Northeastern University D'Amore-McKim MBA program and has a degree in Biomechanical Engineering from WPI. When Tyler is not working on Flexxbotics you can find him playing basketball, spending time with family/friends and traveling.



Peter Schroer - CEO and Founder, Aras, and Member of eCoast Angels

Peter Schroer was founder and CEO of Aras PLM, an enterprise software company based in Andover, MA. The company develops software solutions for complex engineering and manufacturing product lifecycle management. Over a 22-year period, the company raised \$150M from VC (Matrix, Oak and Greylock) and Private Equity (Goldman-Sachs and Silver Lake). The company was sold in 2021 to GI Partners for \$860M with 800 employees globally and \$80M of ARR. Peter is an alumnus of Cornell University with Masters in Electrical Engineering and an MBA.



Dean Walsh - Program Manager, TiE ScaleUp

Dean Walsh is the Program Manager of TiE ScaleUp, "New England's First and Only Seed to Series A Accelerator." In this role, Dean works to support the growth of early

stage startups from all sectors by pairing them with compatible mentors and investors, co-producing a curriculum of scaling workshops, and engaging with various stakeholders, partners, and community resources to help sustain the equity-free program's success. In this role, Dean has reviewed and assessed hundreds of local startups, recruited and selected dozens for the program, and refined his program development, marketing, and event planning skills. He is keenly interested in fundraising strategy and venture capital, emerging markets, organizational behavior, public and

digital health, microfinance, and more. Dean holds a BA in English and Psychology from the University of Rochester, where he was deeply invested and involved in the research of human motivation.



Moderator - Michael S. Chester - President, International Manufacturing Consultants; Chair Emeritus, ENET

Mike has co-founded high tech, clean tech, and medical device startups in both the US and China and is now an advisor to startups. 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 a consulting organization for IBM manufacturing clients. 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 Chair Emeritus of ENET, has served on the board of APICS Boston, was a member of the planning committee of the MIT Enterprise Forum, and is a 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".

Entrepreneurs' Network – 7:00PM, Tuesday, March 21

Product Development for Startups

Location: CIC, One Broadway, Cambridge, MA

Information and registration for this event will be posted shortly at <https://bostonenet.org/events/product-development-for-startups/>

Online Participation: Zoom links will be sent to all registrants after registration.

Agenda:

7:00 PM - Introduction, ENET Chairperson's announcements

7:10 PM - eMinute Pitch, up to 3 Startup pitches

7:25 PM - Expert Panel, 4 expert speakers on the night's topic

8:10 PM - Moderator and Audience Q & A with the speakers

8:30 PM – Networking - Panelists will be available afterward for responses to individual questions

Power & Energy Society – 6:00PM, Tuesday, March 21

Effective Grounding Solutions for System Reliability and Worker/ Public Safety

Speaker: Kris Cox, Utility Technical Specialist, Specialized Analysis Engineering (SAE) Inc.



Refreshments start at 6:00pm; Talk begins at 6:30pm

Location: Wentworth Institute of Technology, Beatty 426 (Building: Beatty Hall) 550 Huntington Ave, Boston, MA 02115

Free Parking at West Parking Lot

(Rsvp on our website: <https://site.ieee.org/boston-pes/>)

While utilities are leveraging new technology and materials for grid hardening and better data analytics, they often still approach system grounding with a legacy philosophy. This talk will look at Distribution, Transmission and Station grounding practices and why they need to evolve. In the distribution world increased burial of infrastructure & safety incidents are pushing OH pole grounding into the pole hole. This combined with new backfill materials can effectively negate electrode performance. The relationship between arrester performance, pole down ground routing and effective grounding will be explained to illustrate what is required for successful lightning mitigation and reduced equipment failure. On the OH Transmission side of the business, it is commonplace to leave grounding to the last stage of the project, where construction forces are required to install an unknown number of grounds rods /counterpoise /per structure until utility target is met. With the rapid expansion of wind & solar connections to the grid, increases in available fault current at our ageing stations is commonplace. We will look at common soil Resistivity testing issues and grid design solutions. We

will also look at what happens to touch & step potential at stations assigned a “hi-split” factor, when the connected Tx structures do not meet grounding targets or copper theft occurs. The common practice of installing communication towers inside the fence will be reviewed a common cause as well for lightning related damage. A list of factors will be examined that will help Stations Asset managers decide where to prioritize their maintenance dollars.

Kris Cox is the Utility Technical Specialist for Specialized Analysis Engineering (SAE) Inc. Prior to his employment with SAE, Kris enjoyed a career with Ontario Hydro/Hydro One Transmission & Distribution Engineering & Operations Divisions. Although engaged in many steering committees and significant reliability/equipment failure/public safety investigations, the complete Overhaul of their Distribution OH&UG standards, materials & work practices were a significant milestone. Today, Kris is enjoying working with Tx, Dx & stations groups across North America as they look to improve their reliability & safety performance.

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)

Computer Society and GBC/ACM – 7:00PM, Thursday, March 23

Specialization and the End of Moore's Law

Neil Thompson, MIT



Register in advance for this webinar at https://acm-org.zoom.us/webinar/register/7816750322392/WN_2k-jR3BqSvihF-D8EnJnlzQ

After registering, you will receive a confirmation email containing information about joining the webinar.

For decades, Moore's Law made the economics of specialized chips unattractive because the upfront costs couldn't be justified when the alternative was fast-improving CPUs. As Moore's Law fades, however, this is changing. Not only is specialization becoming more economically attractive, but it is now one of the best ways to get performance improvements for many applications. In this talk, I will discuss (1) how the economics of specialization have changed, (2) how specialization is fracturing computing in ways commonly seen in other technologies, and (3) how long we can expect the gains from specialization to make up for the slowdown in Moore's Law.

Neil Thompson is the Director of the FutureTech research project at MIT's Computer Science and Artificial Intelligence Lab, where his group studies the economic and technical foundations of progress in computing. He is also a Principal Investigator at MIT's Initiative on the Digital Economy.

Previously, Neil was an Assistant Professor of Innovation and Strategy at the MIT Sloan School of Man-

agement, where he co-directed the Experimental Innovation Lab (X-Lab), and a Visiting Professor at the Laboratory for Innovation Science at Harvard. He has advised businesses and government on the future of Moore's Law, has been on National Academies panels on transformational technologies and scientific reliability, and is part of the Council on Competitiveness' National Commission on Innovation & Competitiveness Frontiers.

He has a PhD in Business and Public Policy from Berkeley, where he also did Masters degrees in Computer Science and Statistics. He also has a masters in Economics from the London School of Economics, and undergraduate degrees in Physics and International Development. Prior to academia, he worked at organizations such as Lawrence Livermore National Laboratory, Bain and Company, the United Nations, the World Bank, and the Canadian Parliament.

This joint meeting of the Boston Chapter of the IEEE Computer Society and GBC/ACM will be online only due to the COVID-19 lockdown.

Up-to-date information about this and other talks is available online at <https://ewh.ieee.org/r1/boston/computer/>. You can sign up to receive updated status information about this talk and informational emails about future talks at <https://mailman.mit.edu/mailman/listinfo/ieee-cs>, our self-administered mailing list.

Nuclear & Plasma Sciences and Social Implications of Technology (co-sponsored by BU IEEE-HKN) - 6:00PM, Monday, March 27

Developing New Technology for Affordable Internet: Phased Array Antenna Fundamentals and WiFi Application



Location: Photonics Building, ECE Department, Boston University via zoom.

Registration link will be posted soon. The zoom link will be emailed to registered participants.

Starry is developing and deploying new technology with the goal of connecting billions of people worldwide to affordable, high speed internet. Currently, Starry's internet service is available in 5 different U.S. cities: Boston, LA, DC, Denver, and NYC. This mission is enabled by Starry's advanced multipoint system, which will be reviewed in this talk at a high level. Following the system overview, there will be a general

technical discussion of applicable topics including antenna characterization, phased arrays and applications in WiFi. The session will conclude with questions.

Ryan Lagoy currently works at Starry, Inc. as the Senior Manager of Systems Engineering, developing and integrating new technology for internet applications. He previously worked at BAE Systems, in the Engineering Leadership Development Program. His interests and experience include systems engineering, RF/Microwave system design, electromagnetic theory and modeling, digital signal processing, and software development.

Call for Course Speakers/Organizers

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

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

The Boston Section is one of the largest and most technically diverse sections of the IEEE. We have over 20 active chapters and affinity groups. If you have an expertise that you feel might be of

interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is

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

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

Introduction to Quantum Software Development

Web-based Course with live Instructor!

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

New Reduced rates!

Times & Dates: 6 - 8PM ET, March 7, 9, 14, 16, 21, 23, 28, 30

Speaker: Richard Preston, MITRE Corporation

Course Format: Live lectures interspersed with lab exercises in Visual Studio



This course is organized by the MITRE Corporation and being offered as part of the IEEE Boston Section's professional development program.

Summary:

In recent years, there has been an enormous surge of interest in quantum computing. Government, academic, and commercial organizations have spent billions of dollars attempting to create reliable, general-purpose quantum computers. These systems leverage the unusual properties of quantum mechanics to perform computations that could never be performed on conventional computers in our lifetime. Such calculations have a wide range of applications, including:

- Breaking certain cryptographic algorithms
- Engineering new materials
- Simulating how systems behave in extreme environments
- Finding new medicines that target specific diseases
- Building secure transmission channels that cannot be eavesdropped

How do quantum computers accomplish these bold claims? How could we use this technology to tackle our most difficult challenges? And how do programmers like you access it? In this course, we will explore the answers to these questions and help you unlock the ability to write quantum software and simulate quantum algorithms. Students should bring some basic programming experience and an open mind as we delve into a new computing paradigm.

Format: Live virtual lectures with self-paced exercises.

Target Audience: Practicing software engineers.

Objective: Develop the practicable skills needed to implement and study quantum algorithms in software.

Prerequisites:

Students are assumed to have exposure to the following concepts:

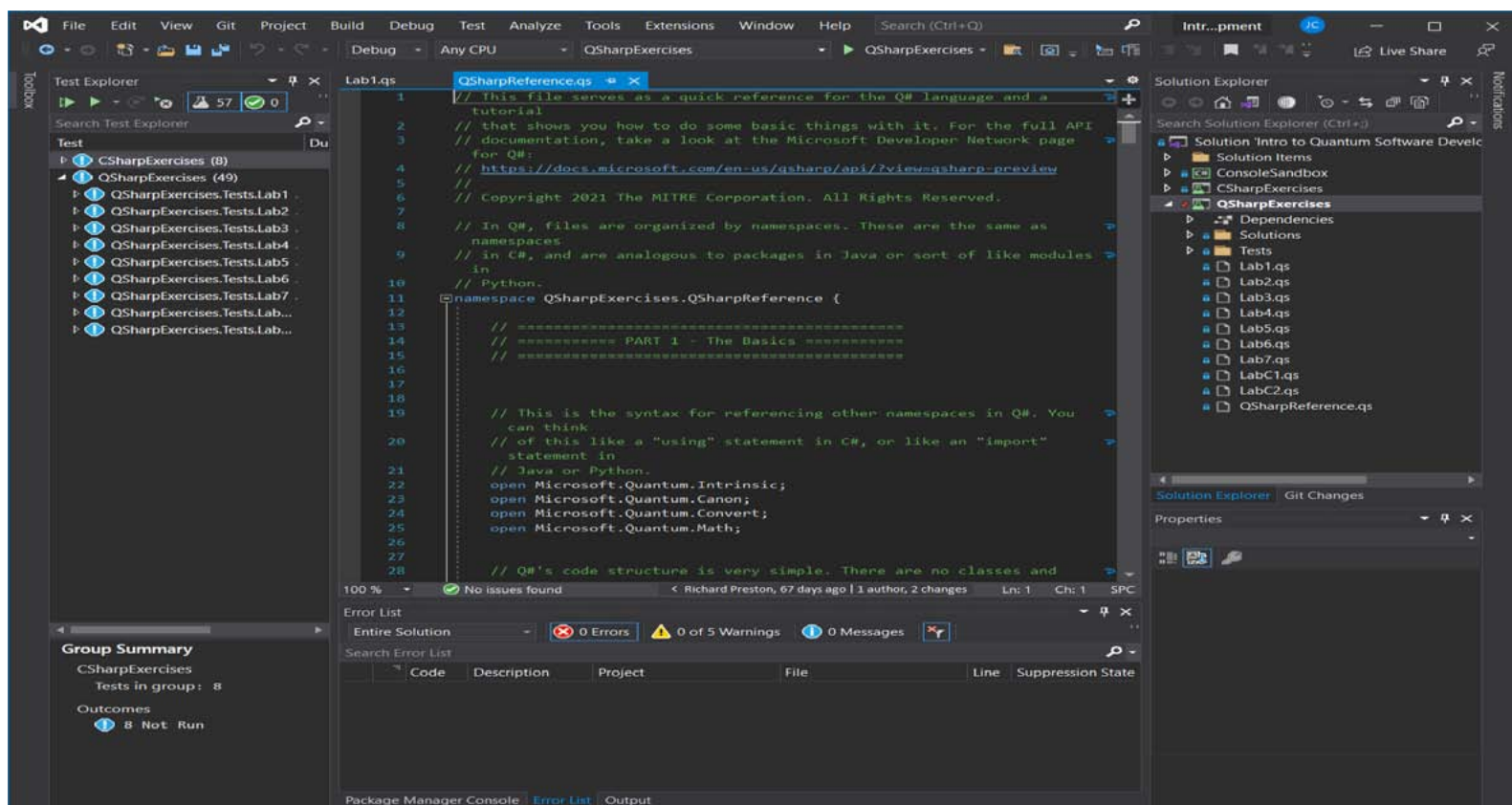
- Complex numbers
- Vectors & Matrices
- Bra-ket and tensor notation
- Digital information
- Endianness
- Digital logic
- Low- and high-level programming
- Visual Studio

Learning materials covering the course prerequisites will be provided in advance. This way, students can fill in any gaps in their knowledge and everyone starts on the same page on day 1.

Outline:

The course consists of live lectures interspersed with lab exercises in Visual Studio. All the materials are available in the form of an online course guide, so students can learn at their own pace both during and outside of class time. To mitigate technical difficulties, each student is provided remote access to a virtual machine with a preconfigured environment. The following topics are covered:

- Qubits and quantum gates
- Multi-qubit systems
- Quantum circuits
- Quantum protocols
- Quantum algorithms
- Q# programming



The Visual Studio exercises are Q# operations that must be implemented correctly for a unit test to pass. This approach allows students to get immediate feedback on how well they understand a concept. We use the Discord platform as a course forum, where students can ask questions at any time and collaborate on solving the coding challenges.

Instructor Bio:

Richard Preston is a lead engineer at the MITRE Corporation. He graduated Tufts University in 2019 with an MS in Electrical Engineering and BS in Computer Engineering. Since then, Richard has worked on R&D projects spanning a wide variety of technology areas, including network security, machine learning, cloud & edge computing, IT automation, software engineering, and quantum computing. Currently, he leads a research effort aimed at helping software engineers ap-

ply quantum algorithms to real-world problems. Richard has taught quantum software development at MITRE, MIT's Beaver Works Summer Institute, IEEE Boston, and Tufts University, and is passionate about helping to grow the quantum-capable workforce.

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Public Release Case Number 21-3742.

**Decision (Run/Cancel) Date for this Course is
Friday, March 3, 2023**

IEEE Members	\$190
Non-members	\$235

https://ieeeboston.org/event/ieeequantumsoftware/?instance_id=3387

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Call for Course Speakers/Organizers

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

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

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

If you have an expertise that you feel might be of

interest to our members, please submit that to our online course proposal form on the section's website (www.ieeeboston.org) and click on the course proposal link (direct course proposal form link is

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

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

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

Web-based Course with live Instructor!

Times & Dates: 9AM - 12:30PM ET, Saturday, March 18, 2023

Speaker: CL Kim

Course Format: Live Webinar, 3 hours of instruction!

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

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 hand-written 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, March 10, 2023**

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

https://ieeeboston.org/event/neuralnetworks/?instance_id=3285

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Python Applications for Digital Design and Signal Processing

Dates & Times: Live Workshops: 6:00 - 7:30PM EDT; Thursdays, April 6, 13, 20, 27
First Video Release, March 30, 2023, additional videos released weekly in advance of that week's live session!

Speaker: Dan Boschen

Location: Zoom

This is a hands-on course combining pre-recorded lectures with live Q&A and workshop sessions in the popular and powerful open-source Python programming language.

Course Information will be distributed on Thursday, March 30, 2023 in advance of and in preparation for the first live workshop session.

Attendees will have access to the recorded session and exercises for two months (until June 27, 2023) after the last live session ends!

New Format with Pre-Recorded Videos: The course format has been updated to release pre-recorded video lectures that students can watch on their own schedule, and an unlimited number of times, prior to live Q&A workshop sessions on Zoom with the instructor. The videos will also be available to the students for viewing for up to two months after the conclusion of the course.

Overview: 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 modelling and analysis for applications in signal processing and digital design verification. Students will be using the Anaconda distribution, which combines Python with the most popular data science applications, and Jupyter Notebooks for a rich, interactive experience.

The course begins with basic Python data structures and constructs, including key "Pythonic" concepts, followed by an overview and use of popular packages for scientific computing enabling rapid prototyping for system design.

During the course students will create example designs including a sigma delta converter and direct digital synthesizer both in floating point and fixed point. This will include considerations for cycle and bit accurate models useful for digital design verification (FPGA/ASIC), while bringing forward the signal processing tools for frequency and time domain analysis.

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

Target Audience: This course is targeted toward users with little to no prior experience in Python, however familiarity with other modern programming languages and an exposure to object-oriented constructs is very helpful. Students should be comfortable with basic signal processing concepts in the frequency and time domain. Familiarity with Matlab or Octave is not required, but the equivalent operations in Python using the NumPy package will be provided for those students that do currently use Matlab and/or Octave for signal processing applications.

Benefits of Attending / Goals of Course: Attendees will gain an overall appreciation of using Python and quickly get up to speed in best practice use of Python

Topics / Schedule:

Pre-recorded lectures (3 hours each) will be distributed Friday prior to each week's workshop dates. Workshop/ Q&A Sessions are 6 - 7pm on the dates listed below:

Class 1

Topic 1: Intro to Jupyter Notebooks, the Spyder IDE and the course design examples. Core Python constructs.

Class 2

Topic 2: Core Python constructs; iterators, functions, reading writing data files.

Class 3

Topic 3: Signal processing simulation with popular packages including NumPy, SciPy, and Matplotlib.

Class 4

Topic 4: Bit/cycle accurate modelling and analysis using the design examples and simulation packages

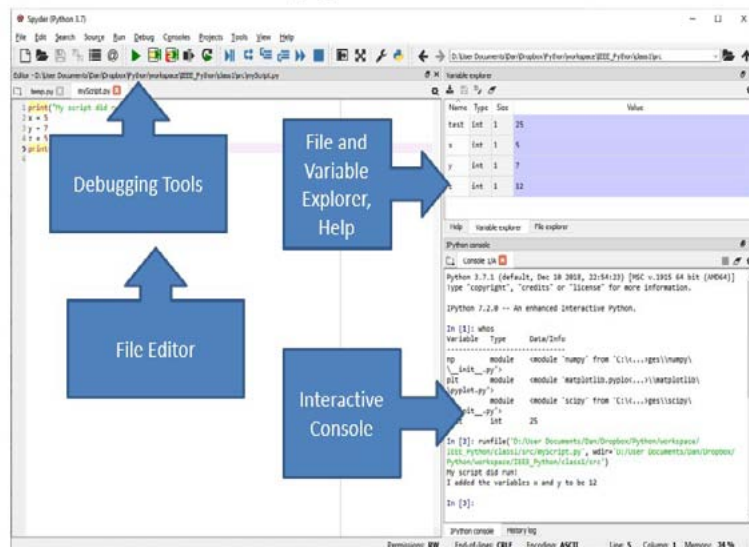
Speaker's Bio: Dan Boschen has a MS in Communications and Signal Processing from Northeastern University, with over 25 years of experience in system and hardware design for radio transceivers and modems. He has held various positions at Signal Technologies, MITRE, Airvana and Hittite Microwave designing 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 (<https://www.linkedin.com/in/dan-boschen/>)

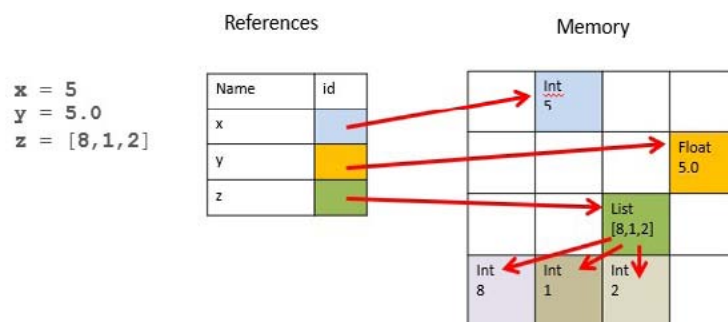
Decision (Run/Cancel) Date for this Course is Friday, March 24, 2023

Payment	On/by March 20	After March 20
IEEE Members	\$180	\$195
Non-members	\$195	\$215

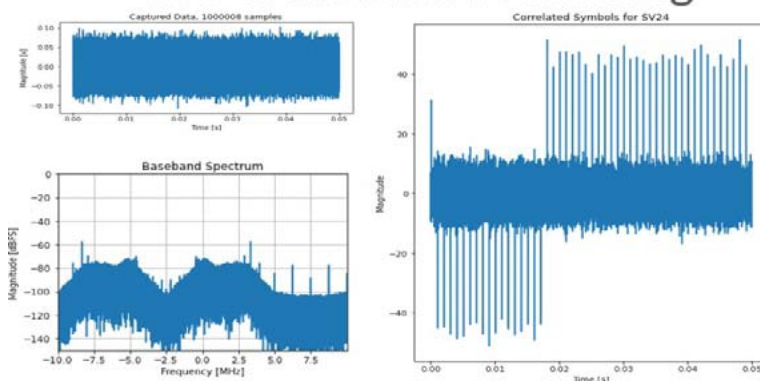
Spyder IDE



Mutable / Immutable



GPS Waveform Processing



https://ieeeboston.org/event/pythonapplications/?instance_id=3380

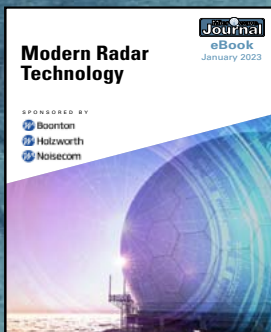
This Month

EXPLORE



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B&S on Aerospace and Defense, Episode 4

Bringing Digital RF Technology to 5G with SiTune

Exploring 6G Technology with Keysight

Trends in Radar Technology with ADI

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ONLINE PANEL SESSIONS

Will Flat Panel Beamsteering Arrays Meet the SATCOM Challenge?

March 22, 11am ET



Catch up on the latest industry news with the bi-weekly video update **Frequency Matters**

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