

BOSTON



THE REFLECTOR

ISSUE #6
JUNE 2021

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COMPUTING CONFERENCE -
CALL FOR PAPERS

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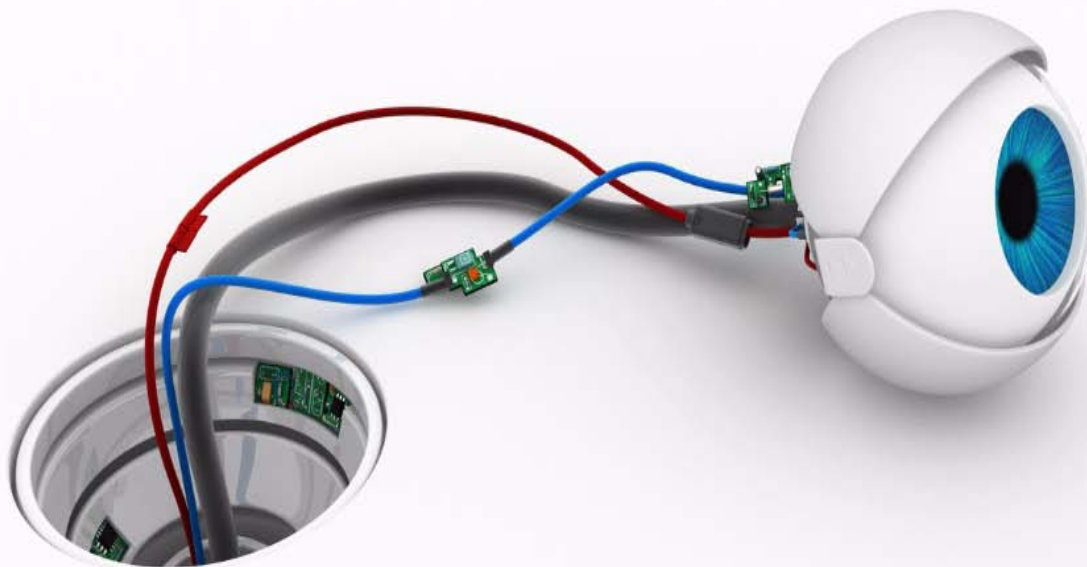


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Chip Shortage Affects Everyone

by Ramon De la Cruz, Chair, Research Team, IEEE Boston Section

As if we did not have to put-up with the revolving list of shortages for certain basic supplies in 2020, the latest shortage in 2021 -besides gasoline- is for semiconductors, also known as chips.

Today's technologies that make our lives more comfortable and allow us to be communicated and entertained 100% of the time and keep us safe increasingly rely on those chips.

As global consumption suddenly halted in 2020, demand for chips decreased which in turn shocked the chip supply chain and its effects will likely take some time to recover.

If you are thinking on buying a certain new car or truck, appliance, high-end audio equipment or consumer electronics product you may be out of luck for a while.

But the chip shortage effects go beyond the typical high-tech or electronics products companies. According to research from one of Wall Street's largest investment firms, the chip shortage is not just hurting the automo-

tive and tech sectors, but about 169 industries in some way.

From steel product and ready-mix concrete manufacturing to industries that build air conditioning systems and refrigerators to breweries. Even cleaning compound manufacturing is impacted by the chip crisis. Unlike other products, advanced high-performance semiconductors can take up to 6 months to produce. This could mean the shortage may be felt up to the second quarter of 2022.

And as expected with such supply constraint, price of some products will likely increase pushing this year's inflation even higher.

The chip shortage will make for an interesting and unpredictable 2021 holiday shopping season.

Do not know about you, but in the meantime, I am planning to weather the chip supply storm by listening to music on my vacuum tube audio gear.

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/3763694/>

IEEE Boston Section Online Courses:

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

Electronic Reliability Tutorial Series (NEW!!!)

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

Verilog101:Verilog Foundations

Full course description and registration at ,
<http://ieeeboston.org/verilog-101-verilog-foundations-online-course/>

System Verilog 101: Design Constructs

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

System Verilog 102: Verification Constructs

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

High Performance Project Management

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

Introduction to Embedded Linux Part I

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

Embedded Linux Optimization - Tools and Techniques

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

Embedded Linux Board Support Packages and Device Drivers

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

Software Development for Medical Device Manufacturers

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

Fundamental Mathematics Concepts Relating to Electromagnetics

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

Reliability Engineering for the Business World

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

Design Thinking for Today's Technical Work

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

Fundamentals of Real-Time Operating Systems

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

Entrepreneurs' Network – 7:00PM, Tuesday, June 1

Licensing to Speed Your Product to Market

Location: Webinar

Register:

**<https://boston-enet.org/event-3892696/Registration>
REGISTRATION FOR THIS EVENT WILL CLOSE ON
TUESDAY, June 1, AT 3:00 PM (EDT)**

How can you acquire Intellectual Property (IP) to bring your idea to market? Creating IP is expensive and requires significant amounts of time and resources. IP Licensing might be the correct path for you.

During the session, we will learn IP terminology, the advantages, and disadvantages of IP licensing, where and how to acquire IP, and the cost benefits of licensing versus creation.

The panel includes IP Counsel to walk us through the legal aspects of IP Licensing. An IP licensor to provide insights on creating and selling IP. And an IP licensee to enlighten us on the benefits of including external IP in commercial products.

Agenda:

6:00 – 6:45 – Networking on Grapevine.today
7:00 – 7:10 PM - ENET Chairperson's announcements
7:10 – 7:25 PM – eMinute Pitch - Up to 3 Startup companies' presentations
7:25 – 8:10 PM - 3 expert speakers on the night's topic
8:10 – 8:30 PM – Moderator and Audience Q & A with the speakers
8:30 – 9:00 PM - Networking on Grapevine.today
(all times are USA Eastern Daylight time) (all times are USA Eastern Daylight time)

A question and answer session will follow the panel discussion, and panelists will be available afterward for responses to individual questions.



Panel Members

Adam Kessel, Principal, Fish & Richardson, Boston

Adam Kessel, a principal in Fish & Richardson's Boston office, is an IP litigator and licensing attorney whose practice focuses on software. He works with clients ranging from single-employee startups all the way up to companies in the top 10 of the Fortune 500, helping them develop strategies to avoid disputes whenever possible and win them when they must go to court. He handles cases spanning all areas of IP law, including patent, copyright, trade secret, and trademark law. Adam is active in local attorney and IP-related organizations and appears frequently in the District of Massachusetts. He has also argued appeals before the First, Fourth, Eleventh, and Federal Circuit. He is also Fish's guru on open source software licenses. By way of technical background, Adam has a chemistry degree from Princeton University and also many years of experience writing code. He maintains an active pro bono docket, concentrating on online civil rights and civil liberties cases.



Myron Kassara, Technology Licensing Officer at MIT TLO

Strategic transactions and technology commercialization expert. Now managing a portfolio of technologies and IP for MIT. Have structured and closed hundreds of deals including multi-million dollar sales of start-up companies, technology & IP

licenses sales as well as complex partnerships and strategic alliances. Unique ability to package, market and transact complex situations for whole companies or assets including patents, products and technologies. I work with inventors to help them realize the potential for their technologies and products through venture creation and/or licensing.

Real-world experience as an entrepreneur and business executive with both big companies and start-ups. Involved in the very early stages of several markets in-

cluding online and web services, digital imaging, personal publishing/user generated content and clean tech/energy management.

<https://www.linkedin.com/in/myronkassaraba/>



David Arthur, CEO / Co-Founder at Chasm Advanced Materials, Inc.

David J. Arthur has more than 35 years experience commercializing products utilizing advanced materials, including work at Rogers Corporation, A.T. Cross Company, TPI Composites, Helix Technologies, and Eikos. He holds a BS de-

gree in Chemical Engineering from Tufts University, MS degree in Chemical Engineering from the University of Connecticut and an MBA degree from Northeastern University.

In 2005, Arthur co-founded Chasm Technologies, a consulting firm that helps its clients commercialize new products through smart application of materials science and process technology. For 10 years, he was CEO of SouthWest NanoTechnologies (SWeNT), a leading producer of Carbon Nanotube materials for electronics,

energy storage, conductive polymers, fibers, metal matrix composites, water purification membranes, etc. In November 2015, Arthur co-founded Chasm Advanced Materials, Inc.



Organizer and Moderator:

Dan Skiba, VP Printed Electronics Chasm Advanced Materials, Vice-Chair Boston ENET

As a Product Development Company Executive, I provide strategic leadership in product innovation and managing global teams, delivering award-winning prod-

ucts to the international market. My ability to problem solve, direct the entire product development lifecycle, and gain commitment to a common goal have driven faster release of products and market penetration. By building synergies across all Product Life Cycle disciplines, we have delivered products that result in 100% product utilization and seamless integration into customer environments. My skills in optimizing international resources have significantly reduced costs and streamlined production, delivering product excellence.

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". 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 Com-

mittee 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.

Geoscience & Remote Sensing Society – 6:00PM, Tuesday, June 8

Melt probes for a Future Europa Lander

Speaker: Paula do Vale Pereira

Location: Zoom

Registration:

<https://events.vtools.ieee.org/m/265360>



Water is essential to the formation and evolution of life as we know it. The Earth is an example of a planet full of liquid water where life has successfully formed. Fortunately, water is fairly common in our solar system—many other celestial bodies present oceans of liquid water. In the search for finding extraterrestrial life, our best bet may be traveling to such nearby

Ocean Worlds. Jupiter's moon Europa, for example, is believed to harbor not only liquid water but also easily available energy and biologically essential elements. However, these are not readily available at the surface—an ice crust up to 30km thick covers the liquid water. Therefore, a key remaining challenge is reaching the oceans of Europa. This requires developing ice penetrators that can carry payloads from the cryogenic vacuum at the surface to the liquid water ocean below the ice. Initial steps have been taken to develop analytical and numerical models of the thermal and physical dynamics of ice penetrators in Europa-relevant environments, but experimental validation of these models has been limited. We have built and experimentally tested the performance of a set of melt probes under

thermodynamic conditions similar to those of Europa. Our probes are designed to test the fundamental thermal properties of melt probes in cryogenic ice. They include monitoring of power, temperature, and penetration depth. The validated thermal model resulting from this work will help optimize the probe design for a future Europa lander, minimizing the time it takes for the probe to reach the ocean and maximizing the science return of a mission to Europa.

Paula do Vale Pereira is a PhD Candidate in Aerospace Engineering at MIT. Paula has master's degrees in Aerospace Engineering (MIT, 2019) and Thermal Engineering (UFSC, 2017), and a bachelor's degree in Mechanical Engineering (UFSC, 2014). Paula specializes in the thermo-mechanical features of space exploration systems. She has experience designing, manufacturing, integrating, testing, and operating satellites, besides a strong knowledge of design and experimental analysis of probes for extraterrestrial oceans. Paula's main goal is to use science and engineering to help further humanity's knowledge about both our own planet and other worlds in the solar system. Paula has been recognized as a "20 Twenty" by the Aviation Week/AIAA, a "Rising Star in Mechanical Engineering" by UC Berkeley, an "Amelia Earhart Fellow" by the Zonta Foundation, and a "Graduate Woman of Excellence" by MIT.

Photonics Society – 7:00PM, Thursday, June 10

Fundamental Performance Bounds in Nanophotonics

Prof. Alejandro Rodriguez, Princeton University, Princeton, NJ

Registration: <http://www.bostonphotonics.org/seminar.aspx?seminar=341>



Spurred by continued advances in computational methods, nanofabrication, and material synthesis, development of general-purpose electromagnetic solvers have been principally driven by the tantalizing possibility of accessing the full wave physics contained in Maxwell's equations. Such developments have in turn raised questions pertaining to the underlying physical limitations of optical devices. Functioning as complements to large-scale structural optimization or 'inverse design', the study of fundamental limits on optical processes has grown from a disparate collection of situation-specific and heuristic results into sophisticated general-purpose optimization techniques aimed at understanding the interplay of fundamental physics and optimal device performance. In this talk, we present an overview of recent developments in this area and their applications to light

scattering, light-matter interactions, fluctuation phenomena, optical transformations, and communication.

Alejandro Rodriguez is an Associate Professor of Electrical Engineering and the Director of the Program in Materials Science and Engineering at Princeton University. His research focuses on nanophotonics, the study of light in structured media, where he is known for his contributions to computational and mathematical methods and for his work on quantum fluctuations, nonlinear optics, and nanophotonic inverse design. He was awarded the Presidential Early Career Award for Scientists and Engineers, the National Science Foundation Early CAREER Award, the Society of Hispanic Professional Engineers Young Investigator Award, and the Department of Energy Frederick A. Howes Award in Computational Science. He has Bachelors and PhD degrees in Physics from MIT and was a Postdoctoral Fellow at Harvard University.

This meeting begins at 7:00PM Thursday, June 10, 2021 and will be online only.

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

Entrepreneurs' Network – 7:00PM, Tuesday, June 15

Planning for a Successful Exit

Location: Webinar

Register:

<https://boston-enet.org/event-3892698/Registration>
REGISTRATION FOR THIS EVENT WILL CLOSE ON TUESDAY, June 15, AT 3:00 PM (EDT)

You are one of them...a dedicated entrepreneur, who has poured heart and sweat into the venture.

Does this focused dedication to launch and grow the business also include planning for potential future exits?

An exit strategy is an important "early on" element of the overall business strategy that describes the vision of how you will eventually capitalize on your investment. The decisions about how you structure and operate the business can have huge implications down the road.

Hear from expert panelists, who have prepared companies and participated in successful exits!

They will talk about exit strategy planning and, just as important, what exits look and feel like in real life to a serial entrepreneur, an investor and legal M&A advisors.

Agenda:

6:00 – 6:45 – Networking on Grapevine.today
 7:00 - 7:10 PM - ENET Chairperson's announcements
 7:10 - 7:25 PM – eMinute Pitch - Up to 3 Startup companies' presentations
 7:25 - 8:10 PM - 3 expert speakers on the night's topic
 8:10 - 8:30 PM – Moderator and Audience Q & A with the speakers
 8:30 – 9:00 PM - Networking on Grapevine.today
 (all times are USA Eastern Daylight time) (all times are USA Eastern Daylight time)

A question and answer session will follow the panel discussion, and panelists will be available afterward for responses to individual questions.

Panelists:

Jeff Behrens, CEO and Co-Founder, LabShares Newton, CEO, GelMEDIX, Inc.

Jeff Behrens is a serial biotech entrepreneur. He is currently CEO of GelMEDIX, an ophthalmology startup



based on work from Mass Eye and Ear and UCLA. He is also founder and CEO of LabShares Newton, a biotech incubator for biotech startups run by biotech entrepreneurs.

Formerly, Jeff was President and CEO of Siamab Therapeutics, a biotech company focused on developing antibodies targeting glycan targets in cancer that exited in 2019. Siamab's lead drug candidate initiated clinical trials in early 2021. Previously, Jeff served as Senior Director, Business Development and Operations at Edimer Pharmaceuticals (funded by Third Rock Ventures) and also worked at Alnylam and Biogen Idec, where co-founded Biogen's Innovation Incubator.

In 2003 Jeff sold his healthcare IT company, The Teluride Group, to mindSHIFT Technologies, a Fidelity-funded rollup.

Jeff has a PhD from EPFL (Lausanne, Switzerland), an MS from the Harvard/MIT Division of Health Sciences and Technology (HST), an MBA from MIT Sloan, and graduated from Harvard College. He teaches HST590, a PhD level course at MIT.



Katherine Hill Ritchie, Director and Board Member Nottingham Spirk

Mrs. Hill Ritchie has 18 years of investment and financial services experience. She worked internally or as an advisor to 8 family offices directly or through her firm, Private Capital Investments, LLC.

Her current role is Director and Board Member for Nottingham Spirk Family Office, and her past roles include: Simon Group Holdings, Eden Capital, and PEX Global. She spent 7 years in Switzerland where she was a Managing Director at Palladio Alternative Research and Senior Analyst and Investment Committee Member for the Saad family office's \$3.5 billion investment portfolio. She was a Director for Wedge Alternatives, and also Hedgefund.net. She is an Angel Investor and is on the

investment committee for University Impact, a social impact VC fund.

Katherine received her MBA from Fordham University and her BS in Psychology from University of Maryland. Her Board member activities include: Chair of the ACG New York Family Office Committee, Board Member of ACG NY, and Family Office Advisory Board of TriState Capital. Her past philanthropic volunteer activities include: Global Co-Chair of The Guild, the Philanthropy and Education Committees of 100 Women in Finance, Fordham MBA Overseers Board.



Daniel T. Janis, Partner at Davis, Malm & D'Agostine, P.C.

Dan Janis is a corporate attorney who focuses on mergers and acquisitions. He also represents public and private companies in a range of general and transactional matters. Dan's clients rely on his experience in corporate finance, private

equity placements, venture capital financings, syndicated commercial credit facilities, joint ventures and day-to-day business counseling to help them achieve their objectives.

Prior to joining Davis Malm in 2009, Dan cut his teeth as a corporate associate in the Boston offices of Skadden Arps and Goulston & Storrs. Dan prides himself on his pragmatic, efficient resolution of whatever issues confront his clients.



David J. Powsner, Partner at Davis, Malm & D'Agostine, P.C.

Dave is an intellectual property attorney, advising high-tech companies on a range of complex matters. His physics degree from MIT and experience in computer programming, combined with his legal experience, enables him to understand, analyze and provide practical guidance on

patent, copyright, trade secret, trademark, licensing

and litigation matters. Dave represents companies with products in a variety of tech markets, from medical devices to computer software to networking to consumer electronics.



Co-Organizers /Moderators

Kristin King, MBA., VP Corporate Development & Strategy, Defibtech, LLC. Boston Harbor Angel Investor

Kristin is an accomplished MedTech executive, serial intrapreneur, investor and strategic advisor to startups developing biotech solutions. With over 20 years

spanning technical, commercial and business skills as well as Boston Harbor Angel Investor, she covers broad expertise transforming technologies from early concept to successful global divisions.

Kristin holds a B.S. in bioengineering from Syracuse University, MBA in Finance & Marketing from NYU Stern.



Dave Hall, Founder & CEO, DLH Technology Advisors

Startup Strategy & Venture Capital Consulting

Dave is Founder and CEO of DLH Technology Advisors. He is a startup & strategy Executive, Innovation Consultant, Advisory Board Member, Connector,

Evangelist and Speaker for growth companies looking to implement, optimize, and fund their Go-to-Market plan.

DLH Technology Advisors offers consulting services including Startup Strategy, & Frameworks, Business Development, Startup Marketing, Go-to-Market Strategy, Executive Coaching and Startup Funding Channels. DLH has resources for CRM development services including Salesforce implementation, AppExchange App Development, QuickStarts, Lead Architect and Admin Services for the entire Salesforce product line - www.DLHsales.com.



MIT URTC 2021 10/8 - 10/10, 2021

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peers and
professionals?**

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PAPERS

EARLY SUBMISSION DEADLINE	JULY 11, 2021
EARLY NOTIFICATION OF ACCEPTANCE	JULY 31, 2021
REGULAR SUBMISSION DEADLINE	JULY 31, 2021
REGULAR NOTIFICATION OF ACCEPTANCE	AUGUST 21, 2021

POSTERS & LIGHTNING TALKS

SUBMISSION DEADLINE	AUGUST 29, 2021
NOTIFICATION OF ACCEPTANCE	SEPTEMBER 5, 2021

CONFERENCE DATES

10/8 - 10/10, 2021

Technical Tracks

1. **Biological and Biomedical Engineering (BioEECS)**
2. **Circuits, Materials, and Nanotechnologies**
3. **Computer Systems, Theoretical Computer Science and Mathematics**
4. **Machine Learning / Artificial Intelligence (AI)**
5. **Robotics and Controls**
6. **Security and Communications**
7. **Space Application and Technologies**
8. **Innovation Research**

Submission Site:

<https://cmt3.research.microsoft.com/URTC2021>

5G The Best Channel Codes:

Polar Codes with MATLAB Applications

Web-based Course with live Instructor!

Times & Dates: 10 – 11AM ET, September 14, 16, 21, 23, 28, 30, October 5, 7, 12, 14

Speaker: Orhan Gazi, Cankaya University, Ankara-Turkey

Course Format: Live Webinar, 10, one hour, sessions

Introduction: Forward error correction is a vital process in communication systems. The last channel codes discovered in the research world are the "polar codes" which are adapted to be used in 5G standard. The construction and decoding of polar codes are quite different from the construction and decoding of classical channel codes. Polar codes are the only codes constructed in a non-trivial manner. The discovery of polar codes can be considered as a breakthrough in coding society. It is clear that future channel codes will follow the logic of polar codes. For this reason, it is critical to learn the encoding and decoding philosophy of the polar codes which is the state of art of the coding world.

Outline of the topics to be covered:

- Entropy and Mutual Information
- Philosophy of Polar Codes
- Generator Matrices of Polar Codes
- Polar Encoder Structures
- Recursive Structures for Polar Encoders
- Channel Splitting and Concept of Channel Polarization
- Split Channels
- Calculation of Split Channel Capacities
- Polar Decoding
- Polar Decoding for Noiseless Transmission
- Polar Decoding Formulas for Kernel Structure for noisy Transmission
- Successive Cancellation Decoding of Polar Codes
- Belief Propagation Decoding of Polar Codes
- Polar Encoders and Decoders in 5G New Radio (NR) and Future Channel Codes

Target Audience: Electronic and Communication Engineers, electronic engineers, computer engineers, engineers working in communication industry

Benefits of Attending Course:

1) The participant will have an idea about the state of art polar codes.

2) Polar codes are used in 5G standard; the participant can comprehend the polar code used in 5G standard.

3) The participant will learn successive cancellation decoding of polar codes.

Speaker Bio: Prof. Orhan Gazi is the author of the book "Polar Codes. A Non-Trivial Approach to Channel Coding" which can be reached from <https://www.springer.com/gp/book/9789811307362>

The book is selected by IEEE COMSOC as one of the best readings in polar codes, <https://www.comsoc.org/publications/best-readings/polar-coding>

Prof. Orhan Gazi is the sole author of 10 books written in electrical engineering subjects. Apart from the polar code book, he is the single author of the books "Information Theory for Electrical Engineers" <https://www.springer.com/gp/book/9789811084317> and "Forward Error Correction via Channel Coding" <https://www.springer.com/gp/book/9783030333799>. The research area of Prof. Orhan Gazi involves "channel coding", and "digital communication subjects". Recently, he focuses on over capacity data transmission using polar codes. He is also interested in practical applications of communication systems involving FPGA devices. He is delivering courses with titles "VHDL circuit design", "interface design using VHDL for FPGA devices" and "system on chip design".

Materials to be included: Lecture slides will be provided.

**Decision (Run/Cancel) Date for this Course is
Wednesday, September 8, 2021**

IEEE Members	\$250
Non-members	\$300

https://ieeeboston.org/event/5g-the-best-channel-codes/?instance_id=3068

Information Theory for Electronic Communication with MATLAB Applications

(12 hours of instruction!)

Web-based Course with live Instructor!

Times & Dates: 10 AM - 11:30 AM ET - July 20, 22, 27, 29, August 3, 5, 10, 12

Speaker: Orhan Gazi, Cankaya University, Ankara-Turkey

Course Format: Live Webinar, 8, 90 minute sessions

Introduction: Information theory was born with the publication of Shannon's paper, a mathematical theory of communication, in 1948. In his paper, Shannon defined the terms entropy, mutual information, and channel capacity which is the maximum reliable transmission speed for a given signal-to-noise ratio. Shannon also stated 'channel coding theorem' in his paper, which opened another research area, design of channel codes, in communication field. The concept of data compression aroused after Shannon's paper. Any engineer working in the communication industry must have some knowledge about information theory. Especially knowledge of capacity is very critical to compare the performance of communication systems with each other. In this course, we will provide information about basic concept of information theory. We will also provide some practical applications using MATLAB platform.

Prerequisite: The one who is interested in taking this course should have basic knowledge of probability and random variables. He or She should be familiar with the terms probability mass function, probability density function, random variable, expected value, variance, etc.

- Discrete Entropy, Mutual Information for Discrete Channels, Information Channels
- MATLAB Applications for Entropy and Mutual Information
- Entropy for Continuous Random Variables, Dis-

crete and Continuous Channel Capacities

- Bounds and Limiting Cases for AWGN Channel Capacity
- MATLAB Applications for Channel Capacities
- Typical Sequences and Data Compression
- MATLAB Applications for Data Compressions
- Channel Coding Theorem

Target Audience: Electronic and Communication Engineers, electronic engineers, computer engineers, engineers working in communication industry

Benefits of Attending Course:

- 1) The participant will have an idea about Shannon's information theory.
- 2) The participant will have an idea about transmission channel capacity.
- 3) The participant will learn the logic behind the data compression concept.
- 4) The participant will be able to compare the performances of two different communication systems.
- 5) The participant will have an idea about the factors affecting maximum transmission speed.

Speaker Bio: Prof. Orhan Gazi is the author of the book "Information Theory for Electrical Engineers" <https://www.springer.com/gp/book/9789811084317> Prof. Orhan Gazi is the sole author of 10 books written in electrical engineering subjects.

He is also the author of the book "Polar Codes. A Non-Trivial Approach to Channel Coding" which can be reached from <https://www.springer.com/gp/book/9789811307362>

The book is selected by IEEE COMSOC as one of the best readings in polar codes, <https://www.comsoc.org/publications/best-readings/polar-coding>

He is also the single author of the book "Forward Error Correction via Channel Coding" <https://www.springer.com/gp/book/9783030333799>

The research area of Prof. Orhan Gazi involves "channel coding", and "digital communication subjects". Recently, he focuses on over capacity data transmission using polar codes. He is also interested in practical ap-

plications of communication systems involving FPGA devices. He is delivering courses with titles "VHDL circuit design", "interface design using VHDL for FPGA devices" and "system on chip design".

Materials to be included: Lecture slides will be provided.

**Decision (Run/Cancel) Date for this Course is
Wednesday, July 14, 2021**

IEEE Members	\$250
Non-members	\$300

https://ieeeboston.org/event/information-theory-for-electronic-communication/?instance_id=3060

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

Forward Error-Correcting Codes with MATLAB Applications and Their Use for Communication Systems (12 hours of instruction!)

Web-based Course with live Instructor!

Times & Dates: 10 AM - 11:30 AM ET, June 15, 17, 22, 24, 29, July 1, 13, 15

Speaker: Orhan Gazi, Cankaya University, Ankara-Turkey

Course Format: Live Webinar, 8, 90 minute sessions

Introduction: Communication systems employ channel codes for the correction of errors occurring during transmission. Channel codes are used in almost every data communication and storage devices. For instance, channel codes are used in mobile phones, network elements, satellites, flash memories, RAMs etc. Any engineer working in the communication industry should have an idea about the error correcting codes. In this course, an introductory information will be provided about forward error correcting codes.

Those who takes this course will get an idea about the construction of channel codes, how error correction is achieved, and some of simple preliminary channel codes used for error correction. We will also provide some applications of channel codes using MATLAB environment. We will teach how to perform computer simulations to measure the performance of communication systems and see the effect of channel codes on the performance of communication systems.

Prerequisite: The one who is interested in taking this course should have basic knowledge of linear algebra

Outline

- Introduction to Forward Error Correction and Channel Codes
- Review of Linear Algebra, Groups, Fields, and Vector Spaces

- Linear Block Codes, Generator and Parity Check Matrices, Encoding Operation
- Syndrome Decoding and Some Important Linear Codes
- Forward Error Correction Using MATLAB
- Cyclic Codes, Encoding and Decoding of Cyclic Codes
- Galois Fields, Algebraic Code Construction
- Galois Fields Using MATLAB
- BCH Codes, Encoding and Decoding of BCH Codes
- BCH Encoding and Decoding Using MATLAB
- Reed Solomon Codes, Encoding and Decoding of Reed Solomon Codes
- Convolutional Codes, Viterbi Decoding Algorithm
- Convolutional Encoding and Decoding Using MATLAB

Target Audience: Electronic and Communication Engineers, electronic engineers, computer engineers, engineers working in communication industry.

Benefits of Attending Course:

- 1) The participant will have an idea about forward error correction.
- 2) The participant will have an idea about the construction of channel codes.
- 3) The participant will learn how to make computer simulation using channel codes.

4) The participant will learn how to encode information bits using channel codes and how to decode them using decoding methods.

Speaker Bio: Prof. Orhan Gazi is the author of the book "Forward Error Correction via Channel Coding" <https://www.springer.com/gp/book/9783030333799>. Prof. Orhan Gazi is the sole author of 10 books written in electrical engineering subjects.

He is also the author of the book "Polar Codes. A Non-Trivial Approach to Channel Coding" which can be reached from <https://www.springer.com/gp/book/9789811307362>

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He is also the single author of the book "Information Theory for Electrical Engineers" <https://www.springer.com/gp/book/9789811084317>.

The research area of Prof. Orhan Gazi involves "channel coding", and "digital communication subjects". Recently, he focuses on over capacity data transmission using polar codes. He is also interested in practical applications of communication systems involving FPGA devices. He is delivering courses with titles "VHDL circuit design", "interface design using VHDL for FPGA devices" and "system on chip design".

Materials to be included: Lecture slides will be provided.

**Decision (Run/Cancel) Date for this Course is
Thursday, June 10, 2021**

IEEE Members	\$250
Non-members	\$300

- https://ieeeboston.org/event/forward-error-correcting-codes-with-matlab-applications/?instance_id=3052

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LinkedIn: <https://www.linkedin.com/groups/3763694/>

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

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

Times and Date: 9AM - 12:30PM ET, Saturday, June 19

Speaker: CL Kim

Location: Live, Interactive Webinar

Reference book: "Neural Networks and Deep Learning" by Michael Nielsen, <http://neuralnetworksand-deeplearning.com>

Series Overview: Updated from the previous course offering! From the book introduction: "Neural networks and deep learning currently provides the best solutions to many problems in image recognition, speech recognition, and natural language processing."

This Part 1 and the planned Part 2 (winter or spring 2022, 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 network 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 of 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

Introduction to Practical Neural Networks and Deep Learning (Part 1)

Feedforward Neural Networks.

* Simple (Python) Network to classify a handwritten digit

* Learning with 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

*** Hyper-parameters

Pre-requisites: There is some heavier mathematics in learning the four fundamental equations behind backpropagation, so a basic familiarity with multivari-

able 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
Tuesday, June 15, 2021**

IEEE Members	\$110
Non-members	\$130

https://ieeeboston.org/event/neuralnetworks/?instance_id=3049

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Announcing the 2022 IEEE International Symposium on Phased Array Systems and Technology October 11-14, 2022 Greater Boston, Massachusetts, USA

Greetings from the Conference Committee as we assemble an exciting program and hope you will consider joining us at this milestone event in the Greater Boston area. We look forward to the return to in-person networking and collaboration that these events provide.

Phased array technology is evolving at a rapid pace, finding its way into a growing set of commercial and military applications. The 2022 Symposium will highlight the wide spectrum of work going on across the international community and emphasize new developments in the field. While an official call for papers is in the works, the committee wanted to share a preview of the topics we are considering and some important logistical information for this gathering.

Preliminary Technical Program Schedule:

12 March 2022 – full paper submission deadline

30 April 2022 – author notification

01 Sept 2022 – conference registration deadline for accepted authors

Venue: Westin Waltham, Greater Boston, Massachusetts, USA

Suggested Topics:

- | | |
|-------------------------------|---------------------------------------|
| • Array Design | • Signal Processing and Architectures |
| • Array Measurements | • Millimeter Wave and Terahertz |
| • Beamforming and Calibration | • Wideband Arrays |
| • T/R Modules | • Dual polarized arrays |
| • Radar Systems | • Weather radar arrays |
| • Communications Arrays | • Automotive |
| • Metamaterial Phased Arrays | • MIMO |

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Modern Applications of RISC-V CPU Design

Access Period: September 1 - 30, 2021 (originally scheduled for March '21)

Speaker: Steve Hoover, Redwood, EDA

Type of Course: Self-paced, on-demand Course. Lab format

Course Overview: CPUs are a fundamental building block of complex SoCs, and RISC-V is taking hold as the ISA of choice. In this workshop, you will create a Verilog RISC-V CPU from scratch, and you will modify this CPU to be suitable for different applications.

You will learn and use modern techniques, using Transaction-Level Verilog to generate and modify your Verilog code more reliably, in far less time. You will discover how concepts like pipelining and hazards can be incorporated easily using timing-abstract design principles. All labs will be completed online in the Makerchip.com IDE for open-source circuit design. The skills you learn will be applicable far beyond CPU design.

Outline of Topics to be Covered:

Digital logic using TL-Verilog and Makerchip

- combinational logic
- sequential logic
- pipelined logic
- validity
- a calculator circuit

Basic RISC-V CPU microarchitecture

- single-cycle CPU microarchitecture
- testbench, test program, and lab setup for your CPU
- fetch, decode, and execute logic for RISC-V subset
- control flow logic

Pipelined RISC-V subset CPU microarchitecture

- simple pipelining of the CPU
- hazards and PC redirects

Completing the RISC-V CPU

- data memory and load/store
- remaining RISC-V (RV32I) instructions

Course Format:

- self paced, on demand course, providing attendees a flexible schedule

- access to content for 30 days
- pre-scheduled live Zoom and chat sessions with the instructors during the 30 day access period
- offline chat available with instructors during the entire 30 day access period (reply within 24 hours).

Target Audience: Engineers interested in a career in digital logic design or adjacent disciplines, including experienced engineers looking to modernize their skill set.

Prerequisites: An engineering education and basic understanding of digital logic. (Verilog knowledge is not a prerequisite.)

Benefits of Attending:

- Develop a solidified understanding of pipelined CPU design through hands-on labs.
- Acquire knowledge of advanced digital circuit design methodology.
- Gain exposure to an open-source design ecosystem.

Speaker Bio: Steve Hoover is the founder of Redwood EDA, an early-stage startup focused on advanced silicon design methodology and tools. Steve is a former logic design lead for DEC, Compaq, and Intel and has extensive experience designing high-performance server CPUs and network switches.

System Requirements: All resources are free and on-line; no download or installation required. We will use Slack, Zoom, GitHub Classroom, and Makerchip.com.

**Decision (Run/Cancel) Date for this Course is
Wednesday, August, 25, 2021**

IEEE Members	\$350
Non-members	\$395

http://ieeeboston.org/event/modern-applications-of-risc-v-cpu-design-course/?instance_id=2955

Postponed Until Fall 2021

Software Development for Medical Device Manufacturers

Web-based Course with live Instructor!

(11 hours of instructions!)

Times & Dates: Postponed until the fall 2021; Exact dates and times TBD

Speaker: Steve Rakitin, Software Quality Consulting

Course Format: Live Webinar, four, 3 hour sessions

COURSE SUMMARY: Developing software in compliance with the FDA Design Control regulation, changing FDA guidance documents and latest international standards is challenging. This intensive course provides practical solutions and suggestions for developing software in a manner that meets applicable FDA regulations, guidance documents and international standards, such as IEC-62304:2015. The focus is on interpreting Design Controls for software. Each section of the Design Controls regulation (820.30) is discussed from the perspective of software development. Discussions on key topics such as Software Requirements, Traceability, Design Reviews, Software Verification & Validation and Risk Management (including recently updated standards ISO-14971:2019 and EN-14971:2019) are included. Also discussed are FDA requirements for validation of software development tools and software used in Manufacturing and Quality Systems. Also discussed are recent FDA Guidance Documents on Cybersecurity, Mobile Apps, and Usability.

THIS COURSE IS INTENDED FOR: Software engineers, project managers, quality managers, software quality professionals, RA/QA staff, and anyone who needs to develop cost-effective processes and procedures that will enable their organizations to deliver high quality software-based medical devices that comply with FDA regulations and international standards. This course is also appropriate for people who are new to the medical device industry. Course notes, access to an extensive collection of reference documents and a training certificate are provided.

COURSE OUTLINE: This course will be presented with a live instructor using web-meeting software. The course content will be covered in 4 sessions as described below.

SESSION 1 – Regulatory Context

Duration ~3 hours with one 15 min break

This session will cover key regulatory requirements for medical device software in the US and EU.

Regulations and Guidance:

- FDA Medical Device Regulation (21 CFR Part 820 – specifically, design controls)
- EU Medical Device Regulation
- FDA Guidance Documents:
 - Guidance for Content of Pre-market Submissions for Medical Devices Containing Software
 - Off-the-Shelf Software Use in Medical Devices
 - General Principles of Software Validation
 - Content of Premarket Submissions for Management of Cybersecurity in Medical Devices
 - Policy for Software Device Functions and Mobile Medical Applications
 - Applying Human Factors and Usability Engineering to Medical Devices

International Standards:

- ISO 13485:2016 Medical Devices – Quality Management Systems
- IEC 62304: 2015 Medical Device Software – Software Lifecycle Processes
- ISO 14971: 2019 Application of Risk Management to Medical Devices

- EN 14971: 2019 Application of Risk Management to Medical Devices
- Off-the-Shelf (OTS) Software and Open Source software (SOUP)
- Discussion: All Software Is Defective...

SESSION 2 – FDA Design Controls and IEC 62304 – Part 1

Duration ~2.5 hours with one 15 min break

This session will cover FDA Design Controls and IEC 62304 requirements for medical device software.

- Design and Development Planning
 - How does Agile Development fit?
 - Medical Device Software Lifecycle Processes
- Risk Management
 - FDA Levels of Concern
 - IEC 62304 Software Safety Classification
- Software Requirements
 - Techniques for Removing Ambiguity from Requirements
- Software Architecture and Design
- Software Design Changes

SESSION 3 – FDA Design Controls and IEC 62304 – Part 2

Duration ~2.5 hours with one 15 min break

This session will cover Software Verification and Validation requirements.

- Software Implementation
- Software Verification
 - Technical Reviews
 - Static Analysis
 - Unit and Integration Testing
- System Testing
- Software Validation Testing

SESSION 4 – Software Tool Validation and Risk Management

Duration ~2.5 hours with one 15 min break

This session will cover Software Tool Validation and Risk Management requirements.

- Software Tool Validation

- Deciding which tools need to be validated
- Validation approach for software tools
- Validation of Manufacturing Software and Quality System Software
- Risk Management Using Fault Tree Analysis (FTA)
 - Review of ISO/EN 14971:2019 Requirements
 - Example of Fault Tree Analysis and Failure Modes Effect Criticality Analysis (FMECA)

About the instructor: Steven R. Rakitin has over 45 years experience as a software engineer. He has over 30 years of experience in the medical device industry and has been a medical device consultant for over 20 years. He has worked with over 100 medical device manufacturers and biotech companies worldwide, from startups to Fortune 100 corporations. He has published papers on medical device software risk management as well as a book titled: Software Verification & Validation for Practitioners and Managers.

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

Steve works collaboratively with medical device companies to help them comply with FDA regulations, guidance documents, and international standards in an efficient and cost-effective manner.

Decision (Run/Cancel) Date for this Course is TBD

IEEE Members	\$285
Non-members	\$345

Registration information coming soon. Please visit ieeeboston.org.

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.

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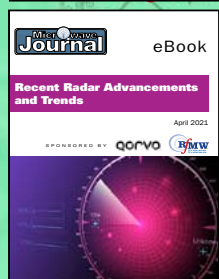
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Frequency Matters May IMS/5G Issue



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What is the Best 5G mmWave Beam Steering Architecture?

April 27

11am ET

RF/Microwave Test and Component Solutions for New Space

May 18

11am ET



Access webinars on-demand from the archived webinars and events page

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Submission deadline has been extended until June 21!

Call for Papers



Co-Sponsor:



2021 IEEE Virtual International Symposium on Technologies for Homeland Security

November 8–9, 2021 • information@ieee-hst.org

Call for Papers

We are pleased to announce that the 20th Annual IEEE Symposium on Technologies for Homeland Security (HST '21), will be held November 8–9, 2021 as a virtual event. This symposium will bring together innovators from leading academia, industry, businesses, Homeland Security Centers of Excellence, and government agencies to provide a forum to discuss ideas, concepts, and experimental results.

HST is produced by IEEE with technical and organizational support from IEEE, IEEE Boston Section, IEEE-USA, MIT Lincoln Laboratory, and Raytheon Technologies. This year's event will once again showcase selected technical papers highlighting emerging technologies in the following areas:

Border Security, Critical Infrastructure Protection, and Law Enforcement

Climate Change and Homeland Resilience

Cyber Security

Frontier and Emerging Technologies

We are currently seeking technical paper submissions in the above areas. This year, the Homeland Security Technology community has come together to respond and develop technology to address the challenges of COVID-19 and we anticipate HST'21 to reflect that focus. Accordingly, all areas are inclusive of technologies related to the global COVID-19 pandemic. Papers examining the feasibility of transition to practice will also be considered. All areas will cover the following common topics:

- Strategy, threat characterization, operational concepts, and risk analysis;
- Modeling, simulation, experimentation, exercises & training; and
- Testbeds, standards, performance, and evaluations.

Contact Information

For more detailed information on the Call for Papers, as well as Sponsorship and Exhibit Opportunities, visit the website: <http://ieee-hst.org/> or email: information@ieee-hst.org. Submissions should be sent to the following website: <https://cmt3.research.microsoft.com/HST2021/>

Important Dates *(All deadlines are by midnight Eastern Standard Time)*

Paper Extended Abstract Deadline: June 1, 2021 (extended to June 21, 2021)
 Paper Acceptance Notification: July 16, 2021
 Final Paper Submission Deadline: September 24, 2021

Organizing Committee

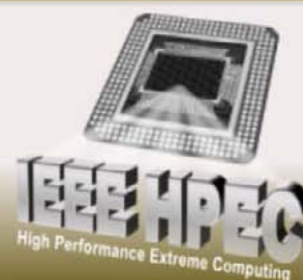
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25th Annual
**2021 IEEE High Performance
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 21 - 23 September 2021



www.ieee-hpec.org

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A Note from the HPEC Committee:

IEEE HPEC 2021 will be presented as a virtual conference that will allow safe participation and full publication in IEEE Xplore.

The IEEE High Performance Extreme Computing Conference (HPEC '21) will be held in the Greater Boston Area, Massachusetts, USA on 21 – 23 September 2021. 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 9, 2021**
 Notification of Acceptance: **AUG 13, 2021**
 Camera Ready Deadline: **AUG 31, 2021**

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 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.

HPEC 2021