IEEE NH SECTION'S MTT/AP SOCIETY

Summary of 2022-2023 Events

by

Elizabeth Schenk,

Chair, IEEE MTT/AP-S Chapter

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Preface

Ever wonder what you missed by not coming to the IEEE NH Section meetings sponsored by our joint Microwave Theory & Technology Society (MTT-S) and the Antennas & Propagation Society (AP-S) chapter?

Well, here is a quick synopsis of our events these last two years, showing how our events, while remaining technical, always included aspects that were enjoyed and appreciated by all.

We held three events in 2022, all of which were in person with one of them also having the opportunity to join virtually.

Event 1 2022

We began on 5/10/22 with Dr. Supriya Chakrabarti's great presentation on Space Hauc, the CubeSat satellite designed, built, and launched into space by U Mass Lowell science and engineering students. It was deployed from the ISS on 10/12/2021. Dr Chakrabarti is Director of the Lowell Center for Space Science and Technology (LoCSST) from the University Massachusetts Lowell, and his talk included a brief history of satellites (from Sputnik to CubeSats!) along with the process of all the work entailed, from applying for the grant from NASA to the final assembly/tests run at the UML North

Campus. He even brought a show-and-tell; part of the phased array of 16 patch antennas fit in the palm of your hand!

Event 2 2022

The next was IEEE's Distinguished Microwave Lecturer (DML) Dr. Jeffrey Nanzer's 9/20/22 interesting talk on Distributed Phased Arrays. In contrast to the single-platform phased antenna arrays that currently dominate all wireless systems, from the handheld 4G/5G cell phone you're carrying right now, to large radar systems and satellites, a distributed phased array consists of a number of separate wireless nodes where each antenna element is connected to a separate transceiver; signals can be coherently transmitted to enable beamforming and/or co-processed on receive to coherently form beams digitally.

Dr. Nanzer described the elements of this distributed phased array system, all its benefits (especially cheaper $ cost!), and the challenges to implement it. He works in academia/research at Michigan State University.

Event 3 2022

Our last talk of the year was a broad overview on the state of electromagnetics engineering education in a BSEE, presented by another Distinguished Lecturer from the AP-S, Dr. Levent Sevgi (Istanbul ATLAS University) on 10/11/22.

Stressing the critical importance of electromagnetics in today's world (we are surrounded by electromagnetic waves everywhere!) today's students need an intelligent balance between strong mathematical background (theory), engineering experience (practice), and modeling and numerical computations (simulation). He demonstrated some modeling and simulation strategies pertaining to complex electromagnetics problems with several user-friendly virtual tools that he has worked on to successfully teach and train students the world-over, most of which have been presented in the *IEEE AP Magazine*. I wish I could have had the neat

programs he showed when I was taking those mandatory junior level electromagnetics courses in my BSEE decades ago; it would have made Maxwell's Equations a *lot* more clearer! Dr. Sevgi compiled a great video of his 2022 APS DL Tour of the Northeast USA here. Check out the video from 1:17 to 1:54 for his time here in NH, in our beautiful state in the peak of its fall foliage!

Event 1 2023

This year, we've held one virtual event, co-sponsored the NJ Section on 2/16/23, on Communications and Networking in LEO Mega-Constellations, in which the data from the electromagnetic signals from thousands of satellites is processed for integration with terrestrial networks here on Earth.

Presented by Dr. Gunes Karabulut from Polytechnique Montréal in Montréal, QC, Canada, who has worked in both industry and academia, this talk was very technical in applied research but with applications to many world-wide problems she described well.

Event 2 2023

Our last in-person meeting this year was on 4/17/23 with DML Dr. Jasmin Grosinger's presentation "RF Design for Ultra-Low-Power Wireless Communication." She described RF design solutions for wireless sensor nodes to solve sustainability issues at the environmental and economic level in the Internet of things (IoT), which will arise due to the massive deployment of wireless IoT nodes. Her talk began with the background needed to understand the need for such efforts (imagine a landfill filled with (10^7 electronic devices)/(km^2)!), and described her group's work to address the issues, using HF/UHF RFID technologies. She clearly described current beta testing underway at her university (Graz University of Technology, Austria) for a coffee dispensing machine that uses this technology.

Conclusion

So please consider joining us at a future IEEE NH joint MTT/AP-S meeting. Yes, some of the content will be technical, but the speaker is always informed of the audience's make-up beforehand so they do tailor their talk on the fly. You will always learn something new, enjoy seeing fellow engineers, and be able to appreciate more of what went into all your wireless devices. For instance, for that news flash you just heard on your radio from some remote site that was only made possible by cheap satellite communication (maybe it was via a CubeSat! Dr. Chakrabarti's talk), to your ISP/cell phone carrier bill describing a one-time price hike as they transition from single-platform phased array to a distributed one (Dr. Nanzer's talk), you will be able to understand more, all as you sip your fresh coffee that you just bought with your credit card from that smart RFID-enabled coffee machine (Dr. Grosinger's talk)!

Pictures

I am sharing some pictures from the events in the following pages.

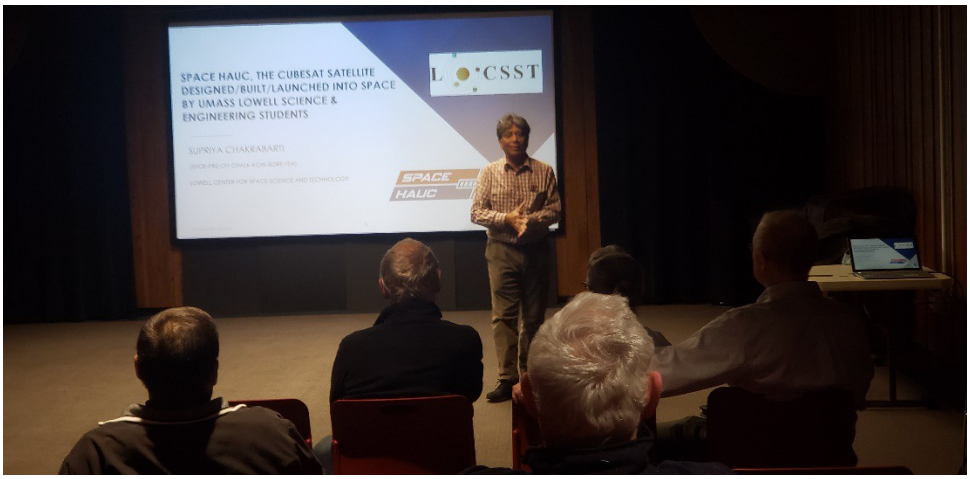

Figure 1. Dr. Supriya Chakrabarti's 5/10/22 CubeSat talk to us at the Nashua Public Library

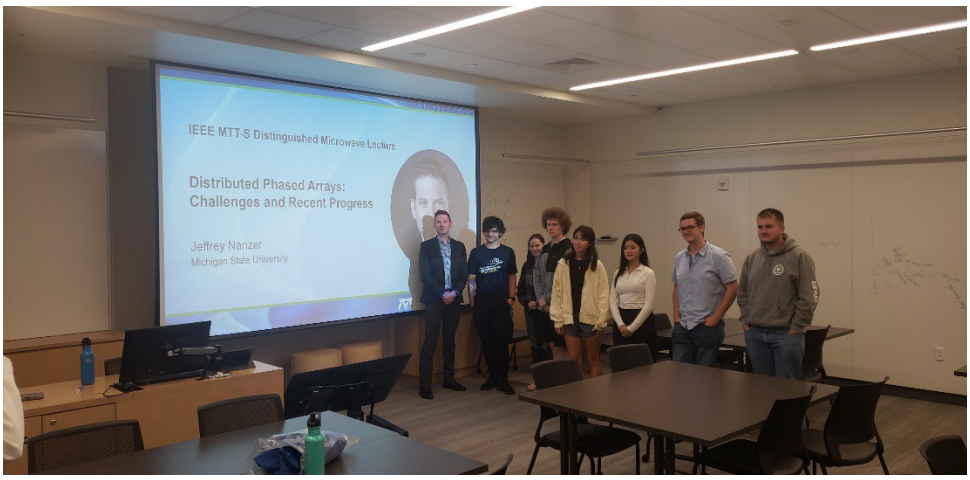

Figure 2. Dr. Jeffrey Nanzer poses with the SNHU students after his 9/20/22 talk there on Distributed Phased Arrays

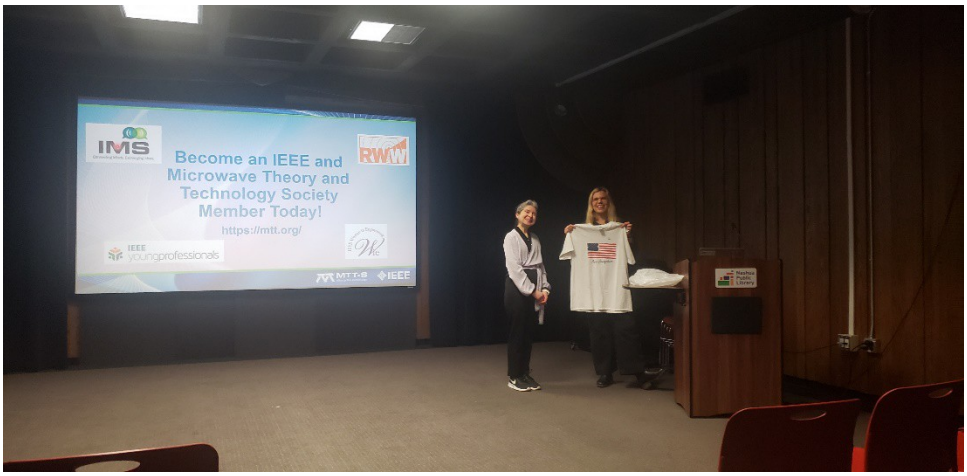

Figure 3. Elizabeth Schenk (left) presenting Dr. Jasmin Grosinger two gifts of appreciation after her 4/17/23 talk, a USA – New Hampshire T-shirt and the legal-tender American Innovation® $1 Coin for New Hampshire (yes, our state's coin is in honor of IEEE member Ralph Baer, "The Father of Video Games"!)

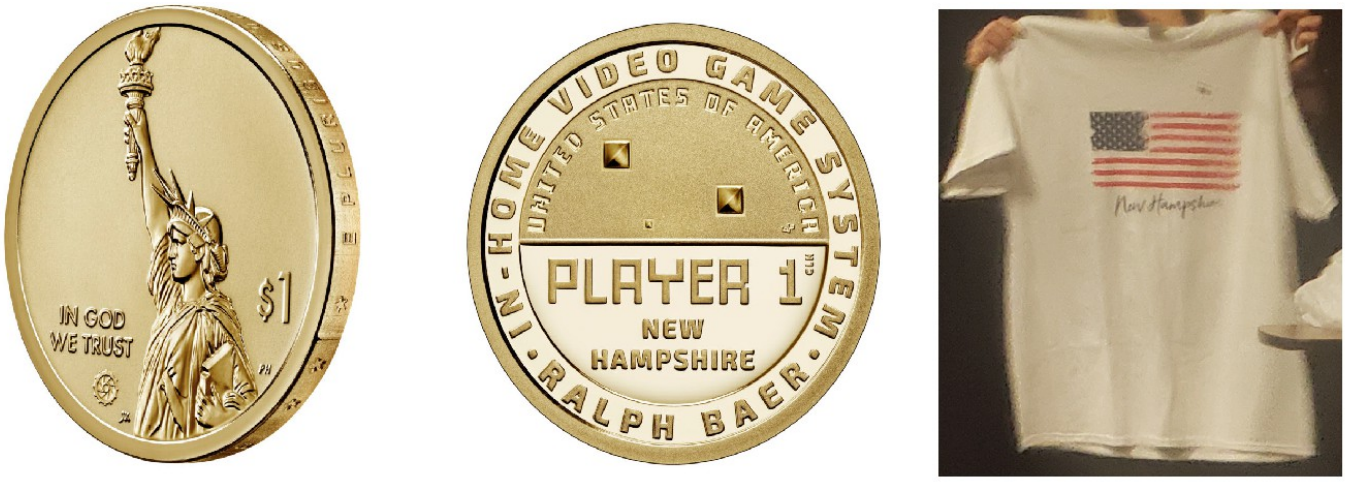

Figure 4. Close-up view of our NH state's American Innovation $1 Coin, in honor of Ralph Baer (courtesy of the US Mint), plus the T-shirt showing the USA flag with "New Hampshire" printed beneath, presented to Dr. Grosinger to always remember her visit to our IEEE NH Section!