IMS
Connecting Minds. Exchanging Ideas.
International Microwave Symposium
11-16 June 2023, San Diego, CA
The Coolest Ideas Under the Sun
SAN DIEGO 2023

Boot Camps at IMS2023 in San Diego, CA, USA

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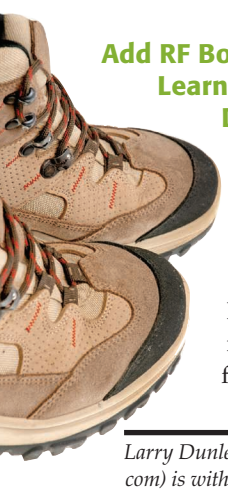

Introduced at IMS2015, the RF Boot Camp has been a great way for newcomers to the RF & Microwave field, as well as seasoned professionals, to expand their knowledge regarding the basic principles and techniques used in the exciting field of RF/Microwave technology.

Add RF Boot Camp to Your Learning Plan With a Full Day of RF/Microwave Skills Growth on Monday, 12 June 2023!

- *Schedule*: Monday, full day

Industry and academia recognize the critical need for RF/microwave (RFMW) knowledge in optimizing and accurately characterizing products. Often embedded with high-speed digital, software, and firmware elements, our designs require knowledge of the impact on RFMW system performance across all aspects of development, from simulation to prototyping, layouts, and testing.

RF Boot Camp is designed to grow RFMW skills in an educational forum that is focused on the fundamentals of microwave theory and techniques. We focus on teaching the fundamentals, terminology, and applications of RF and microwave design, simulation, and measurement—for those new to RFMW, those wishing to stay current with new technologies and applications, or even for booth staff members who would like to understand a little more about microwave technology and terminology. Two IEEE continuing education credits are offered to RF Boot Camp attendees.

RF Boot Camp material is updated each year based on student feedback, IMS location, and industry needs. Attendance in Denver in 2022, our first in-person event since IMS Boston in 2019, exceeded 150 attendees from industry and academia (Figures 1 and 2)! RF Boot Camp has demonstrated each year to be a true testament to the quality and effectiveness of—and need for—this valuable day of learning in the fundamentals of RF and microwave theory.

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The main agenda for RF Boot Camp 2023 includes a series of tutorials, delivered by experts from Keysight Technologies; Modelithics, Inc.; University of South Florida; Eindhoven University of Technology; and Ericsson Research

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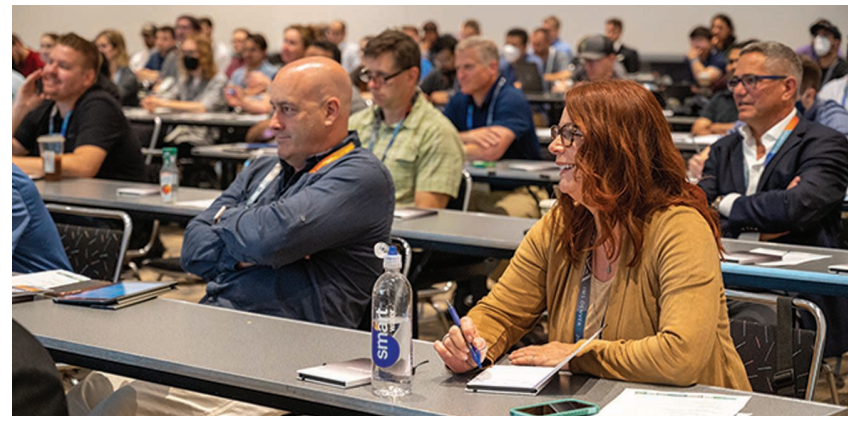
Sweden. The refreshed and updated topics for RF Boot Camp at IMS2023 will include the following:

- the RFMW signal chain
- network characteristics, analysis, and measurement
- fundamentals of RF simulation
- device modeling and impedance matching basics
- spectral analysis and receiver technology
- signal generation
- modulation and vector signal analysis
- microwave antenna basics
- RFMW focus application (Ericsson Research).

At RF Boot Camp in Denver at IMS2022, we introduced a special session on RFMW focus application, where our analog devices guest addressed the challenges of product development for a transmitter/receiver system and inspired RFMW learning. RF Boot Camp 2023 will feature Ericsson Research Sweden's insights in our RFMW focus application session. Register today to attend IMS2023 in San Diego and RF Boot Camp and be part of the many other valuable IMS week technical and networking activities!



LYLE PHOTOS

Figure 1. *Attendees come from a wide range of backgrounds and interests, yet all take away useful information from the day.*

LYLE PHOTOS

Figure 2. *Dr. Dunleavy is explaining the nuances of the iconic Smith chart used extensively in our field!*

ML/AI Boot Camp

- *Organizers*: Qi-Jun Zhang (Carleton University), Costas Sarris (University of Toronto), and Ulf Gustavsson (Ericsson)
- *Schedule*: Monday, half day

The ML/AI Boot Camp will present the basics of artificial intelligence (AI)/machine learning (ML) for microwaves. The course is targeted to general audiences in the microwave community who are not necessarily experts in AI/ML. To start with, the course addresses basic questions, such as the following: What is AI/ML? Why are AI/ML tools relevant for the microwave community? How can AI/ML be used in microwave design, and how can it be adopted in microwave circuits and systems? We also address what the benefits and limitations of using AI/ML in microwave technologies are.

The course will introduce basic types of ML methods, such as multilayer perceptrons, radial basis function networks, convolutional neural networks, time-delay neural networks, recurrent neural networks, long short-term memory networks, generative adversarial networks, and reinforcement learning. Examples of applications of AI/ML to microwaves will be presented.

This course is intended for engineers who want to learn the basics of AI/ML or are interested in using AI/ML for microwave applications, marketing and sales professionals who are interested in understanding the basics and relevance of AI/ML for microwaves, and university students who would like to acquire basic knowledge of AI/ML. The course will provide ample opportunities for audience interaction as well as questions and answers.

Quantum Boot Camp

- *Organizers*: Prof. Kevin O'Brien (MIT), Prof. Will Oliver (MIT), and Dr. Ofer Naaman (Google)
- *Schedule*: Monday, half day

The quantum computing industry relies heavily on microwave technologies, yet the connection between the IEEE Microwave Theory and Technology Society and quantum efforts is still nascent. For the quantum computing industry to succeed, it is essential to train multidisciplinary engineers who understand both quantum physics and microwave engineering. Quantum engineering is a fast-growing interdisciplinary field of research in which microwave and RF engineers can play an important role, especially in the areas of quantum sensing, quantum communications,

(continued on page 117)

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and the microwave control of quantum computing platforms.

The Quantum Boot Camp will introduce the basics of quantum engineering, targeting microwave engineers who want to understand how they can make an impact in this emerging field. It features speakers covering quantum engineering basics with a focus on the design, fabrication, control, and measurement of quantum systems with a focus on superconducting qubits. The course will conclude with an industry perspective from one of the leading commercial providers of quantum computing.

The intended audience includes new engineers, engineers who may be changing their career path, and marketing and sales professionals seeking a better understanding of quantum technology as well as current college students looking to learn more about the practical aspects of quantum technology.

IMS2023 Paper Competitions *(continued from page 112)*

Advanced Practice Paper Competition

An advanced practice paper is one that describes, in contrast to basic research, a practical RF/microwave design, integration technique, process enhancement, and/or combination thereof that results in significant improvements in performance and/or in time to production for RF/microwave components, subsystems, or systems. Any author can submit to this category. Judges will review the presentations of all finalists, whose identities at this point are known publicly, thereby choosing a winner, who will be announced at the IMS Plenary Closing Session.

Congratulations to the winners of the IMS2022 student, industry, and advanced practice paper competitions in Figures 1, 2, and 3, respectively.

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