



International Webinar Series on "Advanced Antenna Design Principles"

Organized by

DEPARTMENT OF ECE

SRI SIVASUBRAMANIYA NADAR COLLEGE OF ENGINEERING

(An Autonomous Institution, Affiliated to Anna University, Chennai)

**Kalavakkam-603110,
Chennai, Tamilnadu, India**

Date: June 25th – 27th, 2020

Objectives :

The participants will be introduced to the

- **Developments made in the field of Antenna Engineering for mobile and implantable devices**
- **Importance of near field devices in the wireless world**

Target participants :

Faculty / Research scholars in Engineering Colleges

Registration :

Registration is free and is limited to 250 participants

E-certificates will be provided only to the active participants who attend all the sessions

Last date for receiving registrations: **June 23, 2020**

For registration please visit the URL below :

<https://forms.gle/nB1mkx2S5sE6utEr7>

Organizing Committee :

Convenor

Dr. S. Radha, Professor & Head, Department of ECE, SSNCE

Coordinators

Dr. M. Gulam Nabi Alsath, Associate Professor, Department of ECE, SSNCE

Dr. S. Ramprabhu, Associate Professor, Department of ECE, SSNCE

Dr. S. Kirubaveni, Associate Professor, Department of ECE, SSNCE

Program Schedule

25th June 2020 (IST) 16:30 - 18:00

"Implantable Antennas"

Dr. Anja Skrivervik,

Professor of Electrical Engineering,
EPFL, Switzerland

26th June 2020 (IST) 14:00 - 15:30

"Design of Antenna Systems for IoT Devices with Antenna Boosters"

Dr. Jaume Anguera, IEEE Fellow

CTO and Co-Founder at Fractus Antennas, Barcelona, Spain
Associate Professor,
Universtat Ramon Llull University (URL), Barcelona, Spain.

26th June 2020 (IST) 17:00 - 18:00

"Near-Field Wireless World"

Dr. Paolo Nepa,

Professor,
Department of Information Engineering, University of Pisa, Italy

27th June 2020 (IST) 16:30 - 18:00

"Integrated Antenna Designs for 4G/5G Mobile Terminals"

Dr. Mohammad S. Sharawi,

Professor Electrical Engineering,
Polytechnique Montréal, Canada

For queries please contact

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Speaker Biographies

Antennas for Bio-Implants



Anja Skrivervik

ABSTRACT

The revolution in telecommunications triggered by the democratization of mobile phones was the starting for the renewed interest in electrically small antennas in the nineties. Since then, wireless communication has become ubiquitous, with new applications emerging each day. This has led to an exponentially increasing demand for miniaturized antennas, from small antennas for mobile phone to antennas for implanted biosensors. This contribution will review the evolution of electrically small antennas since the nineties, with special emphasis on antennas for implants and wearables. Design and measurement strategies will be presented, along with new results on fundamental limitations for antennas radiating into lossy media.

Anja Skrivervik obtained her electrical engineering degree from Ecole Polytechnique Fédérale de Lausanne in 1986, and her PhD from the same institution in 1992, for which she received the Latsis award. After a stay at the University of Rennes as an invited Research Fellow and two years in the industry, she returned part time to EPFL as an Assistant Professor in 1996, and is now a Professor Titulaire at this institution, where she is the head of the Microwave and Antenna Group. Her research activities include electrically small antennas, antennas in biological media, periodic structures, reflect-and transmit arrays, and numerical techniques for electromagnetics. She is author or co-author of more than 200 peer-reviewed scientific publications. Her teaching activities include courses on microwaves and antennas, and she has course at Bachelor, Master and PhD levels. She was director of the EE section from 1996-2000, and is currently the director of the EE doctoral school at EPFL. She is very active in European collaboration and European projects. She was the chairperson of the Swiss URSI until 2012, is a Board member of the European School on Antennas and is frequently requested to review research programs and centers in Europe. She is a member of the board of directors of the European Association on Antennas and Propagation (EurAAP) since 2017.

Design of Antenna Systems for IoT Devices with Antenna Boosters



Jaume Anguera

ABSTRACT

This webinar is addressed to Microwave, RF, Wireless, Electronics, and Antenna Engineers to learn to design wireless devices with antenna boosters. Antenna boosters are electrically small components that can be integrated inside any wireless device for operation at any frequency band (0.4GHz-10.6GHz) through the proper design of a matching network. This is a simpler, faster, and more familiar method for RF/microwave and wireless engineers, who are acquainted with the design of matching networks at every single stage of a telecommunication system—for example, filters, and amplifiers. Some Design examples covering from single-band to multi-band for wireless applications will be explained either using passive and active matching networks. After finishing the webinar, attendants will be able to address the design of wireless devices embedding antenna boosters.

Dr. Jaume Anguera, IEEE Fellow, is co-founder and CTO of the technology company Fractus Antennas (Barcelona). Associate Professor at Ramon LLull University and a member of the GRITS research group. Inventor of more than 135 antenna patents, most of them licensed to telecommunication companies. He is inventor of Virtual Antenna™, a technology enabling full functional multi-band wireless connectivity to wireless devices through miniature and off-the-shelf antenna boosters. Author of more than 230 scientific widely cited papers and international conferences (h-index 48). Author of 6 books. He has participated in more than 21 competitive research projects financed by the Spanish Ministry, by CDTI, CIDEM (Generalitat de Catalunya) and the European Commission (H2020) for an amount exceeding € 6M being principal researcher in most of them. He has taught more than 20 antenna courses around the world (USA, China, Korea, India, UK, France, Poland, Czech Republic, Tunisia, Spain). With over 20 years of R&D experience, he has developed part of his professional experience with Fractus in South Korea in the design of miniature antennas for large Korean companies such as Samsung and LG. He has received several national and international awards (ex. 2004 Best Ph. D Thesis -two prizes, one given by Telefónica Mobile, 2004 IEEE New Faces of Engineering, 2014 Finalist European Patent Award). He has directed the master/doctorate thesis to more than 110 students, many of them have been awarded. His biography appears in Who's Who in the World and Who's Who in Science and Engineering. He is Associate Editor of the IEEE Open Journal on Antennas and Propagation and reviewer in several IEEE and other scientific journals.

Near-Field Wireless World



Paolo Nepa

ABSTRACT

In the last decade, the request for reliable and efficient near-field wireless links has been increasing, in a large frequency span going from a few MHz up to THz. While traditional antenna engineering mostly concentrates on the far-field radiation properties (patterns, gain, polarization etc), near-field antennas require for different metrics. This webinar aims to present a detailed overview on antenna near-field properties, especially aiming at applications on wireless power/data transfer, RFID systems, wireless non-destructive sensing, intelligent reconfigurable surfaces, and many others. Near field coupling models will be introduced, together synthesis techniques for near-field shaping, and multi- and adaptive-focusing techniques. Finally, an overview of the several technologies used to implement near-field focused antennas will be presented.

Paolo Nepa (IEEE Senior Member) received the Laurea degree (summa cum laude) in electronics engineering from the University of Pisa, Pisa, Italy, in 1990. Since 1990, he has been with the Department of Information Engineering, University of Pisa, where he is currently a Full Professor. In 1998, he was a Visiting Scholar at the Electro Science Laboratory (ESL), The Ohio State University (OSU), Columbus, OH, USA, where he was involved in efficient hybrid techniques for the analysis of large antenna arrays. His current research interests include the design of wideband and multiband antennas, and antennas optimized for near-field coupling and focusing. His research group at the University of Pisa is involved in several projects on antenna design for UHF-RFID readers and tags, mobile communication terminals, automotive radio links, wearable devices. In the context of UHF-RFID systems, he is also working on techniques for radiolocalization of either tagged objects or mobile readers. He has co-authored more than 300 international journal articles and conference contributions.

Dr. Nepa is a member of the Technical Advisory Board of URSI Commission B - Fields and Waves. He served as the General Chair of the IEEE RFID-TA 2019 International Conference. Since 2016, he has been serving as an Associate Editor for the IEEE Antennas and Wireless Propagation Letters. He was a recipient of the Young Scientist Award from the International Union of Radio Science, Commission B, in 1998.

Integrated Antenna Designs for 4G/5G Mobile Terminals



Mohammad S. Sharawi

ABSTRACT

A tremendous increase in the achievable data rates will be expected from the fifth generation (5G) wireless standard. This increase (almost x1000) will be spread between the antenna systems, network architecture, radio front ends, and signal structure. Multiple-input-multiple-output (MIMO) technology has been utilized heavily in 4G terminals and will continue to serve as a key technology in 5G ones as it provides data rate increase without power or bandwidth increase. In addition, backward compatibility with 4G dictates the use of MIMO in 5G enabled terminals. The use of millimeter-wave (mm-wave) bands is essential to provide high data throughputs due to the excess bandwidth they offer and has already been approved for 5G use. In this talk, I will shine some light on some new antenna designs and concepts that can aid in coming up with novel multi-function 5G enabled antenna systems for future handsets. Examples of active-integrated-MIMO antennas, mm-wave MIMO antennas, multi-functional antenna systems and integrated 4G/5G handset antenna solutions will be presented and discussed.

Mohammad S. Sharawi is a Professor of Electrical Engineering at Polytechnique Montreal, Montreal, Québec, Canada. He is also a member of the Poly-Grames Research Center at Polytechnique. He was with King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia, between 2009-2018. He founded and directed the Antennas and Microwave Structure Design Laboratory (AMSDL) at KFUPM. He was a visiting Professor at the Intelligent Radio (iRadio) Laboratory, Electrical Engineering Department, University of Calgary, Alberta, Canada, during the Summer-Fall of 2014. He was a visiting research Professor at Oakland University during the summer of 2013. Prof. Sharawi's areas of research include Multiband Printed Multiple-Input-Multiple-Output (MIMO) Antenna systems, Reconfigurable and Active integrated Antennas, Applied Electromagnetics, Millimeter-wave MIMO antennas and Integrated 4G/5G antennas for wireless handsets and access points. He has more than 300 papers published in refereed journals and international conferences, 9 book chapters, one single authored book entitled "Printed MIMO Antenna Engineering," Artech House, 2014, and the lead author of the recent book "Design and Applications of Active Integrated Antennas," Artech House, 2018. He has 20 issued and 15 pending patents in the US Patent Office. He is serving as the Associate Editor for the IEEE Antennas and Wireless Propagation Letters (AWPL), IET Microwaves, Antennas and Propagation (MAP), as well as an Area Editor for Wiley Microwave and Optical Technology Letters (MOP). He served on the Technical and organizational program committees of several international conferences such as EuCAP, APS, IMWS-5G, APCAP, iWAT among many others.