

IEEE AP/MTT/EMC/ED TURKEY JOINT CHAPTER AND IEEE TECHNICAL COMMITTEE ON ANTENNA MEASUREMENTS (TCAM) WORKSHOP



Sema Dumanlı Oktar
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Atif Shamim
KAUST
Saudi Arabia



Sima Noghian
COMMSCOPE RUCKUS WIRELESS
USA



Sami Gabriel
VODAFONE FUTURE TECHNOLOGIES
UK



Benoit Derat
ROHDE AND SCHWARZ
Germany



Felix Vega
TII
UAE



Anouk Hubrechen
ANTENNX
The Netherlands



İbrahim Tekin
SABANCI UNIVERSITY
Turkey



Doğanay Doğan
ASELSAN
Turkey



Hüseyin Yiğit
TÜBİTAK
Turkey

DAY 1**DAY 2**

 **Boğaziçi University, South Campus,**
Albert Long Hall, Bebek/İstanbul

 **09-10 December 2024**

Registration is required,
the event is free of charge!



**IEEE****IEEE AP-S**
Antennas and Propagation Society**EMC SOCIETY****BUEC**
Boğaziçi University
IEEE Student Branch

IEEE AP/MTT/EMC/ED TURKEY JOINT CHAPTER AND IEEE TECHNICAL COMMITTEE ON ANTENNA MEASUREMENTS (TCAM) WORKSHOP

	Time	Location	Workshop	Lecturer
Monday December 9, 2024	12.30	ALH	Registration	---
	13.00	ALH	Opening & Lecture	Sema Dumanlı Otkar
	13.40	ALH	Lecture	Atif Shamim
	14.20	ALH	Lecture	Sima Noghianian
	15.00	ALH	Coffee Break	---
	15.30	ALH	Lecture	Sami Gabriel
Tuesday December 10, 2024	16.10	ALH	Lecture	Benoit Derat
	16.50	ALH	SAR Demo	Masood Khan
	09.00	ALH	Breakfast	---
	09.20	ALH	Lecture	Felix Vega
	10.00	ALH	Lecture	Anouk Hubrechsén
	10.30	ALH	Lecture	İbrahim Tekin
	11.00	ALH	Lecture	Doğanay Doğan
	11.30	ALH	Lecture	Hüseyin Yiğit
	12.00	Mühendislik Fak.	Lunch	---
	13.00	ALH	WiEMT Event/Panel	---
14.00	Kare Blok	BOUNtenna Lab Tours	---	
14.30	Technical Tour	TUBITAK ATAM	---	

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Biography



Sema Dumanlı Oktar
Boğaziçi University
Turkey

Dr. Dumanlı received the B.Sc. degree in electrical and electronics engineering from Orta Dogu Teknik Universitesi, Ankara, Turkey, in 2006, and the Ph.D. degree from the University of Bristol, Bristol, U.K., in 2010. She was with Toshiba Research Europe, Bristol, as a Research Engineer and a Senior Research Engineer from 2010 to 2017. She is currently an Associate Professor at Boğaziçi University, Istanbul, Turkey. She is the founder of the Boğaziçi University Antennas and Propagation Research Laboratory (BOUNtenna). She has a grant portfolio of more than €850K. She is the current chair of IEEE AP/MTT/EMC/ED Turkey Joint Chapter and URSI-TR Commission K and a board member of URSI Turkey. She is the recipient of the IEEE Antennas and Propagation Society 2022 Donald G. Dudley Jr. Undergraduate Teaching Award. Her current research interests include antenna design for implantable and wearable devices, in-body sensing, bio-hybrid implant sensors, and multiscale communications.

Abstract

In this talk, I am going to introduce the AntennAlive concept. AntennAlive aims to utilize the advancements of synthetic biology to revolutionize in-body sensing, addressing key challenges in continuous health monitoring with wireless implantable sensors. It aims to pioneer a novel class of implantable sensors that employ genetically engineered cells capable of detecting specific molecules of which long-term continuous monitoring is important. Synthetic biology already offers the tools to genetically modify living cells, enabling them to detect particular molecules and thus function as sensors. Although these cells are inherently suited to live within the human body, their potential for in-body sensing has yet to be harnessed.

The core innovation of AntennAlive is its method of sensor data communication. AntennAlive envisions cells that can respond to a specific molecular stimulus such that the response can be wirelessly transmitted outside the human body via electromagnetic waves (EM). The EM waves should be tuned to centimeter-scale wavelengths to navigate the challenging electrical environment of human tissues. Successful interaction thus depends on aligning the cellular response with the corresponding EM wavelength size. AntennAlive proposes the response of the genetically modified cells to reconfigure a passive microwave antenna to foster this unique communication. The contraction can be linked to the arrival of specific molecules such as naturally occurring molecules like glucose or viral infection-related molecules like HIV-1 envelope protein where long-term continuous monitoring is of importance.

AntennAlive will convert the biological recognition of molecules into EM signals, in such a way that the need for batteries and circuits is eliminated. The envisaged wireless sensors are self-sustaining and self-repairing entities within the human body. AntennAlive's mission extends beyond technology, aiming to ensure equitable access to healthcare by placing preventive healthcare at the forefront.

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Biography

Abstract

Atif Shamim received his MS and PhD degrees in electrical engineering from Carleton University, Canada in 2004 and 2009 respectively. He was an NSERC Alexander Graham Bell Graduate Scholar at Carleton University from 2007 till 2009 and an NSERC Postdoctoral Fellow in 2009-2010 at Royal Military College Canada and KAUST. In August 2010, he joined the Electrical Engineering Program at KAUST, where he is currently an Associate Professor and principal investigator of IMPACT Lab. He was an invited researcher at the YTT Micro-Modules Research Center (Oulu, Finland) in 2006. His research work has won best paper awards in IEEE IMS 2016, IEEE MECAP 2016, IEEE EuWIT 2008, first prize in IEEE IMS 2019 3MT competition and finalist/honorable mention prizes in IEEE APS Design Competition 2020, IEEE APS 2005, IEEE IMS 2014, IEEE IMS 2017 (3MT competition), R. W. P. King IEEE Award for journal papers in IEEE TAP 2017 and 2020. He was given the Ottawa Centre of Research Innovation (OCRI) Researcher of the Year Award in 2008 in Canada. His work on Wireless Dosimeter won the ITAC SMC Award at Canadian Microelectronics TEXPO in 2007. Prof Shamim has also won numerous business-related awards, including 1st prize in Canada's national business plan competition and was awarded OCRI Entrepreneur of the year award in 2010. He has won the Kings Prize for the best innovation of the year (2018) for his work on sensors for the oil industry. He is an author of 1 Book, 3 Book Chapters and more than 350 publications, an inventor on 35 patents and has given more than 70 invited talks at various international forums. His research interests are in innovative antenna designs and their integration strategies with circuits and sensors for flexible and wearable wireless sensing systems through a combination of CMOS and additive manufacturing technologies. He is a Senior Member of IEEE, Member of IEEE APS Measurements Committee and IEEE MTT Microwave Control Techniques Committee, founded the first IEEE AP/MTT chapter in Saudi Arabia (2013) and served on the editorial board of IEEE Transactions on Antennas and Propagation (2013-2019), as a Guest Editor for IEEE AWPL Special issue (2019), and is currently serving as an Associate Editor for IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology.

With the advent of wearable sensors and internet of things (IoT), there is a new focus on electronics which can be bent so that they can be worn or mounted on non-planar objects. Due to large volume (billions of devices), there is a requirement that the cost be extremely low, to the extent that they become disposable. The flexible and low-cost aspects can be addressed through additive manufacturing technologies such as inkjet and screen printing. This talk introduces additive manufacturing as an emerging technique to realize low cost, flexible and wearable wireless communication and sensing systems. The ability to print electronics on unconventional mediums such as plastics, papers, and textiles has opened up a plethora of new applications. In this talk, various innovative antenna and sensor designs will be shown which have been realized through additive manufacturing. A multilayer process will be presented where dielectrics are also printed in addition to the metallic parts, thus demonstrating fully printed components. Many new functional inks and their use in tunable and reconfigurable components will be shown. In the end, many system level examples of wireless sensing applications will be shown. The promising results of these designs indicate that the day when electronics can be printed like newspapers and magazines through roll-to-roll printing is not far away.



Atif Shamim
KAUST
Saudi Arabia

Biography



Sima Noghian
CommScope Ruckus
Wireless
USA

Dr. Sima Noghian is a Distinguished Hardware Engineer at CommScope Ruckus Networks and serves as an Antenna/RF consultant with Neuspera Medical Inc. She received her Ph.D. from the University of Manitoba in 2001, followed by a Postdoctoral Fellowship at the University of Waterloo in 2002. Dr. Noghian began her academic career as an Assistant Professor at Sharif University of Technology in Iran before joining the University of Manitoba (2003–2008). She then served as a faculty member at the University of North Dakota (2008–2018), where she directed the Applied Electromagnetic and Antenna Engineering Laboratory and chaired the Electrical Engineering Department from 2014 to 2016. In 2018, she was a visiting professor at San Diego State University.

In industry, she has worked as an Electromagnetic Application Engineer at PADT Inc. and as a Principal Antenna Design Engineer at Wafer LLC. Dr. Noghian is a senior member of IEEE, a fellow of the Applied Computational Electromagnetics Society (ACES), and a senior member of URSI Commissions B and K. She currently serves as an associate editor for multiple IEEE and international journals, including IEEE Transactions on Antennas and Propagation and IET Microwave, Antennas and Propagation. She has held roles on the IEEE Antennas and Propagation Society AdCom (2023-2025) and on several IEEE committees, and she serves as USNC-URSI Commission K Chair from 2024 to 2026.

Abstract

Wireless connectivity plays a major part in our daily lives. Wireless Local Area Network (WLAN), mostly operating through Wi-Fi technology, is one of the major technologies to provide this connectivity. 5G is another technology that promises a significant increase in data transmission speed. The goal of this talk is to highlight some of the aspects of the evolution of wearable antennas designed for applications in Wi-Fi and 5G, emphasizing their significance in enabling continuous, reliable connectivity for various wearable devices utilized in diverse applications and industries.

With the focus on wearable wireless devices, it is desired to have a direct connection to networks such as Wi-Fi or 5G networks. Therefore, there is a need for wearable antennas in the WiFi or 5G bands (especially the sub 6 GHz band) that can seamlessly be integrated into clothing. Such antennas should be small. However, the small antennas usually have omnidirectional patterns, and their input impedance may be affected significantly by the lossy human tissue in their vicinities. On the other hand, the radiation toward the body can cause a high Specific Absorption Rate (SAR), requiring a reduction in the input power to comply with the standard SAR levels.

In addition, wearable antennas must be lightweight and flexible. There are multiple options for flexible materials that may be considered. Other conditions specific to wearable antennas are being low-profile, compact, and efficient. Some of the factors that need careful consideration are the performance of the antennas under bending, crumpling, and stretching. The other factors are the cost, availability, washability, and endurance under extreme and harsh conditions. Some of the wearable antennas may be integrated as parts of the clothing such as buttons or zippers, while others may be integrated into the surface area of the clothes.

This talk is an exploration of wearable antennas for 5G and Wi-Fi, highlighting their pivotal role in enabling ubiquitous and reliable wireless connectivity.

Biography



Sami Gabriel
 Vodafone Future
 Technologies
 UK

Sami holds a BEng in Mechanical Engineering an MSc in Information Technology and is a Fellow of the IET. He has authored/co-authored 9 external publications with nearly 15,000 citations to his work and he designed the SAM head phantom that is used in testing compliance and performance of handsets and devices in labs around the world.

Sami's expertise focuses on the possible effects of electromagnetic fields on people and the standardisation and testing to support compliance with exposure requirements.

Within a lab environment he evaluates and investigated the usability of standards and the application to prototype and research devices to better understand the exposure.

Abstract

This presentation will review the development of a biological tissue dielectric database and how this has impacted the standardization field. In particular we will look at the standards for both measurement and numerical modelling of Specific Absorption Rate (SAR).



Benoit Derat
 ROHDE AND SCHWARZ
 Germany

Benoit Derat received the Engineering degree from SUPELEC, in 2002, and the Ph.D. degree (Hons.) in physics from the University of Paris XI, in 2006. From 2002 to 2008, he worked at SAGEM Mobiles, as an Antenna Design and Electromagnetics Research Engineer. In 2009, he founded ART-Fi, which created the first vector-array specific absorption rate measurement system. He operated as the CEO and the President of ART-Fi, before joining Rohde & Schwarz, Munich, in 2017. He is currently the Senior Director of Engineering for Vector Network Analyzers, Electromagnetic Compatibility, Over-The-Air and Antenna Test applications. Dr. Derat is a Senior Member of the Antenna Measurement Techniques Association (AMTA) and a Distinguished Lecturer of the IEEE EMC Society (2024 – 2025). He is the author of more than 80 scientific journals and conference papers, and an inventor on more than 40 patents, with main focus in antenna systems near and far-field characterization techniques.

Antenna or OTA measurements are blind. Knowing the detailed implementation of the device under test is not needed to realize them. They even include all production tolerances that might impact performance. However, measurements are limited to canonical test environments, e.g. in anechoic chambers. Simulations, on the contrary, can give access to electromagnetic fields in practically any scenario. Yet, simulations are only as good as the knowledge of the very details of the radiation source. What if one could unite the two and benefit from the combined strengths of experimental and numerical techniques? This talk shows how to enable this with the augmented OTA approach, involving the creation of an antenna digital twin, based on actual measured data. Practical applications are demonstrated, including field characterization inside the car and EMF assessments with virtual human models.

Biography



Felix Vega
TII
UAE

Felix Vega is the Chief Research Officer at the Directed Energy Research Center a Center affiliated with the Technology Innovation Institute, Abu Dhabi, UAE. He's also the Secretary of IEEE AP-S. His interests include the study of High-Power Electromagnetic Devices and Antennas. He holds a PhD from the Ecole Polytechnic Federal de Lausanne in Switzerland.

Abstract

This talk presents measurement techniques, instrumentation, and data processing algorithms for characterizing radiated high-power electromagnetic fields across MHz to GHz frequencies and GW power levels. The discussion will cover classic frequency-domain approaches, challenges in time-domain high-power ultra-wideband (UWB) measurements and the description of time-domain sensors. Finally, an original novel reconstruction technique to mitigate drifting and noise will be introduced.



Anouk Hubrechen
ANTENNEX
The Netherlands

Anouk Hubrechen received the B.Sc. and M.Sc. degrees in Electrical Engineering from the Eindhoven University of Technology, Eindhoven, The Netherlands, in 2017 and 2019, respectively, where she finished her Ph.D. in 2023 on reverberation-chamber measurements of mmWave antennas. She was a Guest Researcher with the National Institute of Standards and Technology at Boulder, Boulder, CO, USA, in 2018 and 2019. There she was involved in reverberation-chamber metrology for Internet-of-Things applications. She is co-founder and CEO of ANTENNEX B.V., a company that develops instrumentation for measuring integrated antenna systems, based on reverberation-chamber technology.

High-frequency antenna systems integrate RF electronics with antennas (e.g. phased arrays, antenna-on-chip, antenna-in-package). Therefore, the only way to characterize these systems is over-the-air, which requires new types of testing methods. In this talk, we detail the newest over-the-air measurement techniques for metrics such as noise figure, out-of-band emissions, radiated power spectrum, and field distribution in advanced, highly integrated devices.

Biography



İbrahim Tekin
Sabancı University
Turkey

İbrahim Tekin received the BS and MS degrees from Middle East Technical University, Ankara, Turkey, in 1990 and 1992, respectively. From 1993 to 1997, he was with the Ohio State University, Columbus, OH, USA, where he received the PhD degree in 1997. From 1997 to 2000, he worked as a Researcher with Wireless Technology Lab of Bell Laboratories, Lucent Technologies. He is currently with the Electronics Engineering Program, Sabancı University, Istanbul, Turkey. His research interests include RF and microwave circuit design, millimeter-wave antennas, and circuits. He is involved in various projects including Indoor positioning using GPS signals, 77 GHz LNA and antenna design, RFIC design for WLAN systems, antennas for full duplex systems, 5G mm-wave antennas.



Doğanay Doğan
ASELSAN
Turkey

Doğanay Doğan received the BS degree in Electrical and Electronics Engineering from Middle East Technical University in 2008. He received the MS and PhD degrees from the same department in 2011 and 2023, respectively. In 2008, he started working as an Antenna Design Engineer at ASELSAN's Radar and Electronic Warfare Systems (REHİS) Business Sector. Between 2018 and 2023, he served as the Head of Phased Array Antenna Design Department of REHİS. Since 2023, he has been serving as the Hardware Design Director at REHİS. For 16 years, he has been involved in projects related to antenna design, measurement, beamforming/shaping, and, numerical electromagnetic analysis.

Abstract

5G networks are turning to mm-wave frequencies for higher data throughput. To address challenges like free space path loss, atmospheric attenuation, and signal blockage at these high frequencies, high-gain, beam-steerable antenna arrays are essential for both mobile devices and base stations. Beam steering is crucial to overcoming these challenges, with adaptive arrays maximizing signal strength and minimizing interference in base stations, while switched beam systems offer simpler solutions for mobile devices. Passive beamforming networks (BFNs), like Butler matrices and Rotman lenses, are preferable over complex digital BFNs due to their lower complexity and system loss. This talk will highlight examples of these systems.

The lecture will cover the use of antennas in the defense industry, focusing on design and measurement infrastructures at Aselsan, one of Turkey's leading defense companies. It will explore Aselsan's antenna design approaches based on different application areas, with a special emphasis on phased array antenna structures. The importance of antenna measurements in field performance will be discussed, alongside the impact of beamforming structures and digitization at the antenna level on measurement outcomes. Additionally, the synchronization between antennas and measurement fields will be addressed to highlight how it contributes to successful implementations.



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Biography

Abstract



Hüseyin Yiğit
TÜBİTAK
Turkey

Hüseyin YİĞİT received the bachelor's from Yıldız Technical University in 2008 and master's degrees from Gebze Technical University in 2010. In latter institute he also has worked as research assistant in numerical electromagnetics. Since March 2012 he has been working as antenna design and development engineer in Scientific and Technological Research Council of Türkiye (TÜBİTAK), Informatics and Information Security Research Center (BİLGEM). He has participated various defense industry projects and also completed long-term infrastructure development project (ATAM) which was founded by Turkish Ministry of Development as Project manager. While serving as experienced antenna engineer, he is carrying out responsibility of antenna measurement labs in ATAM.

As being a critical hardware terminal, antennas play crucial role in telecommunications, radars remote sensing. Unlike other RF components for each end product design antenna also get revised and updated. Consequently, requirements for design and development processes are evolving as fast as end-product market. In this presentation ATAM firstly will be introduced covering working areas and product portfolio briefly. After, antenna products performance practicalities will be discussed within the scope of testing. Finally, some challenges will be addressed for real site application scenarios; including manufacturing costs, miniaturization, digital & analog integrated antennas.