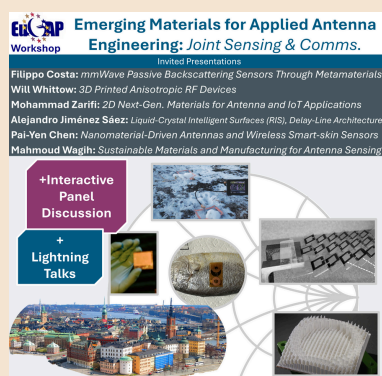


Emerging Materials for Applied Antenna Engineering: Sensing and Communications

Abstract

Antennas and electromagnetic engineering have evolved beyond conventional materials. In advanced communication (6G/mmWave) and sensing (near/far-field) applications, emerging advanced materials and metamaterials are enabling new applications. In particular, reconfigurable metamaterials, advanced manufacturing, and wave-matter interactions in unexplored conductors/dielectrics are the foundation of joint sensing and communication (JSAC).

The workshop spans 2D materials, through additive manufacturing, to liquid crystals and reconfigurable metamaterials, while discussing sensing applications and sustainability considerations. Fundamental contributions as well as application areas will be covered by a range of speakers across multiple electromagnetic societies/councils (Antennas, Microwaves, Sensors, and RFID), with multiple interactive elements engaging the audience.



Workshop outline

The workshop is built around 6 invited talks from 5 countries including 3 IEEE Distinguished Lecturers, and Award-Winning YP speakers, across different AP-related areas and IEEE societies. An interactive panel session towards the end will bring together the speakers.

1. Lightning presentations from the audience will be sought before the event (3 minutes), to boost engagement and attendance.
2. "3D printed anisotropic RF devices" Will Whittow (IEEE Additive Manufacturing Distinguished Lecturer), Loughborough University, UK.
3. "2D Next-Generation Materials for Antenna and IoT Applications: Challenges and Opportunities" Mohammad Zarifi (IEEE Microwave Distinguished Lecturer), University of British Columbia, Canada.
4. "Nanomaterial-Driven Wearable Antennas and Wireless Smart-skin Sensors" Pai-Yen Chen (IEEE Sensors Distinguished Lecturer), University of Illinois Chicago, USA.
5. "MM-wave passive backscattering sensors through metamaterials" Filippo Costa, University of Pisa, Italy.
6. "Liquid-Crystal Reconfigurable Intelligent Surfaces based on the Delay-Line Architecture" Alejandro Jimenez Saez, TU Darmstadt, Germany.
7. "Sustainable materials and manufacturing for antenna-based sensing" Mahmoud Wagih, University of Glasgow, UK.

Speakers

Mahmoud Wagih (Organiser) is an Assistant Professor and Royal Academy of Engineering UK IC Fellow at the University of Glasgow and a Founder of RX WaTT Ltd. He leads the Green RF-Enabled Electronics Lab, working on RF/antenna-based sensing, wireless power, and wearable antennas. He is a Speaker's Bureau representative of IEEE Microwave Technical Committee 26, on Wireless Sensors, RFID, and IoT. He has published 110+ papers receiving over 20 research awards including EurAAP Best PhD in Europe in Antennas & Propagation. He has organised 3 workshops at EuCAP, EuMW, and IMS, with various special sessions. He is the TPC Co-Chair for IEEE SAS, 2025, and an Associate/Guest Editor for Royal Society Open Science, and IEEE Open Journal of Antennas and Propagation.

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Pai-Yen Chen (Co-Organiser) is a Professor and University of Illinois Scholar in the Department of Electrical and Computer Engineering at the University of Illinois, Chicago. He has been involved in multidisciplinary research on applied electromagnetics, RF and microwave antennas and circuits, wireless sensors and systems, wearable electronics, nanoelectronics, nanophotonics, and metamaterials. Prof. Chen is an IEEE Sensors Distinguished Lecturer and currently serves as an Associate Editor for IEEE Transactions on Antennas and Propagation, IEEE Antennas and Wireless Propagation Letters, IEEE Sensors Journal, and IEEE Journal of Selected Areas in Sensors.

Will Whittow (FIET, AFWES, SFHEA, SMIEEE) is Professor of Radiofrequency Materials and leads the Wireless Communications Research Group at Loughborough University, UK. He is a named PI/CI on grants totalling > £14m. He has > 320 peer-reviewed publications (~120 journal papers) (> 5,450 citations, h-index = 38) including metasurfaces; reconfigurable radiofrequency (RF) devices; dielectric lenses, dielectric characterisation; millimetre-wave (MMwave) antennas; and direct write / inkjet printing. He is an IEEE Distinguished Lecturer in Additively Manufactured RF Devices.

Mohammad Zarifi (Ph.D. PEng, PRC Tier II, SMIEEE), is an Associate Professor and Tier II Principal's Research Chair (PRC) in Sensors and Microelectronics at the University of British Columbia, and the director of Okanagan MicroElectronics and Gigahertz Applications laboratory (OMEGA Lab). He has more than 150 papers in peer-reviewed journals and conference proceedings and holds six issued or pending patents. Dr. Zarifi's research focuses on Applied Electromagnetics and Circuits and Systems for Communications and Sensing Applications. Dr. Zarifi is the chair and a member of IEEE MTT-S TC-26 "RFID, Wireless Sensor, and IoT," as well as a member of IEEE MTT-S TC-4 "Microwave Passive Components and Transmission Line Structures.". Dr. Zarifi has received the Emerging Researcher Award and the Best Teaching Award at the School of Engineering in 2020 and 2021, respectively. He is also an IEEE MTT-S Distinguished Microwave Lecturer for the class of 2024-2027.

Filippo Costa (S'07-M'11-SM'19) received the M.Sc. degree in telecommunication engineering and the Ph.D. degree in applied electromagnetism from the University of Pisa in 2006 and 2010, respectively. He has been a visiting researcher with Aalto University (2009) with Grenoble Institute of Technology (2015, 2016, 2023), and University Rovira I Virgili (2016, 2017). He is currently an Associate Professor at the University of Pisa. His current research interests include metamaterials, metasurfaces, antennas, and radio frequency identification. He was recipient of the Young Scientist Award of the URSI conferences in 2013, 2014 and 2015. He serves as an Associate Editor for IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, IEEE SENSORS LETTERS, Scientific Reports.

Alejandro Jiménez-Sáez received the master's degrees (Hons.) in telecommunications engineering from the Polytechnic University of Valencia, Spain, and in electrical engineering from the Technical University of Darmstadt, Germany, in 2017. In 2021, he received the Dr.-Ing. degree (with distinction) in electrical engineering from the TU Darmstadt and the Freunde der TU Darmstadt prize for the best dissertation in electrical engineering. He obtained the Athene Young Investigator award at TU Darmstadt and leads the Smart RF Systems based on Artificial and Functional Materials independent research group. His current research interests include chipless RFID, electromagnetic bandgap structures, liquid crystal, and reconfigurable intelligent surfaces.