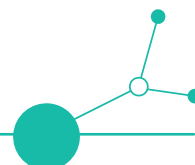


1st MedWaveImage Workshop

June 17, 2025, Politecnico di Torino





1ST MEDWAVEIMAGE WORKSHOP

Tuesday, 17th June 2025

Venue: Maxwell Meeting Room

Dept. of Electronics and Telecommunications, 5th floor

Politecnico di Torino, Corso Castelfidardo 42/a, Torino, Italy

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The MedWaveImage project is devoted to the development of the “microwave imaging” technology for biomedical applications. This technology uses low-power non-ionizing radiations, so there is no-risk for patients. Moreover, microwave imaging devices are portable, cost-efficient and with easy maintenance thanks to the implemented hardware, widely used for telecom purposes. In this workshop, the microwave imaging technology will be presented in several biomedical applications, and the preclinical feasibility testing of the medical microwave imaging prototypes, developed within the MedWaveImage project, will be investigated and discussed.

Agenda

- 9.00 - 9.15 Welcome and registration
- 9.15 - 9.35 MedWaveImage project presentation, Prof. Francesca Vipiana, Project Coordinator
- 9.35 - 10.45 “From Physiological to Functional Microwave Biomedical Imaging”, Prof. Luis Jofre-Roca, Universitat Politècnica de Catalunya (UPC), Barcelona, Spain
- 10.45 - 11.00 *Coffee break*
- 11.00 - 11.40 “Preclinical Testing of a Microwave Imaging Prototype for Early-stage Breast Cancer Detection”, Dr. Alexandra Prokhorova, TU Ilmenau, Germany
- 11.40 - 12:20 “Testing a CTU Microwave Imaging Prototype for Real-Time Temperature Monitoring in Hyperthermia Therapy”, Prof. Jakub Kollár, Czech Technical University in Prague, Czechia
- 12.20 - 13:00 “In-lab Realistic Validation of a Microwave-based Brain Stroke Scanner”, Dr. David O. Rodriguez Duarte, Politecnico di Torino, Italy
- 13.00 - 14.00 *light lunch*

For organization reasons, the interested attendees are invited to register writing an email to francesca.vipiana@polito.it and cristina.origlia@polito.it by Thursday June 12.

The workshop can be attended also online via <https://meet.google.com/huw-xjdw-htj>





From Physiological to Functional Microwave Biomedical Imaging

Prof. Luis Jofre-Roca

Universitat Politècnica de Catalunya (UPC), Barcelona, Spain

Abstract

Microwave imaging techniques have shown significant results on extracting specific biological parameters of different human body parts. In this presentation, after a quick review into the principle of operation of the active microwave monitoring systems, we will first focus into the extraction of physiological parameters able to indicate their biological condition, and, then, will show recent advances into the possibility of obtaining functional information able to indicate their biological activity through the detection of their low frequency electric signatures. We will discuss the principle of operation through the illumination, wave-biological medium interaction and non-linear modulation effect. We will discuss the basic monitoring geometries, the significant electromagnetic figures of the linear and non-linear scattering phenomena and the expected results. Finally, we will present different experimental microwave imaging and monitoring set-ups and some first experimental results at the scale of biological organ and the scale of the microorganisms.

Biography

Luis Jofre-Roca (Life Fellow, IEEE) received the M.Sc. (Ing.) and Ph.D. (Doctor Eng.) degrees in electronic engineering (telecommunications) from the Technical University of Catalonia (UPC), Barcelona, Spain, in 1978 and 1982, respectively.

He has been a Visiting Professor with the École Supérieure d'Electricité Paris, France, from 1981 to 1982, with the Georgia Institute of Technology, Atlanta (Fulbright Scholar), from 1986 to 1987, and with the University of California, Irvine, CA, USA, from 2001 to 2002. He was Director, from 1989 to 1994, with the Telecommunication Engineering School, UPC, Vice President of the UPC, from 1994 to 2000, Director of the Catalan Research Foundation, from 2002 to 2004, and General Director and Secretary for Catalan Universities and Research, from 2011 to 2016. Also, he has been the Principal Investigator from 2008 to 2013 of the Spanish Terahertz Sensing Lab Consolider Project, Research Leader of the 2017-2020 CommSensLab Maria de Maeztu Project, Director of the UPC-Telefonica Chair on Information Society Future Trends since 2003, Academic Director of the Consortium on Automotive and Future Urban Mobility (Carnet) and Chairman of the EIT-Urban Mobility European Association (2019-2023).



He has authored more than 200 scientific and technical articles, reports, and chapters in specialized volumes. His research interests include antennas, electromagnetic scattering and imaging, system miniaturization for wireless, and sensing for industrial, scientific, and medical applications. His current work focuses on connected reconfigurable autonomous vehicles or urban mobility, massive MIMO antennas, and microorganism wireless interaction.

