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SEMINAR

Brain Stroke Microwave Imaging

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Abstract: Microwave imaging is a technology able to exploit differences in dielectric properties (i.e., permittivity and conductivity) of objects illuminated with an array of antennas at low-power microwave frequencies in order to identify unknown targets in a known scenario. This technology has several attractive characteristics such as it is non-destructive, contactless, totally safe for operators, potentially real-time, cost-efficient and easy to operate. On the other side there are some intrinsic constraints: the dielectric contrast between the targets and the surrounding media, and the needed wave spatial resolution and penetration depth within the considered media.
In this seminar, the key ingredients to model, design, realize and test microwave imaging systems will be presented, including an ad-hoc problem-based design procedure, a reliable and effective forward solver, model-based imaging techniques and specialized hardware. Here, the proposed microwave system is designed for the medical continuous monitoring of patients after the stroke onset. The developed prototypes will be presented and discussed highlighting their capabilities with respect to the current state of the art.

Bio: Francesca Vipiana is a Full Professor of Electromagnetic Fields at the Department of Electronics and Telecommunications of the Politecnico di Torino, Torino, Italy.
Her current research interests include the modelling, design and testing of microwave imaging and sensing systems for medical and industrial applications. She is also involved in the development of numerical techniques based on integral equations and method of moment approaches, with a focus on multiresolution schemes, domain decomposition and advanced quadrature integration schemes.
Prof. Vipiana received the Young Scientist Award from the Union of Radio Science General Assembly (URSI) in 2005, the First Prize in the poster competition at the IEEE Women in Electromagnetics Workshop in 2009, the ISMB Best Paper Award in 2011, the Lot Shafai Mid-Career Distinguished Award from the IEEE Antennas and Propagation Society (APS) in 2017, and the Best Paper Award at the Spanish URSI Symposium in 2023. She is currently Associate Editor of the IEEE Transactions on Antennas and Propagation, Associate Editor of the IEEE Antennas and Propagation Magazine, where she is the responsible for the column “Women in Engineering”, Vice-Chair of the IEEE APS Diversity, Equity, Inclusion and Belonging Committee, and part of the Board of Directors in the European Association on Antennas and Propagation (EurAAP).

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Seminar in English

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