

## Seminar

Friday, 26 May 2023

9:45, B044

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### Title: Harmonic Transponders for Industrial Applications

**Abstract:** Wireless sensors are ever more adopted in industrial environments to check the correct operation of machines, and to verify the structural integrity of equipment and infrastructures in real time. This way, anomalies can be detected at an early stage, thereby reducing production waste and improving safety. A drawback in the use of wireless sensors is their power supply: sensors are usually embedded in machines and powered using batteries, which must be periodically replaced. This is unacceptable in many industrial scenarios, where the machineries and the related sensors must operate without interruptions, and where sensors are usually placed in remote areas. This talk focuses on describing an emerging approach for wireless sensing in industrial environments based on harmonic transponders, which allows us to achieve seamless operation of the sensors, without any battery change. These tags leverage harmonic backscattering for communication, are robust to clutter and are ultra-low power, which makes them particularly appealing for industrial environments. Application-oriented solutions, based on ultra-low power and passive transponders, will be described, and the main trade-offs and challenges to the development of energy-autonomous systems will be discussed.



**Short bio: Valentina Pallazzi** received the M.S. degree in electrical engineering and the Ph.D. degree in industrial and information engineering from the University of Perugia, Italy, in 2014 and 2018, respectively. In 2015 she was a Visiting Ph.D. Student with the Tyndall National Institute, Cork, Ireland; in 2016 she did a short-term scientific mission with the Centre Tecnològic de Telecomunicacions de Catalunya, Barcelona, Spain, sponsored by the cost action IC1301 "WiPE"; from December 2016 to April 2017 she was a student intern with the Agile Technologies for High-Performance Electromagnetic Novel Applications Research Group, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA, USA.

Since 2019, she has been a researcher at the Department of Engineering, University of Perugia, Italy, working on wireless sensors, wireless power technologies, additive manufacturing processes, and conformal electronics. She has coauthored more than 50 articles and holds 3 patents. Dr. Palazzi is the 2023 IEEE MTT-S Secretary. She is chair of the IEEE Microwave Theory and Technique Society (MTT-S) Technical Committee- 26 "RFID, Wireless Sensor and IoT", and is Early Career Representative of the Commission D "Electronics and Photonics" of the International Union of Radio Science (URSI).