

Abstract Seminar Università La Sapienza 2023

Strategies, techniques, and systems for powering low-maintenance and battery-free devices through Energy Harvesting and Wireless Power Transfer.

The seminar focuses on the sector of Internet of Things (IoT) devices and wireless sensor networks. According to market predictions, there will be a connection of one trillion "things" by 2025. The global smart sensor market is expected to grow from \$36.6 billion in 2020 to \$87.6 billion by 2025, with a CAGR of 19.0%. The energy harvesting systems market has a potential of \$440.39 million in 2019, with a forecast to reach \$817.2 million by 2025, with a CAGR of 10.91% from 2020 to 2025. In this scenario, a trillion batteries would be required to power a trillion-node IoT infrastructure, resulting in obvious maintenance problems and management costs. Even in the most optimistic scenario where they can reach their 10-year life expectancy, 274 million batteries would need to be replaced daily for every trillion installed nodes. This seminar showcases innovative systems, strategies, techniques, and circuits to power battery-free energy-autonomous electronic devices. It also highlights research progress in sustainable wireless sensor nodes that require minimal or no maintenance. Additionally, it shows how RF power transfer (WPT) is a very convenient way to remotely power wireless nodes, especially if installed in hard-to-reach places.

Roberto La Rosa Biography

Roberto La Rosa received a master's degree in electrical engineering from the University of Palermo and was conferred a PhD from the École Polytechnique Fédérale de Lausanne where he authored a thesis on strategies and techniques for powering wireless sensor nodes through energy harvesting and wireless power transfer.

Since joining STMicroelectronics in 1997, he has held a variety of assignments, including the design of high-frequency PLLs for clock generation and recovery, fiber-optic transceiver and system design, power management ICs, and analog, digital and mixed-signal bipolar and CMOS circuit development projects. He currently is a Research Senior Staff Member at STMicroelectronics Catania. His current research interests include Ultra-Low Power applications, Wireless Power Transfer, Energy Harvesting, and very high-frequency power conversion.

Dr. La Rosa holds several patents and has published papers on advanced strategies and techniques for powering wireless sensor nodes through energy harvesting and wireless power transfer.