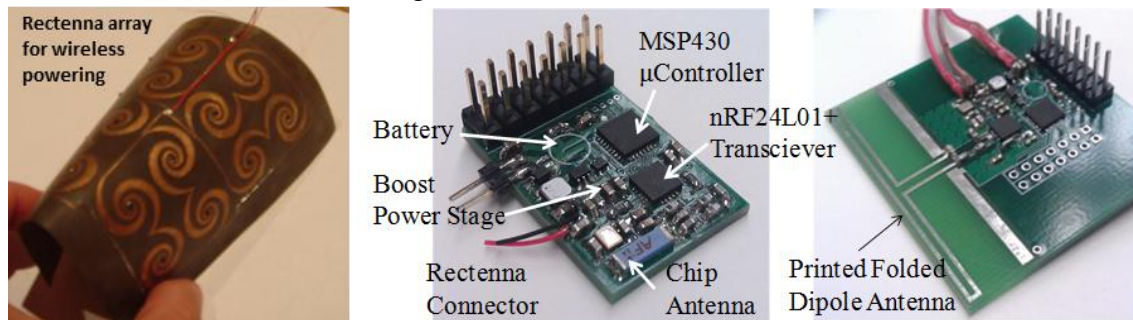


Far-Field Wireless Powering for Low-Power Wireless Sensors

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Wireless powering system implementation and design differs significantly for inductive or resonant near-field powering, far-field directive power beaming, over-moded cavity shielded powering or non-directive low-power far-field harvesting. The latter is differentiated from radio frequency identification (RFID) in that the powering is independent of signal transmission and is done at different time scales, power levels and frequencies. In this talk, first an overview of powering methods will be discussed and a comparison presented. Following this overview, the talk focuses on a system for wireless far-field powering of unattended distributed wireless sensors, including the power reception device design and optimization, power transmission, power management and control. Design and measured data of implementations of the various parts of the system in the 900-MHz and 2GHz cellular and 2.45GHz unlicensed bands will be shown. A design methodology for antennas integrated with rectifiers (rectennas) optimized for efficiency at low incident power levels ($1-100\mu\text{W}/\text{cm}^2$) will be presented. Integration of rectenna elements and arrays with the electronic application (wireless sensing in this case) requires power management, and some approaches that consume very low power levels will be discussed. The co-design methodology for the power reception circuit and the power management circuit is developed in order to achieve the highest total system efficiency. Possible applications such as sensors for comfort, performance and security of commercial and residential buildings will be discussed.



Zoya Popovic is a Distinguished Professor and the Hudson Moore Jr. Endowed Chair of Electrical Engineering at the University of Colorado. She obtained her Dipl.Ing. degree at the University of Belgrade, Serbia, and her Ph.D. at Caltech. She has graduated 46 PhDs and currently advises 16 doctoral students in various areas of microwave engineering. She is a Fellow of the IEEE and the recipient of two IEEE MTT Microwave Prizes for best journal papers, the White House NSF Presidential Faculty Fellow award, the URSI Issac Koga Gold Medal, the ASEE/HP Terman Medal and the German Humboldt Research Award. She was named IEEE MTT Distinguished Educator in 2013. She has a husband physicist and three daughters.

