

Seminar On

**IEEE AP-S Young Professionals Lecture:
Wireless Power, Seamless Design: Energy Harvesting Antennas – The Future of Self-Sustaining Devices**

Dr. Arup Ray

Qualcomm India Pvt. Ltd., India

Date : 23 September 2026 (Wednesday)
Time : 11:00 am – 12:00 noon (Hong Kong Time, GMT +08:00)
Venue : Online (Zoom Meeting)
Zoom : <https://cityu.zoom.us/j/84661582984?pwd=eJ9Yd8inUtv2pL9sQsStxVIUEUcBRE.1>
Meeting : Meeting ID: 846 6158 2984
Passcode: 440096

Abstract

The integration of on-chip antennas (OCAs) with RF rectifiers is emerging as a key technology for realizing compact, self-powered wireless systems. This talk introduces the principles of antenna–circuit co-design and highlights how monolithic integration can eliminate the traditional 50-Ω boundary, reduce interconnect losses, improve miniaturization, and enable highly optimized wireless platforms. The major challenges associated with OCAs in CMOS technologies—including substrate losses, parasitic coupling, fabrication constraints, packaging effects, and measurement difficulties—are discussed along with practical mitigation techniques.

The second part focuses on RF energy harvesting and rectenna design. Key performance metrics such as sensitivity, power transfer efficiency, power conversion efficiency, and voltage conversion efficiency are introduced. Various rectifier topologies, including Dickson charge pumps, self-threshold-voltage reduction schemes, and differential cross-coupled rectifiers, are reviewed with emphasis on efficiency improvement at low input power levels. A practical CMOS-integrated rectenna design flow is presented, emphasizing impedance-conjugate matching between the antenna and rectifier. Finally, a CMOS-integrated biomedical energy-harvesting case study demonstrates the potential of rectennas for future self-sustaining sensors, implantable devices, THz systems, and IoT applications.

Biography



Dr. Arup Ray is a Senior Lead Engineer working in the RFIC domain at Qualcomm India Pvt. Ltd., Bangalore. He received his Ph.D. from the Indian Institute of Technology Kharagpur in 2022, where his research focused on CMOS on-chip antennas, Low noise amplifiers, RF energy harvesting systems, rectifiers, and microwave passive devices in CMOS technologies. His current work involves advanced RFIC design for next-generation wireless communication systems. He has contributed to four novel ideas at Qualcomm, all of which have been filed as U.S. patent applications. He is also the recipient of one Qualcomm Distinguished solution award. Dr. Ray is an IEEE AP-S Young Professional Ambassador for the year 2026 and actively contributes to technical outreach, mentoring, and professional development activities within the antenna and propagation community. He has authored or co-authored nine journal papers and three conference papers. He has served as a peer reviewer for international journals, including IEEE Antennas and

Wireless Propagation Letters, IEEE Trans. Components, Packaging and Manufacturing Technology, IEEE Trans. Circuits and Systems -I, Springer Scientific Reports, IETE Journal of Research, and IET Microwaves, Antennas & Propagation.

***** ALL ARE WELCOME *****

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