IEEE (HK) Section AP/MTT

State Key Laboratory of Terahertz and Millimeter Waves
香港城市大學 City University of Hong Kong

Department of Electrical Engineering
香港城市大學 City University of Hong Kong

IEEE AP-S Young Professional Ambassador Talk Series:

Multiport Rectenna Design for Ambient RF Energy Harvesting

Professor Shanpu Shen
University of Liverpool, U.K.

Date : **22 November 2024 (Friday)**

Time : **4:00 pm – 5:00 pm (UTC+08:00) Hong Kong**

Venue : **Online**

Registration : **https://events.vtools.ieee.org/event/register/445846**

Abstract

The Internet-of-Things (IoT) is predicted to bring a revolution in the way we monitor our health, environment, and infrastructure and allow enhancements in efficiency, performance, and services. However, a critical issue is how to power IoT devices as they become more numerous and smaller. Ambient RF energy harvesting, which utilizes rectifying antenna (rectenna) to extract energy from the environment by leveraging RF signals radiated by communication infrastructure, such as WiFi, cellular, and broadcast systems, is a promising technology to overcome the issue of energizing massive IoT devices. A key problem in ambient RF energy harvesting is that the extremely low RF power density of the ambient RF environment significantly limits the available output dc power. In this talk, the state-of-the-art multiport rectenna technology for overcoming the low output dc power challenge of ambient RF energy harvesting will be presented. Different techniques to suppress the mutual coupling which degrades the multiport rectennas will be highlighted. In addition, the multi-band, multi-polarized, and multiport rectenna design technology, which jointly exploits frequency domain, polarization diversity, and spatial domain to significantly enhance the output dc power, will be introduced. Furthermore, transparent multiport rectenna design integrated with solar cell, which supports hybrid solar and RF energy harvesting, will be provided.

Biography

Shanpu Shen (IEEE Senior Member) received the bachelor's degree in communication engineering from the Nanjing University of Science and Technology, Nanjing, China, in 2013, and the Ph.D. degree in electronic and computer engineering from The Hong Kong University of Science and Technology (HKUST), Hong Kong, in 2017.

He was a Visiting Ph.D. Student with the Microsystems Technology Laboratories, Massachusetts Institute of Technology, Cambridge, MA, USA, in 2016. He was a Post-Doctoral Fellow with HKUST from 2017 to 2018 and a Post-Doctoral Research Associate with the Communications and Signal Processing Group, Imperial College London, London, U.K., from 2018 to 2020. He was a Research Assistant Professor with the Department of Electronic and Computer Engineering, HKUST, from 2020 to 2023. He is currently a Lecturer (Assistant Professor) with the Department of Electrical Engineering and Electronics, University of Liverpool, U.K.

His current research interests include RF energy harvesting, wireless power transfer, reconfigurable intelligent surface, MIMO antennas, and pixel antenna design and optimization. He is the 2024 IEEE AP-S Young Professional Ambassador and has been awarded the top reviewer for IEEE Transactions on Antennas and Propagation 2023 and exemplary review for IEEE Transactions on Communications 2022.

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

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