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DEPARTMENT OF ELECTRONIC SCIENCE, UNIVERSITY OF DELHI SOUTH CAMPUS, NEW DELHI & IEEE CRFID-APS JOINT CHAPTER DELHI SECTION

Distinguished Lecture

The Transformative Impact of Machine Learning Enabled Computational Electromagnetics on the Future of Wireless

Speaker

Prof. Konstantinos (Costas) Sarris, IEEE Fellow

Department of Electrical and Computer Engineering, University of Toronto 10 King's College Rd., Toronto, Canada

Date : Monday, Ist September 2025
Time : 4:00 PM – 5:00 PM IST
Meeting Link: https://meet.google.com/zhi-mshr-axu
Registered free at: https://forms.gle/GAioY8RFyfLrG7iU8
Registered Attendees Will Be Honored with E-Certificates!

Abstract

The continuous proliferation of wireless technologies, from 5G communications to the Internet of Things, creates a compelling need to intelligently plan the deployment of such systems in indoor and outdoor environments. This planning is required to meet the desired Quality of Service objectives (e.g. high bit-rates for Wi-Fi networks) along with safety standards for exposure of users to radiated emissions, and to ensure compatibility with existing systems. Wireless propagation modeling, which is the prediction of the electromagnetic field levels generated by a wireless communication system, is an essential element of such an intelligent planning process. These models can be deduced by numerical algorithms based on the physics of electromagnetic wave propagation, or by measurements.

Software-based planning is a reality in several areas, including the design of environmentally friendly buildings, where simulation tools are used to optimize heat and air flow. The question is how to enable a similar approach for wireless infrastructure that is becoming as indispensable as any other infrastructure element.

This presentation demonstrates that machine learning–enabled propagation models can overcome the long-standing trade-off between accuracy and efficiency. We review recent advances, including neural networks that predict signal strength of indoor and outdoor wireless networks in real time by processing geometry and transmitter positions. We also discuss their use for rapid deployment of large-scale networks, such as stadium Wi-Fi. Finally, we show how this research enables reliable digital twins of wireless systems—robust computational models for evaluating network performance under varying environments and operating conditions.

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