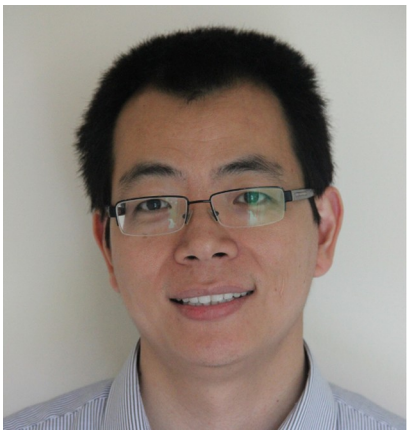
Bilkent EEE Distinguished Seminar Series

Bilkent University

Department of Electrical and Electronics Engineering



Using Pinching Antennas to Shape Next-Generation Network Architecture

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Due to the explosive growth in the number of wireless devices and diverse wireless services, next-generation wireless networks face unprecedented challenges caused by heterogeneous data traffic, massive connectivity, ultra-high bandwidth efficiency and ultra-low latency requirements. To address these challenges, flexible-antenna systems have been recognized as key enabling technologies of the sixth-generation (6G) wireless networks, as they can intelligently reconfigure users' effective channel gains and hence significantly enhance their data transmission capabilities. However, the existing flexible-antenna systems have been developed to combat small-scale fading in non-line-of-sight (NLoS) conditions. As a result, they are lack of the capability to reconstruct strong line-of-sight (LoS) links which are typically 100 times stronger than NLoS links. Furthermore, the existing flexible-antenna systems exhibit restricted flexibility, where adding/removing an antenna is not straightforward. This talk focuses on an innovative flexible-antenna system, termed generalised pinching-antenna systems, and how such a new physical technology can reshape the future network architecture. The principles of generalized pinching-antenna systems are described first together with specific examples of generalized pinching-antenna systems, including Docomo's dielectric waveguide based pinching antennas, leaky coaxial cable (LCX), etc. In addition, promising 6G related applications of generalized pinching antennas, including environment division multiple access (EDMA), integrated sensing and communication, multi-cell interference management, etc, are also illustrated. Finally, important directions for future research, such as antenna/waveguide deployment, channel estimation, etc, are highlighted.

Bio: Zhiguo Ding is currently a Professor in Communications at Nanyang Technological University and an Academic Visitor at Princeton University. His research interests are 6G networks, communications and signal processing. His h-index is over 100 and his work receives 70,000+ Google citations. He is serving as the EiC of IEEE JSAC, an Area Editor for the IEEE TWC and OJSP, an Editor for IEEE TVT, and OJ-SP, and was an Area Editor for IEEE TCOM and OJCOMS, an Editor for IEEE TCOM, TWC, COMST, WCL, CL and WCMC. He received the best paper award of IET ICWMC-2009 and IEEE WCSP-2014, the EU Marie Curie Fellowship 2012-2014, the Top IEEE TVT Editor 2017, IEEE Heinrich Hertz Award 2018, IEEE Jack Neubauer Memorial Award 2018, IEEE Best Signal Processing Letter Award 2018, Alexander von Humboldt Foundation Friedrich Wilhelm Bessel Research Award 2020, IEEE SPCC Technical Recognition Award 2021, IEEE VTS Best Magazine Paper Award 2023, and the Best Paper Award in IEEE GLOBCOM 2024. He is a Web of Science Highly Cited Researcher in two disciplines (2019-2025), and a Fellow of the IEEE.