

# Enhanced 4D Sensing

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## Abstract

Sensing has become more important than before in the era of Internet of Things, digital twin and autonomous driving. To seamlessly take advantage of sensing in mobile communications, the international mobile communication standards are promoting sensing as a service and integrated sensing and communication (ISAC). Realizing ISAC on portable mobile devices means that every resource, from spectrum, power, to space, is precious. This calls for new system and signal processing designs. In this talk, we will present some new techniques to enhance 4D (i.e., 3D position plus speed) sensing based on virtual multi-input multi-output (MIMO) arrays.



**Hsuan-Jung Su** is a professor with the Department of Electrical Engineering and Graduate Institute of Communication Engineering (GICE), National Taiwan University (NTU). He was the Director of NTU GICE (2018-2021), and has held visiting positions at Princeton University (2014-2015, 2022-2023) and Nokia Bell Labs (2022-2023). Before joining NTU, Dr. Su worked as a Postdoctoral Research Associate at the Institute for Systems Research, University of Maryland (1999-2000), and Bell Labs, Lucent Technologies (2000-2003), where he received Bell Labs President's Gold Award and Central Bell Labs Teamwork Award in 2002 for his contributions to MIMO system and 3G wireless network design and standardization. He has also received the Outstanding Electrical Engineering Professor Award in 2020 from the Chinese Institute of Electrical Engineering and the Future Tech Breakthrough Award in 2019 from the Ministry of Science and Technology, Taiwan. Dr. Su was the Editor-in-Chief of the International Journal of Electrical Engineering (2018-2023), an Area Editor of Elsevier's Physical Communication (PHYCOM) journal (2012-2023), and is currently an Associate Editor of the IEEE Internet of Things Journal. He has also guest edited special issues for journals such as IEEE Access, and served in leadership positions of many international conferences (TPC Track Chair, IEEE VTC 2010 Spring, TPC Co-chair, WPMC 2012, TPC Co-chair, IEEE GreenCom 2014, TPC Chair, WOCC 2015, TPC Co-chair, IEEE Globecom 2020, Tutorial Co-chair, EuCNC 2022, Executive Chair, IEEE Globecom 2025). He has been an officer of the IEEE Communications Society Asia-Pacific Board serving various roles since 2014. Dr. Su received the B.S. degree in Electronics Engineering from the National Chiao Tung University, Taiwan, in 1992, and the M.S. and Ph.D. degrees in Electrical Engineering from the University of Maryland, College Park, in 1996 and 1999, respectively. His research interests cover coding, modulation, signal processing, interference management, resource allocation, and MAC protocols of wireless communication, cognitive, M2M (IoT), D2D and non-terrestrial networks.