

Seminar On

Enhancing Microwave Imaging & Integrated Sensing and Backscatter Communication by Exploiting Diversity and Inverse Scattering Techniques

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Venue : Room 15-202, 15/F, State Key Laboratory of Terahertz and Millimeter Waves, Lau Ming Wai Academic Building, City University of Hong Kong

Abstract

Microwaves have the unique ability to penetrate optically opaque materials without causing harmful ionizing effects, making them a safer and more versatile alternative to X-ray imaging in various fields. These include security screening, remote sensing, medical imaging, through-wall imaging, and civil and industrial applications. However, conventional microwave imaging methods, such as synthetic aperture radar (SAR) or phased array techniques, typically rely on mechanical or electrical scanning to collect spatial data. This reliance introduces challenges in terms of imaging speed and system complexity, which hinder the development of efficient microwave imaging systems.

To address these limitations, frequency-diverse techniques have been proposed as a means to develop high-speed, low-profile, and cost-effective microwave imaging systems. Furthermore, integrated sensing and communication (ISAC) techniques have gained significant attention due to their ability to share hardware platforms, frequency bands, and software resources. Despite this progress, most existing imaging systems are limited to sensing functions and are unable to simultaneously support both sensing and communication capabilities.

In this report, we propose leveraging frequency, spatial, and pattern diversities to develop high-speed, low-profile, and cost-effective microwave imaging systems. Additionally, we integrate inverse sensing approaches with backscatter communication systems to propose a novel framework for integrated sensing and backscatter communication. The proposed system enables simultaneous sensing, identification, and backscatter communication of tags in cluttered environments, paving the way for more versatile and efficient applications.

Biography



Dingfei MA (Member, IEEE) received the B.E. and M.Sc. degrees from the Harbin Institute of Technology (HIT), Harbin, China, in 2017 and 2019, respectively. She received the Ph.D. degree in electronic and computer engineering from the Hong Kong University of Science and Technology (HKUST), Hong Kong, in 2023. From 2023 to 2024, she was a Post-Doctoral Fellow at HKUST. She is currently an Associate Professor in the College of Information Engineering at Guangdong University of Technology, Guangzhou, China. Her research interests include leaky-wave antenna design, microwave imaging, inverse scattering problems, machine learning, integrated sensing and communication systems, and the Internet of Things.

*** ALL ARE WELCOME ***

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