SEMINAR

Academic Exchange with Postgraduate Students from Tsinghua University

Date: **7 August, 2026 (Friday)**
Time: **1:00 p.m.**
Venue: **Room 734 & 735**
Haking Wong Building
HKU

Talk 1
Speaker: **Xuan Liu, PhD Student, Department of Electronic Engineering, Tsinghua University**

Title: ***High-Efficiency Antenna-in-Package and On-Chip Antenna for Millimeter-Wave/Terahertz Sensing***

Abstract:
Millimeter-wave and terahertz sensing technologies have attracted increasing attention due to their high spatial resolution, broad available bandwidth, and strong potential for applications in high-resolution imaging, radar detection, nondestructive testing, and biomedical sensing. As a key interface for transmitting and receiving electromagnetic waves, antenna performance directly affects the sensitivity, resolution, and operating range of these sensing systems. This report focuses on high-efficiency antenna-in-package (AiP) and on-chip antenna (AoC) technologies for millimeter-wave and terahertz sensing. It addresses major challenges, including severe propagation loss at high frequencies, significant substrate loss, limited radiation efficiency, and complex antenna–package integration. High-performance millimeter-wave and terahertz antenna solutions are proposed from two complementary perspectives: antenna-mode engineering and advanced fabrication and integration processes. These approaches aim to enhance radiation efficiency, antenna gain, operating bandwidth, and integration density, thereby supporting the development of compact and highly integrated millimeter-wave and terahertz sensing systems.

Talk 2
Speaker: **Shixuan Du, PhD Student, Department of Electronic Engineering, Tsinghua University**

Title: ***Angle-Dependent Multi-Rotational-IRS Enabled Cooperative Beam Routing***

Abstract:
Intelligent reflecting surfaces (IRSs) can be densely deployed to establish cascaded multi-hop line-of-sight (LoS) paths in complex environment, thereby significantly extending base station (BS) coverage. Unlike prior works assuming multiple fixed IRSs with isotropic reflections, we focus on angle-dependent IRS reflections and the associated multi-hop path selection optimization problem in this paper. To tackle the severe cascaded aperture gain

loss under this reflection model, we propose a novel rotational IRS (RIRS) architecture, where an IRS can rotate along a certain axis to mitigate the aperture-gain loss based on its incoming and outgoing neighbors. Specifically, we aim to jointly optimize the multi-reflection path selection, the rotational angles and passive beamforming at each selected RIRS, as well as the BS active beamforming to maximize the received signal power at a remote user. Although this path selection problem is combinatorial and non-convex, we first derive closed-form expressions for the optimal BS/RIRS active/passive beamforming, and the optimal rotational angles of each selected RIRS for any given path selection. To address the remaining path selection problem, we show that it can be equivalently recast as a shortest path problem by constructing a two-dimensional line graph for the considered multi-IRS system. Numerical results show that the proposed multi-RIRS-enabled beam routing scheme significantly outperforms conventional fixed-IRS benchmark and other baseline schemes, driving key insights into the role of cascaded aperture gain.

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. F. Zhang at 3917 7909.