2 December 2024 (Monday)

8:30 am	Registration
8:45 am	Opening Ceremony
9:00 am	Keynote talk Recent Advances in Closely Connected Antenna Arrays Trevor S. Bird, University of Technology Sydney
10:00 am	Coffee Break
10:30 am	Keynote talk Over-the-air Multi-antenna Device Testing in a Reconfigurable Reverberation Chamber Michael A. Jensen, Brigham Young University
11:30 am	Industry talk Desmond Tan, CAD-IT Consultants (Asia) Pte Ltd
12:00 pm	Executive Editor-in-Chief Talk on Electromagnetic Science Erping Li, Zhejiang University
12:10 pm	Lunch
1:30 pm	Keynote talk Efficient Array Antenna Design for mmWave Applications Ahmed A. Kishk, Concordia University
2:30 pm	Keynote talk Building-edge Additive Manufacturing Technologies: 3D Printing Landscape for Next Generation Radio Frequency Applications Stepan Lucyszyn, Imperial College London
3:30 pm	Coffee Break
4:00 pm	Keynote talk Emerging Leaky-Wave Antenna Technologies for Wireless Systems Ke Wu, Polytechnique Montréal (University of Montreal)
5:00 pm	Keynote talk Technology trends and challenges of base station antennas Weihong Xiao, Huawei Technologies
6:30 pm	Reception

3 December 2024 (Tuesday)

8:30 am	Distinguished Lecture How to Bring 6G to Reality? Its Enabling Technologies Qammer H. Abbasi, University of Glasgow
9:15 am	Distinguished Lecture Wideband Millimeter-Wave Antennas for Emerging Wireless Communication Yongxin Guo, City University of Hong Kong
10:00 am	Coffee Break
10:30 am	Distinguished Lecture Design and Optimization of Metal-Mountable UHF RFID Tag Antennas Eng-Hock Lim, Universiti Tunku Abdul Rahman
11:15 am	Industry talk Enhanced Phased Array Antenna and Metasurface Design and Analysis Rijin Saseendran, Dassault Systems & RFS-GTECH
11:45 am	Industry talk Innovations in Phased Array Antenna and RIS Technology for 5G/B5G and SATCOM, and Wireless Education Su-Wei Chang, TMY Technology Inc.
12:15 pm	Lunch
1:30 pm	Distinguished Lecture Comprehensive Analysis of Commercial 5G mmWave AiP Designs Chow-Yen-Desmond Sim, Feng Chia University
2:15 pm	Distinguished Lecture Universal Calculation Method for MIMO-WPT Efficiency - from near field coupling to far-field coupling Qiaowei Yuan, Tohoku University
3:00 pm	Coffee Break
3:30 pm	YP and Student Papers
6:30 pm	Banquet

Keynote

Recent Advances in Closely Connected Antenna Arrays

Trevor S. Bird
University of Technology Sydney

Abstract:
Antenna arrays are widely used for communications, defence, and radioastronomy. In recent years, some new arrays have been fabricated where the array elements are closely connected or even fully connected. Underpinning this work has been a greater understanding of mutual coupling effects for elements in close proximity. Through improved techniques and computational methods, mutual coupling has been harnessed to improve array performance. Mutual coupling in arrays has been explicitly used in some applications in the past and wider adoption is long overdue. In recent implementations the array elements are small to medium sized with spacings much less than half-wavelength, or even fully connected. This approach is used in the Australian SKA prototype (ASKAP), the low-frequency LOFAR radiotelescope, and in tightly coupled arrays for future wireless systems. The array elements can be as simple as short dipoles or log-periodic antennas as in LOFAR. As well as improved radiation performance, with the addition of some passive elements, the array can be designed to achieve wideband matching.
This talk describes the advantages of closely connected arrays for forming and shaping current sheets for beam steering, input matching, and beam synthesis. An overview of mutual coupling and its effects in arrays will also be provided initially as background [1]. A circuit model for a tightly coupled array with be introduced to demonstrate the impact of loading the array for bandwidth extension. Recent applications of arrays as feeds for radioastronomy, and wideband arrays for systems such as 6G are used in the presentation to illustrate these techniques.

[1] T.S. Bird (ed.), ‘Mutual coupling between antennas’, John Wiley & Sons Inc., Chichester UK, 2021.

Keynote

Over-the-air Multi-antenna Device Testing in a Reconfigurable Reverberation Chamber

Michael A. Jensen
Brigham Young University

Abstract:
Mode-stirred reverberation chambers have proven themselves useful for over-the-air (OTA) testing of mobile devices, with their main drawback being that they offer limited control over the spatial profile of the fields incident on the device under test. This limitation can be largely overcome if the mechanical stirring is replaced with electronic stirring by placing a reconfigurable surface on one or more of the chamber walls, allowing more precise control of the chamber mode weighting to achieve specified field spatial characteristics. This talk is on combining the electromagnetic chamber models with optimization tools that enable design of the physical chamber and determination of the operational parameters of the reconfigurable surfaces that achieve the desired field characteristics. It also proposes a machine learning model that shows promise for synthesizing fields in the chamber considering the impact of the device under test on the field perturbations. Results from these tools demonstrate the potential of this technology for modern OTA testing.

Keynote

Efficient Array Antenna Design for mmWave Applications

Ahmed A. Kishk
Concordia University, Montreal

Abstract:
Recently, interest in millimeter wave antennas has increased due to the high demand for faster data and reliable service in mobile communication. One of the driving forces is the fifth generation (5G) of the wireless network, which aims to provide such requirements. To handle such a demand, the systems should utilize the millimeter-wave bands. Path and material losses increase as frequency increases, reducing system efficiency. Therefore, there is a need for efficient millimeter-wave guiding structures that overcome such limitations. Gap waveguide technology is found to overcome such limitations at millimeter-wave bands. The advantages of this structure are in its suitability for millimeter wave applications as it is self-packaged with no radiation losses. Such a guiding structure has around 1:2 bandwidth that can also be enhanced under some conditions.
In this talk, several highly efficient antenna arrays will be presented based on the use of the gap waveguide technology. In addition, examples of added functions to the arrays will be presented, such as diplexers separating transmit and receive bands and monopulse arrays with compact comparables based on gap waveguide technology and leaky wave antenna arrays for frequency scanning properties.

Keynote

Building-edge Additive Manufacturing Technologies: 3D Printing Landscape for Next Generation Radio Frequency Applications

Stepan Lucyszyn
Imperial College London

Abstract:
Prof. Lucyszyn and his team have been pioneering 3D printed components, circuits and subsystems that can operate in the microwave-to-terahertz spectrum for lightweight applications that include low-cost communications, radar and sensor systems. This talk will explore some of the work undertaken at Imperial College London, highlighting advantages and current challenges for commercial exploitation in next generation applications.
Over the past eight years, he has published six invited international conference papers and 18 journal papers; the first of which kick-started the recent innovation of 3D-printed rectangular waveguides. In 2022, for his work on 3D printing, Prof. Lucyszyn (and his team at Imperial College London) won Junkosha's inaugural Technology Innovator of the Year Award for the Microwave and Millimeter Wave category.

Keynote

Emerging Leaky-Wave Antenna Technologies for Wireless Systems

Ke Wu
Polytechnique Montréal (University of Montreal)

Abstract:
In the diverse and colorful electromagnetic radiation world, leaky-wave antenna (LWA), as a special kind of guiding structures characterized by both wave guidance and wave radiation, has received much attention since its inception in 1940s, thanks to its many appealing features such as high directivity, narrow directive beam, easy feeding mechanism, simple configuration, and particular frequency-driven beam-scanning (or space-frequency mapping) capability. Recent mainstream academic and industrial activities in this connection are well manifested in the development of various kinds of LWAs featuring multifarious functionalities/electrical characteristics and the exploration of possible system-level applications. This talk presents several emerging concepts and techniques to develop a series of LWAs with elegant functionalities and electrical behaviors. Besides, this presentation also discusses a possible antenna front-end solution enabling LWAs to be used for wideband operation in radar sensing systems.

Keynote

Technology trends and challenges of base station antennas

Weihong Xiao
Huawei Technologies

Abstract:
From an industrial perspective, the future trends of wireless network development will be introduced in terms of frequency bandwidth, spectrum efficiency, green energy, and native intelligence. Along the challenging requirements of wireless network, we will share the concerns on the corresponding trends and solutions of base station antennas, for instance, antenna digitalization, multi-band integration, ELAA. Lastly, several challenging research topics will be introduced for discussion.

Distinguished Lecture

How to Bring 6G to Reality? Its Enabling Technologies

Qammer H. Abbasi
University of Glasgow

Abstract:
Future wireless networks are expected be more than allowing people, mobile devices, and objects to communicate with each other. The sixth generation (6G) of mobile networks are envisioned to include high data rate applications and ultra-massive, connected things. This also includes bio and nano-internet of things (IoT) tele-operated driving, unmanned mobility, haptic communications, unmanned aerial vehicles, and many more. Given the size of nano-sensors, THz frequency is proposed to do various sensing activities at this scale. However, it will be ideal to use the same radio frequency for communications as well. Furthermore, THz is also proposed as an enabler of extremely high data rate applications in 6G communications. The talk will be focused on Terahertz antenna design, Reconfigurable Intelligent Surfaces (RISs) and its role for joint communication and sensing feature of 6G.

Distinguished Lecture

Wideband Millimeter-Wave Antennas for Emerging Wireless Communication

Yongxin Guo
City University of Hong Kong

Abstract:
Novel wideband millimeter-wave antennas including antennas in package, on-chip antennas and 3D-printed antennas have been developed for emerging wireless communications. Integrated antennas are crucial to the development of high-density high-performance transceivers, especially at millimeter-wave bands or even higher frequencies, to avoid the costly and lossy packaging issues. At the millimeter-wave frequency band, these antennas are sufficiently small to be integrated in chip packaging or on chip while maintaining high performance, which could enable their use in mobile devices. On the other hand, 3D printing brings more flexibilities in antenna fabrication and design. In this talk, I will report our progress in the development of those wideband millimeter-wave antennas.

Distinguished Lecture

Design and Optimization of Metal-Mountable UHF RFID Tag Antennas

Eng-Hock Lim
Universiti Tunku Abdul Rahman

Abstract:
Radio Frequency IDentification (RFID) Technology can be found in many practical applications. When you are driving on the road, the electronic toll collection systems can be implemented using RFID. Your eWallet is also an RFID! In fact, the RFID technology has already been widely applied for assets tracking, inventory checking, supply chain management, gate automation, and many more. In the first part, the applications of different types of RFIDs will be introduced. A typical RFID system comprises an interrogator, a tag antenna, and a server that is connected to the internet. This makes the data access very convenient, and the data processing can be performed on the powerful CLOUD platform. Advancement of RFID has been very fast in recent few years due to its incorporation with the IoT. The RFID is one of the most convenient ways to connect and identify through the wireless mechanism. The second part is focusing on the UHF (Ultra-High Frequency) RFID systems. The read performance of an UHF tag antenna is greatly affected by its backing objects, especially those made of metallic materials. This issue has attracted increasing attention from many researchers, and much effort has been devoted to designing the tag antennas that can be mounted on metals for achieving long read distances. Here, I will be sharing the recent technical developments and design tradeoffs of different types of metal-mountable UHF tag antennas. A couple of new antenna structures will be explored. Novel tuning mechanisms will also be explored for performing coarse- and fine- tunings on the tag's resonant frequency, without affecting its read performances much.

Distinguished Lecture

Comprehensive Analysis of Commercial 5G mmWave AiP Designs

Chow-Yen-Desmond Sim
Feng Chia University

Abstract:
This presentation will begin by discussing the current trends in 5G millimeter-wave (mmWave) antennas and the challenges faced by antenna engineers in this area. To enhance the audience's understanding of mmWave array antenna design within the context of commercial mmWave Antenna-in-Package (AiP), we will conduct a comprehensive analysis of a selected series of commercial mmWave AiP designs, starting with the QTM 052. The session will explore the different design techniques used by these commercial AiP solutions, comparing them with recent findings from scholarly literature. Finally, the presentation will conclude with a brief overview of future 6G communication.

Distinguished Lecture

Universal Calculation Method for MIMO-WPT Efficiency - from near field coupling to far-field coupling

Qiaowei Yuan
Tohoku Institute of Technology & Tohoku University

Abstract

The talk will present a universal approach for calculating the power transfer efficiency (PTE), maximum power transfer efficiency (MPTE), and conditions for achieving MPTE for arbitrary multiple input (or transmitters) multiple output (or receivers) wireless power transfer (MIMO-WPT) systems. The PTE, also known as the RF efficiency, between M transmitters and N receivers, is precisely formulated using the equivalent M+N port S-parameters circuit network as the Rayleigh quotient. Accordingly, the MPTE is achieved by calculating the eigenvalue of the generalized Rayleigh problem that has been formulated. The effectiveness and universality of the proposed method are demonstrated through highlighting the MPTEs of single transmitter single receiver (SISO) and multiple transmitters single receiver (MISO) among many applications. Several potential applications of the proposed approaches are introduced based on the MPTE performance of the MISO system.