You are cordially invited to the following workshop

hosted by the IEEE UTS Student Branch and IEEE NSW AP-S/MTT-S Joint Chapter

Time schedule

2026 IEEE AP-S Distinguished Lecture/Young Professional Workshop Series in Australia, Sydney Event 15th May, 2026, Friday, Sydney Time	
Venue: CB10.03.290, Building 10, University of Technology Sydney **Zoom link**: https://utsmeet.zoom.us/j/84216406110	
	Agenda
8:45 – 9:00	Morning coffee/tea/juice
9:00 – 9:10	Welcome by Associate Professor Dush Thalakotuna
9:10 – 9:15	Introduction of the event and the visiting distinguished lecturer by Distinguished Professor Karu Esselle, AP Society Representative for Asia Pacific (excl. China and India)
9:15 – 10:45	Distinguished lecture **Multifunctional Antennas and Arrays for Wireless Communications** (Professor Satish Sharma)
10:45 – 11:15	Break
11:15 – 12:45	Distinguished lecture **Near-Field Meta-Steering – A Low-Profile Method to Steer the Beam of Any Antenna** (Distinguished Professor Karu Esselle)
12:45 – 1:45	Lunch
1:45 – 2:00	Presentation about IEEE and AP-S by the Immediate Past President of IEEE AP-S Professor Christophe Fumeaux
2:00 – 2:45	Expert technical presentation **Series-Fed Arrays: Classical Elegance and New Insights** (Professor Christophe Fumeaux)
2:45 – 3:30	Local YP Ambassador technical presentation **Ultra-Flexible Beamforming at 5G mm-Wave and 6G Mid-Band: The Power of Polarization** (Associate Professor Can Ding)
3:30 – 4:00	Formal discussions with members in the room and online **Career Planning for Early-Career Professionals** **Research Funding Application**
4:00 – 4:30	Break, informal discussions with members who are physically present **Strategies for Attracting Students to Research** **Effects of AI on Antenna Design**
4:30 – 4:35	Closing ceremony

Biography

Prof. Satish Kumar Sharma (Fellow, IEEE) received his Ph. D. degree in Electronics Engineering from the Indian Institute of Technology (IIT), Banaras Hindu Universssssity (BHU), Varanasi, India in August 1997. He received his undergraduate degree (Bachelor in Technology) in Electronics Engineering from Kamla Nehru Institute of Technology, Sultanpur, Uttar Pradesh, India in June 1991. He was a Post-Doctoral Fellow at the University of Manitoba, Winnipeg, Canada from March 1999 to May 2001. He joined InfoMagnetics Technologies Corporation, Winnipeg, Canada as a Senior Antenna Engineer/Researcher from May 2001 to August 2006. While at IMT, he was also a Part-Time Research Associate at the University of Manitoba until August 2006.

Dr. Sharma joined San Diego State University (SDSU) as an Assistant Professor in August 2006. He established the Antenna and Microwave Laboratory (AML) at SDSU and has led the AML as its Director since then. He became tenured Associate Professor in August 2010. He was promoted to full Professor in August 2014 and currently holds this position. He was Interim Chair of his department from August 2022 to October 2023. He has held Distinguished Summer Faculty Fellow positions at the Naval Information Warfare Center, Pacific, (NIWC-Pacific), San Diego (2020, 2021, 2022 & 2024). He has received the National Science Foundation (NSF)'s prestigious faculty early career development (CAREER) award in 2009. He also received the 2015 IEEE AP-S Harold A. Wheeler Prize Paper Award. He served as an Associate Editor of the IEEE Transactions on Antennas & Propagation journal from August 2010 to June 2017. He also served as an Associate Editor of IEEE Antennas, Wireless & Propagation Letters from March 2017 to March 2023. His research lab has the capability to analyze, design, develop, and verify antennas from VHF to millimeter wave (110 GHz) frequencies.

Dr. Sharma has published over 320 journal and conference papers and holds three US and Canadian patents. He co-edited three volumes of *"Handbook of Reflector Antennas and Feed Systems"*, published by Artech House in May/June 2013. His other coauthored book, *"Multifunctional Antennas and Arrays for Wireless Communication Systems"*, was published by *IEEE-Press/Wiley* in April 2021. He has collaborated with industry professionals on SBIR/STTR Phase I and II projects in addition to projects from the NSF, NASA and Office of Naval Research (ONR). His research interests include microwave and millimeter-wave frequencies, beam steering antennas, flat panel phased array antennas, reconfigurable and tunable antennas, 3D printed antennas, inkjet printed conformal antennas, massive MIMO antennas, antennas for Cube-Satellites, reflector antennas and their feed systems, and metasurface antennas.

Distinguished Professor Karu Esselle, FRSN, FIEEE, FIEAust, is Distinguished Professor in Electromagnetic and Antenna Engineering at University of Technology Sydney. A large collection of awards Karu recently received include Academic Research Team of the Year (Team Leader) at 2025 Australian Space Awards, 2024 Premier's Prize for Leadership in Innovation in New South Wales, Australia's national 2023 Eureka Prize for Outstanding Science in Safeguarding Australia (Team Leader), Australia's national 2022 Professional Engineer of the Year, both the most prestigious space award in Australia – the "Winner of Winners" Excellence Award – as well as the Academic of Year Award at the 2022 Australian Space Awards, 2022 UTS Chancellor's Medal, both the Excellence Award and the Academic of the Year Award at 2021 Australian Defence Industry Awards, and 2019 Motohisa Kanda Award (from IEEE USA) for the most cited paper in IEEE Transactions on EMC in the past five years.

Karu is a Fellow of the Royal Society of New South Wales, IEEE and Engineers Australia. He has authored over 750 research publications, and his papers have been cited over 18,000 times. His h-index is 66. Karu is among the top 0.3% of active researchers in the world in the research area of Networking and Telecommunications, according to an analysis published in Elsevier, which considered only actively publishing researchers in this field.

Since 2002, his research income is over 35 million dollars. Karu has provided expert assistance to more than a dozen companies in USA, Europe and Australia. At present, Karu is the Representative of the IEEE Antennas & Propagation Society (AP-S) for all Asia-Pacific countries excluding China and India. From 2018 to 2020. Karu chaired the prestigious Distinguished Lecturer Program Committee of the IEEE AP-S for 3+ years. He has served or is serving in 8 global committees of this IEEE society, including AdCom and Awards. In addition, Karu has been a Senior Editor of IEEE Access and has served as an Associate Editor for nearly all major journals in his fields including IEEE Transactions on Antennas Propagation, IEEE Antennas and Propagation Magazine, IEEE Access and IET MAP. He is a Director of Innovations for Humanity Pty Ltd.

Karu was in the College of Expert Reviewers of the European Science Foundation. He has been invited to serve as an international expert/research grant assessor by many research funding bodies around the globe, and as an Assessor for professorial promotions by prestigious universities.

Previously Karu was a Director of WiMed Research Centre and Associate Dean – Higher Degree Research (HDR) at Macquarie University. He has also served as a member of the Dean's Advisory Council and the Division Executive. Karu is also the Chair of the Board of management of Australian Antenna Measurement Facility, and was the elected Chair of both IEEE New South Wales (NSW), and IEEE NSW AP/MTT Chapter, in 2016 and 2017. His research activities are posted in the web at https://www.uts.edu.au/staff/karu.esselle and https://en.wikipedia.org/wiki/Karu_Esselle .

Christophe Fumeaux (Fellow, IEEE) received the Diploma and Ph.D. degrees in physics from ETH Zurich, Zurich, Switzerland, in 1992 and 1997, respectively. From 1998 to 2000, he was a Postdoctoral Researcher with the School of Optics, University of Central Florida, Orlando, FL, USA. In 2000, he joined the Swiss Federal Office of Metrology, Bern, Switzerland, as a Scientific Staff Member. From 2001 to 2008, he was a Research Associate and Lecturer with the Laboratory for Electromagnetic Fields and Microwave Electronics, ETH Zurich. From 2008 to 2023, he was a Professor with The University of Adelaide, Adelaide, SA, Australia. In 2023, he joined the School of Electrical Engineering and Computer Science, The University of Queensland, Brisbane, QLD, Australia, as a Chair Professor in Optical and Microwave Engineering. His main research interests include applied electromagnetics, antenna engineering, and the application of RF design principles across the electromagnetic spectrum. Dr. Fumeaux was the recipient of the ETH Medal for his doctoral dissertation. From 2011 to 2015, he was a Future Fellow of the Australian Research Council. He was the recipient of the 2018 Edward E. Altshuler Prize and the 2014 IEEE Sensors Journal and the 2004 ACES Journal best paper awards. He was the recipient of the University of Adelaide Stephen Cole the Elder Award for Excellence in Higher Degree by Research Supervisory Practice in 2018. From 2010 to 2013, he was an Associate Editor for IEEE Transactions on Microwave Theory and Techniques. From 2013 to 2016, he was a Senior Associate Editor and later an Associate Editor-in-Chief for IEEE Transactions on Antennas and Propagation. From 2017 to early 2023, he was the Editor-in-Chief for IEEE Antennas and Wireless Propagation Letters. He was the 2025 President of the IEEE Antennas and Propagation Society.

Associate Prof. Can Ding received a Bachelor degree in integrated circuit and integrated systems from Xidian University, Xi'an, China, in 2009, and a joint Ph.D. Degree from Xidian University and Macquarie University, Australia, in electromagnetic fields and microwave technology in 2016. He is currently an Associate Professor with the Faculty of Engineering and IT (FEIT) at the University of Technology Sydney (UTS).

His contributions to the antenna and propagation society have been to advance the understanding and the evolution of cutting-edge base station antenna technologies that are leading to the cost-efficient deployment of 5G networks. His accomplishments encompass several research and industry projects, patented innovations, and a portfolio of over 140 publications in top-tier journals and conferences. Among his publications, there are 20 awarded conference papers and 10 featured journal papers.

Since late 2023, he has been a member of the IEEE AP-S Education Committee and the EurAAP Working Groups on Early Careers and Arrays, and since 2025 he has also served on the IEEE AP-S Technical Committee 4 on Metamaterials. He has been an Australian ARC DECRA Fellow from 2020 to 2024. He was selected as a 2024 IEEE AP-S Young Professional Ambassador and has been serving on the IEEE AP-S Young Professional Committee since 2025. He currently serves as the Chair of IEEE AP-S Student Paper Competition Committee and an associated editor for IEEE TAP and IEEE AWPL.

Abstract

Multifunctional Antennas and Arrays for Wireless Communications

This talk will explore the state-of-the-art in multifunctional antennas and arrays, which can deliver multiple functionalities, such as frequency agility, frequency and polarization reconfiguration, and radiation pattern reconfiguration, including their possible combinations. This topic is crucial for antenna engineers and researchers, particularly in the context of 5G/6G technology, where multifunctional antennas and arrays are expected to play a significant role. As demand for high data throughput increases, the need for multifunctional, compact, low-profile, lightweight, and cost-effective antennas becomes more critical. However, achieving these capabilities also adds complexity to antenna design and implementation.

The talk will begin with an introduction to the different types of multifunctional antennas and the various design approaches used to create them. It will showcase representative examples, developed at the Antenna and Microwave Lab (AML) at San Diego State University. The discussion will also cover multiple-input-multiple-output (MIMO) and massive MIMO antennas that incorporate multiband, frequency-tunable, and reconfigurable radiating elements, designed for practical wireless communication devices such as cell phones, base stations, multimedia devices, and routers. For handheld devices like cell phones, the presentation will address specific absorption rate (SAR) and the impact of human hand and head proximity on antenna performance. Challenges in antenna design, fabrication, and measurement will be explored, along with future research directions in this field.

Near-Field Meta-Steering – A Low-Profile Method to Steer the Beam of Any Antenna

In the history of Antenna Engineering, there has been only one universal method to steer the beam of any fixed-beam antenna. That's physically tilting the antenna. This method has been implemented in many commercial antenna systems using motorised mechanical tilting and rotating systems. Now there is another way: Near-Field Meta-Steering, in which two flat phase-gradient metasurfaces (MS) are placed very close to the fixed-beam "base" antenna, in its near field, and are rotated independently. This way, the beam of the antenna can be steered over a large range of zenith angles and the complete azimuth range of 360, without tilting or rotating the antenna. In fact, no part of the system is tilted.

A Meta-Steering antenna system is only slightly taller than the base antenna itself. Lack of tilting means it is much shorter than conventional tilting antennas. In the future, one electronically reconfigurable near-field metasurface may provide 2D beam steering without any mechanical rotation.

Since this method was introduced in the seminal paper in 2017, together with the concept of Near-Field Phase Transformation, it has been applied by many industry and academic researchers across the globe (e.g. Thales in France, WaveUp in Italy, TICRA in Denmark, UCLA, University of Wisconsin-Madison, San Diego University, all in USA) to develop novel antenna systems, and to steer the beam of nearly all types of fixed-beam antennas, e.g. Fabry-Perot/resonant cavity antennas, reflector (dish) antennas, metasurface antennas, slot arrays, holographic antennas, and even some end-fire antennas, to name a few.

The method is also known in several names including Risley Method and Near-Field Phase Transformation. The surfaces are also known in different names, e.g. meta lenses, flat lenses, transmitarrays, deflectors.

Several different types of metasurfaces have been developed, e.g. standard printed-circuit-board type, all dielectric, all metal, hybrid and 3D-printed, and some research outcomes have led to national prizes and awards. This distinguished lecture will review the research conducted by the speaker's team as well as others in this modern and growing area of research.

Series-Fed Arrays: Classical Elegance and New Insights

Series-fed arrays occupy a distinctive place in antenna engineering, providing a simple, elegant, and efficient solution for a wide range of high gain applications, from classical high-power slotted waveguide antennas to modern millimeter wave automotive radar systems. Despite being a well established technique, series feeding has not lost its relevance, and there remains significant potential for continued innovation.

This presentation revisits the fundamental concepts that underpin series-fed arrays, starting with classical realizations and landmark contributions that have shaped the field. A tutorial introduction to series-fed array design is provided, with particular emphasis on physical intuition and the key constraints that have guided their development over decades.

In the second part of the talk, the continuing potential for innovation in this mature area is illustrated through several new series-fed configurations. These include linear, circular, and spiral architectures, as well as multi-mode, multi-port arrangements offering attractive performance for applications such as polarimetry and tracking.

Overall, this plenary aims to show how simplicity and classical elegance continue to provide fertile ground for innovation, enabling enhanced performance and offering valuable insight for addressing future challenges in antenna technology.

Ultra-Flexible Beamforming at 5G mm-Wave and 6G Mid-Band: The Power of Polarization

This talk will present recent advances in beamforming techniques tailored for 5G mm-wave and 6G mid-band systems. A central theme is the innovative use of dual-polarized antennas—not only to provide polarization diversity, but also to unlock a new level of flexibility in beamforming design. By intelligently coordinating the two orthogonal polarizations, rather than treating them separately as in conventional approaches, it becomes possible to dynamically control beamwidth, polarization states, and coupling characteristics. This talk will showcase several phased array architectures and control strategies that achieve lower power consumption, reduced hardware cost, and highly adaptable beamforming performance, addressing key challenges in next-generation wireless networks.