

Title: Wireless Micro/Nano-Sensors for Healthcare Internet-of-Things

Abstract: With the rapid advent in sensors and actuators, and the ever-advancing wireless technologies, the idea of internet-of-things (IoT) has had a revolutionary impact on ubiquitous computing with massive amount of data from the “5G/6G-connected” smart objects. This new paradigm has become the driving force for many new technologies, such as smart health, telemedicine, telediagnosis, and point-of-care testing. This talk will provide an overview of recent advances in telemetry techniques, micro/nanotechnology-driven wireless sensors and integrated systems. The first part of this talk will discuss new types of long-range (far-field), batteryless and wireless sensors for physical and (bio-)chemical sensing in noisy environments, as well as compact, passive wireless biosensors based on chemically-reconfigurable radio-frequency oscillators and modulators built using nanomaterial-based transistors. Additionally, wearable antennas and circuits based on lightweight, flexible and stretchable nanocomposite materials will be discussed, along with their applications in smart skins. The second part of this talk will discuss how the concepts of “PT-symmetry” originated in quantum physics can be implemented using electronic circuits and applied to enhance the sensitivity and resolvability of wearable/nearable/bio-implantable wireless micro/nano-sensors.



Biography: Prof. Pai-Yen Chen is a Professor in the Department of Electrical and Computer Engineering at the University of Illinois Chicago (UIC). He received the Ph.D. degree from the University of Texas at Austin in 2013, and M.S. and B.S. degrees from National Chiao Tung University in Taiwan in 2006 and 2004, respectively. He was a Research Scientist at Intellectual Ventures Laboratory (2013-2014) and a Research Staff in the Taiwan Semiconductor Research Institute (2006-2009). He has been involved in multidisciplinary research on applied electromagnetics, RF/microwave antennas and circuits, wireless sensors and systems, smart skins, metamaterials, nanophotonics, and nanoelectronics. He has published numerous papers in high-ranked journals including Nature, Nature Electronics, Nature Nanotechnology,

Nature Communications, Science Advances, and various IEEE transactions, a book, and many book chapters and patents. He has received several prestigious awards, including NSF CAREER Award, IEEE Sensors Council Technical Achievement Award (advanced career), IEEE Sensors Council Young Professional Award, IEEE AP-S Raj Mittra Travel Grant, IEEE Chicago Distinguished R&D Award, SPIE Rising Researcher Award, ACES Early Career Award, Young Scientist Award from Electromagnetics Academy and International Union of Radio Science (URSI), IOP Emerging Leader in Measurement Science and Technology, AFRL Faculty Fellowship, University of Illinois Scholar, UIC Researcher of the Year, UIC College of Engineering Faculty Research Award, Donald Harrington Fellowship, UAAT International Young Visiting Scholar, and quite a few best paper and design awards from IEEE flagship conferences. He currently serves as Senior Editor for IEEE Journal of Selected Areas in Sensors, Topical Editor for IEEE Sensors Journal, Track Editor for IEEE Transactions on Antennas and Propagation, and Associate Editor for Optics Express. He was a former Associate Editor of Advanced Electromagnetics, IEEE Antennas and Wireless Propagation Letters, IEEE Journal of Radio Frequency Identification, and IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology. He currently serves as the chair of IEEE Chicago AP-S/MTT-S Joint Chapter. He was the founding chair of the IEEE Chicago Sensors Chapter and the ACES Board of Directors. He currently serves as the Distinguished Lecturer for IEEE Sensors Council (2024-2026) and IEEE Antennas and Propagation Society (2026-2028). He is an Fellow of IEEE and Optica.

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