Department of Electrical and Computer Engineering

TEXAS TECH UNIVERSITY
Edward E. Whitacre Jr.
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Fall 2026 Seminar Series

Jointly hosted by the TTU IEEE MTT-S/AP-S Student Chapter

Seminar: Active incoherent millimeter-wave systems for high-speed imaging with extremely sparse antenna arrays
Speaker: Dr. Stavros Vakalis, University of South Florida
Time: 2:00-2:50 PM, Monday, Oct 26, 2026
Location: ECE 101

Abstract: Electromagnetic signals in the frequency range of 30–300 GHz can penetrate through materials like clothing, fog, and smoke, and at the same time provide image reconstruction with fine spatial resolution. Millimeter-wave imaging is typically implemented by means of mechanical or electrical scanning which requires long data acquisition times or a large number of active components. Passive millimeter-wave imaging systems that capture thermal signals and operate similarly to optical cameras are very costly because they need to employ highly sensitive receivers due to thermal radiation being extremely low power at millimeter-wave frequencies. This talk presents a newly developed millimeter-wave imaging technique called active incoherent millimeter-wave (AIM) imaging which combines the benefits of active and passive millimeter-wave imaging. This approach combines the high signal-to-noise ratio capabilities of active millimeter-wave imaging systems with the fast image formation potential of passive millimeter-wave imaging systems. The combination is achieved by illuminating the scene with multiple spatially distributed noise transmitters that mimic the randomness of thermal radiation. Starting from our earlier work in microwave frequencies, I discuss the system design and calibration approach, along with an experimental demonstration of a millimeter-wave active incoherent digital array. The array can generate millimeter-wave video at very high frame rates, and millimeter-wave imaging results include video captured at 652 frames per second of a sphere in pendulum motion. The use of stray reflections from a small set of communication transmitters is also examined, and incoherent imaging results using WiFi and 5G signals are presented.



Biography: Dr. Stavros Vakalis received the Diploma degree in electrical and computer engineering from the National Technical University of Athens, Athens, Greece, in 2017, and the M.S. degree in electrical and computer engineering and the Ph.D. degree in electrical engineering from Michigan State University, East Lansing, MI, USA, in 2020 and 2022, respectively. In 2022, he joined the Department of Electrical and Computer Engineering at the University of South Florida, Tampa, FL, USA, as an Assistant Professor and a member of the Center for Wireless and Microwave Information Systems. His current research interests include wireless microwave and millimeter-wave

systems and measurements, millimeter-wave imaging, radar, signal processing, and wireless communications. He has received the 2020 IEEE Antennas and Propagation Society Doctoral Research Grant, the IEEE Microwave Theory and Techniques Society Tom Brazil Graduate Fellowship Award in 2021, and the URSI Young Scientist Award in 2021. He was a recipient of second-place awards in both the Student Paper Competition and the Student Design Competition at the 2020 IEEE International Symposium on Antennas and Propagation, the 2020–2021 Fitch H. Beach Award for Outstanding Research in the College of Engineering, Michigan State University (Honorable Mention), and the Passive and Active Millimeter-Wave Imaging Best Student Paper Prize at the 2022 SPIE Defense + Commercial Sensing. He received the 2024–2025 Outstanding Undergraduate Teaching Award from the University of South Florida, the 2026 USF College of Engineering Early Career Research and Entrepreneurship Award, and was named a 2026 IEEE MTT-S YP Outstanding Lecturer. He currently serves as a reviewer for multiple IEEE journals and has served as the Technical Program Chair for the 2026 IEEE Wireless and Microwave Technology Conference (WAMICON). He is a member of the IEEE Microwave Theory and Techniques Society, the IEEE Communications Society, and the IEEE Antennas and Propagation Society.