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SEMINAR

Portable Radar Systems at the Human-Microwave Frontier: Life Activity Sensing and Human Tracking

Prof. Changzhi Li

IEEE Microwave Theory and Techniques Society (MTT-S) Distinguished Microwave Lecturer
Department of Electrical and Computer Engineering, Texas Tech University, USA

Oct. 24th, 2023 – 14.30, Room A3

Abstract: By sensing various life activities with microwave signals, portable radar with state-of-the-art front-end and measurement algorithms has great potential to improve healthcare, security, and human-machine interface. This presentation will first provide an overview of the state-of-the-art smart radar sensors powered by advanced digital/RF beamforming, multiple-input and multiple-output (MIMO), inverse synthetic-aperture radar (ISAR) technique, and deep learning. A few examples based on interferometry, Doppler, frequency-shift keying (FSK), and frequency-modulated continuous-wave (FMCW) modes at 5.8 GHz, 24 GHz, and 120 GHz will be discussed. In addition, the use of nonlinear technologies will be reported, with a focus on in-band third-order intermodulation measurement for enhanced target identification and parameter extraction. Case studies at this exciting human-microwave frontier will be presented on physiological signal sensing, non-contact human-computer interface, driving behavior recognition, human tracking, and studies in clinical environments. Finally, this talk will conclude with future industrial and academic R&D outlooks for microwave short-range life activities sensing.

Bio: Changzhi Li received a Ph.D. degree in Electrical Engineering from the University of Florida, Gainesville, FL in 2009. He is a Professor at Texas Tech University. His research interest is microwave/millimeter-wave sensing for healthcare, security, and human-machine interface.

Dr. Li is an MTT-S Distinguished Microwave Lecturer. He was a recipient of the IEEE MTT-S Outstanding Young Engineer Award, the IEEE Sensors Council Early Career Technical Achievement Award, the IEEE-HKN Outstanding Young Professional Award and the ASEE Frederick Emmons Terman Award. He is the General Chair of the 2024 IEEE Radio & Wireless Week (RWW), and an Associate Editor of the *IEEE JOURNAL OF ELECTROMAGNETICS, RF AND MICROWAVES IN MEDICINE AND BIOLOGY*. He served as the chair of the MTT-S Technical Committee “Biological Effect and Medical Applications of RF and Microwave” from 2018 to 2019, the TPC Chair of the 2022 IEEE RWW, a TPC Co-Chair of the IEEE MTT-S International Microwave Biomedical Conference (IMBioC) from 2018 to 2019, and the TPC Chair of the IEEE Wireless and Microwave Technology Conference from 2012 to 2013. He is a Fellow of the National Academy of Inventors.

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Seminar in English. For more information: sb.unipv@ieee.org