

# Portable Continuous-Wave Radar for Non-contact Sensing and Localization

Changzhi Li

Department of Electrical and Computer Engineering, Texas Tech University  
Lubbock, Texas

## Abstract:

Wireless sensors with embedded control and communication links have the potential to improve the quality of service in healthcare, infrastructure maintenance, and energy conservation. This presentation provides an overview of our research activities on smart radio frequency (RF) sensors aided with advanced technologies such as beamforming, inverse synthetic aperture radar (ISAR), and flexible electronics. The scope of applications extends to sleep study, fall detection, indoor localization, and civil engineering. Specifically, our recent efforts on smart house, cancer treatment, and structure monitoring will be discussed. In a smart house, the sensors ensure human well-being and energy efficiency by tracking users' vital signs, location, gait, gestures, and activities. In cancer radiotherapy, we investigate accurate non-contact tumor tracking, which provides a method to dynamically target a tumor with a radiation beam even when the tumor moves due to the respiratory movement of a patient. In structural health monitoring, our RF sensors advance infrastructure maintenance by remotely monitoring structural vibrations and movements, as aging infrastructure remains a national concern with widespread impacts on the quality of our daily lives.

## Biography:

Changzhi Li received the B.S. degree in electrical engineering from Zhejiang University, China, in 2004, and the Ph.D. degree in electrical engineering from the University of Florida, Gainesville, FL, in 2009.

In the summers of 2007–2009, he was first with Alereon inc. Ausitn, TX, USA and then Coherent Logix inc. Austin, TX, USA, where he was involved with ultrawideband (UWB) transceivers and software-defined radio, respectively. He joined Texas Tech University as an Assistant Professor in 2009, and became an Associate Professor in 2014. His research interests include biomedical applications of microwave technology, wireless sensors, and RF/analog circuits.

Dr. Li is an Associate Editor for the IEEE Transactions on Circuits and Systems I and an Associate Editor for the IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology. He was as an Associate Editor for the IEEE Transactions on Circuits and Systems II in 2014 and 2015, and served as the TPC co-chair for the IEEE Wireless and Microwave Technology Conference (WAMICON) in 2012 and 2013. He received the IEEE Sensors Council Early Career Technical Achievement Award, the Texas Tech Chancellor's Council Distinguished Research Award, the ASEE Frederick Emmons Terman Award, the IEEE-HKN Outstanding Young Professional Award, and the NSF Faculty Early CAREER Award. Dr. Li has published 200 papers, 5 book chapters, 2 books, and holds 6 US patents. He received nine best conference/student paper awards as author/advisor in IEEE-sponsored conferences.

