THz Sensor Science and Technology

Elliott Brown
Departments of Physics and Electrical Engineering
Wright State University

Friday, April 30, 2010
11:00 am in Birck 1001

Abstract: With world events during the past decade, the THz region of the electromagnetic spectrum is being widely investigated for a variety of sensing challenges including concealed object imaging, explosives detection, bio-warfare agent detection, and biomedical imaging. This talk summarizes our recent research on the science and technology of these challenges, especially devices and components for THz sensor systems that operate at room temperature, are amenable to field applications, and inherently transferable to industry. Three THz sensor technologies and their scientific issues will be addressed: (1) high-spectral-resolution coherent photomixing spectroscopy of explosives and biomolecules; (2) high-spatial-resolution impulse-radar biomedical imaging of skin hydration, burns, and carcinomas; and (3) 2D focal-plane-array imagers based on uncooled Schottky rectifiers. An underlying theme is that THz sensors can offer unique and complementary information, and could ultimately be fused with infrared sensors or data, ultrasonic imagers, or other sensor modalities.

Bio: Elliott Brown is a Professor of Physics and Electrical Engineering at Wright State University where he holds the Ohio Research Scholars Endowed Chair in Sensors Physics. He is conducting research and teaching courses in RF and THz sensor science and technology, and in solid-state physics and engineering. His THz research encompasses several topics including ultra-low-noise rectifiers, photomixing sources, the THz phenomenology of biomaterials, and THz remote sensor and imager design and simulation. Other areas of research include multifunctional RF electronics and systems, biomedical ultrasonic imaging in and around hard tissue (in collaboration with the UCLA Medical and Dental Schools), and electronic and photonic transport in nanostructures. Prior to WSU Dr. Brown was a Professor of Electrical and Computer Engineering at the University of California, (Santa Barbara and Los Angeles campuses), and prior to that was a Program Manager at DARPA in the Electronics Technology Office, Arlington, VA. He earned a Ph.D. in Applied Physics from the California Institute of Technology in 1985, and did his post-doctoral work at Lincoln Laboratory, Massachusetts Institute of Technology. Dr. Brown is a Fellow of the IEEE (since 2000) and a Fellow of the American Physical Society (since 2007). In 1998 he received an Award for Outstanding Achievement from the U.S. Office of the Secretary of Defense.