Holography and Computational Sensing in Imaging at Microwave and Millimeter-Wave Frequencies

ECE Faculty Candidate Okan Yurduseven
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2:00 PM, 202ECEC

Microwave and millimeter-wave frequency regimes for imaging has become the subject of considerable research because radiation in these bands is non-ionizing and thus ideally suited for a variety of emerging imaging applications, including security-screening, through-wall imaging, non-deconstructive testing, and biomedical imaging.

Within these applications, there is a strong demand for simplifying the hardware architecture, especially in support of low-cost real-time imaging capabilities. These research efforts include the development of alternative imaging modalities.

In this talk, I will present: (a) indirect holography and (b) computational compressive sensing using coded frequency-diverse apertures in imaging at microwave and millimeter-wave frequencies. Computational imaging schemes have attracted significant attention at microwave frequencies and beyond because comparable performance is obtained as more expensive and cumbersome phased arrays and mechanically scanned radar systems. I will demonstrate the application of unusual apertures, such as frequency-diverse metasurfaces and mode-mixing cavities, in security-screening and threat detection. I will explain the principles of operation and demonstrate how these techniques can address the limitations of conventional imaging systems.

Okan Yurduseven received the B.Sc. and M.Sc. degrees in electrical engineering from Yildiz Technical University, Istanbul, Turkey, in 2009 and 2011, respectively, and the Ph.D. degree in electrical engineering from Northumbria University, Newcastle upon Tyne, United Kingdom in 2014.

From 2009 to 2011, he was a Research Assistant within the Department of Electrical and Electronic Engineering at Marmara University, Istanbul, Turkey. From 2011 to 2014, he worked as a Lecturer (part-time) within the Faculty of Engineering and Environment at Northumbria University. Since May 2014, he has been a Postdoctoral Associate in the Center for Metamaterials and Integrated Plasmonics, Department of Electrical and Computer Engineering, Duke University, working in collaboration with the U.S. Department of Homeland Security.

His research interests include microwave and millimeter-wave imaging, multiple-input-multiple-output (MIMO) radar imaging, wireless power transfer, antennas and propagation, antenna measurement techniques, and metamaterials. He has authored more than 60 technical journal and conference papers, and two provisional patents. He has organized and chaired a number of special sessions within these fields at various international conferences, including IEEE International Symposium on Antennas and Propagation (AP-S) and European Conference on Antennas and Propagation (EuCAP).

Dr. Yurduseven was a recipient of an Academic Excellence Award from the Association of British – Turkish Academics (ABTA) in London in 2013. He also received a best paper award at the Mediterranean Microwave symposium in 2012 and a travel award from the Institution of Engineering and Technology (IET). He has recently been nominated for an Outstanding Postdoc Award at Duke University.

He is a member of the IEEE, IEEE Antennas and Propagation Society (AP-S), IEEE Microwave Theory and Techniques Society (MTT-S), and European Association on Antennas and Propagation (EurAAP). He serves as a reviewer for IEEE Transactions on Antennas and Propagation, IEEE Transactions on Microwave Theory and Techniques, IEEE Antennas and Wireless Propagation Letters, Progress in Electromagnetics Research, and Applied Physics B.