



ITC-Egypt 2026 – Keynote Speaker

Through-the-Wall Radar Imaging: A Historical Perspective

Prof. Moeness Amin



Professor of ECE, Director of the Center for Advanced Communications, Villanova University.

Web: <https://homepage.villanova.edu/moeness.amin/>

ABSTRACT

Through-the-wall radar imaging (TWRI) has evolved from a theoretical research concept into a transformative sensing technology with applications in public safety, defense, emergency response, infrastructure inspection, and security surveillance. This keynote presents a historical perspective on the development of TWRI, highlighting the major scientific milestones, technological breakthroughs, and practical challenges that have shaped the field over the past several decades. The lecture traces the evolution of radar signal processing techniques, electromagnetic propagation modeling, and image formation methods, with particular emphasis on overcoming the distortions introduced by unknown wall characteristics, multipath propagation, and cluttered indoor environments. Key advances—including wall-parameter estimation, multi-position imaging strategies, adaptive focusing techniques, sparse signal processing, and modern computational imaging frameworks—will be discussed in the context of their impact on localization accuracy and image quality.

Drawing upon pioneering contributions that established many of the foundational concepts in through-the-wall radar imaging, the lecture will illustrate how innovative signal processing methodologies have enabled reliable imaging in increasingly complex scenarios. The presentation will also examine the transition from early proof-of-concept systems to contemporary radar platforms incorporating machine learning, distributed sensing, MIMO radar, and cognitive sensing paradigms. Finally, the keynote will outline emerging research directions and future opportunities, emphasizing the continued role of TWRI in intelligent sensing systems and next-generation situational awareness applications. Through this historical journey, attendees will gain a comprehensive understanding of the evolution of through-the-wall radar imaging and the challenges and innovations that continue to drive the field forward.

BIO



Prof. Moeness Amin received his PhD. degree from the University of Colorado, Boulder, in 1984 in electrical engineering. Since 1985, he has been with the Faculty of the Department of Electrical and Computer Engineering, Villanova University, Villanova, PA, USA, where he became the Director of the Center for Advanced Communications, College of Engineering, in 2002.

Dr. Amin is a Life Fellow of the Institute of Electrical and Electronics Engineers (IEEE); Fellow of the International Society of Optical Engineering (SPIE); Fellow of the Institute of Engineering and Technology (IET); and a Fellow of the European Association for Signal Processing (EURASIP). He is the Recipient of: the 2022-IEEE Dennis Picard Gold Medal in Radar

Technologies and Applications; the 2017-Fulbright Distinguished Chair in Advanced Science and Technology; the 2016-Alexander von Humboldt Research Award; the 2016-IET Achievement Medal; the 2014-IEEE Signal Processing Society Technical Achievement Award; the 2009-Technical Achievement Award from the European Association for Signal Processing; the 2015-IEEE Aerospace and Electronic Systems Society Warren D White Award for Excellence in Radar Engineering. He is also the Recipient of the 2010-Chief of Naval Research Challenge Award; the 1997-IEEE Philadelphia Section Award, the 1997-Villanova University Outstanding Faculty Research Award. He is the Recipient of the IEEE Third Millennium Medal.

Dr. Amin served as Chair/Member of the Electrical Cluster of Franklin Institute Committee on Science and the Arts (2001-2016). He served on the Editorial Board of the Proceedings of the IEEE and is currently a member of the Editorial Board of the IEEE Press. Dr. Amin has published numerous papers in signal processing theory and applications, covering the areas of Wireless Communications, Radar, Satellite Navigations, Ultrasound, Healthcare, and RFID. He is the Editor of four books on radar.