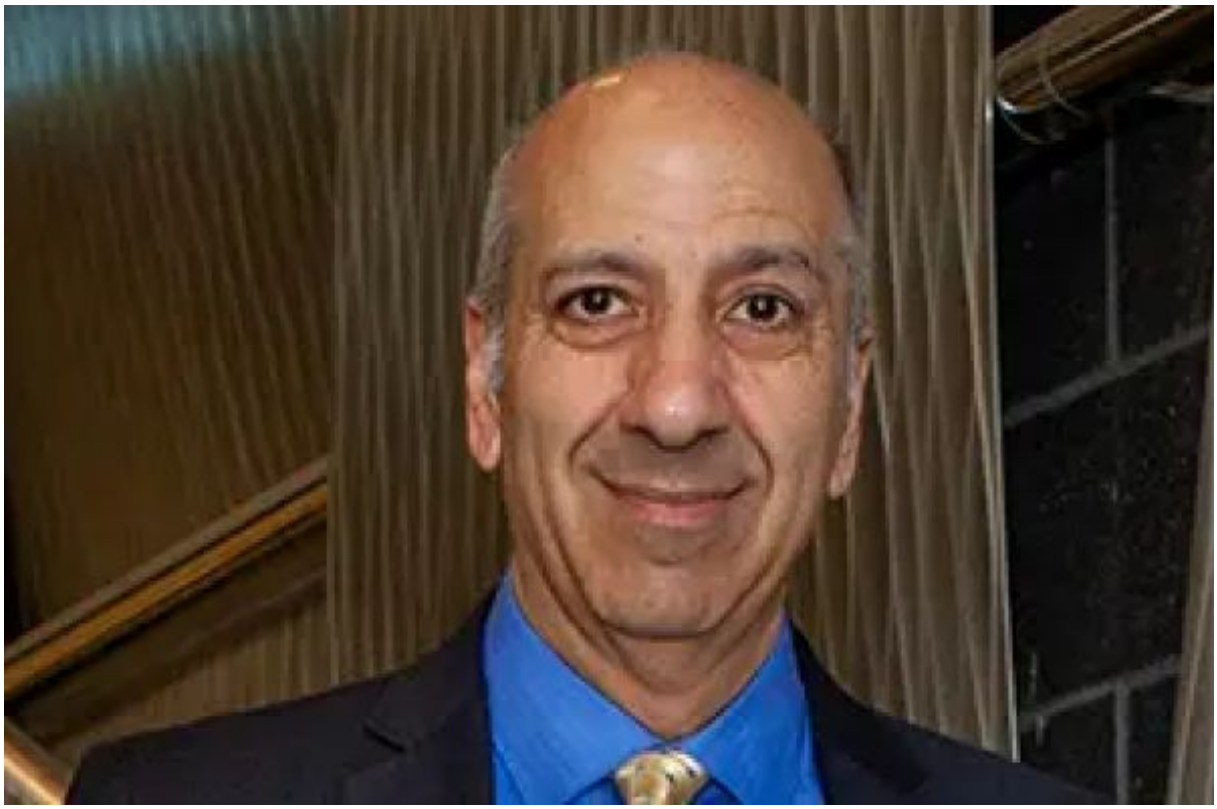


COLLOQUIUM SERIES: Automated Disease Identification with Multidimensional Optical Imaging

BAHRAM JAVIDI

March 06, 2023
12:00 to 13:00
ICFO Auditorium

Abstract:
This seminar is an overview of recent and reported research in rapid automated disease identification with low-cost field portable bio-photonics systems through the analysis of blood cells with multidimensional digital holographic systems. Statistical and/or deep learning algorithms are used to analyze the spatial and temporal characteristics of the reconstructed blood cells for automated disease identification. Recent applications of digital holography and dedicated algorithms for rapid COVID-19 detection will be presented. We present a variety of bio-photonics sensors including 3D printed thin lensless sensors using pseudo-random phase encoding. Conventional holographic systems require a stable optical table for reliable performance. Self-referencing holographic systems show much greater

stability and are field portable. Experimental results are presented to illustrate the performance of these instruments in the field such as health clinics for COVID-19 detection, Sickle Cell disease detection, etc. Dedicated algorithms to inspect and classify cells such as blood cells reconstructed using field portable holographic systems for automated disease identification will be presented. Recent advances in the proposed bio-photonics sensors give this approach a great potential for success.

Bio:

Prof. Bahram Javidi is Board of Trustees Distinguished Professor at University of Connecticut, the highest rank and honor bestowed on faculty by UConn, based on research, teaching, and service. His interests are in a broad range of transformative imaging approaches using optics and photonics, and he has made seminal contributions to passive and active multi-dimensional imaging from nano to micro and macro scales. His recent research activities include digital holography, polarimetric 3D imaging at low light, 3D visualization and recognition of objects in photon-starved environments; automated disease identification using biophotonics with compact digital holographic sensors for use in developing countries; optical information security, encryption, and authentication; non-planar flexible 3D image sensing, and bio-inspired imaging. He has 35 patents some of which have been licensed by industry. Prof. Javidi's research has been recognized by awards and prizes from major scientific societies. He has been awarded The Optical Society (OSA) Emmett Leith medal (2021), OSA C. E. K. Mees Medal (2019); The IEEE Photonics Society William Streifer Scientific Achievement Award (2019); The OSA Joseph Fraunhofer Award / Robert M. Burley Prize (2018); and the European Physical Society (EPS) Prize for Applied Aspects of Quantum Electronics and Optics (2015). He was awarded the IEEE Donald G. Fink Paper Prize (2008), chosen from among all, that is over 130 IEEE transactions, journals, and magazines; the John Simon Guggenheim Foundation Fellow Award (2008); the Alexander von Humboldt Foundation Prize (2007); the SPIE Technology Achievement Award (2008); and the SPIE Dennis Gabor Award in Diffractive Wave Technologies (2005). He was named an IEEE Photonics Society Distinguished Lecturer in 2004 and 2005; and was the 2010 recipient of the George Washington University's Distinguished Alumni Scholar Award, the university's highest honor for its alumni in all disciplines. He has been named Fellow of 8 societies, including IEEE, OSA, SPIE, American Inst. for Medical & Biological Eng, European Optical Society, National Academy of Inventors, and Institute of Physics. Prof. Javidi has over 1100 publications, including 9 books, 58 book chapters, 540+ peer reviewed journal articles, and 520+ conference proceedings. His publications have been cited 42800 times (h-index=104) according to Google Scholar. He is on The Most Cited Researchers List in Electrical & Electronic Engineering according to Shanghai Academic Ranking of World Universities.

Hosted by: Prof. Dr. Majid Ebrahim-Zadeh