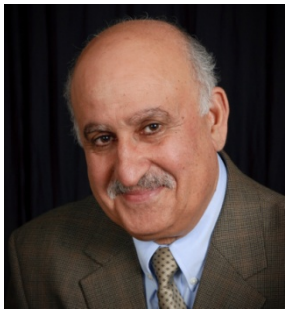
8:00am-12:00pm | Oct 21, 2015 (Wednesday)

1D

Title:	**Signal Processing, Time-Frequency Analysis and System-on-Chip Designs for Ultrasonic Imaging, Detection and Estimation Applications**
Lecturer:	**Jafar Saniie,** Department of Electrical and Computer Engineering at Illinois Institute of Technology **Erdal Oruklu,** Department of Electrical and Computer Engineering, Illinois Institute of Technology
Abstract:	In this short course, we present signal processing algorithms and system-on-chip designs for ultrasonic imaging applications. Topics includes (1) ultrasonic signal modeling and echo classification, (2) time-frequency analysis and split-spectrum processing, (3) order statistics and neural networks for flaw detection, (4) time-frequency distributions, (5) chirplet echo estimation, (6) discrete wavelet transform for 3D ultrasonic data compression, and (7) system-on-chip implementation of detection, estimation, and compression algorithms using FPGA devices. This course will cover several case studies such as detecting defects in steam generator tubes used in nuclear power plants, transducer pulse-echo wavelet estimation, and flaw detection in large grained materials.

Biography



Jafar Saniie (IEEE Fellow for contributions to ultrasonic signal processing for detection, estimation and imaging) received his B.S. degree in Electrical Engineering from the University of Maryland in 1974. He received his M.S. degree in Biomedical Engineering in 1977 from Case Western Reserve University, Cleveland, OH, and his Ph.D. degree in Electrical Engineering in 1981 from Purdue University, West Lafayette, IN. In 1981 Dr. Saniie joined the Department of Applied Physics, University of Helsinki, Finland, to conduct research in photothermal and photoacoustic imaging. Since 1983 he has been with the Department of Electrical and Computer Engineering at Illinois Institute of Technology where he is the Filmer Endowed Chair Professor, Director of the Embedded Computing and Signal Processing (ECASP) Research Laboratory, and Associate Chair. Dr. Saniie's research interests and activities are in ultrasonic signal and image processing, statistical pattern recognition, estimation and detection, data compression, time-frequency analysis, embedded digital systems, digital signal processing with field programmable gate arrays, and ultrasonic nondestructive testing and imaging. Dr. Saniie has been a Technical Program Committee member of the IEEE Ultrasonics Symposium since 1987 (The Chair of Sensors, NDE and Industrial Applications Group, 2004-2013), the Lead Guest Editor for the IEEE UFFC Special Issue on Ultrasonics and Ferroelectrics (August 2014) and the IEEE UFFC Special Issue on Novel Embedded Systems for Ultrasonic Imaging and Signal Processing (July 2012), Associate Editor of the IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control since 1994. Dr. Saniie was the General Chair for the 2014 IEEE Ultrasonics Symposium in Chicago. He is currently the Ultrasonics Vice President of the IEEE UFFC Society. He has over 270 publications and has supervised 31 Ph.D. dissertations.

Erdal Oruklu received his B.S. degree in Electronics and Communications Engineering from Technical University of Istanbul, Turkey in 1995, his M.S. degree in Electrical Engineering from Bogazici University, Istanbul, Turkey in 1999 and his Ph. D. degree in Computer Engineering from Illinois Institute of Technology, Chicago, Illinois in 2005. He joined Department of Electrical and Computer Engineering, Illinois Institute of Technology in 2005, where he is an Associate Professor and the Director of VLSI and SoC Design Research Laboratory. Dr. Oruklu's research interests are reconfigurable computing, advanced computer architectures, hardware/software co-design, embedded systems and high-speed computer arithmetic. In particular, he focuses on the research and development of system-on-chip (SoC) frameworks for FPGA and VLSI implementations of real-time ultrasonic detection, estimation and imaging applications. Dr. Oruklu has more than 100 technical publications. He is a senior member of IEEE.