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| Title | System-on-Chip and Embedded Computing for Ultrasonic Imaging, Deep Learning, Data Compression, and Software-Defined Communications |
| Lecturer names and affiliations | 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 |
| Course Outline | Topics include: (1) ultrasonic signal modeling and echo classification, (2) time-frequency analysis and split-spectrum processing, (3) order statistics and deep artificial neural networks for target detection, (4) chirplet echo estimation, (5) discrete wavelet transform for data compression, (6) software-defined communications, and (7) system-on-chip implementation. |
| Abstract | In this short course, we present signal processing algorithms and system-on-chip designs for ultrasonic imaging applications. This course covers several case studies such as detecting defects in steam generator tubes used in nuclear power plants, pulse-echo chirplet estimation, flaw detection in large grained materials using order statistics and deep artificial neural networks, 3D ultrasonic data compression, software-defined ultrasonic system for communication through solid structures, and hardware/software codesign using FPGAs for ultrasonic signal processing applications. |
| Target audience | This short course covers fundamental and advanced ultrasonic signal processing topics and system-on-chip designs of interest to Graduate Students and Researches involved in medical ultrasound and ultrasonic nondestructive evaluation. |