IEEE SCV Signal Processing Society

Date: Apr 10th 2006
Title: Correcting Distortion in Multi-media Audio Terminals
Speaker: Dr. Kevin Lashkari, currently consultant to DoCoMo USA Labs

Location: National Semiconductor Credit Union Building (Building 31), 955 Kifer Rd., Sunnyvale (Near the intersection of Lawrence and Central Expressway);
Coordinates: N37deg 22.464' W122deg 00.272' (WGS84);
http://maps.yahoo.com/maps_result?ed=Lz2FO.p_0TpVKFWBuA124OtTr9dn&csz=Sunnyvale%2C+CA&country=us
Directions: Take 101 to Lawrence Expressway. Head south on Lawrence to Kifer (past Central). Turn right on Kifer. Go 0.5 miles on Kifer and turn right into the Credit Union parking lot. Entrance is on the back side of the building.

Time: 6:30pm: Fast Food & drinks ($1 Donation Recommended towards Refreshments)
7:00pm: Announcement
7:05pm: Talks starts

Abstract:
Future multimedia terminals such as videophones will be used at almost an arm's length from the speaker and require high quality sound at high playback levels. Small loudspeakers in mobile devices introduce severe linear and nonlinear distortions into the sound at high sound volumes. To enable high quality multimedia services signal processing methods are needed to compensate for the distortions of the electroacoustic conversion. Conventional approaches use a predistortion filter placed between the audio signal source and the loudspeaker. The predistortion filter is based on the p-th order inverse of the Volterra model of the loudspeaker. The p-th order inverse is computationally very intensive and does not result in an exact inverse. A new compensation method based on the exact nonlinear inverse and a novel model of the loudspeaker are introduced. It is shown that the Volterra-Wiener-Hammerstein model of the loudspeaker lends itself to having an exact inverse and is a closer match to the loudspeaker response. An experimental setup involving hardware and software was developed to evaluate the performance of the new techniques as well as those reported in the literature using real loudspeakers and perceptual metrics. The initial results with real loudspeakers are consistent with the predictions and result in significant improvement in the sound quality.

Biography:
Lashkari, PhD, has over 25 years of experience in industry, academia and management and has held senior positions in research and management in a number of companies in the Silicon Valley. He was an executive research engineer at DoCoMo USA Labs and currently serves as a consult to the Lab. He holds a number of patents related to nonlinear signal processing and speech coding and has published papers in international conferences and professional journals. He has organized and chaired sessions in international conferences and served as advisor to Ph.D. students and postdoctoral fellows. He is a member of IEEE, the Acoustical Society of America and the American Institute of Physics. He received his Masters and Ph.D. degrees from Stanford University in 1977 and 1981 respectively and is the co-founder of the Silicon Valley Technical Institute, Inc.