

**Erik Jonsson School of Engineering and Computer Science**  
*Department of Electrical Engineering Lecturer Series 2011 and*  
*Dallas Chapter of IEEE Signal Processing Society*

*Present*

**Prof. Hiroshi Saruwatari**  
**Nagoya University, Japan**  
**High-Quality Blind Signal Extraction in**  
**Real-World Speech Applications**



In this talk, I review some current speech enhancement technologies based on independent component analysis (ICA) and higher-order-statistics related methods. First, blind speech extraction (BSE) and its recent extension are described. BSE is an approach taken to estimate original speech signal using only observed signals without knowing a priori information. The basic principle of BSE based on noise estimation by ICA is explained, and its recent extensions combining ICA and nonlinear noise reduction are shown with the demonstration of our recently developed real-time BSE hardware. In addition, its application to speech recognition system is demonstrated.

Next, for a mitigation of an artifact arising in nonlinear signal processing like BSE, I introduce a new mathematical metric of musical noise generation based on higher-order statistics pursuit. This is motivated by new findings that the amount of musical noise is highly correlated with a change of the 4th-order statistics of the signal. I show some applications of this metric successfully used in speech enhancement study.

**Date: Wed, Sept. 28, 2011**  
**Time: 10:30 a.m.**  
**Place: Engineering and**  
**Computer Science Complex**  
**UTD Campus**  
**TI Auditorium 2.102**

**Biographical Statement:** Hiroshi Saruwatari received the B.E., M.E. and Ph.D. degrees in electrical engineering from Nagoya University, Japan, in 1991, 1993 and 2000, respectively. He is currently an Associate Professor of Nara Institute of Science and Technology, Japan. His research interests include noise-robust speech processing, array signal processing and BSS. He received paper awards from IEICE in 2001 and 2006, from TAF in 2004 and 2009, and from IEEE-IROS2005 in 2006. He won the first prize in IEEE MLSP2007 Data Analysis Competition for BSS.

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