

DEPARTMENT OF COMPUTER SCIENCE
University of Houston

FALL 2012 SEMINAR

WHEN: WEDNESDAY, NOVEMBER 14, 2012
WHERE: PGH 550
TIME: 11:00 AM

SPEAKER: Yunghsiang S. Han, National Taiwan University of Science and Technology

Host: Dr. Rong Zheng

TITLE: Efficient Decoding over Unknown Impulsive Noise Channels

Abstract: It has been known from many researches that communication systems are susceptible to memoryless impulsive noise characterized by, for instance, the Bernoulli-Gaussian model. In order to combat this obstacle, channel coding has long served as an effective tool, especially in the context of moderately frequent occurrence of impulses, when the statistics of impulsive noise can be realized at the decoder. In this talk, irrespective of the statistics of impulses, an efficient decoding scheme is introduced by incorporating clipping-featured technique into the Viterbi algorithm. As a result, the proposed decoding scheme, while having a complexity at the same order as that of the Viterbi algorithm, is on a par with its optimal counterpart, for which statistics of impulses is assumed known at receiver, in terms of bit error probability. In addition, the Chernoff bounds of the bit error probabilities of the devised decoding algorithm are derived for both Bernoulli-Gaussian noise model and Middleton Class-A noise model. Comparisons between the bounds we derived and the simulated error rates under a variety of settings indicate that the ensuing analysis can provide critical insights for the efficacy of the proposed decoding approach when dealing with precarious frequent strong impulses.

Biography: Yunghsiang S. Han received B.Sc. and M.Sc. degrees in electrical engineering from the National Tsing Hua University, Taiwan, in 1984 and 1986, respectively, and a Ph.D. degree from the School of Computer and Information Science, Syracuse University, NY, in 1993. He was with Hua Fan College of Humanities and Technology, National Chi Nan University, and National Taipei University, Taiwan. From August 2010, he is with the Department of Electrical Engineering at National Taiwan University of Science and Technology.

Dr. Han's research interests are in error-control coding, wireless networks, and security. Dr. Han has conducting state-of-the-art research in the area of decoding error-correcting codes for more than sixteen years. He first developed a sequential-type algorithm based on Algorithm A* from artificial intelligence. At the time, this algorithm drew a lot of attention since it was the most efficient maximum-likelihood decoding algorithm for binary linear block codes. Dr. Han has also successfully applied coding theory in the area of wireless sensor networks. He has published several highly cited works on wireless sensor networks such as random key pre-distribution schemes. He also serves as the editors of several international journals. Dr. Han was the winner of the Syracuse University Doctoral Prize in 1994 and a Fellow of IEEE.