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SPEAKER: John Thompson, University of Edinburgh
DATE: Thursday, April 23rd
TIME: 5:30 pm *Doubleheader*
TITLE: Efficient Sphere Decoding Techniques for MIMO Systems

ABSTRACT: Novel detection algorithms for uncoded multiple input-multiple output (MIMO) systems based on the sphere decoder (SD) are presented in this talk. Unlike the original SD algorithm, our fixed sphere decoder (FSD) approach performs a fixed number of operations to detect the symbols, independent of the noise level. The algorithm achieves this by combining a novel channel matrix preprocessing with a search through a small subset of the complete receive constellation. Simulation results show it has only a very small bit error ratio degradation compared to the original SD while it is much more suited for a fully-pipelined hardware implementation. Theoretical results on the error performance of the FSD will also be presented to justify the algorithmic design that is presented. If time allows, recent work on a low complexity K-best SD detector and the extension to soft decoding problems will also be presented.

BIO: John S. Thompson received his BEng and PhD degrees from the University of Edinburgh in 1992 and 1996, respectively. From July 1995 to August 1999, he worked as a postdoctoral researcher at Edinburgh, funded by the UK Engineering and Physical Sciences Research Council (EPSRC) and Nortel Networks. Since September 1999, he has been a lecturer at the School of Engineering and Electronics at the University of Edinburgh. In October 2005, he was promoted to the position of reader. His research interests currently include signal processing algorithms for wireless systems, antenna array techniques and multihop wireless communications. He has published approximately 150 papers to date including a number of invited papers, book chapters and tutorial talks, as well as co-authoring an undergraduate textbook on digital signal processing. He is currently editor-in-chief of the IET Signal Processing journal and was a technical program co-chair for the IEEE International Conference on Communications (ICC) 2007, held in Glasgow in June 2007.

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