

IEEE Queensland Activities

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Applications of Random Matrices to Multi-Antenna Communication Systems

1 May 2008

The analysis and design of MIMO systems in realistic channel scenarios is considered, such as those exhibiting spatial correlation, line-of-sight, and frequency-selectivity. Analytical capacity and performance results are presented for a number of important practical systems, including MIMO Spatial Multiplexing, MIMO-Beam-forming, coded MIMO-OFDM, MIMO Bit-Interleaved Coded Modulation, and Optimum Combining.

Ekram Hossain

University of Manitoba



Cognitive Radio Networks Based on Dynamic Spectrum Access

16 June, 2008

An introduction to the dynamic spectrum access-based cognitive radio networks will be provided. Specifically, the basic concepts behind “cognitive radio” technology, basic functionalities in a cognitive radio transceiver for dynamic spectrum access, and different spectrum sharing models will be described. The key technical challenges related to spectrum sensing, dynamic spectrum sharing/medium access control, and spectrum pricing in these networks will be presented.

Hajime Suzuki

CSIRO ICT Centre



MIMO-OFDM for Next Generation Wireless Communication Systems

25 June, 2008

MIMO-OFDM utilises multiple antennas at both ends of a communication link to increase bandwidth efficiency and reliability, and parallel orthogonal narrowband frequency channels to combat multipath with a low computational complexity. In this talk, we will first overview the basics and applications of MIMO-OFDM. We will then review the characteristics MIMO-OFDM channels, in particular in indoor environments. CSIRO ICT Centre's Burst-Mode and Real-Time MIMO-OFDM Demonstrator is then introduced, showing practical aspects of MIMO-OFDM implementation.

Norman C. Beaulieu

University of Alberta



Designing Ultra-Wide Bandwidth (UWB) Receivers for Multi-User Interference Environments

8 August, 2008

The principles and structures of time-hopping (TH) ultra-wide bandwidth (UWB) wireless systems are recalled and the suitability of the conventional matched filter (correlator) digital receiver for TH-UWB applications is discussed. Soft-limiting and zonal receiver structures are intuitively motivated and shown to outperform the conventional matched filter UWB receiver by many dB's in signal-to-noise ratio (SNR). The improved receiver performances are explained using maximum likelihood (ML) receiver design principles. The application of the new signal detection structures in modified Rake receiver designs for multipath fading UWB channels is explored.

Tsuhan Chen

Carnegie Mellon University



Face Recognition for the Rest of Us: Working with Consumer Images

7 October, 2008

This talk will focus on the use of face recognition on consumer images. While human perception is fine-tuned to recognize face images with great precision, existing computer algorithms for face recognition perform worse than humans. In this talk we will introduce some interesting facts of human perception. We will then present examples of image analysis techniques that are inspired by human perception. Comparing these techniques with face recognition algorithms based on conventional pattern recognition techniques, we will outline some promising research directions, including face recognition using social context.