Princeton University
Department of Electrical Engineering
Information Sciences and Systems (ISS) Seminar

Speaker: Antonis Kalis,
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Date: Tuesday, December 12, 2006

Time: 3:30pm ~ 4:30pm

Room: B205 ~ Equad

Title: Beamspace-MIMO: Extending the capacity limits of wireless communications

Abstract:
In recent years a great deal of effort and literature has been devoted in taking advantage of the properties of the wireless channel to increase the performance of wireless communications systems. These efforts have built upon the ground-breaking work of Telatar, Foschini and Gans, in defining the limits and capacity through wireless communication channels. Various diversity techniques as well as multiple-input multiple-output (MIMO) architectures have been employed, to achieve greater capacity or more robust error performance in diverse channel conditions. However, the cost of implementing multiple antenna structures with multiple RF chains and the large inter-element distances required to ensure the orthogonality of the system's input signals, makes MIMO systems technically difficult to implement for cost and size sensitive applications, such as mobile telephony and mobile computing. In our work we introduce a new perspective to the implementation of wireless systems with increased bandwidth efficiency. Unlike traditional spatial multiplexing techniques in MIMO systems, where additional information can be send through the wireless channel by feeding uncorrelated antenna elements with diverse bitstreams, we introduce the idea of convolving diverse bitstreams in orthogonal bases defined in the beamspace domain of the transmitting array far-field region. Using this approach we show that we can increase the capacity of wireless communications using a single RF front end and compact antenna arrays.