



Computer Engineering

CE Program Seminar



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Mobility for Sensing Uncertainty Reduction in Sensor Networks

One of the major design concerns in sensor networks is their sensing performance. This talk considers the problem of discovering desirable network configurations in a distributed manner for improving the sensing performance of a sensor network. Mobility is used as a means of adapting network configuration. Mobility itself may have a high resource overhead, hence a constrained form of mobility is exploited, which has low overheads but provides significant reconfiguration potential. An architecture that allows each node in the network to learn the medium and phenomenon characteristics is presented. A quantitative metric for sensing performance is defined based on real sensor and medium characteristics, rather than on abstract range based models. The problem of determining the desirable network configuration is expressed as an optimization of this metric. A distributed optimization algorithm is developed to compute a desirable network configuration and adapt it to environmental changes. The relationship of the proposed algorithm to simulated annealing and incremental sub-gradient descent based methods is discussed. A key property of the proposed algorithm is that convergence to a desirable configuration can be proved even though no global coordination is involved. A network protocol to implement this algorithm is discussed, followed by simulations and experiments on a prototype system.

Speaker Bio

Aman Kansal received his BS in Electrical Engineering and MS in Communications and Signal Processing from Indian Institute of Technology Bombay in 2001 and 2002 respectively. He is currently pursuing a PhD at University of California, Los Angeles. Aman has been an active researcher in the area of voice over Internet, wireless networks, pervasive computing and most recently, embedded sensor networks. He has authored or co-authored over 30 technical papers in these areas and prototyped several systems, some of which are now in use by researchers spread across North America, Europe, and Asia. He also worked at Agilent Labs Palo Alto, in the Measurement Research Lab on embedded data processing methods for wireless imaging sensor nodes. He has received several engineering awards, including the Microsoft Innovation Award (2001) for prototyping a mobile telephony system for airplanes (team effort). He was awarded the NTSE scholarship by the Govt. of India, and the graduate research fellowship by the Regents of the University of California.



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