

Niramol Phunseantaveekul 2011: An Energy-Efficient Sensor Utilization Protocol for a Cluster-Based Wireless Sensor Network. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Teerasit Kasetkasem, Ph.D.  
73 pages.

As wireless sensor nodes are used in wide range of applications, the energy consumption becomes an important issue because, in some applications, wireless sensor network (WSN) is deployed in a harsh terrain or difficult to access area. In many situations, the system performance of a WSN is measured in terms of network or system lifetime, the maximum period that the system performs its assigned tasks successfully.

Network lifetime is the key issue to evaluate the performance of sensor networks. Several works base their definitions of network lifetime on a coverage variant. Model iterlic-coverage is an appealing solution demanding that each point in a field is sensed by at least sensors. To guarantee coverage several studies propose their probabilistic models for sensor deployment. Resulting in clustering algorithms and probabilistic models which guarantee coverage of sensors, the energy consumption are maintained uniformly and the connectivity can be guarantee in terms of coverage respectively. To prolong network lifetime sensors in each cluster need to be selected as active sensors to balance load within each cluster. In this thesis, we consider the sensors utilization algorithm which aims to prolong the network lifetime by balancing energy consumption among sensor nodes within the clusters. We propose a probabilistic equation to guarantee coverage within each cluster and an algorithm to select active sensor deployment algorithm which can be balance the load among sensors in clusters. These lead the network to be uniform energy consumption and good performance in terms of lifetime. The selection algorithm is based on the residual energy of sensor nodes, density, distribution and coverage characterization.

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Thesis Advisor's signature