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Dissertation

Title	<i>EFFECTIVE NODE CLUSTERING AND DATA DISSEMINATION IN LARGE SCALE WIRELESS SENSOR NETWORKS</i>
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Abstract	The denseness and random distribution of large-scale WSNs makes it quite difficult to replace or recharge nodes. Energy efficiency and management is a major design goal in these networks. In addition, reliability and scalability are two other major goals that have been identified by researchers as necessary in order to further expand the deployment of such networks for their use in various applications. This thesis aims to provide an energy efficient and effective node clustering and data dissemination algorithm in large-scale wireless sensor networks. In the area of clustering, the proposed research prolongs the lifetime of the network by saving energy through the use of node ranking to elect cluster heads, contrary to other existing cluster-based work that selects a random node or the node with the highest energy at a particular time instance as the new cluster head. Moreover, a global knowledge strategy is used to maintain a level of universal awareness of existing nodes in the subject area and to avoid the problem of disconnected or forgotten nodes. In the area of data dissemination, the aim of this research is to effectively manage the data collection by developing an efficient data collection scheme using a ferry node and applying a selective duty cycle strategy to the sensor nodes. Depending on the application, mobile ferries can be used for collecting data in a WSN, especially those that are large in scale, with delay tolerant applications. Unlike data collection via multi-hop forwarding among the sensing nodes, ferries travel across the sensing field to collect data. A ferry-based approach thus eliminates, or minimizes, the need for the multi-hop forwarding of data, and as a result, energy consumption at the nodes will be significantly reduced. This is especially true for nodes that are near the base station as they are used by other nodes to forward data to the base station. MATLAB is used to design, simulate and evaluate the proposed work against the work that has already been done by others by using various performance criteria.