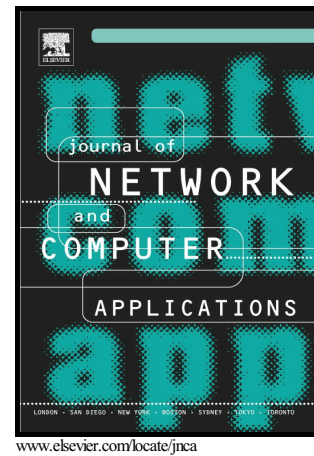


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Novel Unequal Clustering Routing Protocol Considering Energy Balancing Based on Network Partition & Distance for Mobile Education

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Abstract

In Wireless Sensor Networks (WSN) of mobile education (such as mobile learning), in order to keep a better and lower energy consumption, reduce the energy hole and prolong the network life cycle, we propose a novel unequal clustering routing protocol considering energy balancing based on network partition & distance (UCNPD, which means Unequal Clustering based on Network Partition & Distance) for WSN in this paper. In the design model of this protocol, we know that all the network node data reaches the base station (BS) through the nodes near the BS, and the nodes in this area will use more energy, so we define a ring area using the BS as the center to form a circle, then we partition the network area based on the distance from node to the BS. These parts of nodes are to build connection with the BS, and the others follow the optimized clustering routing service protocol which uses a timing mechanism to elect the cluster head. It reduces the energy consumption of cluster reconstruction. Furthermore, we build unequal clusters by setting different competitive radius, which is helpful for balancing the network energy consumption. For the selection of message route, we considered all the energy of cluster head, the distances to BS and the degrees of node to reduce and balance the energy consumption. Simulation results demonstrate that the protocol can efficiently decrease the speed of the nodes death, prolong the network lifetime, and balance the energy dissipation of all nodes.

Keywords— Routing Service; Mobile Education (mobile learning); WSN; Network Partition; Energy Consumption

1 INTRODUCTION

Wireless sensor network of mobile education (such as mobile learning) is composed by a large number of micro sensor nodes which are deployed in the designated area. Nodes in such kind of networks self-organize into a wireless communication network system that adopts single or multi-hop routing [1-2]. This system is widely applied in physical environments to monitor data, especially working at severe and special environment where is inaccessible for human [3].

Those micro-sensor nodes are easy to deploy, but the shortcomings of limited energy effectively put a brake on the application and development of wireless sensor networks [4-5]. Therefore, there are lots of studies of wireless sensor network system, including how to prolong the survival time of the network and balance the network energy consumption[6]. Many scholars have made a large number of researches on more energy-efficient network topology, routing algorithm and protocol design, more kind of mechanisms are used in energy policy of wireless sensor network[7-8]. Among them, the application of hierarchical clustering routing algorithm has better adaptability and energy efficiency compared with the plane routing algorithm[9]. The clustering algorithm[10] distributes the network nodes into different clusters, each cluster has a cluster head node, the remaining members of the cluster send information to the cluster head node and the cluster head nodes are responsible for data integration and forwarding data, as shown in figure 1. The option of cluster head is the key of clustering algorithm, the researches about how to form a high quality cluster by the option of cluster head to reduce the energy consumption have important significance[11].

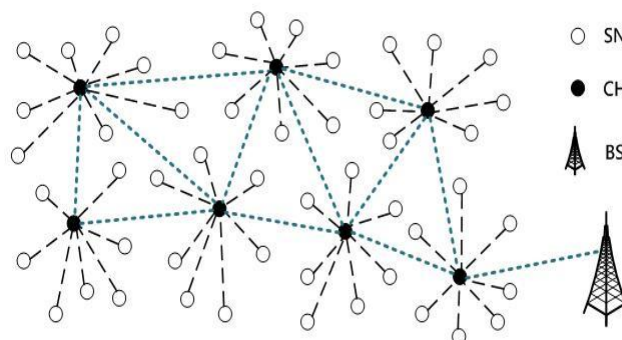


Fig.1 The structure of wireless sensor network

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