SENSOR NETWORKS AND DATA COMMUNICATION

[1]Kayathri, [2]Dinesh, [3]S. Subathra

[1][2][3]Assistant Professor in Computer Science,

Dhanalakshmi Srinivasan College of Arts and Science for Women (Autonomous)

Perambalur

ABSTRACT

Mobile Wireless Sensor Network (M-WSN) derives its name from the mobile sink or mobile sensor nodes in the Wireless Sensor Network (WSN). because the sensor nodes are energy constrained, energy efficiency is that the main aspect to be considered in any applications. By considering mobile sensor nodes in WSN, we will have better energy efficiency, improved coverage, and enhanced target tracking in Wireless Sensor Network. thanks to mobility of nodes, a mobile WSN has dynamic topology. For all data gathering applications, the topology of mobile WSN depends on either the trail of mobile sink or position of mobile nodes. So the whole WSN topographic sink is mobile or the sensor nodes are mobile so keep changing.That is, we've dynamic topology. counting on application scenario, we may use a mobile sink to gather information from a static WSN or a dynamic WSN. generally static WSN uses multihops for digital communication from sensor node to sink. Hence sensor node closer to sink is usually in use and its energy gets exhausted quickly, thereby it dies down first, breaking link to sink and whole network collapses. this is often one among the intense problems to be considered. Mobile WSN is one among approach which will increase life time of network because nodes close sink keeps on changing in order that no particular node are going to be always on the brink of sink. it's also possible by controlled mobility of nodes, all nodes successively can take role of being on the brink of sink and supply necessary services. Also by providing mobility to nodes in controlled manner it also possible to scale back number of hops to sink from a node, there by errors in communication gets reduced. during this article we consider two general application areas, studying the conditions of disastrous area where in static sensor nodes are deployed in disastrous area and a mobile sink agent which is outside the boundary moves around predefined path to collect information's of disastrous area, a battle field where in two way digital communication between captain and soldiers is Both the captain and the players need a place where there can be less movement.The networking required in both cases is the mobile WSN.We propose proper architecture and digital communication in these contexts.

Keywords:

Sensor Node, Clustering, Mobile Wireless Sensor Network, Dynamic Group, Leader - Followers - Mediators.

1. INTRODUCTION

The sensor terminals are energy restricted and the maximum power consumption communication is in operation.Hence an efficient approach on communication can conserve energy consumption thereby increase network life time. one among the ways is to style a procedure to urge a logical structure for the physically deployed nodes. Thereby we get a correct topology on which data transfer could also be administered [1]. just in case of huge scale Wireless Sensor Networks, wherein thousands of sensor nodes are deployed, proper clustering technique [2] will define proper logical structure. this may conserve energy but simple multihop communication. When clustering is formed considering residual energy of sensor nodes, network life time are often increased considerably. Hence the proposal is to style a grouping strategy counting on energy state of the sensor nodes deployed.

Then we perform data transfer thereon network. In the applications like military, target tracking, microelectronic mechanical devices of stamp size which may sense the encompassing media and transport information to regulate center are often used. In such applications, we may consider mobile nodes which may increase overall life time of network. thanks to mobility of nodes, a mobile WSN has dynamic topology. For all data gathering applications, the topology of mobile WSN depends on either the trail of mobile sink or position of mobile nodes. Designing the group-to-group grouping path should be ambiguous so that communication between any nodes is possible.In general, the high level design for digital communication in wireless sensor networks could also be performed by following procedure.

1) For the thousands of nodes deployed during a controlled area, identify source and sink nodes.
2) ranging from source node form groups and stop procedure once sink node is that the member of any group. Store the intermediate nodes between sink and source therein logical structure.
3) Immerse the data through those intermediate nodes.

The article is organized into six sections. The committee structure definition defining the basic group practices is given in the second section. The deferent grouping algorithms to support digital communication are given in third section. Design is given in section four. Group group view with an example, simulated results and observations are given in the fifth section.In Section six conclusions drawn is given. The article ends with references.

2. GROUPING SYSTEM DESCRIPTION

The compilation structure we define is the group head, which we call the leader, who supports the group members, followers and followers to mediate the other group.Hence the nodes involved within the digital communication process could also be either a gaggle leader or a lover node and a few mediator nodes within the logical structure. Hence we name this as Leader-Follower-Mediator (LFM) algorithm. Considering different clustering techniques, an energy efficientclustering procedure is proposedhere.

Large number of Sensor nodes distributed during a controlled area is assumed to possess initial energy greater or adequate to some upper threshold value. the situation of the nodes is found from the situation finding system, embedded within the Sensor nodes. The grouping procedure is as follows. Staring from one among the node k, check energy state of all the nodes within the transmission range of k (within one hop distance). The node with highest energy state with in visibility range of k which has residual energy greater than some upper threshold value is said as Leader of the group. Other nodes located within the visibility range of that leader and with energy state greater than minimum threshold value are often the followers or members of that group.

This forms first cluster within the clustering process. we might wish to have minimum number of clusters. this will be achieved by non overlapping leaders thereby no two leaders aren't in direct communication range to every other. Hence clusters are linked through a lover node which is within range of present cluster and new cluster we are getting to form. We call that follower node that connects the two clusters as the mediator node.

Therefore, the cluster leader selects one of the remote followers with the residual energy above the specified limit value and calls it the mediator and the mediator decides the next cluster head its transmission range and is neither leader nor a lover of any group. Nodes located within the visibility range of that leader and with energy state greater than minimum threshold value and neither leader nor a lover of any group becomes the followers of that group. The cluster head selects the mediator node to continue the compilation process.

This clustering process is repeated until all nodes have been added to the group (in some cases some nodes may only become followers, but not within any leader range,that can't participate in grouping due to its lower energy state , they're nearly as good as dead). Any member with therein group has got to forward information to its leader.

Any such event identified by leader will expire the knowledge to server. The leader needs a buffer to gather the knowledge from its members.

The primary server ensures the communication of individual members through the team leader.The grouping of sensors got to follow a particular algorithm to prove be efficient. this is often discussed within the next section.

3. GROUPING ALGORITHMS

The sensor nodes haven't any global identification. Hence our algorithm has got to provide identification to each sensor nodes within the grouping process. Hence we consider all nodes have inbuilt GPS or nodes are using some localization algorithms in order that its location within the deployed area is understood to the sensor nodes.

Depending on the various application scenario there are often two major categories of grouping.

1. Both sink and source nodes within defined boundary area where in two ways communication between nodes is feasible.
2. Nodes deployed during a restricted area where during a sink could also be located outside the boundary of restricted area, but in direct link with a minimum of one node located within the restricted area.

3.1Groupingprocedure

3.1.1The LFM algorithm to urge LFM tree where both sink and source nodes are within defined boundary area Input: Source node location and Destination node location // counting on the residual energy state of nodes, nodes are said to be in active (MODE 2), follower (MODE 1) or dead (MODE 0) mode.

Step 1: The source broadcast assumes that the G_Request signal is its node_id = 1.

Step 2: The nodes that receive the G_Request signal will record the N_Response signal by sending it to the source of the nodes' remaining energy and node location (x, y.z coordinates).

Step 3: If the target location is on the answered nodes, the source becomes the leader and the target node becomes the follower giving the node_id to the target by sending the F_Registration signal and stop the compilation process.If no nodes among registered nodes have energy state greater than energy state of source, then source itself becomes leader. Else among nodes responded with source, node having energy state greater than energy state of source and one with highest energy state is chosen as Leader, sending L_Select signal assuming Head node_id = node_id and reset the source node_id to 0. Ties are broken randomly .

Step 4: Leader sends G_Request signal, the nodes within range of the leader respond with N_Response signal with their residual energy and site . they're registered as followers of that group, leader allocates node_id (node_id=node_id+1) to its followers by sending F_Registration signal and leaders update its routing table with followers’ id, its link (leader) and their energy state . Stop the compilation process if the target location is on the follower nodes.

Step 5: every follower node didn't broadcast G_Request signal and nodes which receive that signal and a pacesetter nor follower will respond with N_Response signal and look for destination node.

Step 6: Mediator node broadcast G_Select signal. Nodes receiving that signal will remit its N_Response signal with residual energy state and node location. Mediator sends L_Select signal to the node that has highest energy state , calling it as leader assuming its node_id=node_id+1, ties are broken randomly .

Step 7: Leader sends G_Request signal and nodes which receive which will respond with N_Response signal, the nodes which aren't follower of the other group and responded declared as follower of that group by sending F_Registration signal allocating node_id to the followers and update its routing table with follower's id, its link (leader) and their energy state.Stop the compilation process if the target location is on the follower nodes.

Step 8:attend step 5, until either destination is found or all nodes are included in grouping or all nodes are dead.

3.1.2 The LFM algorithm to urge LFM tree where a mobile sink moves outside the boundary of restricted area, where sink is in direct link with a minimum of one node located within the restricted area else move sink so on get link with a minimum of one node. Input: Destination node location Depending on the residual energy state of nodes, nodes are said to be in active (MODE 2),follower(MODE 1)or dead (MODE 0) mode.

Step 1: Sink broadcasts G_Request signal with Sink_id=1.

Step 2: Nodes receiving that signal sends N_Response signal. Sink look for destination node. If destination is found mark it with node_id=node_id+1,Then stop grouping procedure.Else attend step 3.

Step 3: The sink checks the remaining energy of the responded nodes.If it's greater than or adequate to upper threshold (MODE 2) level, then they're declared as leaders and marked with node_id=node_id+1.

Step 4: Every leader node broadcast G_Request signal, Nodes receiving that signal sends N_Response signal and leaders look for destination node.If the target is detected, mark it with node_id = node_id + 1 by sending the F_Registration signal, update the routing table, and stop panel processing.

Else among leader nodes having one with highest energy state is taken as leader for further clustering. Ties are broken randomly.

Step 5: The selected leader sends the G_Request signal, the receiving nodes send the N_Response signal, and the leader announces them as followers of that group. its followers of that group and update its routing table with followers id , its link (leader) and their energy state . Repeat this process for all remaining leaders.

Step 6: Every follower node broadcast G_Request signal, Nodes receiving that signal sends N_Response signal and look for destination node. If the target is detected, call that follower node as the mediator node and by sending the target L_Select signal.update its routing table, stop grouping procedure.

Else among the followers node, pick the node with highest energy state and farthest call it as mediator node, by sending M_Select signal, here also ties are broken randomly .

Step 7: The mediator node transmits the G_ request signal and the nodes that receive that signal send the N_Response signal.The node responded with highest energy state becomes leader and mediator sends L_Select signal, giving id thereto node, ties are broken randomly .

Step 8: Leader sends G_Request signal, Nodes receiving that signal sends N_Response signal and leader look for destination node. If the target is detected, mark that node with node_id by sending the F_select signal, update its routing table, and stop panel processing.

Else the nodes which aren't follower of the other group but within range of the leader is said as follower of that group by sending F_select signal allocating id to its followers and update its routing table with followers id , its link (leader) with their energy state..

Step 9:attend step 6, until either destination is found or all nodes are included in grouping or all nodes are dead.

4. WIRELESS SENSOR NETWORKS: DESIGN CHALLENGES

Realization of a successful WSN thus requires proper planning and careful design. Deployment of WSNs requires knowledge of communication and signal processing, hardware technologies, embedded system design and software engineering. These areas of technologies are vastly different from one another and thus a thorough study of influence of1 factor on the planning of other factors is required. Here we present a quick survey of the factors affecting design and performance of WSNs.

Typical Sensor Network

Hardware controls, fault tolerance, scaling, and manufacturing are the major design constraintscosts, sensor, topology , transmission media; and power consumption. Synchronization and localization are required

(i) to support TDMA,

(ii) to work out temporalordering of messages

(iii) to work out proximity of sensors,

(iv) to work out relative position of sensors with reference to each other and

(v) to work out the precise time of observed event.

Importance of knowledge Aggregation and Data Dissemination

has been highlighted by Rajgopal at all Security in WSNs has been investigated by several researchers.Design of OS and middleware for WSNs requires special attention thanks to limited storage andlimited computing resources at the node.studied the problems within the design of middleware intimately.Apart from these general issues, every application of WSNs presents new challenges and studies are carriedout to address these application specific issues. studied security issues in employing WSNs forhealthcare.presents the challenges in smart grid and industrial applications. Underwater deployment of WSNs require using acoustic signals for communication rather than radio signals and undersea currents affectthe placement of sensors. These challenges in underwater deployment are studied by Heidemann, John, et al..because the pipelines traverse long stretches of land, designNetworks for pipeline monitoring require sensorsgather data along the length and send them to respective control point. The collected data and measurements are then sent back to a central control station.

In all the WSNs regardless of their application, energy is the most vital constraint. The nodes in WSNs operate on batteries. In most of the applications, it's impossible to recharge the batteries after deployment. Only in few cases, energy scavenging systems are possible to supply. Two factors togetherCommand the sensor to use as little power as possible.

5.CONCLUSIONS

An important observation is that the movement of the nodes will increase the lifespan of the network.Concerning the routing of knowledge from a node in question, the proposed LFM algorithm is efficient (number of hops wise, complexity wise, and power consumption wise), due to a tree arrangement there by path to any node to the other node are unambiguous.

Selection of mediator nodes in clustering avoids possibility of over lapping leaders there by number of groups formed are going to be less compared to existing clustering algorithms. The proposed protocol is on demand protocol (Reactive) during which clustering is made when a node has sensed data to send to other node and thus reduces the facility needs of the nodes. Cluster members are decided at the moment not beforehand as in proactive type. Particularly when nodes are in random motion at different rates, we'd like such dynamic grouping algorithms. In sensor networks, nodes haven't any global identification problem which may be solved giving address to nodes while forming clusters as given in our LFM algorithm.

The limited resources of sensor nodes dictates that power is conserved and amount of knowledge to be stored is restricted , which is facilitated within the algorithm proposed by initiating the clustering from the source and stopping it as soon because the destination becomes either head or member of any group and clustering process checks whether incoming node in to grouping procedure is destination, thereby only the specified nodes are clustered and other nodes are untouched. Only the path from the source to the destination should be saved.Clustering supports media access control, so cross-layer optimization is achieved.We may conclude that proposed LFM protocol is compatible for a network which uses memory hungry devices like sensor nodes.

The LFM protocol could also be simulated using standard simulator like Network Simulator Ns2 and results could also be compared with other routing protocols.

6. REFERENCES

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