ANALYSIS ON CLUSTERED ENERGY ORGANIZED IN MOBILE WIRELESS SENSOR NETWORKS

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ABSTRACT
A Mobile Wireless Sensor Network is a consisting of spatially circulated sovereign systems with a communication for observing and recording conditions at dissimilar situations. MWSN is organized with numerous of sensor nodes from a few to several hundred, where every node is associated to one sensor. MWSN is an promising and striking research area in which numerous applications such as health care, smart house, cultivation, and armed are making use of it. Energy efficiency is one of most imperative issues in mobile wireless sensor network. Cluster is a group of servers and supplementary equipment operate like a single system. Clusters facilitate high availability, load harmonizing and parallel processing in positive circumstances. Clustering algorithm is used to decrease energy spending and improves lifetime of network. Clustering reduces traffic stream, lessen energy consumption, increase residual energy and extend lifetime of sensor network. This paper includes study of various energy efficient clustering algorithms in Mobile Wireless Sensor Networks.

KEYWORDS
Clustering, Lifetime, Cluster head and Gathering.

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INTRODUCTION
Mobile Wireless Sensor Networks (MWSN) has been applied in variety of applications, such as healthcare, smart home, cultivation, and armed. MWSN is a network system of spatially disseminated devices using wireless sensor node to collaboratively accumulate, procedure, and broadcast physical or ecological conditions[1]. Sensor nodes are used in observing physical phenomenon like temperature, humidity, vibrations and so on. Energy

consumption is one of chief constriction of wireless sensor nodes. Many researchers are functioning in energy competent sensor nodes, expansion of energy efficient network procedure and topology. Power is enthusiastic by a sensor node to sense processing and to transmit data. Data communication is most energy overriding operations. Introduction of clustering approach in WSN data communication will condense energy consumption. Clustering is one of imperative methods for prolonging network lifetime in MWSNs. It involves grouping of sensor nodes into clusters and Cluster Head (CH) and communication will occur among CH and Base Station (BS)[2]. CHs accumulate data from respective cluster's nodes and forward aggregated data to BS. A major challenge in WSN is to select appropriate CH[3].

Clustering is one of accepted processes of energy consumption. In clustering sensor nodes are alienated in several Clusters. Each Cluster has one CH and some clustered nodes. Clustered nodes send their sensed data to particular CH. CH collects all data, cumulative them and then sends it to BS. Each CH depreciates energy at a high rate than regular sensor nodes. Making CHs dynamic make a probable solution to these circumstances.

ENERGY ORGANIZATION
Routing protocol uses some techniques to improve energy-efficiency and network lifetime of a MWSNs.

Energy model
Energy modeling is automated simulation of construction or complex, this is focused on energy spending[4]. Energy model constructs a better inference of remaining energy in each node. This is used to advance network presentation and node lifetime.

Decrease Conflict
Conflict is a network attempting to transmit data at exactly same time. In routing procedure, data should send among source and destination without any intrusion. Protocol has to make sure that each node should converse in congestion-free environment. Otherwise, it may lead to re-transmission of data, which directly affect energy-efficiency of network. So, data sent should be free from crammed path.

Minimize control packet transparency
Signal transmission of sensor node consumes maximum amount of energy. Neighbor information, route discovery and maintenance in routing protocol involve plenty of control packets exchanged between sensor nodes[3,5]. Routing protocol needs to restrict unnecessary flow of control packet in network. Size of control packet may also be minimized.

Multi-hop Transmission
Direct data communication always devours more energy than multi-hop transmission in MWSN. To communicate directly sensor node has to maximize broadcasting transmission power, which straightforwardly increases energy consumption at each node. Routing protocol used to take care of these issues to advance energy-efficiency.

Energy-aware MAC procedure
Sensor network is capable of processing some information, gathering sensor information and communicating with other connected nodes in network. Sensor node generates data and forwards it to BS. When sensor nodes are not sensing or routing, they need to switch into sleep mode. MAC protocol is required for energy maintenance in network.

Load harmonizing
Energy model of each node is considered using their residual energy. Routing procedure has to manage load among sensor nodes. More works can be allocated to an energy-rich node and workload can be reduced from nodes having less residual energy. Load harmonizing technique has to be applied to improve energy-efficiency.

Broadcasting range adjustment
Multi-hop network in WSN data should reach destination through intermediate nodes. Generally, that next obtainable relay nodes are always in close neighborhood of sensor node. Sending data with maximum power, transmission power can be readjusted using Received Signal Strength Indicator (RSSI)[6]. It is used to measure of signal power which can vary due to multipath, intrusion or other environmental effects; it may not give a true suggestion of communication presentation or range. This technique can reduce energy consumption and helps to improve network lifetime.

Data aggregation

Data packets can be combined at some point and can send combined data to BS. This technique of aggregating similar data decreases traffic in system. Reduced traffic decreases collision and energy consumption. Routing protocol is used to execute aggregation technique to prolong lifetime of network.

ROUTING TECHNIQUES

Energy efficient clustering algorithms with optimization techniques

A fuzzy logic based clustering approach to cluster-head appointment. It's based on three descriptors energy, attentiveness and centrality of sensor nodes. Energy utilization can be reduced by allowing only some nodes to communicate with BS. These nodes called cluster-heads collect information sent by each node in that cluster compressing it and then broadcast aggregated data to BS. Appropriate cluster-head selection can significantly reduce energy consumption and enhance lifetime of the MWSN[7].

Optimization method to improve lifetime of Mobile Wireless Sensor Networks (MWSNs) is to transmit aggregated data to BS logical nodes called CHs are required to relay data from sensing nodes located on ground in high altitude station. Genetic Algorithm (GA) as a dynamic technique to find optimum states of sensor nodes. By using genetic optimization technique, intelligent clustering architecture is achieved to improve the lifetime of WSN[8].

Representative approaches to prolong lifetime of sensor nodes. In this paper, authors experiment a dynamic clustering algorithm using genetic optimization technique. This algorithm takes dissimilar parameters into consideration to increase network lifetime. These parameters are residual energy, required energy to send a message to BS, and number of cluster heads[9].

Cluster based routing protocols

Authors Proposed a Clustering technique for prolonging lifetime of a wireless sensor network. It used to mitigate hot spot problem. It groups nodes into clusters of unequal sizes. CHs closer to base station have smaller cluster sizes than those farther from BS, thus they can preserve some energy for inter-cluster data forwarding. A greedy geographic and energy-aware routing protocol is designed for inter-cluster communication, which considers tradeoff between energy cost of relay paths and residual energy of relay nodes[10].

A novel Cluster Based Routing Protocol (CBRP) for heterogeneous sensor. CBRP achieves a good performance in terms of lifetime by balancing energy load among all nodes. In this protocol Cluster network by using spanning tree routing method to handle heterogeneous energy capacities[11].

A new protocol called Equalized Cluster Head Election Routing Protocol (ECHERP), which pursues energy conservation through balanced clustering and using Gaussian elimination algorithm, proposed algorithm calculates combinations of nodes that can be chosen as cluster heads in order to extend network lifetime. ECHERP protocol selects a random node or node with higher energy at a particular time instance as new cluster head. It furthermore considers current and estimated future residual energy of nodes, number of rounds that can be clustered heads, in order to maximize the network lifetime. Simulation result shows that proposed protocol outperforms standard clustering protocols[12].

Energy efficient routing protocol called Weighted Election Protocol. Longer stability period is achieved when nodes having higher values of extra energy during its heterogeneous behavior. A standard LEACH algorithm is used to determine cluster and cluster heads in WEP[13].

LEACH[14] is one of Very Basic Protocol of Clustering in MWSN. Leach, stands for Least Energy Adaptive Clustering Hierarchy, is a Hierarchical Protocol for Homogeneous Network. Sensor nodes are here all of same type, deployed randomly over sensing region. Initial CH probability p is set be a small percentage of total sensor nodes. LEACH is working like that in a round- Each sensor node is assigned a random number between 0 and 1. We take a threshold value.

$T(n)=p/(1-r*mod(1/p))$ if $i \epsilon G$, G is the set of node that has not been cluster head in last $1/p$ rounds.

$=0$, else

Each node having random number value < threshold, is selected as a CH in current round r. After nodes have been selected as Cluster Head they send a Broadcast Message over the network. Each node that are not CH, select its CH based on received signal strength from CH. After all nodes select its corresponding CHs, they send their data over a TDMA time schedule to their respective CHs. After CH collects all data from its cluster member, it aggregates data and sends it to BS.

HEED[15] is another popular clustering algorithm in mobile wireless sensor network for heterogeneous nodes. Nodes are not of all same type, i.e. having different energy level. In HEED, clustering parameters are Residual Energy as well as Intra Cluster Communication Cost. Calculate a predefined cluster head probability P_c as a minimal percentage of total nodes. Before executing heed, each node compute its CH probability $P_{ch}=P_c*Eresidual/Emax$. HEED protocol at around r- Each uncovered node (node with no CH) wants to become a CH with probability P_{ch}. This probability value should not go beyond a threshold value P_{min}. Every uncovered node computes its broadcast cost with its neighbor in the cluster range. It then broadcast its P_{ch} and Cost to all the neighbor nodes within cluster range and joins tentative cluster head set Sch. After r round, S_{ch} includes {cluster heads in step (r-1) U new heads selected in step r}. Each uncovered node selects its cluster head with minimum cost from S_{ch}. Each node then doubles its P_{ch} and goes to next round. If P_{ch} of any node reaches 1, it set its status as CH, else it remains as provisional CH. If anode completes executing HEED without selecting any CH cluster head, it announces itself as uncovered and makes its status as CH. A provisional CH can be a normal node if it finds another cluster head with lower cost in later iteration.

APTEEN[16] Adaptive Periodic Threshold-Sensitive Energy Efficiency Sensor Network Protocol APTEEN) is one of protocol to select CH. In each cluster period CH first broadcasts following constraints.

Attributes
This is a set of physical parameters which user is interested in obtaining data about routing protocol.

Threshold
This parameter consists of a HT and a ST. HT is a particular value of an attribute beyond which a node can be triggered to transmit data or file. ST is a small change in the value of an attribute which can trigger a node to transmit data again.

Schedule
This is a TDMA schedule similar to the one used in, assigning a slot to each node.

Count Time
It is the maximum time period between two successive reports sent by a node. It can be a multiple of the TDMA schedule length and it accounts for the proactive component.

Table No.1: Mobile wireless sensor routing protocol

S.No	Algorithm	Life Time	Path selection	Energy awareness	Data aggregation	Location information	Stored information	Mobile nodes	Reliability
1	Flooding	short	Multi-hop	None	None	No need	None	A sensor node Gathering node	better
2	LEACH	longer	Single hop	have	have	No need	have	None	better
3	TEEN	longest	Multi-hop	have	have	No need	have	None	bad
4	PEGASIS	longest	Multi-hop	have	have	No need	have	None	bad
5	SPIN	longest	Multi-hop	None	have	No need	None	A sensor node Gathering node	bad
6	GPSR	longer	Multi-hop	None	None	Need	None	A sensor node Gathering node	better
7	GEAR	longest	Multi-hop	have	None	Need	None	A sensor node Gathering node	better
8	SAR	longer	Multi-hop	have	None	No need	have	None	Good
9	SPEED	longest	Multi-hop	have	None	Need	have	None	Good

CONCLUSION

Clustering is a procedure, which reduces energy consumption and offers constancy in MWSNs. Recent energy efficient clustering procedures premeditated for sensor networks are based on residual energy, regular energy, position, compactness etc. Surveyed energy efficient clustering protocol is based on CH assortment techniques. This has surveyed state-of-art of different clustering algorithms in MWSNs. Some energy efficient algorithms increase network lifetime. There are wide ranges of challenges in mobile wireless sensor networks.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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