ENERGY EFFICIENT DATA AGGREGATION IN WSN: A SURVEY

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ABSTRACT

From multiple years of study conducted, WSNs are emerging for smart processing of ever growing role in monitoring the energy harvesting resources to deploy. For the deployment, monitoring and updating for each and every resource in WSNs manually becomes a daunting task due to large number of sensor nodes and different kind of environment. So to overcome the manual challenging of deployment, monitoring of data sensing, collection, aggregation and analysis needs an efficient data aggregation techniques. In order to determine the data aggregating techniques for Heterogeneous Wireless Sensor network should need a continues streaming model, to organize data streaming from one specific environment to other configured with mobile base stations. The mobility and heterogenous network model causes more resources and produces additional overhead. To determine an efficient data aggregation technique we are

conducting a review on over data aggregation techniques for HWSN by considering the energy and mobile sink parameters. This paper describes the various challenges and techniques drawn to achieve the energy and performance in HWSN.

1. INTRODUCTION

Thanks to the lower deployment cost and ease, sensor networks have been deployed in various fields like those of smart home devices, building automation, metropolitan areas and manufacturing areas [1]. Nevertheless, the nature of commodity-constrained heterogenous wireless sensor networks (HWSNs)[2] requires an Effective way of network creation, deployment, and configuration[3]. Similarly, HWSNs are usually a vast array of resource-constrained sensors covering a large area, different network environments,

making network management challenging [4].To meet the above requirements, numerous HWSN auto-configuration schemes were built and optimized for efficiency and scalability.

Condition monitoring is a method of assessing the state of health of a sensor system using various data types (including heat, rotational velocity, movement, friction, pressure, rotational velocity, distortion, operator experience, voltage, acoustics, and power) to identify change points and provide timely judgment for maintenance work [5]. Nonetheless, a network that involves a large number of nodes also creates management process difficulties [6]

An administrator assigns addresses and functions inside the tiny sensor network easily, and downloads software and firmware to all nodes. Nonetheless, as the number of nodes increases, the previous approach becomes inadequate, resulting in a new solution needed: self-monitoring.

Auto-monitoring is a generic concept in HWSN [7] for initiatives characterized by a need to update or configure. Simply install this monitoring system such as mobile base station or sink node at such a drain; instead automatically transmit it to the other nodes within a HWSN. This simple system has various advantages: it is user-friendly, it has a fast implementation and it is energy-intensive.

The remainder of this paper is classified as follows: Section 2 addresses the key problems that can be posed during the implementation and upgrade phase of auto monitoring of a different sensor network. The third section presents the various data aggregation techniques for WSN and determines the limitations and advantages. Section IV is the conclusion part.

II. PROBLEM STATEMENT

In this section about improving and optimizing energy, in HWSNs the challenges we find are mentioned. The energy loss in the form is also dissipated by energy during the operation of the devices and interacting with different environments. Both the transient temperature fluctuations are high, and the conversion efficiency of thermal energy harvesting is relatively low. Therefore, heat energy processing technologies also need to be developed that decrease the constraint of heat cycling strategies and to achieve most efficient and effective thermodynamic efficiency. Because of the disadvantages of that energy harvesting technology, it is critical that the performance of energy harvesting devices is continuously enhanced by structural options.A harvester with an auto-adjustable and flexible structure, which can select the optimum frequency band based on the energy production of a physical device in a free environment, is difficult to design.

Also, designing efficient data aggregation technique for optimizing energy is essential, particularly with multiple mobile base stations..Nonetheless, upon careful review of each of the above issues, it becomes clear that even a list of recent concerns remains and must be addressed as quickly as possible..

3. LITERATURE REVIEW

Heterogeneous Wireless sensor network (WSN) is used to sense and, collect the data and further transmit it to the corresponding base station for future analysis. In order to organize data collection and sensing should needs an appropriate data aggregation approach, there are various kind of environments information required, collecting such huge information by keeping a stationary sink node or BS is not an idle choice, inorder to manage different kind of environment it really necessary to determine an mobile sink node or stations to manage data collection and data aggregation approaches.

According to the Shashi Bhushan et.al [8], the synchronized tree-based data aggregation approach for HWSN produced lot of challenge during formatting a tree formation for heteronomous

sensors and the selection of data aggregator or base stations was also tedious process to determine the base station in addition. In order to overcome the difficulties of tree formation and selection of base stations, the fuzzy attribute-based joint integrated scheduling and tree formation to overcome the problem of selection of base station, which was determined based on the candidate node with minimum set of dynamic neighbours. If any equal number of dynamic neighbours encounted the fuzzy logic is applied and then min–max normalization is used to extract the normalized weights for the given edges of the graph. This weight value is used to determines the degree to which an element belongs to a set. A node with the minimum sum of all weights is considered as the base station node. However this results determined the selection of Base station only it didn't determine the energy efficiency and selection of base station only depends on the neighbour node weights.

In [9], the authors vijayshree and discussed artificial bee colony algorithm for large scale WSN by exploring multiple mobile sink based data collection technique. In this study, the authors were focused on a large-scale and intensive WSN by taking the consideration of data latency by considering three different Aspects such as data collection maximization, mobile path length minimization, and network reliability optimization. According to the authors the artificial bee colonly algorithm improves not only energy consumption and also focus on data collection mechanism for selection optimal mobile station and optimal paths. Selection of optimal paths and optimal mobile stations should maxims the routing or control packets for managing the neighbour nodes

In most heterogeneous WSN application scenarios, the most of the process have been determined with the help of mobile sink and the mobile sink needs an adequate amount of energy. The continuous drain of mobile sink energy always causes path loss and moving of mobile stations should needs to construct a paths for sensing and collecting a data from set of sensors. In order to minimize the mobile sink traveling distance and energy saving the jay-yund et.al [10], discussed a novel and efficient data gathering path planning

scheme which optimize the set of neighbours to organize a data collection and aggregation process. However the selection of optimal mobile sink nodes was only discussed with respective of path selection approach only.

In [11], the authors proposed new approximation algorithm called Mobile Sink Clustering Algorithm (MSCA) to control the mobility of sensor nodes by controlling with gateway deployment and controlling or determining the mobile sink path for data collection from different gateways, the gathered data at gateways are aggregated by exploit redundancy with the objective of minimizing energy consumption in data transmission. The sink mobility towards a heterogenous environment should needs an optimal path, which can improve energy of the Mobile Sink by forming a Clustering by dividing the network into the approximation ratios

According to the ShaminehTabibiand AliGhaffari [12], the deployment of mobile sinks implicitly help achieving energy-consumption and achieves the e load-balancing. The probability of selecting an optimal node as meeting point will be very low.

To address the optimal node selection problem, the author discussed a particle swarm optimization based selection (PSOBS) is to select the optimal rendezvous points.This model determines the optimal or near-optimal rendezvous points to efficient management of network resources. This method determines the weight value for each sensor node based on the number of data packets that it receives from their neighbour sensor nodes with the formation of clustering based on PSO algorithm to reduce the end-to- end delay. The clustering algorithm, fixes a set of optimal rendezvous points for the mobile sink in HWSN

To determine the shortest path for mobile sink nodes a heuristic tour-planning algorithm (HTPA) wasProposed by avoiding obstacles. In [13], the authors presented a dynamic movement approach which determine the path planning with obstacle avoidance to diminish the localization error while maximizing the number of successful neighbour nodes. But the communication range is another obstacle For covering sensing areas, a inner center path planning algorithm makes an adaptive decision for producingthe moving path of the mobile sink by determining the moving distance of the mobile sink. As per this mode the authors suggest that the energy consumption of the mobile sink is reduced and acceleration of data collection is increased for mobile sinks

In [14], the author discussed an energy efficient routing scheme to maximize the data collection and aggregation process by combining the clustering and sink mobility approach. In this process first network divided into the sectors and each sector elects an appropriate cluster head based on the members weights. The member weights were determined based on the energy consumption rate and routing paths, the Cluster heads are connected with corresponding nodes in a sectors and forms the chain using the greedy algorithm for intercluster communication.

An Unequal Clustering Mechanism for WSNs is determined in [15] by author by adopting the clustering mechanism with the help of cluster size. In order to determine the cluster size a A two-stage Genetic Algorithm (GA) is employed to compute the optimal interval of cluster size and exact value from the interval. However the energy hole or energy wastage is an inherent problem and decreases the network lifespan, this problem arises from the asynchronous energy depletion of nodes located in different layers of the network. The authors proposed a Circular Motion of Mobile-Sink with Varied Velocity Algorithm to balance the energy consumption ratio of cluster heads (CH) this method improve the network lifetime and achieve a high packet delivery ratio with the adoption of multiple mobile sinks with a fixed speed.

As its own response, additional systems were implemented which were based solely on the energy storage of the double layer condenser (DLC)[16]–[18]. Despite of the vast number of potential replacement cycles for DLCs, the storage solution has practically no longer had any impact on lifetime. But, since double layer capacitors have comparatively low ability and contribute to higher self-discharge levels, changes in weather conditions can easily affect them. Nevertheless, devices that only use super capacitor processing have been illustrated successfully in minimal irradiance situations .

A logical and high-throughput data collection scheme was proposed for the EH-HWSN[19], which calculates the optimum lexico graphical rate assignment under the constraint of no node running out of resources. The energy-harvesting-aware routing algorithm (EHARA)[19] is proposed to improve both the lifetime of the sensor nodes and the quality of service (QoS) under adjustable power accessibility conditions.The online pseudo code entitled Optimal Scheduling Algorithm (OSCAR) proposed in [20] allows for decisions on system status, energy harvesting, and data transmission with mobile energy harvested sensing devices to achieve near-optimal utility output in transmission.

Route selection schemes that consider network resource spoilage due to overloading of limited-capacity batteries are formulated in[21] and[22], where the costs involved with packets power usage and battery overload power wastefulness are reduced and loss due to overloading of a countable battery is predicted. Although these systems take ESO into consideration, they demonstrate a issue of unfair use of energy because they allow the source node to send all the data to the destination along a predetermined path. This requires far more energy to be used by the data transmission nodes than those not engaged in the data delivery. The unequal energy usage problem is considerably alleviated in the proposed EAMP, since several discontinuous paths have been used in packet transmission, which differs from procedures.

7. CONCLUSION

The challenge that deals with large varieties of nodes in HWSNs results with an issue of energy efficiency and load balancing. To achieve the energy efficiency in HWSNs this paper discussed the various data aggregation techniques and energy efficient techniques. This survey carried out the study to understand the functionalities and communication process of HWSN and determine the imporatance of energy saving in Heterogenous network model. According to the study its clearly determined that the energy efficiency was clearly achieved with respective of network optimality and classifying the mobile sinks with respective of the clusters Hence the network delay and latency of data aggregation maxims the data aggregation process in HWSN and achieves the efficient energy harvesting with multi objective parameters.

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