An Artificial Intelligence Based Route Adjustment For VGDRA In Mobile Sink WSN

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Abstract - *Wireless Sensor Networks (WSNs) consist of an extensive number of small and low cost sensor nodes powered by small non rechargeable batteries and outfitted with different detecting devices. As a rule, for some applications, once a WSN is established, probably in an un-friendly landscape, it is observed that while accumulating the required information the network is dynamic. After that, it generally remains latent for drawn out stretches of time. Thus, efficient power saving schemes and corresponding algorithms must be created and planned keeping in mind the end goal to give reasonable energy consumption and to enhance the network lifetime for WSNs. The group based strategy is one of the great ways to deal with energy consumption in wireless sensor networks. The lifetime of wireless sensor networks is stretched out by proposed an virtual grid based dynamic routes adjustment (VGDRA) scheme for WSN in which some nodes are generally put to sleep to conserve energy, and this helps to enhance the network lifetime.*

Key Words: **Wireless Sensor Network (WSN), WSN Protocol, Virtual Grid based Dynamic Routes Adjustment (VGDRA).**

1.INTRODUCTION

Wireless or Remote Sensor Network (WSN) – a self-organized network of minor processing and communication devices (nodes or hubs) has been widely used in many untended and hostile environments. In a typical deployment of WSN, hubs are battery worked where they helpfully screen and report some wonder important to a focal hub called sink or base-station for further handling and examination. Conventional static hubs organization where hubs display n-to-1 correspondence in reporting their watched information to a single stationary sink, offers ascend to vitality opening wonder in the region of sink. Sink portability presented in [1] not just adjusts the hubs' vitality scattering however can likewise connect confined system fragments in hazardous zones [2]. Additionally, a couple application circumstances typically require sink convey ability in the sensor field [3] e.g., in a disaster organization system, a rescuer outfitted with a PDA can move around the perilous circumstance to hunt down any survivor. So likewise, in a battle zone environment, a chairman can procure constant information about any interference of enemies, magnitude of attack, suspicious activities thus on through field sensors while progressing. In an Intelligent Transport System (ITS), sensor center points sent at various reasons for interest - crossing points, auto parks, zones helpless to falling rocks, can give early notification to drivers (adaptable sink) well before their physical technique. Manhandling the sink's adaptability draws out the framework lifetime thusly relieving imperativeness crevice issue; regardless, it brings new troubles for the data disseminating process. Not in any way like static sink circumstances, has the framework topology got the opportunity to be fast as the sink keeps changing its range [4]. To adjust to the dynamic framework topology, center points need to screen the latest territory of the flexible sink for capable data movement. Some data scrambling traditions e.g., Directed Diffusion [5], propose periodic flooding of sink's topological redesigns in the entire sensor field which offers ascend to more effects and in this way more retransmissions. Taking into thought the uncommon essentialness resource of center points, progressive multiplication of sink's flexibility overhauls should be avoided as it phenomenally undermines the imperativeness insurance objective. In this appreciation, to enable sensor centers to keep up fresh courses towards the adaptable sink while obtaining immaterial correspondence cost, overlaying based virtual base over the physical framework is considered as a capable technique [6]. In the virtual system based data disseminating plans, only a game plan of appointed center points scattered in the sensor field are careful to screen sink's territory. Such doled out center points collect the watched data from the center points in their area in the midst of the nonappearance of the sink and after that proactively or responsively report data to the flexible sink.

1.1 WIRELESS SENSOR ROUTING PROTOCOLS

Recent advances in wireless sensor networks have lead to numerous new conventions particularly intended for sensor systems where vitality mindfulness is a fundamental thought. In any case, approaches like Direct Communication and Minimum Transmission Energy don't promise adjusted vitality dissemination among the sensor hubs.
In Direct Communication Protocol every sensor hub transmits data specifically to the base station, paying little

respect to separate. Therefore, the hubs uttermost from the BS are the ones to die first. Then again, if there should arise an occurrence of Minimum Transmission Energy directing convention information is transmitted through middle of the road hubs. In this way every hub goes about as a switch for different hubs information notwithstanding detecting the earth. Hubs nearest to the BS are the first amazing MTE directing. In this way, bunch based system is one of the methodology which effectively expands the lifetime and soundness of entire sensor systems. We characterized most imperative vitality productive steering systems in light of different bunching characteristics like group development and information gathering process. Figure 1 is a various leveled outline of various directing conventions which are generally utilized as a part of WSN. A few virtual base based information spread conventions have been proposed for versatile sink based WSN in the most recent decade. In view of the portability design displayed by the sink in the sensor field, the information gathering or dispersal plans can be characterized into controlled and uncontrolled sink versatility plans. In controlled sink versatility plans [7] [10], the portability (speed and/or bearing) of the sink is controlled and controlled either by an outer onlooker or as per the system progression. The uncontrolled sink portability based plans are described by the way that the sink makes its best course of action self-rulingly as far as velocity and heading. This paper considers the uncontrolled sink portability situations and in the accompanying lines, we quickly depict the related works in this setting including their procedure and the relative qualities and shortcomings.

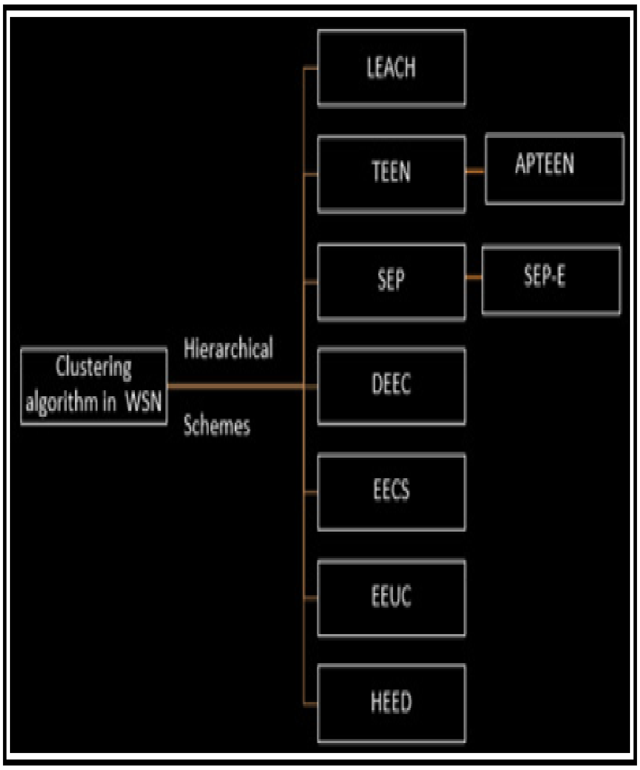

Figure 1: Classification of Clustering Schemes in WSN.

2. VIRTUAL GRID BASED DYNAMIC ROUTES ADJUSTMENT

Virtual Grid based Dynamic Routes Adjustment (VGDRA) is proposed for periodic data collection from WSN.

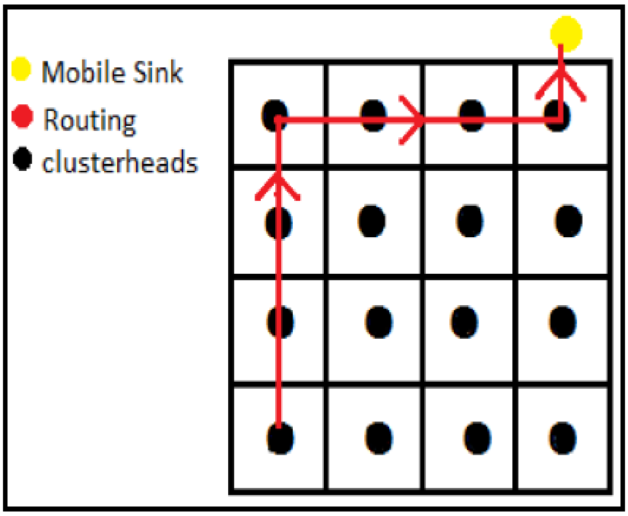

Figure 2: Straight line communication in VGRDA.

Virtual Grid based Dynamic Routes Adjustment (VGDRA) is plans to improve the exchange off between hubs vitality utilization and information conveyance execution utilizing a solitary versatile sink while sticking to the minimal effort subject of WSN. The proposed plan empowers sensor hubs to keep up about ideal courses to the most recent area of a portable sink with negligible system overhead. It segments the sensor field into a virtual lattice of K equivalent estimated cells and develops a virtual spine system involved all the cell-headers furthermore, VGDRA additionally sets up correspondence courses such that the end-to-end postponement and vitality expense is minimized in the information conveyance stage to the versatile sink. The mobile sink moves along the periphery of the sensor field and speaks with the fringe cell-headers for information accumulation. The courses rearrangement procedure is represented by an arrangement of tenets to progressively adapt to the sink versatility. Utilizing VGDRA, just a subset of the cell-headers needs to join in re-conforming their courses to the most recent area of the versatile sink there by lessening the correspondence cost. Recreation results uncover diminished vitality utilization and speedier merging of VGDRA contrasted with other cutting edge.

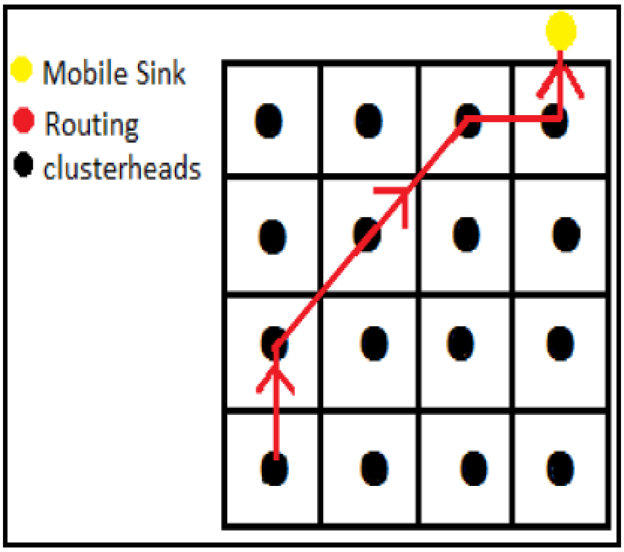

Figure 3: Shortest distance in grid routing approach.

Virtual Grid based Dynamic Routes Adjustment (virtual framework directing) in [22], assembles a virtual spine system and uses straight line correspondence however in this methodology, separation need correspondence is utilized, which will diminish the vitality utilization and enhances the system lifetime. Figure 2 shows the straight line correspondence which is utilized as a part of VGRDA. Figure 3 shows the communication based on distance priority which is used in our distance enhancing grid routing approach.

3. PBO IMPLEMENTATION

According to the general PBO scheme, the parameters plants, seasons and weeks help to calculate the local pollination values and the global pollination values. Applying this concept in WSN, we assume the network parameters to be nodes, cluster heads and iterations respectively. We then utilize the PBO algorithm to optimize the lifetime of the WSN and adjust the routing for VGDRA scheme. This is done by monitoring two aspects of the sensor network: energy of the nodes and the distance between them. To do this, a monitoring search is conducted in each iteration on two levels, called the Local Search and the Global Search. These searches yield the local pollination values and global pollination values; which correspond to the values of the energy of the nodes and the distances between them; and the best values for energy and distance. Based on these pollination values, Cluster Heads are selected and routing is done via the shortest path.

3.1 SELECTING CLUSTER HEADS

In each iteration, the local pollination values and the values are estimated by comparing the energy values. The global pollination values are then obtained by conducting an overall comparison of the local pollinated values. If the evaluation value of each individual is better than the previous local pollination values, then the current value is set to be the local pollination value. If the best local pollination is better than the global pollination value, then the best local pollination value is set to be global pollination value. These global pollinated values are then used to determine which nodes are fit to be cluster heads. After the cluster heads are appointed, their residual energies are again monitored in the next iterations. If the respective residual energies drop below a threshold value, the cluster heads are changed using the same procedure.

3.2 ROUTE ADJUSTMENT

Route adjustment is done on the basis of the distance parameter. Each sensor node forwards the information to the node that is nearest to it. Eventually the information packets are sent to the cluster heads; that repeat the procedure until the information reaches the sink. The path selection technique utilizes PBO inspired artificial intelligence scheme. Using PBO, the local pollination and global pollination give the shortest path via which the information is sent to the mobile sink by calculating the minimum distance between the information carrying nodes and the mobile sink.
Inspite of transmitting data successfully by one route, new efficient tracks are detected from time to time as the sink changes location.

4. ALGORITHM STEPS

- Deploy the nodes (100)
- Initialize the energy for the whole system
- Define the input parameters of the nodes
- Apply PBO for electing Cluster Heads and for routing

a. Plants=Nodes
b. Initialize energy, distance and probability factor of nodes
c. Find local and global pollination values
d. Check energy, distance, other pollination values for selection of cluster heads
e. To check whether a node can be cluster head or not:
If ETx<Ei
(do local pollination of the nodes)
Else
(discard)
f. Repeat step **e** till the iterations finish
g. Find total lifetime of the system
h. End

5. SIMULATED RESULTS

In this section, the proposed algorithm is evaluated via computer simulation using MATLAB simulator. All simulation results are obtained on the basis of proposed approach Pollination Based Optimization (PBO) as the algorithm for observing lifetime, delay time and energies of the system. The results are compared with those of VGDRA scheme to show the improvement.

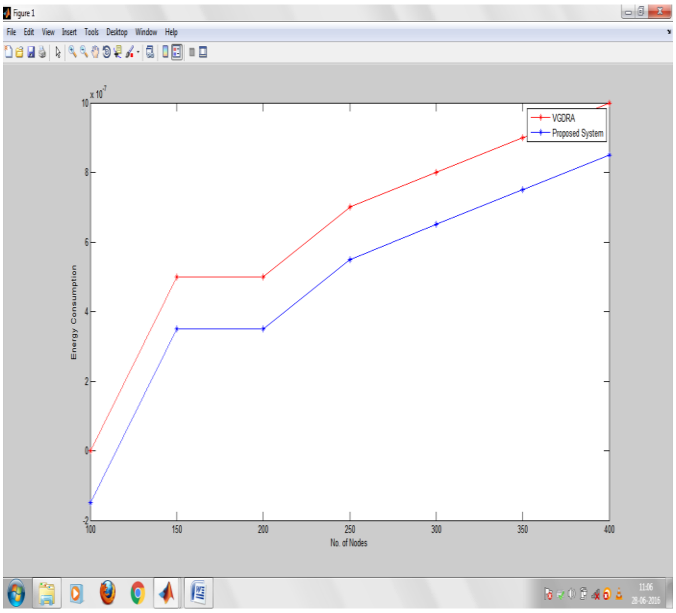

Figure 4: Comparing the virtual structure construction cost for different network sizes.

As demonstrated in Figure 4, nodes using PBO scheme incur least cost compared to VGDRA schemes in constructing the virtual structure.

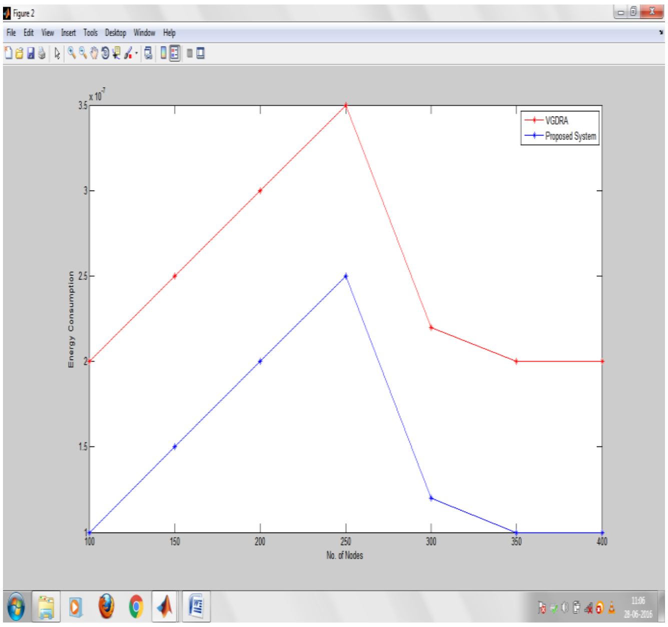

Figure 5: Comparing the per round routes reconstruction cost for different network sizes.

As demonstrated in Figure 5, nodes using PBO scheme incur least cost compared to VGDRA schemes in reconstructing the per round routes.

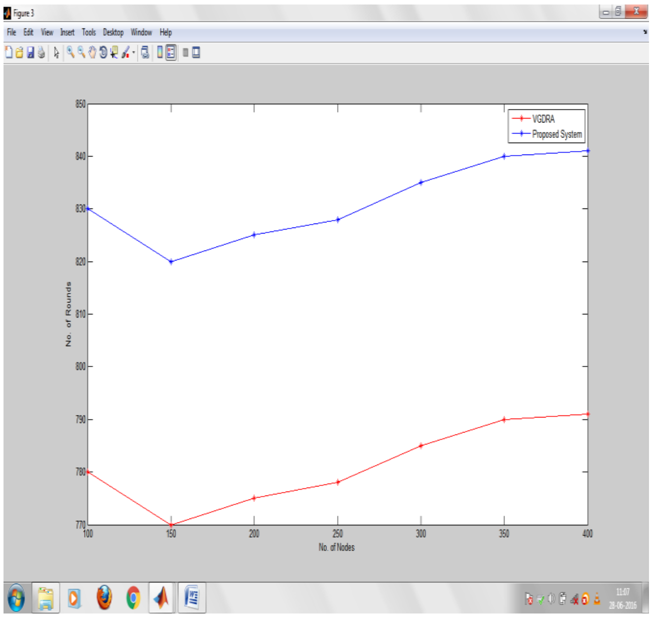

Figure 6: Comparing the network lifetime in number of rounds around the sensor field.

As presented in Fig. 6, our PBO scheme outperforms the VGDRA schemes in terms of network lifetime at different network sizes.

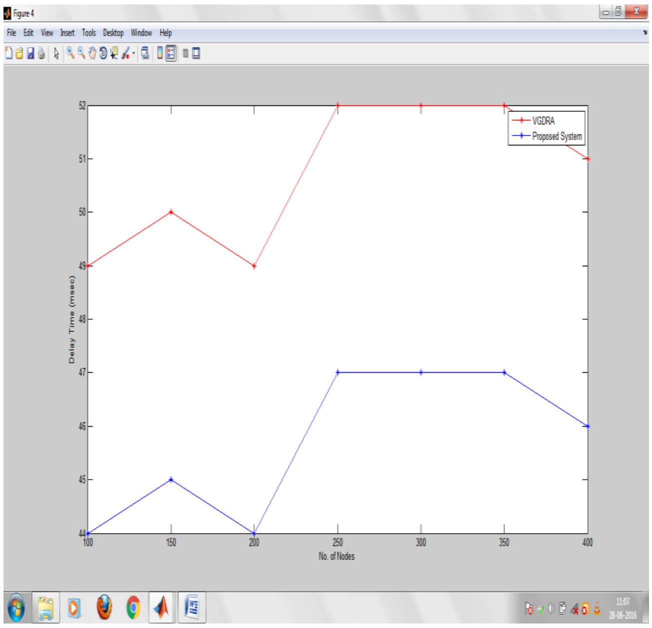

Figure 7: Comparing the network convergence time for different network sizes.

As shown in Figure 7, the convergence time of the proposed PBO optimization scheme is very fast compared to VGDRA when the sink is moving.

6. CONCLUSION AND FUTURE WORK

For WSNs it is of utmost concern to optimize the lifetime of the network while keeping in view the need for reduced delay time. In this dissertation the existing VGDRA schemes used for data collection were explained. To improve the lifetime of the WSN the Pollination Based Optimization (PBO) was applied. This yielded better results in terms of the improved lifetime of the network. Also, we achieved reduced delay time which is an important aspect when the working speed of the network is concerned. The performance of routing scheme is also improved by using shortest distance approach in the grid.
For future work, the performance of our proposed scheme at different sink's speeds and different data generation rates of the sensor nodes will be done. We aim to develop a small test bed for the practical implementation of the proposed scheme.

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