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Review of Literature on Conjunction Control Methodologies for wireless sensor network using Artificial intelligence

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Abstract: This paper revolves around comprehensive study of various techniques which are utilized in improvement in performance of WSN and also gives the appropriate solution for the Congestion problems. As the occurrence of the congestion has an extremely deleterious impact on the performance of Wireless Sensor Network (WSNs). Some novel blockage control method utilizing computerized reasoning for remote sensor systems are compared and studied by us. Basically remote Sensor Systems are a class of remote systems estimated for checking objective and ecological wonders. This paper provides opening to wireless sensor network as well as for artificial intelligence with reference to HEED (Hybrid Energy Efficient Distributed clustering), which aims to act both proactively, in order to avoid the creation of congestion in WSNs, and reactively, so as to mitigate the diffusion of upcoming congestion through alternative path routing.

Keywords —AI, control framework, counterfeit consciousness, HEED (Hybrid Energy Efficient Distributed), WSN (Wireless Sensor Network); streamlining; routing; traffic management.

I. INTRODUCTION

The working of Wireless sensor networks (WSNs) consists of number of nodes and sinks which processes the requested data packets as well as dispatch the packets from the server. Sensor nodes basically understand physical data and integrates data sensing, computation, and wireless communication, and then operates the crude data, and furthermore report the sensed information to the sink. But the problem with sensors is their small size and hence data processing capacity. So to overcome this sensor problem we try to work on this sensors using AI technics and HEED algorithm. In this work, the attributes, benefits and cons of clustering based on cluster count, diversity, cluster overlapping, and role of cluster head, objective of sensor node grouping and methodology with that of HEED, Artificial Intelligence algorithms is studied.

In detail the Wireless Sensor Network is self-arranging system of many little sensor hub conveying among themselves using radio flags, and sent in bulk to detect, screen and comprehend absolute world. WSN accrued of minimized size, moderately economical computational hubs that measure neighborhood ecological conditions or different parameters and forward such data to a main issue for suitable handling and manipulating. WSNs hubs (WNs) can detect nature, can speak with neighboring hub, and can perform essential calculations from the collected information. To avoid such mentioned effects of congestion, it must be controlled or avoided in a very effective manner. As a result of which, there are two different research area such as congestion control and congestion avoidance. In congestion control, learning resumption from congestion methodologies and avoids collapsing in the network is done, whereas in congestion avoidance investigates the techniques to prevent congestion is carried out. By controlling congestion we can achieve the goals like High bandwidth utilization, reduce collision, Sustain a high responsiveness.

II. LITERATURE REVIEW

A. Congestion Control Technique:

V.Prasathkumar, et al [1], In that paper they suggested few algorithms for efficient management of packets means congestion avoidance algorithm like DAIPaS (Dynamic Alternate Path Selection), TARA (Topology Aware

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Resource Adaptation), CADA (Congestion Avoidance Detection Alleviation), GRAB (GRAdient Broadcast), HTAP (Hierarchical Tree Alternate Path) and lot more are elaborated by them. The objective of their survey was to increase the life time of Wireless Sensor Network.

Razieh Golgiri, et al [2], in that paper they proposed an architecture framework based on generated traffic priority for service identification in network level in order to meet better service quality and efficiency. The proposed method called TMCC (Traffic Management Computer Complex) has been compared with Traffic-Aware Dynamic Routing (TADR) method to show the effectiveness of the proposed method in terms of end to end delay, throughput, power consumption and lifetime of network. They worked for congestion control in "resource control" part, and in "traffic management" part, with the use of exact rate setting. They used method to resource control strategy by selecting an alternative path for traffic control.

Neha Pant, et al [3], they proposed a system in which the packets are sent through multiple paths during congestion. Whereas low priority packets are sent via single path after decreasing the packet sending rate thus increasing the time between sending consecutive packets. This paper describes the both congestion control and congestion avoidance techniques. And as result, the throughput is enlarged and packet loss rate also decreased and also helped in increasing the life of network.

Zhenjun Luo, et al [4], the paper provides proposed algorithm Ant Colony Optimization Route Selection-Artificial Neural Network Data Pcket Fusion(ACORS-ANNDPF) algorithms, The algorithm is high energy efficiency and balanced energy consumption along with time consumption improvement. This paper is based on IoT of the drug control system, it probes into the self-regulating energy consumption algorithm with the self-learning ability. Their work was carried out based on protocol in terms of packet loss rate, life cycle, energy consumption curve, energy consumption, etc. which extends network life cycle, as well as promotes multitasking in network packets flow.

Ashish Kumar Luha, et al [5], their paper educates us about Redundancy Aware Hierarchical Tree Alternative Path (RAHTAP) algorithm. Basically it eliminates the duplicate packets from the network and leads to reduction in network load and also create dynamic alternative path from source to sink when there is congestion on a particular node. This algorithm works over the thought of existing congestion control algorithm HTAP. The use of QualNet Simulator is used for calculation and simulation part.

Navpreet Kaur, et al [6], the paper guides to develop in-network intelligent computational and adaptation capability for wireless device networks to enhance their practicality, utility and survival aspects. Their work is very useful for our proposed system as proposed neural network techniques to develop in-network intelligent computation and adaptation capability for wireless sensor network boosts their practicality, utility and survival aspects.

Samiyeh Esmaeili, et al [7], the paper describes working of WSN using intelligent network with PIC12F675, which can detect the failure in transmission and reconfigure itself immediately. The utilized algorithm can be applied to other embedded wireless modules and sensors. The design possesses a high-speed operation at baud rates up to 9600kbps, due to the use of the PIC microcontroller. The high-speed operation and high- accuracy of the proposed system make it suitable for real time monitoring applications.

Gursel Serpen, et al [8], they proposed an AI based system in WSN. The main moto of this paper was to make a wireless sensor network embedded with a neural network which can solve a large class problems to develop capability to adapt to changes in a dynamic environment or possess computational intelligence to address challenges during its operational phase following deployment. Simulation result of their system shows high feasibility of their system.

Najme Tanzade Panah, et al [9], they describe congestion prevention, congestion control, and energy control plans using shortest path selection algorithm. In this the congestion control is done by investigating queue length and by reducing transmission rate and energy conservation is done by balancing the individual energy of nodes. And result shows that the updated system have higher efficiency.

Andrés Felipe Luque Calderón, et al [10], proposed a system to deal with the congestion problems in many multimedia based sites. The studied in Scenario format mainly based on QoS, TCP Security and Transmission rate. And trained an RNA system with only 4% error.

Dionisis Kandris, et al[11], in their paper they worked on COALA (Congestion Alleviation and Avoidance) prototype which is confirmed through simulation trails, and reveal its ability to do remarkable reduction in loss ratios, transmission delays, energy dissipation, and many other parameters.

Mantoj Kaur, et al [12], they studied or research done on high speed multimedia WSN based on D3 (Dynamic Data Dissemination) technique. They used queue buffer length to estimate congestion than dynamically disseminates data

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to multiple forwarders and for energy efficiency they deploy the sensor node in grid based strategy that improves energy efficiency, packet delivery ratio and throughput of system.

Monica R. Mundada, et al [13], they given various paper based on the many congestion control techniques and various congestion control protocols. And comparative analysis is done on the basis of result.

Sasikumar M, et al [14], proposed a protocol called H-HEED to improve the network lifetime and energy. Using this technique they improved performance like delay, throughput, energy and number of packets in the network lifetime. In this the simulation was carried out using MATLAB software and the simulation results were compared with the existing system thus proving that the proposed work achieves longer lifetime and is efficient in managing the energy constraints of the network.

Karthik N V, et al [15], proposed an process of clustering and Cluster Head selection HEED-Hybrid Energy-Efficient Distributed Clustering Algorithm is selected, which is fully distributed, uniform distribution of Cluster Heads over the network, load balancing and energy efficient. In this work, the HEED Clustering Algorithm is selected as a base and the algorithm for implementation and Artificial Intelligence techniques are applied to HEED for Cluster Head selection process, which reduces the energy consumption for the communication among the nodes. The results of both the work are also compared to find the more reliable network.

Gitanshu, et al [16], in this paper they proposed the system for energy optimization using the CH (Cluster Head) technique. In this proposed scenario, the additional cluster head has started communication with rest of sensor nodes and these sensor nodes approached the cluster head. The network simulation starts with a nodes communication, wherein other nodes are welcomed with an authority of cluster head node. And the result is estimated using 40 node in this network scenario.

Yanjing Sun, et al [17], in that paper they combined artificial network with enhanced Growing Neural Gas with utility criterion algorithm into wireless sensor network, this will make network re coverage with response to changed area. And in order of make network more intelligent and adaptive they used evolution property of GA, and probability seeking property of SA. And the simulation results with the use of this algorithm and refined system leads in reduction of improvement in mobility of the network, lot of redundant nodes, increase the rate of convergence and arrive optimal re-coverage.

Zaib Ullah, et al [18], the paper introduces HEED bases clustering algorithms as HEED, UHEED (Unequal-HEED), RUHEED (Rotated Unequal-HEED), and ER-HEED (Energy Based Rotated HEED). They perform a comparison study of HEED based clustering protocols. As they proved ER-HEED is most energy efficient.

III. COMPARISON OF VARIOUS AI TECHNIQUES

All the paper studied and the gathered info is compared and the result of this is comparison is shown in the fig below, we see how the performance, throughput, efficiency is improved with use of the AI in WSN:

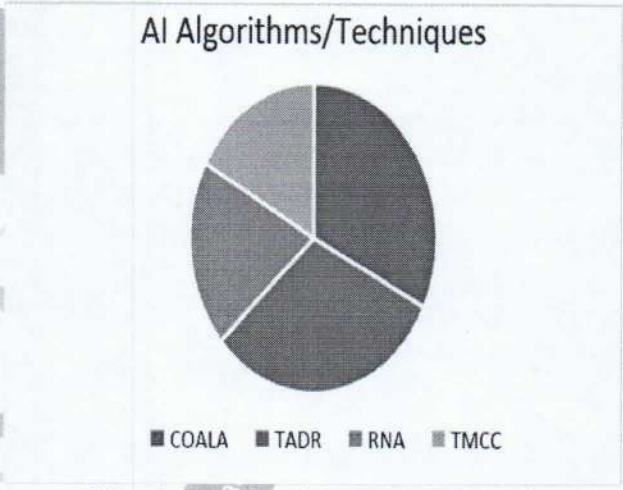

Figure 1: Comparison of AI Algorithm/ Techniques

In this figure 1 the comparison of the most used algorithms like COALA [11], TADR [2], RNA [10] and TMCC [2] is shown in the above figure. From this data we analyzed that the COALA and TADR are one of the most efficient AI techniques in WSN enhancement and congestion techniques.

Rather than this the comparison of various HEED techniques is also done based on the numerous papers. Figure below shows the graphical representation of these comparisons:

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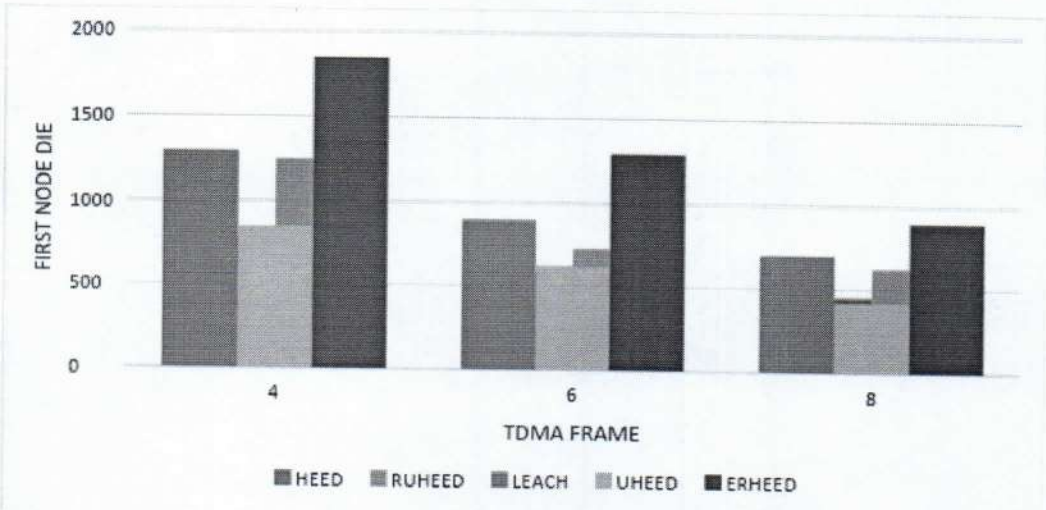

Figure 2. Comparative analysis of WSN protocols at various TDMA frames with 300 nodes and a competition radius of 40.

This figure 2 shows various HEED techniques in comparison with each other. It shows the HEED algorithm performance over TDMA frames and life cycle of particular nodes. This WSN performance is very high as comparison to the network without HEED algorithm.

IV. CONCLUSION

Congestion is a state of network during which the demand of resources is more than the available resource. Causes of the congestion may be insufficient memory to store arriving packets; packet arrival rate exceeds the outgoing link capacity, low speed processor and burst traffic. Often it is misinterpreted that overprovisioning the resources will eliminate the congestion, in some cases it may make the situation even worse. Without use of any proper dedicated congestion control technique, congestion cam have adverse effect on network throughput and delay, even leads to congestion collapse, where none of the packets is transferred. So there is the need to analysis Congestion Control and its various techniques and mechanism. In this paper we made a study of various control techniques based on implementation of AI in WSNs. AI based systems learn from given inputs and evolve with the feedback of system. Contribution of HEED algorithm is also analyzed. The system focuses on overall improvement of system parameters which includes inter network communication improvement, Network training, deploying sensor network, cluster formation, energy of system optimization, and others.

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