Journal of **N**onlinear **A**nalysis and **O**ptimization
Vol. 14, No. 2, No.01 (2023).
ISSN : **1906-9685**

SENSOR NETWORK USING THE HYBRID-BIRD SWARM-DIFFERENTIAL SEARCH ALGORITHM TRUSTED CLUSTER BASED ENERGY AND LIFESTYLE AWARE ROUTING PROTOCOL

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ABSTRACT
The primary systems for transmitting, processing and tracking data are wireless sensor networks. The WSNs have an essential routing protocol. Routing protocol is the method of selecting the best route for data transportation from source to destination. There are different issues with selecting the direction based on the network, channel parameters. Routing issues include data flow, high energy consumption, storage space, latency, classic IP protocols that do not support certain sensor modes, deployment of nodes etc. We are proposing a trustworthy cluster-based, lifetime conscious routing (TCELR) protocol for WSN using a hybrid bird swarm differential search algorithm to solve these problems during the routing protocol process. First, a chaotic optimization bird swarm algorithm (CBSO) for cluster training is implemented in the TCELR protocol. Second, to quantify each client's belief level in the cluster, we demonstrate the enhanced differential search (IDS) algorithm. The higher confidence node in the cluster is known as the cluster head (CH) and is the sink node for intra-cluster routing of cluster members. Third, a Scatter-Based Decision making Algorithm (SSDM) is used for the inter-cluster routing for transmitting sensed data between clusters. The performance of the proposed TCELR protocol is measured in terms of throughput, packet loss, end to end time, network life, packet distribution ratios and jitter, relative to the current modern routing protocols.
Keywords: TCELR, Chaotic Bird Swarm Optimization, Improved Differential Search, SSDM, Routing protocols.

1. INTRODUCTION

WSNs are generally examined as most significant advances for twenty-first century [1] [2]. In the previous decades, it has gotten gigantic consideration from both scholarly community and industry everywhere throughout the world. A WSN (Wireless sensor network) commonly comprises of countless ease, low-control, and multifunctional remote sensor hubs, with detecting, remote interchanges and calculation abilities [3]. These sensor hubs convey over short separation by means of a remote medium and work together to achieve a typical assignment, for instance, condition checking, military exploration and new procedure control. The essential way of thinking behind WSNs is that, while the capacity of every individual sensor hub is constrained, the total intensity of the whole system is adequate to necessary strategic. There are a few applications are accessible utilizing of WSNs through sensor nodes. Once sent, the sensor centers must have the alternative to self ruling deal with themselves into a remote correspondence orchestrate. Sensor center points are battery-controlled and required to work without investment for a modestly noteworthy stretch of time. The essential part of the system is the sensor, basic for observing true physical conditions, for example, sound, temperature, dampness, force, vibration, weight, movement, poisons and so forth at various areas [5][6]. The modest sensor hubs, whichcomprise ofdetecting, on board processor for information handling, and conveying parts, influence the possibility of sensor systems dependent on community oriented exertion of countless hubs [7]. Vitality asset, figuring force and data transfer capacity of hubs in a remote sensor system are restricted so the steering convention plan of a remote sensor system is altogether different from the customary portable system [8]. Significant goals of the steering structure of a remote sensor system are to decrease vitality misfortune and improve the existence cycle of thesystem. Methodsof routing are required for moving information among the sensor hubs and base station [9]. Steering in WSN is unpredictable on the grounds that the quantity of one of a kind qualities with the way things are ridiculous to manufacture a worldwide tending to conspire for an enormous number of sensor hubs; also rather than ordinary correspondence frameworks all usage of sensor frameworks requires the surge of recognized data from various sources to a particular BS [10]. Distinctive steering procedures have been proposed for WSNs and these shows can be delegated per various parameters. A strong trust mindful directing system (TARF) [11] is utilized to verify steering arrangements dependent on the exceptional qualities of asset compelled, the plan of TARF focuses on position and proficiency of energy. A system coding-based probabilistic directing (NCPR) plot gives vitality effective, dependable and reduces the communicate storm issue in a grouped WSN [12]. A safe hub disjoint multipath directing convention handles the information parcels are transmitted in a safe way by utilizing the computerized mark crypto framework [13]. Vitality and action mindful steering (EAR) [14] convention is found out and worked from the occasion movement designs. EAR is a web based steering convention picks the following jump hand-off hub by using: action design data in the ATPG diagram and file of vitality balance. Information steering for in-organize conglomeration (DRINA) system [15] used to lessen the quantity of messages for setting up a directing tree, expanded number of covering courses, high accumulation rate, and dependable information total and transmission. The mix of vitality collecting hereditary based inconsistent grouping and ideal versatile execution steering calculation (EHGUC-OAPR) [16] used to adjust the vitality utilization of the whole system and productively improve the information conveyance proportion. ALBA-R is a cross-layer plot [17] for merge throwing and it consolidates geographic directing, treatment of impasses, MAC, alert snoozing booking, and consecutive information parcel transmission for accomplishing a vitality effective information gathering instrument. A vitality adjusted directing technique dependent on forward-mindful factor (FAF-EBRM) [18] is utilized to choose next-bounce hub dependent on the consciousness of connection weight and forward vitality thickness. Solid responsive steering improvement (R3E) [19] is utilized to build the strength to connect elements. It improves the solid and vitality effective parcel conveyance against the questionable remote connections by using the neighborhood way assorted variety. Effective QoS-mindful GOR (EQGOR) convention chooses and organizes the sending competitor set in a proficient way, which is appropriate for WSNs in regard of vitality productivity, dormancy, and time unpredictability [20].

2. PROBLEM METHODOLOGY AND SYSTEM MODEL

This section explains about problem identification of existing routing protocols of WSNs and issues, then the solution of respective problems and the proposed system model.

PROBLEM METHODOLOGY: Tomaretal. [31] have introduced the Energy efficient gravitational search algorithm (GSA) and Fuzzy depending grouping along Hop include routing protocol depends on WSNs. At first, CH is chosen utilizing GSA, in view of its weight sensor hubs are joined to the CH and in this manner group is shaped. Among the chose CHs in the system, super group head (SCH) is chosen utilizing a fuzzy inference system (FIS). This chose SCH assembles the information bundle from all CHs and advances it to the sink or base station. For transmission, the effective course is set up dependent on the jump tally of the sensor hubs. The exhibition of this proposed GSA-FCR has been assessed as far as vitality effectiveness, conveyance proportion, deferral, drop and throughput and has been contrasted and that of existing plans, for example, GECR and PSOCR. WSNs have immense number of uses out of which military objective following and observation. Notwithstanding, from [21]-

[31] sensors work on constrained power assets; in this manner, using those assets has brought the consideration of flow specialists. The greater part of the current works characterize arrange lifetime as when the main sensor hub debilitates the majority of its vitality. In any case, such time isn't really significant. This is on the grounds that when a sensor hub kicks the bucket, the entire system is probably going to work appropriately.

3. SYSTEMMODEL

The proposed TCELR scheme is shown in below figure. Initially, the sensor nodes are form the clustering using of proposed chaotic bird swarm optimization (CBSO), then we choosing the cluster head and source. Here, we choosing the cluster (CH) based upon which node has high trust values. We choose the cluster head using proposed improved differential search (IDS) algorithm. Then we form intra clustering routing of cluster members and cluster head (CH), intra clustering routing means the data transmission between cluster head and cluster members (node) within the one cluster group. Then, we using the scatter search based decision making (SSDM) scheme, we done the inter cluster routing for forwarding the sensed data from sink node, the sensed data forwards source to each cluster head to sink node. Here sink node act as destination.

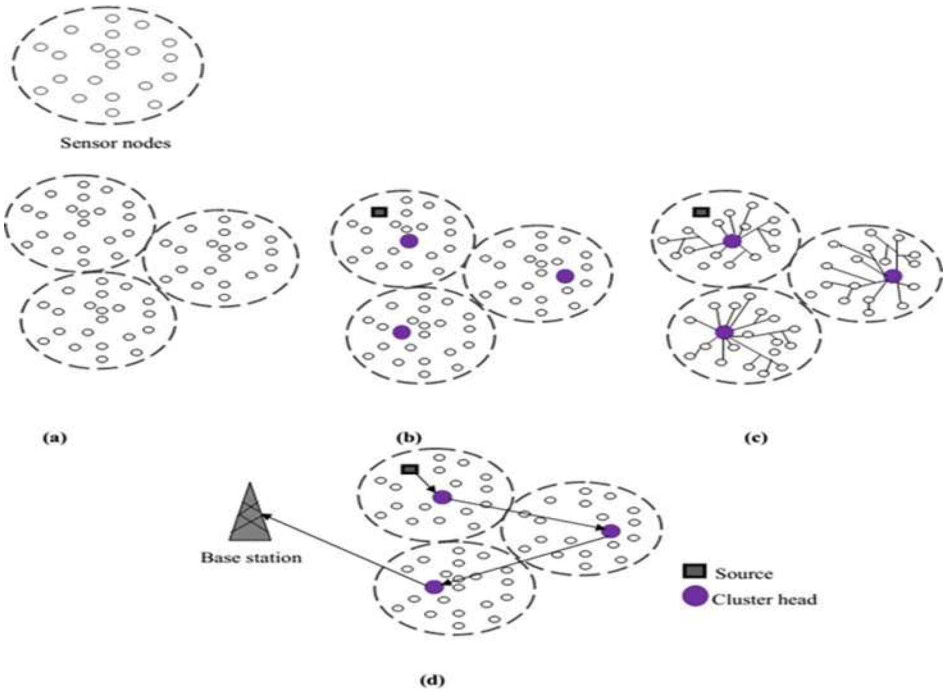

Fig.1 Proposed TCELR protocol (a) Cluster formation using CBSO (b) Cluster head selection using IDS(c) Intra cluster routing using IDS (d) Inter cluster routing for forward sensed data utilizing SSDM.

4. RESULTAND DISCUSSION

The Network Simulator (NS2) is used to model WSN using hybrid swarm-differential search algorithms for energy dependent clusters and life-time conscious routing (TCELR) protocol. Diverse research situations with different number of nodes and rounds analyze the analysis of the routing protocol. The proposed WSN Trusted cluster based energy and life-saving (TCELR) protocol (CBSO) algorithm, enhanced differential search (IDS) algorithm and Scatter Search based decisions (SSDM) algorithm are available. The Chaotic Bird Swarm Optimization and Improved Differential Search algorithm were compared with existing Gravitational Search Algorithm (GSA), super cluster head (SCH), fuzzy inference system. Our proposed model evaluated enormous loads. Here, we using the 400, 600, 800, 1000 and 2000 nodes are randomly performed by the simulator. The nodes are performed on 1000m×1000m network areas. Here, the sensor nodes are clustering form using a chaotic bird algorithm and using of improved differential search algorithm, the signal is forwarding the cluster head, Moreover, the sensed signal is forwards the source to sink node.During this process, the constraints of sensor nodes parameters performance analysis the following graph.

Table .1 Network Simulators of TCELR Settings

Parameters	**Value Assigned**
Number of nodes	400, 600, 800, 1000 & 2000
Routing protocol	TCELR
Antenna	Omni antenna
MAC version	802_11
Packet size	512 bytes
Simulation time	60.000000
Rate of data	500 kb
Initial transmitting & receiving power	0.660w & 0.395
Network area	1000m×1000m
Radio Propagation model	Two ray ground

5.PERFORMANCE ANALYSIS

I.THROUGHPUT: Throughput is described as, the throughput ratio defines the rate of data packets accepted at a destination according to the number of packets generated by the source node for a specified period of time.

Throughput Ratio: Received Data *8

Data Transmission Period

From fig.3, clearly analyze the through put is increases, (TCELR) slightly than the existing method GSA- FCR. From this analysis, the using proposed TCELR, through put ratio is increases and improved. Here, for 600 workloads, corresponding through put value is 43. For 700 workloads, through put value are increased 48 and 800 workloads increasing the through put 53. For 900 workloads, corresponding throughput value is 57. For 1000 workloads, through put values is increase 64. Comparing with existing method, the throughput increased and improved using proposed TCELR protocol.

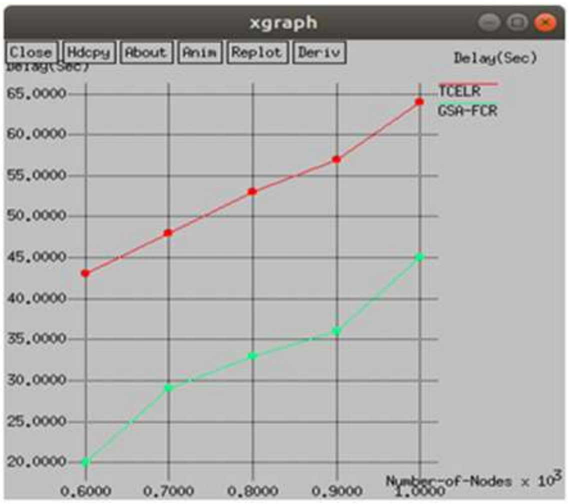

Fig 2. Number of workloads versus throughput

II. NETWORK LIFETIME: It is defined as, it is period of time, which is the energy, runs out from the initial sensor. It is an important property of wireless sensor networks. Here, for 200,400,600,800,1000 workloads corresponding network life time is 50,45,42,39,37. When the loads increases, the corresponding network lifetime also increase. From the figure 4, the network life time is increases 80% to 90% using of proposed TCELR.

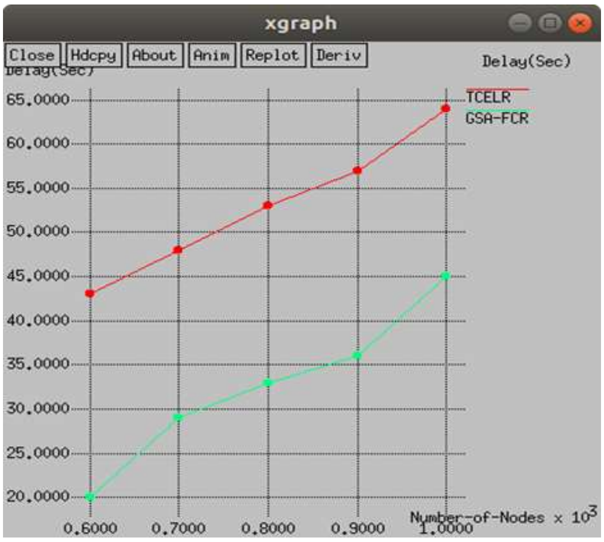

Fig 3. Number of workloads versus Network life time

Comparing with existing method GSA-FCR, the network lifetime is increase in our proposed TCELR method.

III. END TO ENDDELAY:The one way delay or delay is defined as, the time receive from the packet transmitted from source to destination across the network. It can be represented by following formula,

End to end delay N * L

N is represented link in series, which is used for forwarding and storing the links. R is transmission rate and L is packet length. There workloads are 200,400,600,800,1000 and corresponding delay values are 30,27,25,23,22, when workloads values are increases, corresponding delay values decreased from fig. 4, the delay is minimized by using of proposed TCELR. Comparing with existing methods, the delay is decreased rapidly

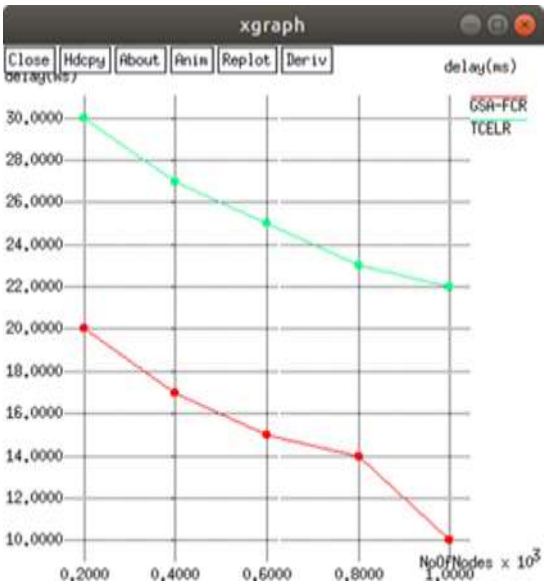

Fig 4. Number of workloads versus Delay

IV. PACKET DELIVERYRATIO:The ratio among the packets received by destination and packets generated by the source.

PDR= Received Packets Generated Packets * 100

Where, packet delivery ratio is increased 99%, by using of proposed TCELR protocol. For given 200, 400, 600, 800, 1000 workloads, the corresponding PDR values are initial PDR value is 70,72,81,89 and final value of PDR is 90. Comparing with existing method GSA-FCR, the improved and higher packet delivery ratio (PDR) is provided by proposedTCELR.

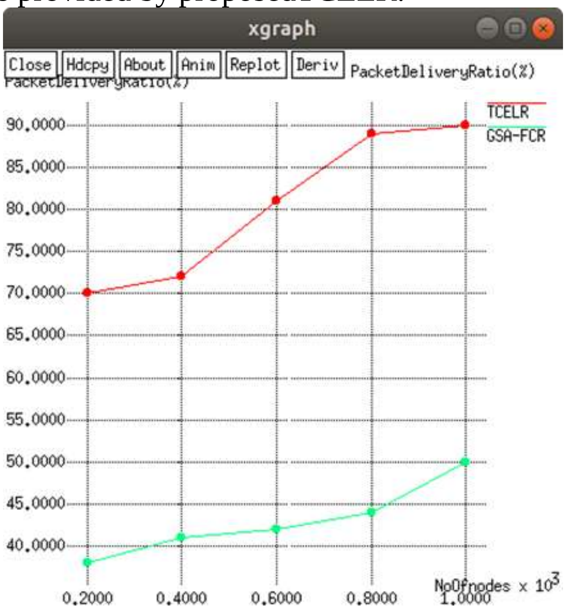

Fig 5. Number of workloads versus Packet delivery ratio

V. PACKET LOSS:The network fails to reach the destination, during more than one packets travelling. This is known as packet loss. The packet loss is may induced by errors in network congestion and data transmission.

Packet loss

No.of .receivedPacketsnot received

Total no. of .packets

Initially, the packet loss value is 45% for 200 workloads. Finally increases 72% for 1000 workloads. For 400, 600, 800 workloads corresponding maximized packet loss values are 47, 55, 63. From analysis of fig.6, the packet loss of proposed protocol is increases the 90% increases than existing GSA-FCR.

Fig 6. Number of workloads versus Packet loss

VI.JITTER:It is also known as packet delay variance. The variance of time delay in milliseconds (ms) among the data packets over a network. The jitter can be calculated by following formula,the jitter values are increased 40, 50, 51,59 also 64 for inputs as well as workloads 200, 400, 600, 800, 1000. From fig.7, the jitter or packet delay variance is increased.

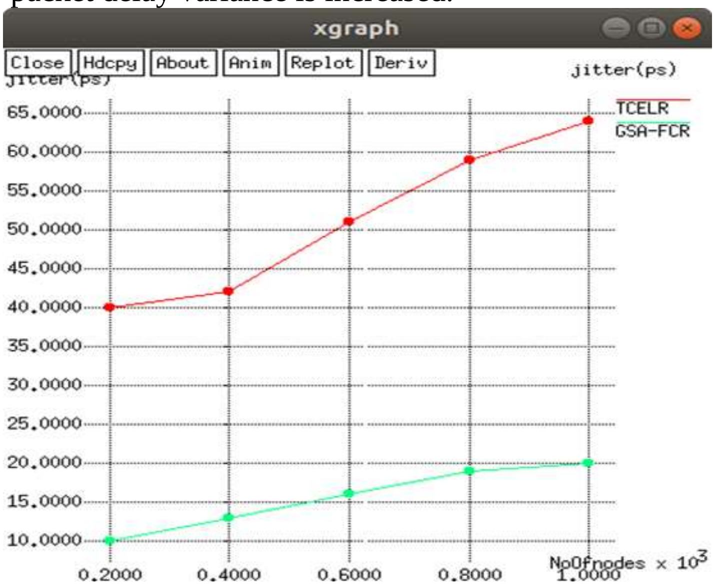

Fig 7. Number of workloads versus Jitter

Where, the jitter is slightly maximized from 50% to reach the 90% contrast with the existing GSA-FCR.

6.CONCLUSION

We suggest a trustworthy energy and life-saving TCELR (cluster-based energy- and life-saving search-algorithm) protocol for WSN. By using of proposed Chaotic Bird Swarm Optimization (CBSO) Algorithm, we clustering the every node and compute the trust degree of every clients of cluster, by using of Improved Differential Search (IDS) Algorithm. Then we computes the highest trust node (cluster head (CH)) and performs intra cluster routing for forward sensed data among the different clusters, by using of Scatter Search based Decision Making (SSDM) Algorithm. The result and performance analysis out of proposed TCELR gives high efficiency and reduce the barriers of existing methods comparing with the existing state-of-art routing protocols in terms of throughput, network lifetime, packet loss rate packet delivery ratio, and end to end delay,jitter.

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