ENERGY ENHACEMENT of NEAHC PROTOCOL WIRELESS SENSOR NETWORK using FIREFLY ALGORITHM

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Abstract

Wireless sensor network consist of sensor nodes which are scattered to sense and to gather data & transmit it to Base Station for processing .NEAHC is energy efficient hierarchical routing protocol toward extend lifespan of the network with combination of clustering approach. The major point of associated in this paper is to maximize lifespan of the network & reduce the energy consumption. NEAHC with using firefly algorithm has shown fairly major success more than accessible WSNs protocol. The lifespan of the network has been approved in this paper by hybridizing the compressed sensing and optimization.

Keywords: Wireless sensor network, NEACH protocol, clustering, firefly algorithm, compressed sensing,.

1. INTRODUCTION

Wireless Sensor Networks (WSNs) can be definite as a autonomic composition and connectionless wireless networks toward observe objective or ecological situation such as high temperature, noise, pulsation strain, action or pollutant toward considerately get ahead of their statistics during the network to a most important position otherwise sink wherever data be able to experimental and analyze. In WSNs, the major task of a sensor node is to intellect the knowledge and sends it to base station into multi-hop situation on behalf of which routing trail is crucial. Sensor node be able to communicate along with them use radio signal. Within homogeneous network, every sensor nodes are indistinguishable within expression of series facility with hardware complication.

2. Technique used

2.1 NEAHC PROTOCOL

Within this literature, Author proposed a narrative energy aware hierarchical cluster-based (NEAHC) routing protocol with two objectives: limiting the aggregate power utilization and guaranteeing decency of power utilization between nodes. Display the hand-off node picking issue as a nonlinear programming issue and utilize the property of arched capacity to locate the ideal arrangement. Additionally review the proposed calculation through performing toward the finish of this paper
NEAHC protocol used to abuse the network life time or reduce aggregate power utilization. The protocol comprises of set up section and steady state segment.

Each non-cluster head node collects sensed information and specifically send it to the cluster head inside its interesting availability agree to TDMA schedule of the cluster. In NEAHC, CH are elected on beginning of outstanding power with some CM (cluster member) nodes with low power switches amongst sleep and dynamic modes are the end goal to adjust power consumption. In NEAHC, power consumption in multi-hop correspondence and fairness among sensor nodes has been upgraded[1] .

Another routing technique for WSNs called NEAHC to augment network lifespan using a combine of a clustering approach and an ideal hand-off selection algorithm. The proposal is to decide an ideal routing way from the source to the target by support the highest residual battery control, least power consumption in multi-hop way, and ideal equality among sensor nodes [1].

2.1.1 NETWORK MODEL

Within part, explain network model used in subsequent segment, which contain the network topology explanation and energy expenditure model.

Suppose the K sensor nodes be irregularly detached in a square area N*N. The Feature of this scenario is as follows:

- Every node is homogeneous and influence controlled.
- Every node is permanent after exploitation.
- Nodes are position oblivious except all nodes can calculate the detachment to other nodes based on the indication potency of getting point.
- Nodes are able to employ control manage to regulate their broadcast rule according to the distance to the receiver.
- The radio replica is used designed for study is the similar as LEACH which be expressed through the subsequent equation:

$$E_{TX}(l, d) = \begin{cases} E_{TX-elec}(l) + l\varepsilon_{fs} & d < d_0 \\ E_{TX-amp}(l, d) = \end{cases}$$

..(1)

$$E_{RX}(l) = E_{RX-elec}(l) = l E_{elec}$$

The network topology of multi-hop communication is shown. Each sensor nodes can be cluster member (CM) of only one cluster, the CH node of each cluster should send the collective data from cluster member to the BS or the CH. Every sensor nodes within the network contain initialize power E_0 with denoted E_i as the remaining power of a node i. $C(n_0, m_1)$ be the communication cost between head node m_1 and n_0 which can be calculated by Eq. (1). We define $H_n = \{N_1, N_2, N_3 \dots N_n\}$ as the set of neighbor head nodes of cluster head node n_0 and $D_n = \{D_{n1}, D_{n2}, \dots D_{nN}\}$ the distance between them. $\overline{E_n} = (\frac{1}{N_c}) \sum_{i=1}^{N_c} E_i$ Is the Average energy of nodes in H_n. We denote nodes set that satisfy the distance between itself and node *m* no more than r_0 as D_m [1].

2.1.2 USER GROUPING ALGORITHM

Consequently during NEAHC, both of outstanding power of next hop nodes and correspondence cost from nodes to the base station will take into consideration when CH chooses their multi-hop path. The algorithm works in round and each of these rounds are estranged into two segments: cluster setup segment and steady state segment.

- **Setup segment**

1) CH collection

Cluster is a gathering of sensor node will go about when a cluster head, and remaining nodes will go about as part nodes. The gathering can be covered or non-covered. The part nodes forward their statistics towards the individual CHs everywhere information is collected by CHs as well as send towards centre base station clearly or by methods for various CHs in the system. Cluster advancement is regularly using the imperativeness spare related with receptors i.e. sensors nearby receptors i.e. closeness to the Cluster Head (CHs). Clustering instrument is the genuine position as for imperativeness saving around WSNs

On the start of setup segment, all nodes chose an arbitrary digit from 0 to 1 and compared it to a threshold T_n, which is designed as:

$$T_n = \begin{cases} \frac{p}{1-p\left[r \bmod \left(\frac{1}{p}\right)\right]} & ;j \in K \end{cases} \quad \dots.(2)$$

Where p preferred proportion of cluster heads is, r is the existing surrounding, K is the places of nodes that contain no develop into the cluster head into previous $1/p''$ rounds. $\alpha > 0$ is a constant. $\left(\frac{1}{1+e^{-\alpha E}}\right)$ Monotone

increasing the function of E_1. If it chooses random number less than then n become the cluster head designed the current rounds r_0 .

2)Sleep mechanism implementation

Once the nodes have chosen themselves to be CHs using the probabilities in Eq. (2), CH node broadcast announcement significance. Each non-CH sink develop its cluster in favour of this round with picking cluster head with aim of require base correspondence power, in perspective of the got summon nature of the advancement from each cluster head and after that transmits link- demand message 2, reverse toward selected cluster head. The CH node will broadcast a summon message3 to its cluster members while the checking complete. At the point when cluster head receive affirmation message from every single dynamic node, it creates a period division different address (TDMA) schedule with transmit an agenda to every dynamic part node. After every one of the clusters have been composed, each cluster head broadcasts a message 4 to its abutting cluster head nodes, this message is consists of the remaining power of head node as well as detachment flanked by cluster head node with base station[1].

- **Steady state phase**

Information transmission occurs during steady state phase. Each non-CH sink collects sensed information and straightforwardly send it to the cluster head inside its exceptional availability agree to TDMA schedule of the cluster. After the cluster head finishes accepting all information from its all part nodes toward the finish of each casing it will total the information, decrease repetitive information and afterward choose a neighbour cluster head node as next hop node.

Within multi-hop transmission phase, cluster nodes check the remaining power of its neighbour head nodes, if $E_{t_1} \geq \overline{E_n}$ and BS $C(n_0, m_1) + C(m_1, N_{BS}) < C(n_0, N_{BS})$ (where, N_{BS}' is BS), neighbour CH node m_1 will be a possible next-hop relay on behalf of node n_0, otherwise node m_1 will not be the relay node and describe a set that include every the possible next-hop communicate nodes designed for node *n* as

$$R_n = \{m_1 | C(n_0, m_1) + C(m_1, N_{BS'}) < C(n_0, N_{BS'}), m_1 \in N_n\},$$

Where $N_n = \{0, 1, \ldots, N\}$

$$P_n = \{m_1 | n_0 \in R_n, m_1 \in N_n\} \qquad \ldots. (4)$$

Node n_0 can decide one otherwise extra cluster head nodes as of R_n subsequently hop based on convinced optimized criterion.. Let $b_{nk'}, \forall k' \in R_n$ denotes the amount of bits transmit as of node n_0 toward node *k'* throughout single-hop broadcast. The equivalent power used on behalf of single-hop broadcast flanked by node n_0 and node *k'* is $b_{nk'} C(n_0, k')$.

Support on the notations above, the entirety numeral bits convey via node *n* is able to followed by uttered as

$$\sum_{k' \in R_n} b_{nk'} = \sum_{m \in P_n} b_{mn} + b_n \qquad \ldots.. (5)$$

Where b_n is the information produce by node *n* itself? In Eq. (5), the gone pass surface is entirety amount bits delivered via node n_0, correct dispense region sum amount bits established with generate via noden_0. The whole com3munication rate for node n_0 can subsequently be intended through

$$C_{n_0} = \sum_{k' \in R_n} b_{nk'} C(n_0, k') \qquad \ldots\ldots (6)$$

There is additionally a requirement on the greatest power for every node $E_n = E_0$, for n_0 = 1, 2... *N*, then the optimization difficulty can symbolize as

$$\left.\begin{array}{c} \underset{s.t}{maximize} \quad b \\ \sum_{k' \in R_n} b_{nk'} = \sum_{m \in R_n} b_{mn} + b \\ \sum_{k' \in R_n} b_{nk'} C(n_0, k') \leq E_n \\ b \geq 0 \end{array}\right\} \quad \ldots\ldots(7)$$

Where E_n is the maximum energy of nth nodes. *It is* a convex optimization difficulty and it also represent in matrix arrange as.

$$\left.\begin{array}{c} \underset{s.t}{b} \\ Rb - PB - 1_n b \\ CB \leq a \\ B \geq 0 \end{array}\right\} \quad \ldots. \ (8)$$

Max

Where $a = [E_1, E_2, \ldots\ldots E_n] \in R^{Nx1}$ the normalize power restriction vector, I_N length-*N* all-one vector, $B = [b_1^T, b_2^T, \ldots\ldots b_N^T]^T$, with $b_n = [b_{nk}]_{k \in R_n}$ = individual a distance end to end $|R_n|$editorial vector contain statistics of bits forward through node *n* to the dissimilar next-hops, and $|R_n|$ is the cardinality of the set R_n .. The whole process on NEAHC works as follows:

- **Setup phase**

1. If node $\in CH$ then
2. Broadcast message msg_1
3. Else
4. Send message msg_2 to nearest CH
5. CHs picked out N_s low energy nodes from the join nodes
6. For *k*=1 to N_s do
7. If $D_k = \varphi$ then
8. Add node *k* to the sleeping nodes list; delete node *k* from all sets *D* in the cluster
9. Broadcast msg_3
10. While node $\in CM$ then
11. Check the node ID list of msg_3
12. If node's ID msg_3then
13. Node switch into sleep-mode
14. Else
15. Send ACK message back to CH
16. CH send TDMA schedule to CMs according to the ACK message and broadcasts msg_4 to neighbor CHs

- **Steady state phase**

1. Initialize: {1, 2.....N_s } *is* the aggregate of neighbour cluster
2. Heads of a CH node, initially the is empty, $R_n = \varphi$
3. If node $\in CH$ then
4. Receive data from CMs and aggregate the data.
5. Check the residual energy of neighbour CHs and calculate *n E*
6. For *k*= 1 to N_s do
7. If $E_i \geq \overline{E_n}$ &&) $C(n,m) + C(m,N_{BS}) \leq C(n,N_{BS})$
8. Then
9. Add node *m* to *n R*
10. If $R_n = \varphi$ then
11. Set N_{BS} as the next hop
12. Else choice next hop according to the answer of Eq. (8)
13. Else
14. Send sensed data in assigned slot.

2.2. COMPRESSED SENSING

In WSNs, core purpose of compression is to diminish the power consumption. Sensing testing, calculation, with correspondence is the three procedures, which are generally in charge of the energy expenditure within WSNs. So some system that straight otherwise ultimately reduce individual otherwise additional of the functions even as maintain some necessities (e. g. preconception, difficulty, etc.) be able to measured as compression in WSNs. Compressed realizing (CS) algorithm is an additional perspective into transmission processing especially in favour of information acquisition compressed sensing is an beneficial at whatever point transmission is light in a known basis, dimension is expensive, and count quantity at the authority end is reserved.

LZW compress ( )

1. Enter all letters in table
2. Initialize string s to first letter of input
3. While any input left
4. Read character c
5. If s+c is in the table
6. s=s+c
7. Else output codeword(s)
8. Enter s+c in the table
9. s=c
10. Output codeword(s)

2.3. FIREFLY ALGORITHM

Avoid the firefly algorithm has turn into a gradually more significant instrument of Swarm Intelligence that has been useful within approximately every part of optimization, with executive perform. FA is one of recent swarm intelligence technique refined into Yang in 2008 and is sort of pretending, nature-inspired, meta-analytical protocol which is capable of constructive inside favour of resolving the rigid accumulation exertion (also NP-hard problems). These kinds of algorithm belong to pretending algorithms. It is influenced via alternating lighting of fireflies within characteristics. Heuristic means `towards locate or `towards determine alternatives by examination and fault. FA is handled by three parameters: randomization variables, magnetism, and the assimilation coefficient.

$$I^{t}(r_0) = I^{t}_{0} e^{-\gamma r_0^2} \quad \text{….. (1)}$$

I^{t} = luminosity strength,

I^{t}_{0}= luminosity strength at primary or novel brightness amount,

γ= the illumination assimilation coefficient

r_0 = reserve flanked by firefly i'' and j''

Magnetism is proportionally toward the brightness amount seen with the another fireflies, thus pleasant appearance is β

$$\beta^{t} = \beta^{t}_{0} e^{-\gamma r_0^2} \quad \text{…… (2)}$$

β^{t}_{0}= Attractiveness at r_0 is 0

The detachment among two fireflies can classify by Cartesian distance.

$$r_{i_0 j_0} = |x_{i_0} - x_{j_0}| = \sqrt{\sum_{k=1} d \left(x_{i_0 k} - x_{j_0 k}\right)^2} \quad \text{… (3)}$$

Firefly i is attracted toward the more attractive firefly j'', the movement is defined as:

$$\Delta x^{t}_{i} = \beta^{t}_{0} e^{-\alpha r_{ij}^2} \left(x_j^{p} - x_i^{p}\right) + \beta \beta_{t'} \quad x_i^{p+1} + \Delta x^{t}_{i}$$

… (4)

In this paper, the ideal methodology is created by considering the decency limitations: every one of the nodes convey an equivalent measure of self-data to the BS to guarantee the reasonableness among the nodes, i.e. $b_1 = \cdots = b_n$.

Algorithm: Pseudo code of the Firefly algorithm

1. Start
2. Introduce algorithm parameter:

3. MaxGen: maximal amount of eras
4. γ_0^n : brightness ingestion coefficient
5. r_0^n: The specific separation from the light source
6. d_0^n: area liberation
7. Describe the aim utility of $f(x^n)$ where $x^n = (x^n_1,\ldots,x^n_d)$
8. Produce primary inhabitants of fireflies otherwise $x^n_i (i = 1,2,\ldots,n)$
9. Determine the brightness strength of I^n_i at x^n_i via $f(x^n_i)$
10. While$(t1 < MaxGen_n)$
11. For $i^n = 1$ to n_n(all n_n fireflies);
12. For $j^n = 1$ to n_n(n_n fireflies)
13. If $(I^n_{j1} > I^n_{j1})$,
14. Shift firefly i^n toward j^n by
15. End if
16. Attractiveness vary through detachment r^n by exp'$[-\gamma r^2]$;
17. Estimate novel resolution with update luminosity concentration;
18. End for i^n;
19. End for j^n;
20. Categorize fireflies with locate existing top;
21. End while;
22. Send procedure result and idea;
23. finish process

3. RELATED WORK

WANG KE et al.[3] proposed a novel energy aware hierarchical cluster based (NEAHC) routing protocol with two goal: minimize the total power utilization and ensuring equality of force expenditure among nodes. The proposed network model the relay node chooses the problem as a nonlinear encoding difficulty and use the property of convex meaning toward find the optimal solution. Iztok Fister et al. [15] proposed a Firefly Algorithm: A concise appraisal of intensifying Literature. Firefly algorithm (FA) was produced by Xin-She Yang within 2008 and turned into a critical instrument for taking care of the hardest improvement issues in every aspect of streamlining and in addition building polish. Xin-She Yang et.al.[41] proposed Firefly calculation, Levy flights and Global Optimization. The proposed systems are basically faster (now and again by solicitations of size), and especially in substantial scale settings. Gilang Kusuma Jati et.al [43] proposed Evolutionary Discrete Firefly Algorithm for Travelling Salesman Problem. Xin-She Yang et.al [51] proposed Multi-target Firefly Algorithm for Continuous Optimization. In this paper, Amplify the starting late developed firefly calculation to take care of multi-target upgrade issues. Santar Pal Singh et.al [37] proposed a review on cluster based routing protocol in wireless sensor networks. In this work, Surveys the status of research and described the specific clustering systems. B.Manzoor et.al[37] proposed Q-LEACH: A New Routing Protocol for WSNs. In proposed thought, recognize constrained coordination in each sectored territory. The essential purpose of this paper is to redesign existing tradition with an authoritative focus on that more generous and upgraded result can be refined.

4. PROPOSED METHODOLOGY

1: computerize network
2: organize network at random within pretend sensor field.
3: Be appropriate NEAHC toward estimate points
When all nodes receive packet, determination analyse their own energy-level (EL) by function:

$$EL1'(i) = \lceil \text{Remaining Energy}(l_0^n)/\alpha^n \rceil \quad (1)$$

4: Be appropriate clustering toward develop cluster heads.
Node increase hooked on CH in favour of current rotation about but number with a reduction of subsequent threshold

$$T(i) = \begin{cases} T_n = \begin{cases} \frac{p}{1-p\left[r \bmod \left(\frac{1}{p}\right)\right]} & i \in K \\ 0 & \text{otherwise} \end{cases} \end{cases} \quad (2)$$

Where p1 is best for percentage of CHs within each round r' is current node and i_0 stand used each node wants to become CH round. $G1'$ is set nodes with the intention of comprise not firefly n selected as CHs in previous $1/P$ rounds

Step 5: Relate firefly optimization on clusters toward discover finest route with CHs to sink.

- Assigning in use fireflies to the victuals source:

$$x'(i_0) = x_i'(i_0) + r'(x'_r(i_0) - x'_k(i_0)) \quad (3)$$

- Association of spectator ended via following equations:

Possibility of selecting nectar source:

$$p'_i = \frac{F'(\theta_i)}{\sum_{k=1}^{n} F'(\theta_k)} \quad (4)$$

$p'_i(\theta_i)$: The possibility of select ith engaged firefly

S'': The number of employed fireflies

θ'_i: The position of the i[th] in use firefly

$f1'(\theta'_i)$: The strength rate

Calculation the new site:

$$x_{ij}(t1' + 1) = \theta_{ij}(t1') + \emptyset(\theta_{ij}(t1') - \theta_{kj}(t1')) \quad (5)$$

x_i'=The position of spectator firefly

$T1'$: Iteration number

θ_k : Arbitrarily selected in use firefly

J1 : Dimension of explanation

$\emptyset(\theta_{ij}(t1) - \theta_{k1j}(t1))$: A series of random variable in the range .

■ Association of the explore firefly

Movement of explore fireflies follows equation

$$\theta_{ij} = \theta_{j\min} + r_1(\theta_{j\max} - \theta_{j\min}) \quad (6)$$

r 1: Accidental quantity and r1 $\in [0,1]$

Step 6: Evaluate and update energy consumption.

$$d1^t_{to\,CH} = \frac{M}{\sqrt{2\pi}} \quad d^t_{toBS} = 0.765 \frac{M}{2} \quad (7)$$

$$E_{tx1}(l'', d1') = \begin{cases} l'' E_{elec1} + l'' \varepsilon_{fs} & d1^{n2}, d1'' \le d1''_0 \\ l'' E_{elec1} + l'' \varepsilon_{mp} & d1^{n2}, d1'' \ge d1''_0 \end{cases} \quad (8)$$

Where $d1_0 = \sqrt{\frac{E_{fs1}}{E_{mp1}}}$

M is area of WSN

E_{fs1} is magnification power of liberated space

E_{mp1} is augmentation power while region is extra.

Step 7: confirm whether every nodes turn into dead, condition yes subsequently illustrate network life span with come again as well maintain to step 3.

$$Dead = \begin{cases} 1 & \text{if } s(i).Energy \le 0 \\ 0 & \text{otherwise} \end{cases} \quad (9)$$

$$Termination' = \begin{cases} 1 & \text{if } countdead1 == n1 \\ 0 & \text{otherwise} \end{cases} \quad (10)$$

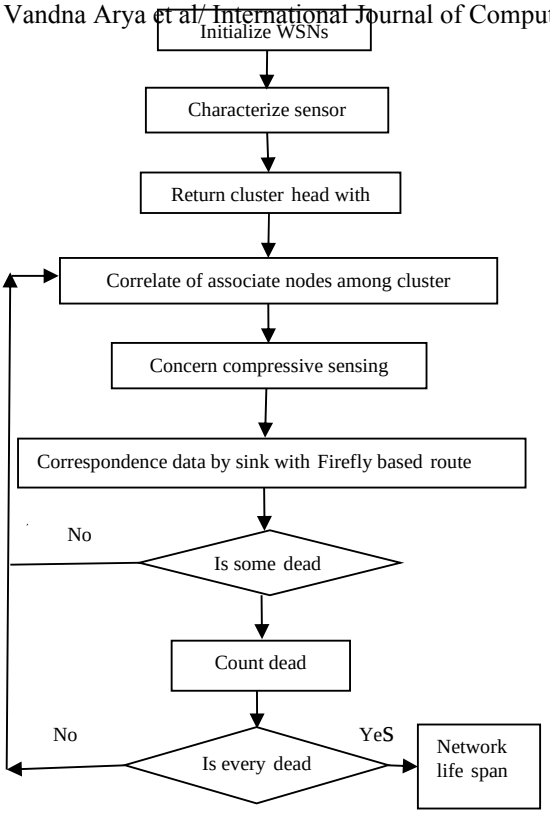

Fig 1. PROPOSED METHODOLOGY

5. RESULT AND DISCUSSION

The proposed algorithm will be considered from the energy enhancement with firefly algorithm using NEAHC protocol applying dissimilar constraints including first node dead , Network lifespan, Packets sent to BS, Residual energy, packet sent to CH, data delivery packet. The subsequent data demonstrates the comparison regarding response to diverse parameters. The result demonstrates the proposed solution provides improvement over active approaches. After the results, we compared the proposed solution against the current procedures.

Parameter	Value
Area (x, y)	$100 * 100$
Base Station (x, y)	$50 * 150$
Sink (x, y)	50*150
Node (n)	200
Probability (p)	0.1
Initial Energy (I_0)	0.01
Transmitter _energy	50
Receiver _energy	50
Massage size	4000
Fraction of Advance node	0.3
Data aggregation energy	5
Amplification energy	0.0013
Sleeping percentage of (CM)	10
Maximum lifespan	4000
No of round	5000

5.1 STUDY OF RESULTS

- **FIRST NODE DEAD TIME**

Bar graph clearly shows that numeral of rounds in favour of first node dead into case of proposed firefly with NEAHC is extra than Existing NEAHC.

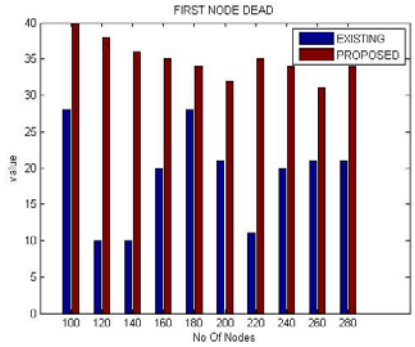

Fig 2 FIRST NODE DEAD

Bar graph clearly shows that number of rounds in favour of all node dead in case of proposed firefly with NEAHC is extra than Existing NEAHC

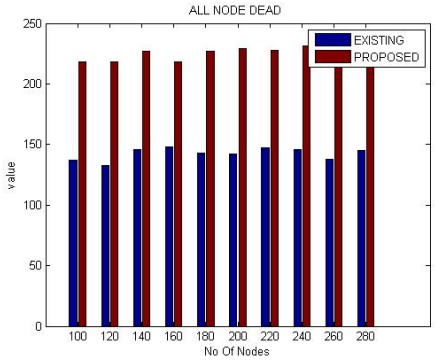

Fig 3 NETWORK LIFESPAN

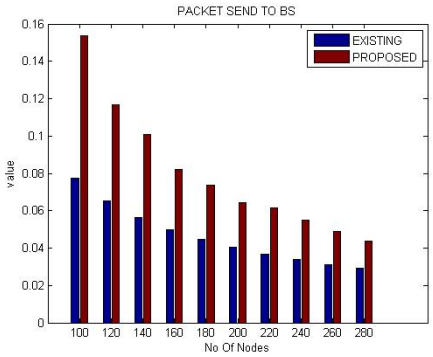

Fig 4 PACKET SENDS to BS

Bar graph clearly shows that the number of rounds for the packet send to BS in case of proposed firefly with NEAHC is extra than Existing NEAHC

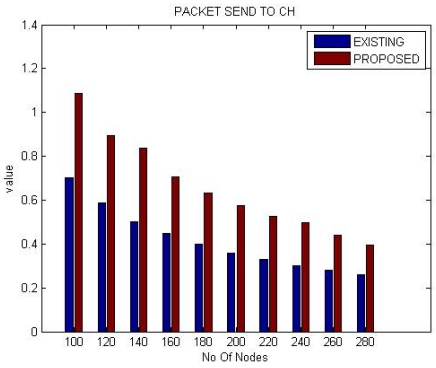

Fig 5 PACKET SENDS to CH

Bar graph clearly shows that the number of rounds in favour of packet send to CH in case of proposed firefly with NEAHC extra than Existing NEAHC

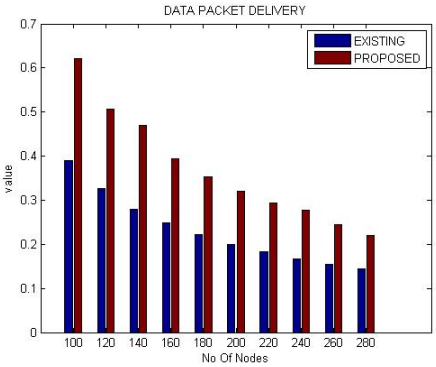

Fig 6 DATA PACKET DELIVERY

Bar graph clearly shows that the number of rounds for the data packet delivery in case of the proposed firefly with NEAHC is more than the Existing NEAHC

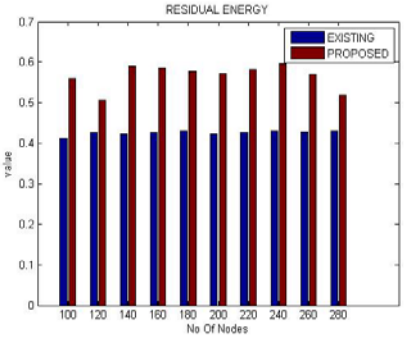

Fig 7 RESIDUAL ENERGY

Bar graph clearly shows that the number of rounds for the residual energy in case of the proposed firefly with NEAHC is more than the Existing NEAHC

5.2 RESULT IN TABULAR

FIRST NODE DEAD

Node	Existing	Proposed
100	28	40
120	10	38
140	10	36
160	20	35
180	28	34
200	21	32
220	11	35
240	20	34
260	21	31
280	21	34

TABLE 1 FIRST NODE DEAD

It obviously shows that in case of proposed firefly with NEAHC protocol number of rounds for first node dead is extra than existing NEAHC

ALL DEAD NODES

Node	Existing	Proposed
100	137	218
120	133	218
140	146	227
160	148	218
180	143	227
200	142	229
220	147	228
240	146	231
260	138	229

TABLE 2 ALL DEAD NODES

It definitely shows that the number of rounds for all nodes dead in case of the proposed is more than the Existing NEAHC.

RESIDUAL ENERGY

Node	Existing	Proposed
100	0.4132	0.5595
120	0.4274	0.5064
140	0.4223	0.5897
160	0.4272	0.5857
180	0.4316	0.5781
200	0.4225	0.5730
220	0.4269	0.5821
240	0.4301	0.5963
260	0.4282	0.5702

TABLE 3 RESIDUAL ENERGY

It obviously shows that the numbers of rounds for residual energy in case of the proposed are more than the Existing NEACH protocol

PACKET SENT TO BS

Node	Existing	Proposed
100	0.0776	0.1536
120	0.0652	0.1165
140	0.0565	0.1008
160	0.0499	0.0820
180	0.0448	0.0736
200	0.0403	0.0642
220	0.0367	0.0613
240	0.0339	0.0552
260	0.0311	0.0487
280	0.0291	0.0436

TABLE 4 PACKET SENDS TO BS

It obviously shows that numbers of rounds for Packet to BS in case proposed are extra than Existing NEACH protocol

PACKET SENDS TO CH

Node	Existing	Proposed
100	0.7037	1.0885
120	0.5879	0.8962
140	0.5020	0.8377
160	0.4463	0.7047
180	0.3998	0.6317
200	0.3574	0.5743
220	0.3286	0.5270
240	0.3012	0.4988
260	0.2792	0.4402

TABLE 5 PACKETS SENDS TO CH

It obviously shows that the numbers of rounds for Packet to CH in case of the proposed are more than the Existing NEACH protocol

DATA PACKET DELIVERY

Node	Existing	Proposed
100	0.3907	0.6210
120	0.3266	0.5064
140	0.2792	0.4693
160	0.2481	0.3934
180	0.2223	0.3527
200	0.1988	0.3193
220	0.1826	0.2941
240	0.1676	0.2770
260	0.1551	0.2445

TABLE 6 DATA PACKET DELIVERY

It obviously shows that the numbers of rounds for data packet delivery in case of the proposed are more than the Existing NEACH protocol

6. CONCLUSION

In this paper a novel hybrid approch has been used to improve the energy of exiting NEAHC and Firefly algortihms. We have enhance the existing Novel energy aware hierarchical cluster based (NEAHC) routing protocol to minimize the total energy consumption & fairness of energy utilization between the nodes.In many

of the earlier approch the lossless compression has been neglected by the most of the researchers .The proposed method has been designed as well as implemented in MATLAB2010 wireless data analysis toolbox. There are various parameters that has been considered for exprimental purpose i.e. Network lifetime(all dead nodes),first nodes dead, data packet delivery,packet sends to CH,packet sends to BS and residual energy. The comparison has demonstrated that the algorithm provides optimal path between the nodes due to the enegy utilization between the node is more while transferring the data. Hence main improvement in network lifetime. The proposed technique outperforms the existing technique. In near future to enhance further by using the different optimization techniques like butterfly optimization,Gray wolf optimization etc, as well as also consider the other compressed sensing technique which will also be considered to reduce the energy utilization rate further.

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