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FUZZY ROUTING FOR WIRELESS SENSOR NETWORK

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Abstract

Proposed work focuses on the reduction of packet size. This reduces the possibility of congestion. However dynamic three dimensional fuzzy routing is already in existence. It focuses on enhancement of lifetime of network. But proposed work increases the success rate of packet delivery ratio. Proposed work improves the performance of wireless sensors that implements security monitoring, environment monitoring.

Index Terms – Routing protocol, Wireless communications, Distance-vector, Autonomous, Environmental

I. INTRODUCTION

Wireless communication is regularly achieving remarkable consideration. Some developed applications[33] that are using sensor networks consists of wild animal tracking, security monitoring, environmental monitoring, military issues & structural systems. In order to detect external environmental conditions several sensors such as humidity, light & accelerator have been generally used in network. Nodes may be considered as static or mobile in Wireless sensor network applications [20]. Generally a node dispersed in Wireless Sensor Network consists of lot of components. It is composition of power generator, processing, sensing, and transmitting.

II. EXISTING PROTOCOL

Wherever Times is specified, Times Roman or Times New Roman may be used. If neither is available on your word processor, please use the font closest in appearance to Times. Avoid using bit-mapped fonts. True Type 1 or Open Type fonts are required. Please embed all fonts, in particular symbol fonts, as well, for math, etc. The target of existing protocol is the enhancement of lifetime of network & packet delivery ratio to be increased. The network lifetime is enhanced by taking Euclidean distance in existing fuzzy system for transmitting packets to node nearest to

destination while the delivery ratio is increased by considering number of neighbours of every neighbouring node for transmitting packets [10] to neighbouring node that has more neighbours as compared to other neighbouring nodes. Though traffic load of network affects the network lifetime & packet delivery ratio, it has been taken to be the output parameter of existing fuzzy system. Further because of symmetric energy distribution & dissemination of traffic load on network, chosen node is selected by a list of neighbours called candidate nodes. They have high residual energy and more available buffer size. Parameters used in this protocol can be easily measured by localization, transmitting request to send RTS & clear to send CTS packets that has been used by IEEE 802.11, battery level access & count of packets present in buffer of nodes .

Traditional Network model

Traditional work considers a network that comprises of nodes & immobile base station such that nodes are aware of their location. Usually nodes were deployed in such a pattern that they could not be organized as clusters. Their battery need not be replaced or remotely recharged so they had batteries having equal & limited energy σ. By broadcasting RTS packet & receiving CTS packets from its neighbours, the nodes could find or change its neighbourhood data. Link quality j in every node is assumed same. To determine the geographical coordinates of nodes, the global positioning system was used. 3D [1] localization was usually used in DFRTP protocol and it could be provided after installing external 3D accelerometer like MMA7260Q accelerometer on standard nodes. Nodes moved throughout network. They used random waypoint RWP mobility model so as to move nodes throughout network. Nodes were switched to off mode if they didn't have any sensed data packet or buffered packet. The Nodes are generally switched to on mode after sensing an environmental data.

Packet Format

Data packet & control packet are used in proposed protocol. To transmit environmental data to destination, data packet is used consisting six elements. Buffer structure of nodes consists of same elements like data packet to transmit packets throughout network. Here in case of data packet format, T_DATA value indicates the packet type to identify packet format by neighbour nodes and to transmit RTS & CTS packets among nodes to report neighbourhood information, control packets are used which comprises of seven elements. Furthermore, to identify RTS packets, packet type is set by T_RTS value & to identify CTS packets received from neighbours, packet type is set by T_CTS value.

Existing fuzzy system

Selected node is chosen from among CNs using fuzzy decision making. Input parameters are Distance & number of neighbours & output parameter is traffic probability. Packet loss will be decreased considerably if the number of neighbours are more. Let input 'distance' be represented by D(n), input 'number of neighbours' be represented by N(n), & output 'traffic probability' be represented by T(n) for node n. The values of D(n) & N(n) are used to determine the value of T(n).

Limitation of Existing Model

Existing model has focused on boosting the lifetime of network & increasing the delivery ratio. But they did not try to reduce size of packet. In Existing model due to large sized packet there is

probability of congestion & transmission delay occurs.
The other limitation is that packet is transmitted as it is so there is lack of security too.

Proposed Work

Present work focuses on reduction of packet size in order to reduce probability of congestion.
Because energy is distributed symmetric & traffic load is disseminated over network so there is minimum load on network during packet transmission.

Packet Modification

Data packets & control packets are used in existing model. To transmit environmental data to destination, data packet is used, which consists of six elements. Also, the Buffer structure of nodes comprises the same elements as data packet for transmitting packets in the network. To identify packet format by neighbour nodes , Packet type is set by T_DATA value in data packet format.
In proposed work T_Data value would be replaced by XT_Data using encoding scheme. Here we would check frequency of repeated data in T_Data & then replace them with corresponding data having less length before packet transmission.
The size of packet automatically gets reduced. Then packets would be grouped using clustering base in fuzzy system.
In order to transmit RTS & CTS packets among nodes to report neighbourhood information , control packet is used which comprises of seven elements. In this format, to identify RTS packets , the packet type is set by T_RTS value & to identify CTS packets received from neighbours , packet type is set by T_CTS value. After receiving xT_Data , it would be decoded to T_Data.

III. PROPOSED ALGORITHM

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1. Data packet & control packet are used in the beginning.
2. Reduce Data Packet by replacing T_Data with xT_data.
3. Select CNs from among neighbours with (RE>REavg) & (ABS>ABSavg)
4. Specify NP based on sender node, SR & base station & determine distance between CN & np, Determine number of neighbours at CN
5. Perform Fuzzification using Fuzzy set, cluster Base , Rule base in inference Engine.
6. Perform defuzzification of data.
7. Get minimum T(n) & chose node accordingly

Packet Size Reduction Logic

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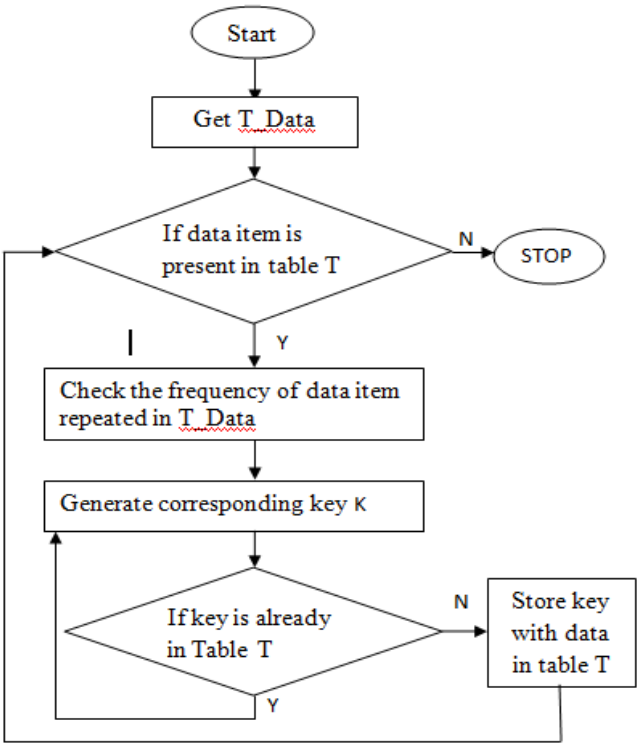

Fig 1. Packet Size Reduction Logic

Benefits of Proposed Model

Proposed model does not focus only on boosting of network lifetime [11 4] & growing packet delivery ratio. It reduces size of packet. In Proposed protocol due to reduced sized packet there is less probability of congestion & transmission delay. The other benefit is that packet is not transmitted as it is to there is more security too

Proposed Model

The model consists of better routing [2 14] features and after reduction of size of packet & grouping of packet model has become far better.

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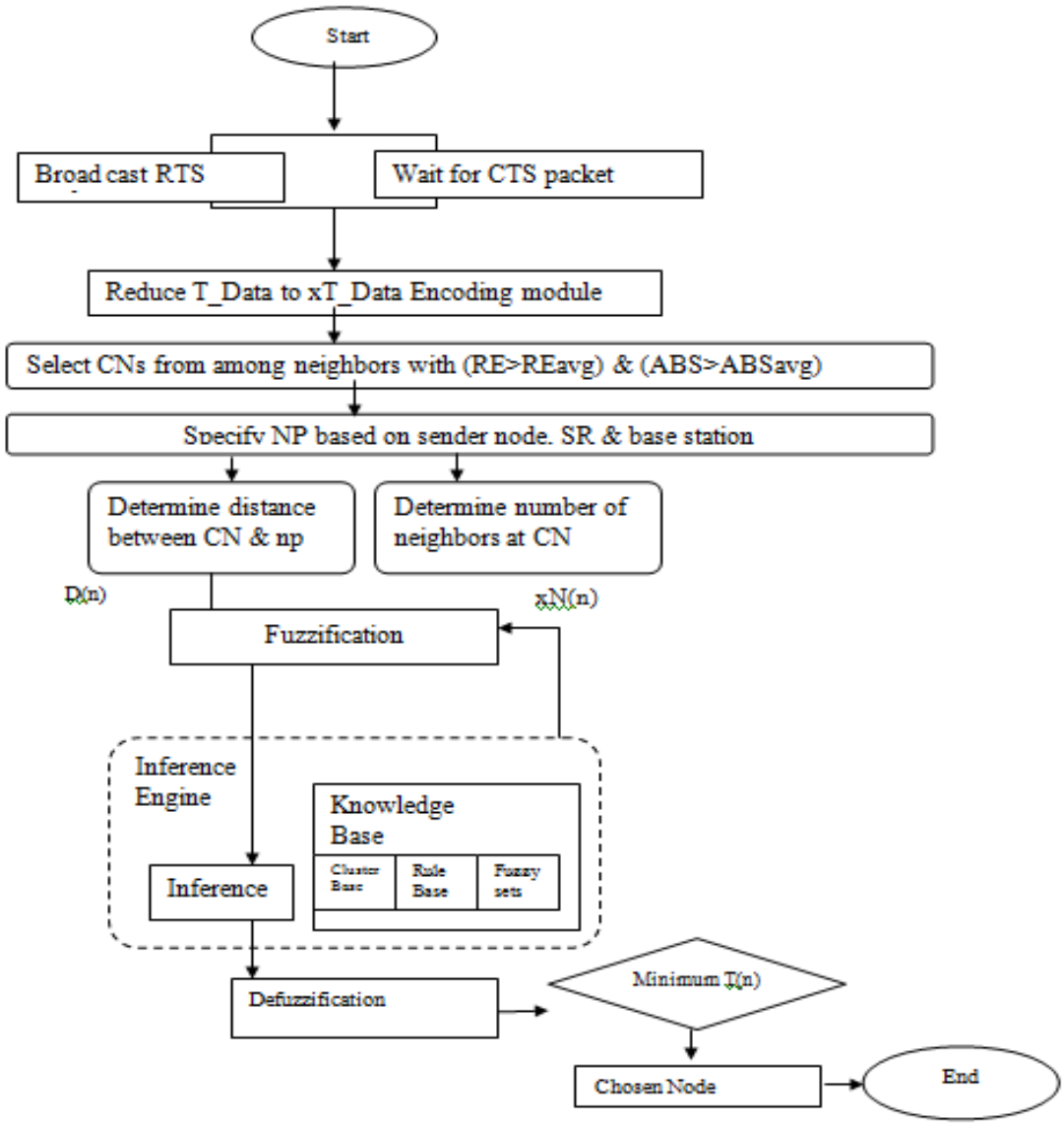

IV. PACKET SIZE REDUCTION

In this implementation packet transmits environmental data to destination. The content of packets has been replaced by corresponding small string so as to reduce packet size to be transmitted on network.

PROCEDURE

Step 1: Read content of file.

Step 2: if data item is present it table then do nothing

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Step 3: Check frequency of data item repeated in Data.
Step 4: Generate corresponding key X
Step 5: If this key is available in database then regenerate it
Step 6: store key with string in database

FACTORS INFLUENCED BY PACKET SIZE REDUCTION
When size of packet get reduced then performance of network get boost.

The following factors are influenced by packet size reduction :

1. Packet Transmission speed increases
2. Probability of Congestion get reduced
3. Error rate get reduced as size of packet get reduced.

V. RESULT AND DISCUSSION

Comparative analysis of data transfer in case of traditional & proposed work is presented here.

Following chart represents time taken during traditional & proposed work after reducing packet size in Dynamic 3D Fuzzy Routing[1 19]

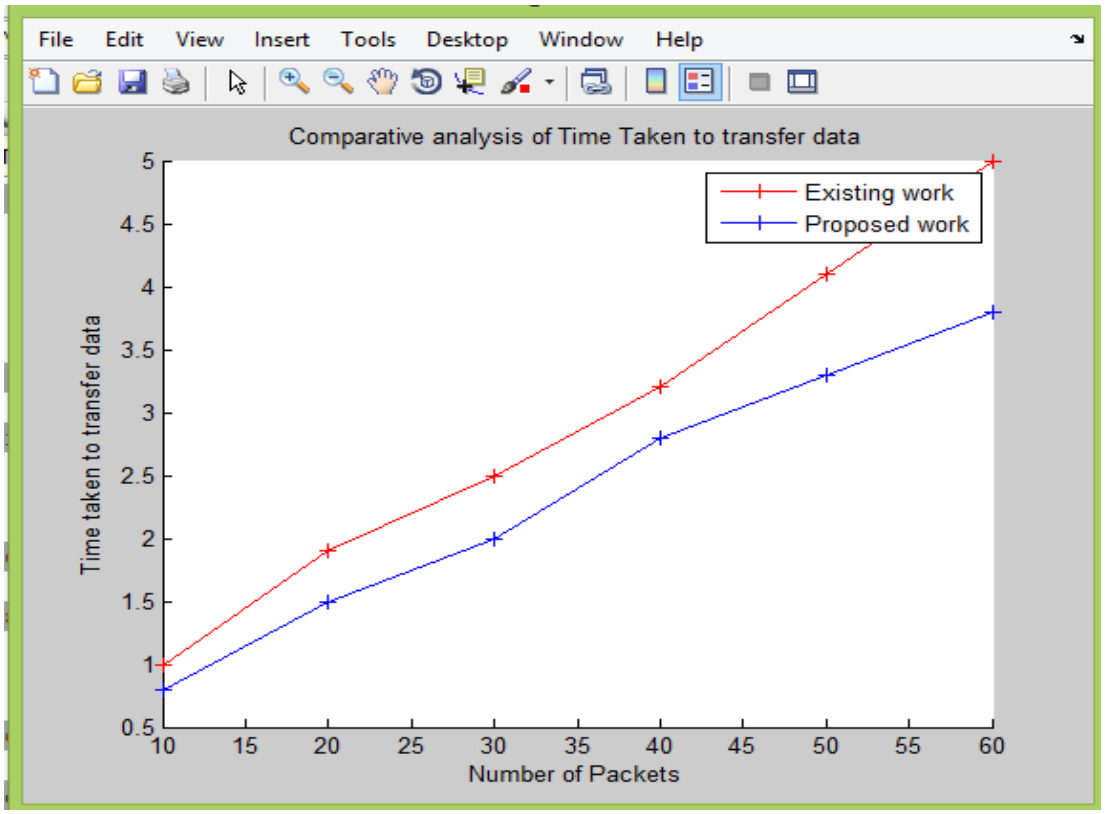

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Fig 1 Time Taken during data transfer

Following chart represent Packet size in traditional & proposed after reducing packet size in Dynamic 3D Fuzzy Routing

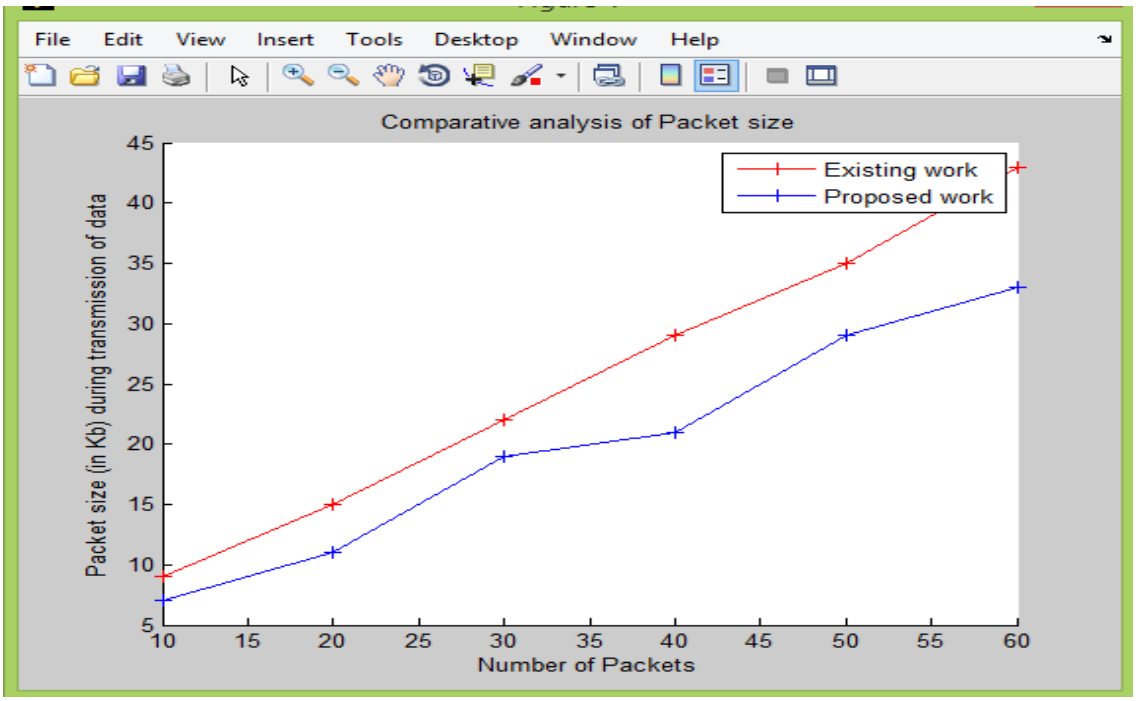

Fig 2 Comparison of Packet Size

Following chart represent error rate in case of traditional & proposed after reducing packet size in Dynamic 3D Fuzzy Routing

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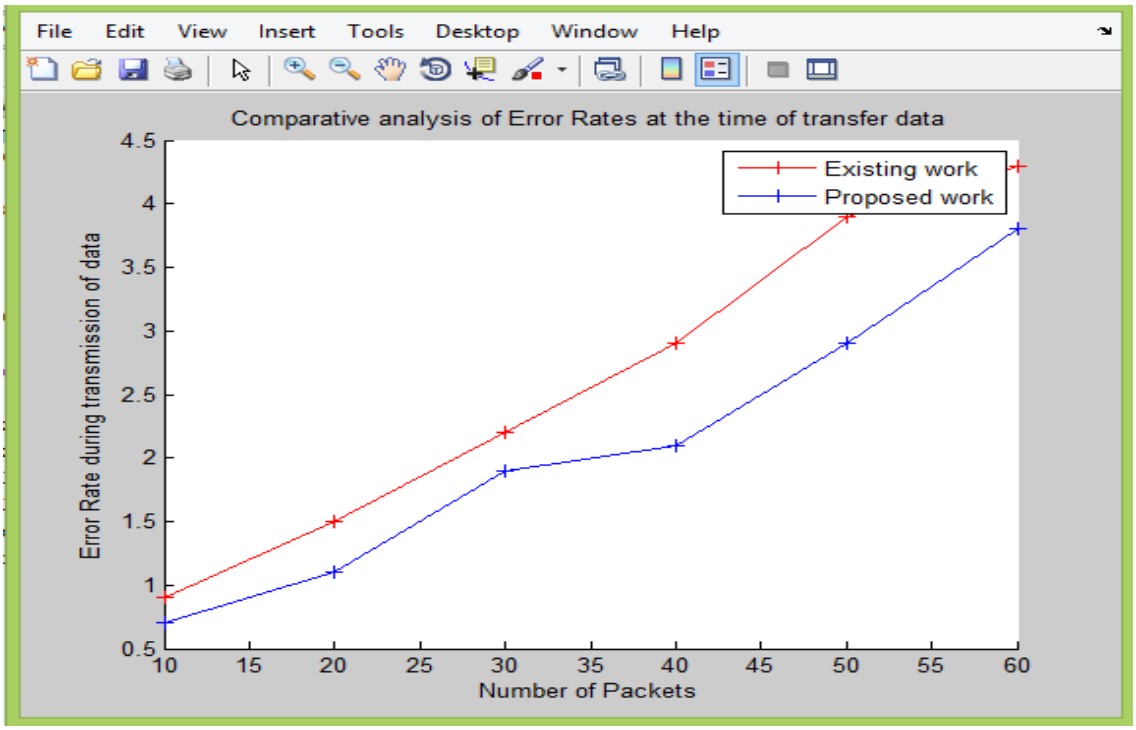

Fig 3 Error Rate Comparison

Following chart represent Queuing delay during traditional & proposed after reduce ng packet size in Dynamic 3D Fuzzy Routing[2]

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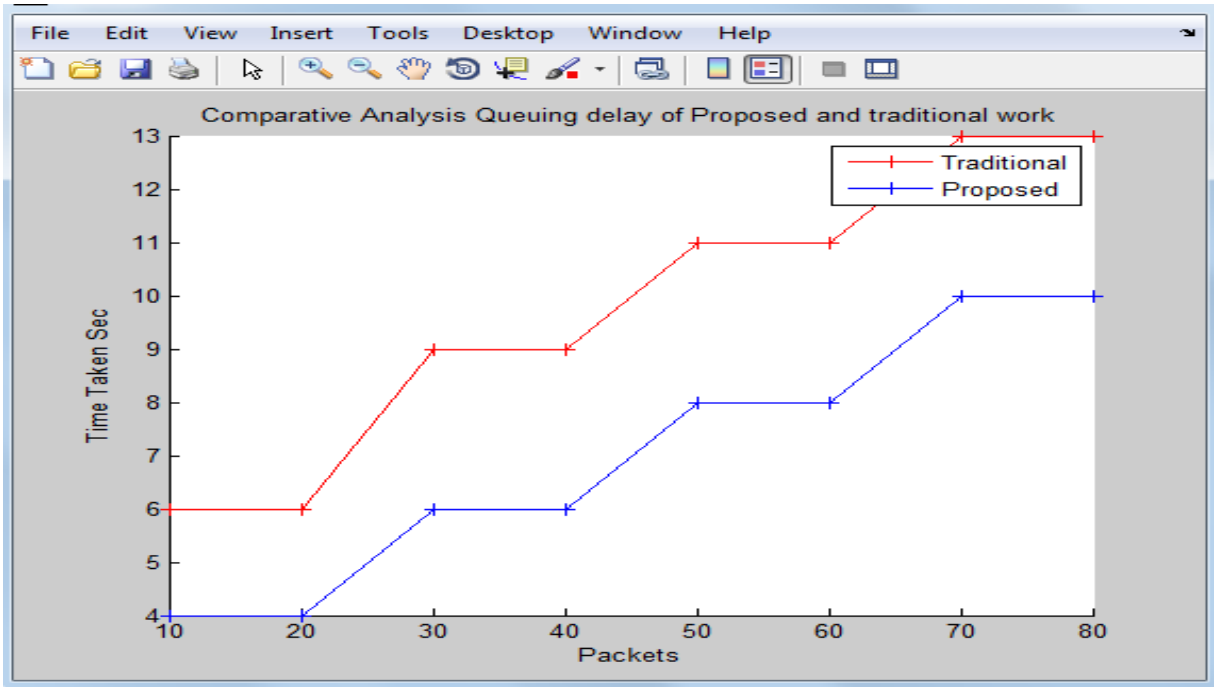

Fig 4 Queuing Delay comparison

Following chart represent packet dropping during traditional & proposed after reducing packet size in Dynamic 3D Fuzzy Routing

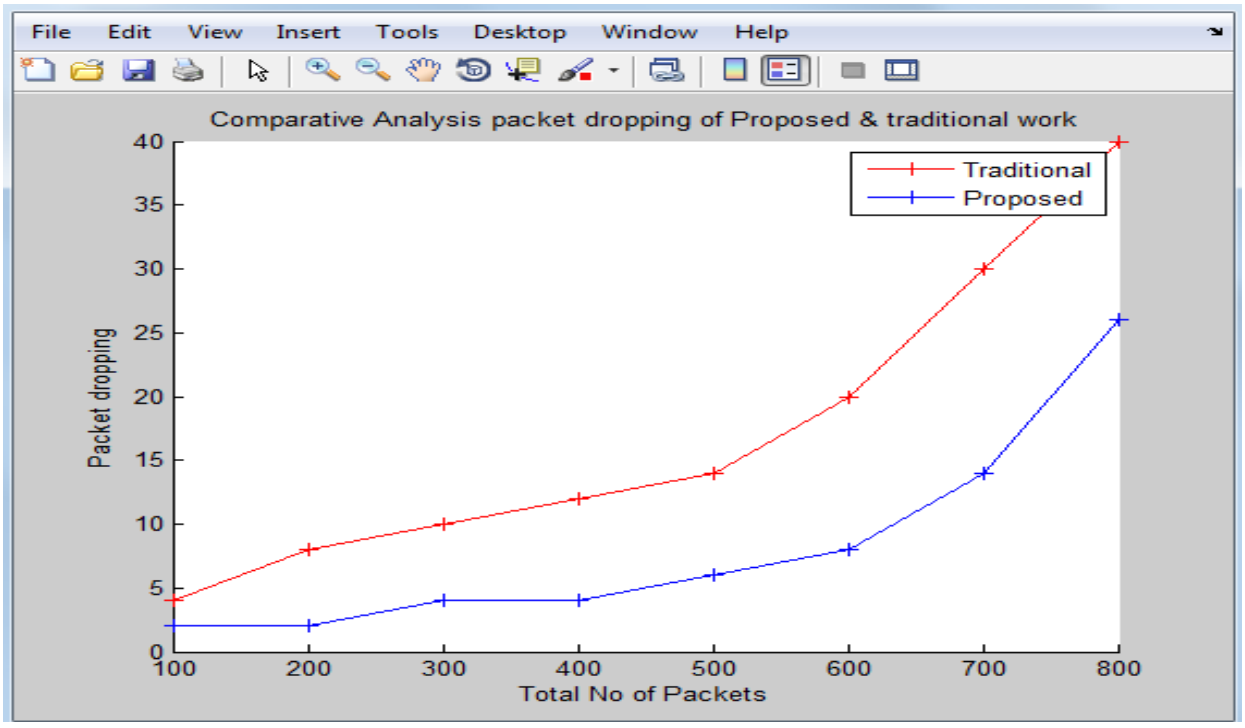

Fig 5 Packet Dropping comparison

VI. CONCLUSION

From the above results it is clear that the Error rate, packet dropping, queuing delay and packet size has been reduced by proposed work as compared to traditional work.
The existing fuzzy system calculates traffic probability [1] of every neighbour that is based on their distance as well as count of nodes. Proposed model not only focuses on boosting of network lifetime & growing packet [9] delivery ratio. Proposed work has tried to reduce size of packet. Probability of congestion & transmission delay has been reduced in proposed system. In proposed work packets are transferred from source to destination with increased delivery ratio.

REFERENCES

1. Mohammad Samadi Gharajeh, Sohrab Khanmohammadi: 'Dynamic 3D Fuzzy Routing Based on Traffic Probability in Wireless Sensor Networks',The Institution of Engineering & Technology, ISSN 2043-6386,30th July 2016
2. Nidhi Suman : 'Secure and Energy Efficient Routing in Wireless Sensor Networks: A Review' , International Journal of Computer Science & Engineering Technology, Feb 2016.
3. Rawat, P., Singh, K.D., Chaouchi, H., et al.: 'Wireless sensor networks: a survey on recent developments & potential synergies',J. Supercomput., 2014, 68, (1),1–48
4. Jitender Kumar, Suman: 'State of Art Techniques for Wireless Sensor Network Lifetime Maximization', International Journal of Enhanced Research in Science Technology & Engineering, June 2014
5. Priti, Suman: 'Secure Hierarchical Data Aggregation in Wireless Sensor Networks – General framework' , International Journal of Engineering Research & Technology, June 2014
6. Rathna, R., Dhanalakshmi, R., Sasipraba, T.: 'Centralised against distributed medium access control scheduling for environmental monitoring sensors', IET Wirel. Sens. Syst., 2015, 5, (6), pp. 271–276
7. Gama, S., Walingo, T., Takawira, F.: 'Energy analysis for distributed receiver-based cooperative medium access control for wireless sensor networks', IET Wirel. Sens. Syst., 2015, 5, (4), pp. 193–203
8. Kafi, M.A., Djenouri, D., Othman, J.B., et al.: 'Congestion detection strategies in wireless sensor networks: a comparative study with testbed experiments', Procedia Comput. Sci., 2014, 37, pp. 168–175
9. Burri, N., Rickenbach, P.V., Wattenhofer, R.: 'Dozer: ultra-low power data gathering in sensor networks'. Proc. of Lecture Notes in Computer Science, April 2007, pp. 450–459, ISBN 978-1-59593-638-7
10. Yahya, B., Ben-othman, J.: 'REER: robust & energy efficient multipath routing protocol for wireless sensor networks'. Proc. of Global Telecommunications Conf., December 2009, pp. 1–7, ISBN 978-1-4244-4148-8
11. Cunqing, H., Yum, T.P.: 'Optimal routing & data aggregation for maximizing lifetime of

wireless sensor networks', IEEE ACM Trans. Netw., 2008, 16, (4), pp. 892–903
12. Haibo, Z., Hong, S.: 'Energy-efficient beaconless geographic routing in wireless sensor networks', IEEE Trans. Parallel Distrib., 2010, 21, (6), pp. 881–896
13. Gilg, M., Yousef, Y., Lorenz, P.: 'Using image processing algorithms for energy efficient routing algorithm in sensor networks'. Proc. of Future Computing, Service Computation, Cognitive, Adaptive, Content, Patterns, November 2009,132–136, ISBN 978-0-7695-3862-4
14. Rout, R.R., Ghosh, S.K.: 'Enhancement of lifetime using duty cycle & network coding in wireless sensor networks', IEEE Trans. Wirel. Commun., 2013, 12, (2), pp. 656–667
15. Sandeep Kumar Suman : 'A Survey of Black Hole Detection Techniques in WSNs' , International Journal of Advanced Research in Computer and Communication Engineering, May 2015
16. Li, X.H., Hong, S.H., Fang, K.L.: 'WSNHA-GAHR: a greedy & A* heuristic routing algorithm for wireless sensor networks in home automation', IET Commun.., 2011, 5, (13), pp. 1797–1805
17. AlShawi, I.S., an, L., Pan, W., et al.: 'Lifetime enhancement in wireless sensor networks using fuzzy approach & A-star algorithm', IEEE Sens. J., 2012, 12, (10), pp. 3010–3018
18. Okazaki, A.M., Frohlich, A.A.: 'AD-ZRP: ant-based routing algorithm for dynamic wireless sensor networks'. Proc. of IEEE Telecommunications (ICT), May 2011, pp. 15–20, ISBN 978-1-4577-0025-5
19. Okazaki, A.M., Frohlich, A.A.: 'Ant-based dynamic hop optimization protocol: a routing algorithm for mobile wireless sensor networks'. Proc. of IEEE GLOBECOM Workshops, December 2011, ISBN 978-1-4673-0039-1
20. Kalantary, M., Meybodi, M.R.: 'Energy-aware routing protocol for mobile sensor networks using learning automata algorithms'. Proc. of IEEE Wireless & Mobile
21. Computing, Networking & Communications (WiMob), October 2010, pp. 492–496, ISBN 978-1-4244-7743-2
22. Gouvy, N., Hamouda, E., Mitton, N., et al.: 'Energy efficient multi-flow routing in mobile sensor networks'. Proc. of IEEE WCNC, April 2013, pp. 1968–1973, ISBN 978-1-4673-5938-2
23. Falcon, R., Hai, L., Nayak, A., et al.: 'Controlled straight mobility & energy-aware routing in robotic wireless sensor networks'. Proc. of IEEE Distributed Computing in Sensor Systems (DCOSS), May 2012, pp. 150–157, ISBN 978-1-4673-1693-4
24. Gharajeh, M.S., Khanmohammadi, S.: 'Dispatching rescue & support teams to events using ad hoc networks & fuzzy decision making in rescue applications',
25. J. Control Syst. Eng., 2015, 3, (1), pp. 35–50
26. Cerami, M., García-Cerdaña, À., Esteva, F.: 'On finitely-valued fuzzy description logics', Int. J. Approx. Reason., 2014, 55, (9), pp. 1890–1916
27. Runkler, T.A.: 'Selection of appropriate defuzzification methods using application specific properties', IEEE Trans. Fuzzy Syst., 1997, 5, (1), pp. 72–79
28. Magistretti, E., Gurewitz, O., Knightly, E.W.: '802.11 ec: collision avoidance without control messages', IEEE ACM Trans. Netw., 2014, 22, (6), pp. 1845–1858
29. Shimokawara, E., Kaneko, T., Yamaguchi, T., et al.: 'Estimation of basic activities of daily living using zigbee 3d accelerometer sensor network'. Proc. of IEEE Int. Conf. Biometrics & Kansei Engineering (ICBAKE), July 2013, pp. 251–256, doi 10.1109/ICBAKE.2013.36
30. Bettstetter, C., Hartenstein, H., Pérez-Costa, X.: 'Stochastic properties of random waypoint

mobility model', ACM/Kluwer Wirel. Netw.: Spec. Issue Model. Anal. Mob. Netw., 2004, 10, (5), pp. 555–567

31. Cococcioni, M., Foschini, L., Lazzerini, B., et al.: 'Complexity reduction of Mamdani fuzzy systems through multi-valued logic minimization'. Proc. of IEEE Systems Man & Cybernetics, October 2008, pp. 1782–1787, ISBN 978-1-4244-2384-2
32. Sellers, K.F., Morris, D.S., Balakrishnan, N.: 'Bivariate Conway–Maxwell– Poisson distribution: formulation, properties, & inference', J. Multivariate Anal., 2016, 150, pp. 152–168
33. Heinzelman, W.B., Chandrakasan, A.P., Balakrishnan, H.: 'An application-specific protocol architecture for wireless microsensor networks', IEEE Trans. Wirel. Commun., 2002, 1, (4), pp. 660–670