IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-6, Issue-5, May 2018 E-ISSN: 2347-2693

An Efficient Proposed Approach for Tracing of Moving Object in Wireless Sensor Network

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Available online at: www.ijcseonline.org

Accepted: 17/May/2018, Published: 31/May/2018

ABSTRACT-Now a days wireless sensor network is a rapid growing area, are increasing in demand and widely deployed. Sensor communicates with other nodes in wireless manner and has ability of collecting, storing, transferring data with each other. Sensors have low power and low cost. Replace and remove of power in each sensor is very difficult. Due to power constraint decrease in energy constraint is a major research issue like localizing, tracking etc. Our proposed approach is to track the moving object accurately with reduce energy consumption of each sensor. Our proposed approach is to locate the position of moving object within an area. First we describe proposed clustering approach and then within the cluster, a cluster head (CH) is positioned. Then active cluster head is localized to get the current moving position of object through sensors. Within that time span the remaining sensors is standby mode so that energy is minimized. Current location of object is localized by trilateration algorithm. Lastly our proposed system shows the network stability and with less consumed sensors power.

KEYWORDS: Wireless Sensor Network (WSN), Trilateration, Cluster Head (CH).

I. INTRODUCTION

Wireless sensor network is a network which involves both hardware and software. It consists of sensors nodes. Sensors nodes are small in size, process data and communicate with each other. It can generate Radio frequency (RF) channel. Sensors can collect and process data from a particular environment. WSN have the capability of low cost and wireless communication. Actually the sensors work in coordination with each other. Sensor nodes collect data form sensing field and sent and forward data to the nearest sensor nodes. Object tracing is a key challenge of WSNs. Object tracing generally deployed in military system, weather forecasting, wildlife animal monitoring. Generally object tracing in wireless sensors network have work in two different principals monitoring and distributing. In monitoring task sensor nodes collect information from its neighboring sensors and in distributing task sensors nodes distribute information to forward sensors. So those moving objects easily trace.

Actually there are various resultant values after trace a moving object. The resultant value are cluster head lifetime, accuracy of object position, network stability etc. in object tracing two types method are exists. They are centralized approach and distributed approach. In centralized approach all sensor send data to base station. After that base station will decide which sensor will active next. This method is easy to implement. But in this method base stations have huge loaded and this may generate less accuracy and huge energy efficiency. Where as in distributed method all the sensors node distribute its position and each sensor know all the sensors location in present scenario. So in this method sensors will occupy less energy and more accuracy. Our proposed approach is in distributing approach which will take less energy consumption and more accurate position. As in WSN, each sensor has limited energy and it is very difficult to replace the battery in sensors nodes.

In a moving object tracing method, the sensors nodes which are communicate with object signal, that sensors will active and other sensors will in sleepy mode. So monitoring an object continuously, a group of sensor nodes will active and remaining other nodes will inactive. The group of active sensor nodes depends on the location of moving object and cluster head. So energy will be optimized in each sensor.

In this paper we describe a heuristic proposed approach in wireless sensor network on moving object tracing. Using the proposed heuristic approach object's next location will be predicted with some active sensors and remaining sensors nodes will be sleepy nodes.

The rest of the paper is as: In section2 we describe the related work of object tracing. We show our proposed approach in section3. Then in section 4 we simulate our heuristic proposed approach and evaluate its performance. After that we present the analysis of result and future scope in section 5 and 6 respectively.

II. RELATED WORK

In [1] the authors used a proposed approach for select the cluster head. In the case of each iteration of the tracking operation, the cluster head tries to predict the region where the target moves. Based on this region, only sensors within this region are activated. And the remaining sensors are sleepy sensors. These proposed algorithms show the network lifetime, energy efficiency and accuracy of tracking. This algorithm will be in heterogeneous environment.

In [2] authors proposed on-demand dynamic clustering in conjunction. This method implemented with static cluster based architecture. The problem in static clustering is global information sharing is refrained. So when the object moves near the boundary, it may be a chance to lose the message. But the change in cluster setting does not change in any circumstance. Here the object tracked continuously and it will do high energy consumption.

In[3],the author presented prediction based clustering algorithm with movable target tracking in WSN. The author describes the tracking scheme. It is also energy efficient. This paper also presents cluster architecture with next predicted position of object and direction. Here three parameters are taken distance, remaining energy and utilized energy. Here some sensor will be active while tracing an object but remaining is standby mode. So energy will be optimized and also increase the life time of network.

In [4] proposed a cluster based algorithm with tracing object. The author describes three main object first target detection, next source localization and last target state estimation. Here some active nodes will work from remaining all of the sensors nodes.

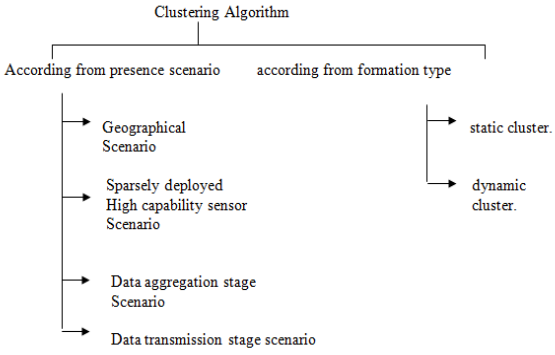
In [5] the author describe dynamic cluster based algorithm. In this algorithm some sensors nodes will active and some The proposed clustering algorithm is applied where few nodes are selected. This few nodes are used for tracking which uses the proposed mechanism to take the next location of the moving object. Here trilateration algorithm is used. This algorithm is used to found the current location of target. The present location is sent to active head within that cluster, present location will be sent to the base station. So proposed approach may be applied in target tracing. The proposed approach gives a better performance and it also reduces the energy consumption
INPUT: Input the sensor nodes.
OUTPUT: Get the current location of the moving object within a cluster.

sensors will slept. The active sensors nodes through predicting moving track of the target optimized the energy consumption. The optimal nodes do the tracking task. The tracking task is completed through the energy consumption of communication function. It is guarantee load balancing and extends the network function.

In [6] author proposed DP in which the object location target is calculate at both sensor node and sensor sink. In this paper firstly difference will make between real location and predicted location. If the difference is acceptable, no message sends to sink. For this reason total number of packets will be reduces. So DPR reduces the energy consumption. So that radio frequency components minimize the number of long distance transmission. The minimization is between sensor nodes and the base station transmission. For this reason reasonable overhead will occur. But error in sensor detection is not recoverable.

In [7] author proposed a Prediction based Tracking (APT). Here the sensors are self recognition for modifying tracking time interval. The modifying tracking time interval for moving object decreases the network power consumption and more accuracy.
In [8] author proposed a two-level cooperative and energy consumption by requiring minimum number of sensor nodes. The sensor nodes do communication, transaction, and perform sensing for target tracking in WSN. Here adjacent nodes are responsible from an expected target sensors nodes for observing the object. So wake-up and sleepy mechanisms extend the network life time and also do energy consumption.

III. PROPOSED APPROACH



In static cluster, when an object enters an area, cluster head is activated and it simultaneously activates its other sensor nodes to watch localized and track that object. But dynamic cluster is belonging to different cluster at different times according to object movement. Here only one cluster is active according from an object, and location is achieved with high probability, low redundant data, and better tracking quality.

Our approach uses moving object tracking to record information moving object tracking to record information of present scenario of the moving object and to keep the information for update. Sensor nodes are used to detect and track the moving position of mobile object.

Part1. Clustering approach:

Proposed approach is used Cartesian co-ordinate system.

Step1: An area in taken for deployment X*Y.

Step2: Divide the area into n number of zones and we are taking two zones i.e. $X_p$and Y_p

Step3:

$X_p = X/n^{⅓}$

$Y_p = Y / n^{⅓}$

Where X_p and Y_p are static clusters.

Part2. Object tracking approach: Our approach is modified trilateration algorithm is used and our approach is heuristic approach (Hp). In Hp approach next location current and previous location of target, keep the next location of target. We take (x_k, y_k) and (x_{k-1}, y_{k-1}), location of sensor nodes (k)and (k-1) at speed V and predicted location (x_{k+1}, y_{k+1}) of the moving object. After time t, it will be calculated using object speed and direction.

Actually target detection is complete in Received Signal Strength Indicator (RSSI) in Hp method. In trilateration algorithm, we take three nodes and three relation of target (x, y) is obtained.

Step1: Initially all the sensors are clustered using Hp method.

Step2: The cluster head (CH) trace the location of object and become next cluster head (CH) will be active which is close to the moving object.

Step3: The next active cluster head (CH) take the location of moving object (x_{k+1}, y_{k+1}).

Step4: So after a given time t, the location of moving object will be,

$X_{k+1}=x_k+vt\sin\theta$

$Y_{k+1}=y_k+vt\sin\theta$

Where,

$\sin\theta = (Y_k - Y_{k-1}) / Z$

Where, $Z = \sqrt{(X_k - X_{k-1})^2 + (Y_k - Y_{k-1})^2}$

$V = Z/(t_k - t_{k-1})$

Step5: Next cluster head select three sensor nodes and calculate the current location using trilateration algorithm.

Step6: If next location is within current cluster then active cluster head send message to the next predicated cluster head (CH).

Step7: Else the predicated locations are not within the current cluster then follow Step6.

III. PERFORMANCE EVALUATION AND ANALYSIS OF RESULT

A. irstly we evaluate our proposed approach and actual path approach which is practically generated path.

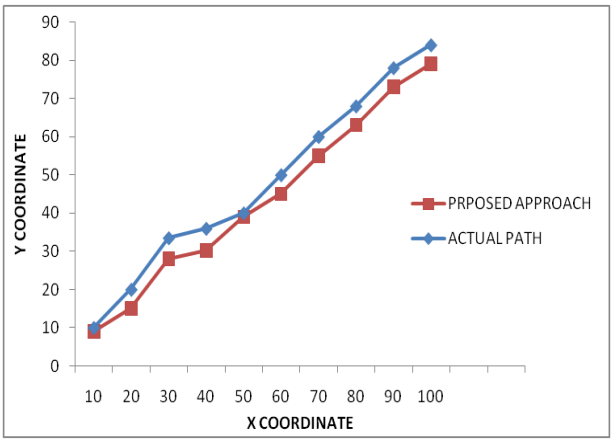


Fig.1:

In fig.1. X axis Vs Y axis represent the curve of Proposed approach and practically oriented path of moving object.

B. In our proposed approach, energy consumed when sensors active in network involve in tracking and rest of sensors remain sleepy mode

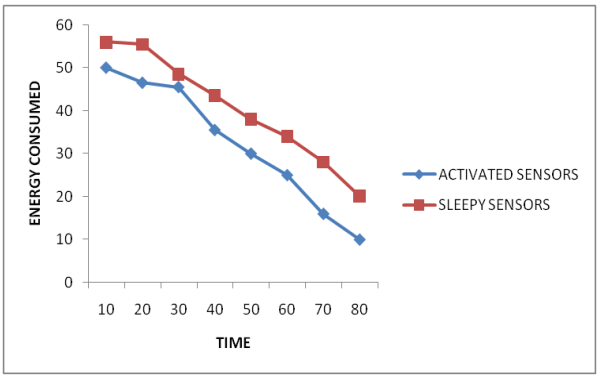


Fig.2:

In the above figure (fig.2.) X axis represent the Time and Y axis represent the energy consumed through sensors.

C. Our stability of network is directly proportional to the number of sensors.

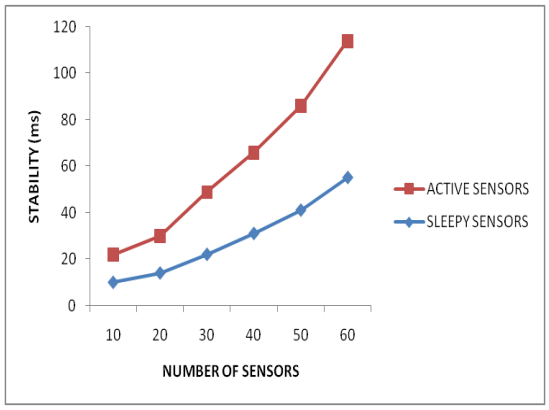


Fig.3:

In this figure (fig.3.) X axis represent the number of sensors and Y axis represent the stability of sensors (milliseconds).

D. Lastly we evaluate our proposed approach with location of head nodes i.e. cluster head (CH)

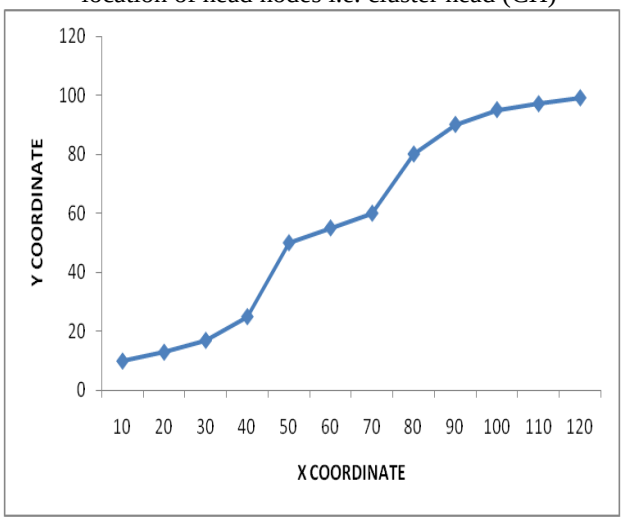


Fig.4:

This is a movable object path between x coordinate and y coordinate and their corresponding Cluster head position is as follows--CH1 (20,10), CH2(32,28), CH3(45,45), CH4(68,45), CH5(85,88), CH6(99,96).

IV. ANALYSIS OF RESULT

According from the fig.1. we can conclude that actually practically oriented path and our proposed approach is near about and error is less than ten percent for moveable object. As in fig.2. the curve is established between time and energy consumed , in X axis and Y axis respectively. The figure show that when time is increased, the consumed power of activated sensors and sleepy sensors are decreases. If the power is decreasing then sensors will be continue more time. In fig.3. describe that if the number of sensors are increased then stability of network will also increased . As the sensors are in two parts i.e. active sensors and sleepy sensors. The number of both sensors are increasing the stability of network also increases. Lastly we proposed the Cluster head (CH) location of moving object. In our proposed approach the CH are positioned properly x axis and y axis properly.

V.CONCLUSIONS

In this paper we proposed a movable target tracking algorithm in WSN in energy optimization. As energy is a big issue in WSN, so position of tracking of an object with minimum energy utilization is important because removing or replacing of battery from a sensor is very difficult [9]. Here we also show the network stability as well as number of sensors increased. So that it will focusing on moveable target long time. Lastly we see our proposed approach is also describing the Cluster Head position along with object path. So it is an efficient way algorithm which will reduce the number of active sensors nodes to save the energy of sensors, so that sensors will continuously run long time. In this paper we describe tracking of movable object will report the base station continuously and accurately. Here our clustering approach reduces the energy consumption of sensors nodes [10] [11]. As within the cluster, sensors nodes send data to the base station and base station will decide which CH nodes will active. In this way network stability is also increased.

Future scope:

Our proposed object tracing algorithm can do multiple movable object tracing algorithms. The proposed work can also enhanced object tracing where multiple obstruction within the cluster. So that more energy will save and more accurate data for movable can be taken within small time span.

REFREENCES

[1] Zhenga, J., M.Z.A. Bhuiyan, S. Liang, X. Xing and G. Wang, 2014. Auction-based adaptive sensor activation algorithm for target tracking in wireless sensor networks.Future Generat.Comput. Syst., 39: 88-99. DOI: 10.1016/j.future.2013.12.014.

[2] M. Akter, M.O. Rahman, M. N. Islam, and M. A. Habib, ”Incremental clustering-based object tracking in wireless sensor networks,” in Proceeding of the International Conference on Networking Systems and Security (NSysS ‘15), pp. 1-5, January 2015.

[3] F. Deldar and M. H. Yaghmaee, "Designing a prediction-based clustering algorithm for object tracking in wireless sensor networks," Computer Networks and Distributed Systems (CNDS), 2011 International Symposium on, Tehran, 2011, pp. 199-203.

[4] KhinThandaSoe, “Increasing Lifetime of Target Tracking Wireless SensorNetworks” ,World Academy of Science, Engineering and Technology 42 2008.

[5] Dan Liu, Nihong Wang and Yi An, "Dynamic Cluster Based Object Tracking Algorithm in WSN", 2010 Second WRI Global Congress on Intelligent Systems, vol : 1 ,Pg:397-399, Dec 2010.
[6] YingqiXu, Julian Winter and Wang-Chien Lee, "Dual Prediction-based Reporting for Object Tracking Sensor Networks", 2004 First Annual International Conference on Networking and services, Pg:154-163,August2004.
[7] Mohammad-TaghiAbdizadeh, HadiJamali Rad and BahmanAbolhassani, "A New Adaptive Prediction-Based Tracking Scheme for Wireless Sensor Networks", 2009 Seventh Annual Communication Networks and Services Research Conference, Pg:335-341,May2009.
[8] Guojun Wang, Md. ZakirulAlamBhuiyan and Li Zhang, "Two-level cooperative and energy-efficient tracking algorithm in wireless sensor networks", Concurrency and Computation: Practice and Experience, September 2009.
[9] Neelam and Dishant khosla, "The energy efficient techniques for Wireless Sensor Network: A review",. International Journal of Computer Science and engineering, Vol.4, Issue. 11, pp.38-41, 2016
[10] V.Prasad, VS. Sunsan, "Multi path dynamic routing for data integrity and delay Minimization differentiated services in wireless sensor network", International Journal of Scientific Research in Computer Science and Engineering, Vol.4, Issue.4, pp.20-13, 2016
[11] Manju Bhardwaj, "Faulty Link Detection in Cluster based Energy Efficient Wireless Sensor Networks ",International Journal of Scientific Research in Network Security and Communication Vol.5, Issue.3, pp.1-8, 2017

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