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A NEW METHODOLOGY OF THREE WAY DISTRIBUTION PROCESS OF IMPROVED PSO ALGORITHM USING MOBILE SINK NODES

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ABSTRACT

In a recent trend, Mobile sink (MS) is a major part of Wireless Sensor network (WSN) for distributing, scalable network of communicating with localized environment. Improved Particle Swarm Optimization algorithm (IPSO) has been used to find the exact location of three way processes such as sink, distribution of frequency and localization. The combined OFDMA/TDMA approach is used in multiple carrier channels for accessing the data parallel without any overlapping bandwidth at the appropriate scheduled time. The existing multiple access techniques have not been used in the mobile sink for accessing the secure data. The time schedules were not fixed for all levels of communication to identify the localization. The proposed research is to implement IPSO algorithm with Orthogonal Frequency Division Multiple Access (OFDMA) techniques for utilizing exact bandwidth to communicate in the schedule time. The experimental results have produced the Quality of Service (QoS) for accessing the better outcome of bandwidth and producing the efficient throughput.

Keywords: *Mobile Sink, Particle Swarm Optimization, OFDMA, Wireless Sensor Network*

1. INTRODUCTION

The Mobile sink is used in many applications for producing accurate and timely phenomena detection is required. OFDMA-Based MAC Protocol for Underwater Acoustic Wireless Sensor Networks described that is configurable to suit the operating requirements of the underwater sensor network. The protocol has three modes of operation, namely random, equal opportunity and energy-conscious modes of operation. The MAC design approach exploits the multi-path characteristics of a fading acoustic channel to convert it into parallel independent acoustic sub-channels that undergo flat fading[1]. Delay tolerant data gathering in energy harvesting Sensor Networks with a Mobile Sink has specified that the energy conversion efficiently investigated. The impact of different parameters on the performance this is the first kind of work of data collection for energy harvesting sensor networks with mobile sinks[2]. Particle swarm optimization for time-difference-of-arrival based localization shown the PSO approach provided an accurate source location estimation for both known and unknown propagation speed, and also gives an efficient speed estimate in the latter case [3]. Reliable and load balanced multi-path routing for multiple sinks in wireless sensor networks specified that an efficient load balanced multipath routing for multiple sinks is obtained and the fault detection and recovery can be made effectively[4]. Architecture of wireless sensor networks with mobile sinks exploited the tradeoff between the successful information retrieval probability and the nodes energy consumption, a number of multiple node transmission scheduling algorithms are proposed [5].

Energy-Aware data aggregation for grid-based Wireless Sensor Networks with a Mobile Sink proposed that each sensor node with location information and limited energy is considered. This approach utilized the location information and selects a special gateway in each area of a grid

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responsible for forwarding[6]. Band-based go casting for mobile sink groups in the wireless sensor Networks delivery-guaranteed and effective data dissemination for mobile sink groups in wireless sensor networks. A mobile sink group denotes a set of tightly coupled mobile sinks for team collaborations such as a team of firefighters and a group of soldiers [7]. An Energy balanced routing algorithm based on mobile sink for Wireless Sensor Networks The algorithm defined the transmitting coordinate (TC) of by mobile sink and the sensor nodes, which TC is the same formed a chain-cluster using a greedy approach. It also defined collecting row (CR) and paralleling column (PC), and each PC transmits information to CR synchronously. Finally, information is transmitted to mobile sink by LEADER node which residual energy is the most [8]. SRP-MS : a new routing protocol for delay tolerant wireless sensor network lifetime maximization of delay tolerant wireless sensor networks (WSNs) through the manipulation of Mobile Sink (MS) on different trajectories[9][10]. Reducing delay data dissemination using mobile sink in Wireless Sensor Networks for reducing drastically for data packet collection from the networks and save energy consumption, congestion and average end to end delay problem for the collection of data packets in the network [11]. To improve the positioning accuracy, this paper puts forward an improved weighted centroid algorithm, then self-corrected defined by[12]. The distributed multi-cell beamforming algorithm converges to an NE point in just a few iterations with low information exchange overhead. Moreover, it provides significant performance gains, especially under the strong interference scenario, in comparison with several existing multi-cell interference mitigation schemes, such as the distributed interference alignment method[13]. The information related to the residual battery energy of sensor nodes to adaptively adjust the transmission range of sensor nodes and the relocating scheme for the sink [14]. The key concept in virtual backbone scheduling is to minimize the energy consumption and more throughputs concentrated by [15].

The objective of our research work is to find the appropriate position using IPSO algorithm in all locations to acquire accurate bandwidth which minimizing the error through mobile sink. In order to communicate in scheduled time, the exact bandwidth can be used by OFDMA technique.

2 ARCHITECTURAL MODELS

The figure 1 shows the architectural model of Mobile sink with PSO for finding the appropriate position in WSN.

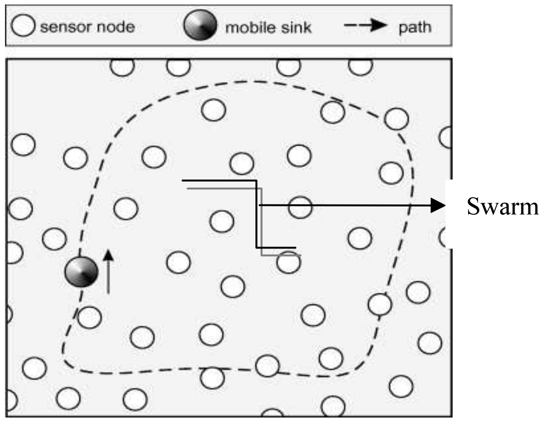

Figure 1: Interconnection of Mobile sink with PSO for finding the position

It shows the how sensor networks are distributed the data to various networks. The mobile sink has used to sink all the sensor nodes. Each sensor is used to find the exact position to transmit the data with PSO for swarming all the sensors for assigning the data in the particular location. The PSO algorithm is used with time scheduled for distributing with higher bandwidth with respect to OFDMA/TDMA for defining the appropriate periods.

3 MOBILE SINK WITH IPSO

A mobile sink sends data request message to sensor nodes via a stationary access node. These mobile sink request messages will initiate the stationary access node to trigger sensor nodes for transmitting their data to the requested mobile sink. The main advantage of mobile sink is used to design for the sensor networks. It is enabled to collect all information from a remote machine and the information has been timely improved with energy. The sink nodes find their geographic locations by the configuration of localization techniques.

The OFDMA techniques also implemented in mobile sink for controlling the information without having any error. MVUE has been implemented to find the errors in all locations and the time slots are assigned to every transmission for avoiding the

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congestion. In WSN, the acknowledgement cannot be predicted to all transmissions. So, OFDMA is scheduled the time for every transmission in mobile sink for finding the appropriate position through IPSO.

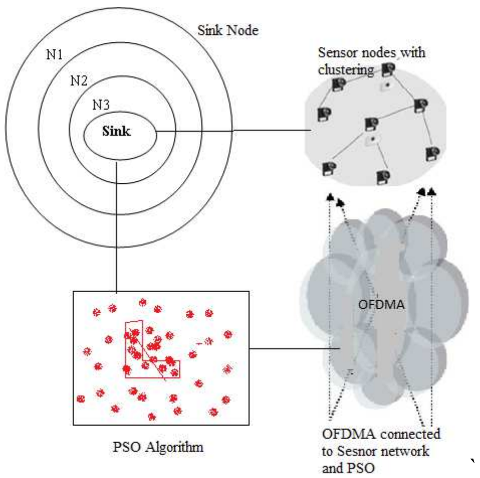

Figure 2 : Clustering of Sensor node sink with position of PSO in OFDMA

The figure 2 depicts the mobile sinks which identifies all the sink nodes and neglect the unauthorized nodes. Then the data has been transferred to the particular location using an IPSO algorithm for finding the exact location and also improving the performance. .

4 IMPROVED PSO ALGORITHM

IPSO is a heuristic global optimization procedure, which is based on swarm Intelligence. IPSO is an algorithm for optimizing a non-linear and multidimensional problem which usually reaches good solutions efficiently, while requiring minimal parameterization. The overall function of this problem is optimized and also it finds the exact solution for an appropriate location. The function can be defined as $f(x_i)$ and the nodes are $f(x_{i,0}),\ldots,f(x_{i,d})$ and also it represents how the particle's position in the multidimensional space is relative to the desired goal. With this problem, the IPSO algorithm shows that how the frequencies are calculated at the rate of weights and also binds the 'd' dimensions to be optimized for given a problem modeled as an optimization one of dimensions d. So, it has positioned as $x_i(x_1,x_2 \ldots x_n)$ and velocity $v_i(v_1,v_2,\ldots v_n)$. In this algorithm, swarm means that all the particles share information and it says that best position ever visited by any particle in the swarm.Each particle has a position can be defined in the equation 1 and 2.

$$x_{i,d}(it+1) = x_{i,d}(it) + u_{i,d}(it+1) \quad (1)$$

and

$$u_{i,d}(it+1) = u_{i,d}(it)$$

$$+C_1 * Rnd(0,1) * \left[p^{b_{i,d}}(it) - x_{i,d}(it)\right]$$

$$+C_2 * Rnd(0,1) * \left[g^{b_d}(it) - x_{i,d}(it)\right] \quad (2)$$

where

i, particle's index, used as a particle identifier
d dimension being considered, each particle has a position and a velocity for each dimension
it iteration number, the algorithm is iterative
$\mathbf{x_{i,d}}$ position of particle i in dimension d
$\mathbf{v_{i,d}}$ velocity of particle i in dimension d
$\mathbf{C_1}$ acceleration constant for the cognitive component;
Rnd stochastic component of the algorithm, a random value between 0 and 1
$\mathbf{P^b_{i,d}}$ the location in dimension d with the best fitness of all the visited locations in that dimension of particle i
$\mathbf{C_2}$ acceleration constant for the social component.

Algorithm : Improved PSO Algorithm

Step 1: For each particle i in s do
Step 2: For each dimension d in D d
$$x_{i,d} = Rnd(x_{\min}, x_{\max})$$
$$u_{i,d} = Rnd(-v_{\max}/3, v_{\max}/3)$$
End
Step 3: For Seq=I,Packet=a_i, ack=I, $P^b_i=x_i$
Step 4: If(P^b_i)<f(gb) and if($a_i=x_i$) then
gb=P^b_i seq=1, the ack=1
else message" No position is found"
seq;ack=0;
End if
end
Step 5: For MaximumFrequency=0 maxof x value=-1
Step 6: For each x in X, frequency=0
Step7: For each y in Y, if y==x,
Frequency++,
End
Step 8: If frequency >MaximumFrequency ,
MaximumFrequency=frequency,
maxofxvalue =x
End If,

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Step 9: For each particle i in S do
if($f(x_i)<f(p^b_i)$ and
(MaximumFrequency==frequency))
then
$P^b_i=x_i$,

Position=MaximumFrequeny,
MaximumFrequency++
If(P^b_i)<f(gb) and
(MaximumFrequency=frequency)) then, gb=P^b_i
globalposition=MaximumFrequency,
MaximumFrequency++
Step 11: For each particle i in S do , for each
dimension d in D do

$$u_{i,d} = u_{i,d} + C_1 * Rnd(0,1) * [p^{b_{i,d}} - x_{i,d}]$$

$$+C_2 * RND(0,1) * [g^{b_d} - x_{i,d}]$$

$$x_{i,d} = x_{i,d} + u_{i,d}$$

Hours=0;Minutes=0;
Step 12: T_i(Time)= global position+(Hours *
60)+Minutes
if(T_i==maxHours),
Message"Error: Request time is more"
Else Print the total time with frequency
Step 14: Print the position with appropriate
frequency level.
end for
end for
Step 15: return T_{i_Time}

5. SECURITY IN LOCALIZATION OF IPSO ALGORITHM

Security is the major role in a distributed environment. The trusted evaluation of anchor node method has been used with an IPSO algorithm for providing the protection against malicious nodes. Whenever data are distributed to neighboring nodes for finding the coordination of exact signal position, all the nodes are accumulated and capturing the frequency without out any deviations. This security method has involved in the communication channel and provides the trusted data in every location.

Trust Evaluation Method: Compute a_i and b_i through the geometric relationship between anchor nodes the values of a_i and b_i are set to 0 initially. The value of d_{ij} is the Euclidean distance between A_i and A_j and d'_{ij} denotes the measurement distance between A_i and A_j (if A_i and A_j are neighbors).

(a) If inequality $|d_{ij} - d'_{ij}| \leq e_{max}$ or $0< d_{ij}<2R$ is satisfied, let a_i^j =1 otherwise a_i^j = 0.

(b) If inequality $|d_{ij} - d'_{ij}| > e_{max}$ or $d_{ij}>2R>0$ is satisfied, let b_i^j =1 otherwise b_i^j = 0.

Compute the trust value of anchor node A_i in each network deployment.

Assume that m ($m<N_3$) sensor nodes ($M_1,M_2,...,M_m$) is available to anchor node A_i. These m sensor nodes utilize step (1) to detect anchor node A_i. The observed number of anchor node A_i as follow us

$$a_i' + 1 = \sum_{j=1}^{m} a_i^j + 1 \quad (3)$$

and the observed number of anchor node A_i to be a malicious one is

$$b_i' + 1 = \sum_{j=1}^{m} b_i^j + 1 \quad (4)$$

The trust value(T_{ij}) of Anchor node Ai is

$$T_{ij} = \frac{a_i' + 1}{a_i' + b_i' + 1} \quad (5)$$

and the variance of anchor node is

$$\sigma A_i' = \frac{(a_i'+1)(b_i'+1)}{(a_i'+b_i'+2)^2 (a_i'+b_i'+2)^3} \quad (6)$$

6. SIMULATION

Let N1, N2,…N200 are the nodes, which are connected to the part of sink allocation for data transmission. In view of identifying the cluster node, each node is group together and its sink position is allocated. Here all the nodes have to be connected to the particular coordinating position which may vary from 0 to 200. The appropriate position can be identified for the particular transmission using IPSO.

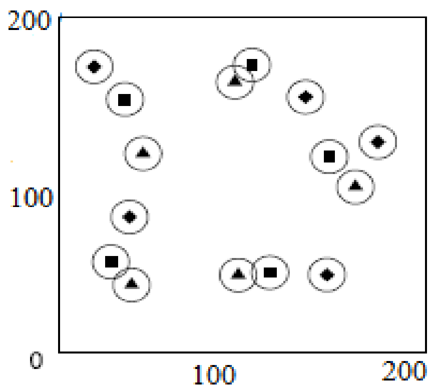

Figure 3: (a) Sink node allocation for data transmission

The figure 3(a) shows the no of nodes which are connected to the part of the sink allocation for data

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transmission. In this case the each node is grouped together and allocating the sink position for identifying the clustering nodes.

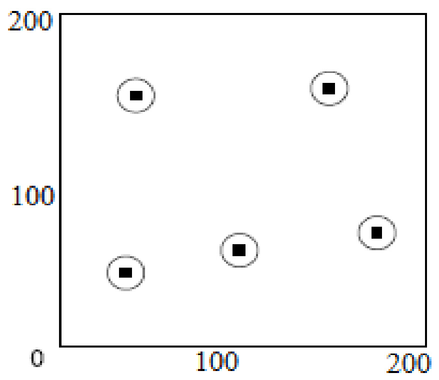

Figure 3: (b) Positioning the data in IPSO

The Figure 3(a) shows totally 200 nodes are connected to the particular coordinating position. It may vary from 0 to 50, 50 to 100 and 100 to 200. The figure 3(b) shows that the appropriate position for identifying the signal location of the particular transmission. In this case the particle the node using Improved Particle swarm optimization (IPSO) technique. The figure4 shows the appropriate position finding with the various coordination. The graph shown the various coordination for finding the position in (0, 20), (20,50), (40,90) and maximum range with (100,300).

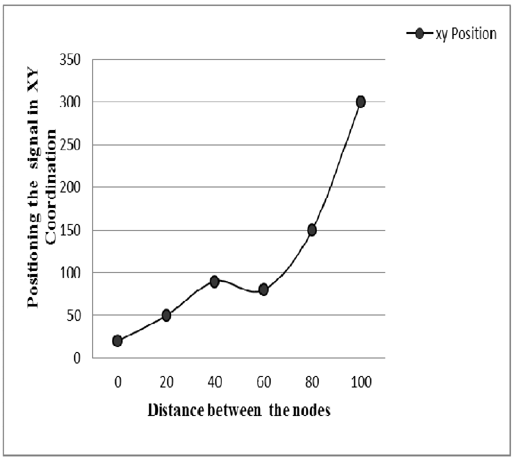

Figure 4: The Node position finding in the Localization

The figure 5 shows the average delay times are calculated in every position. This is normally represented for data distribution in the particular location, for how much of time can be utilized for transmitting data in the particular location.

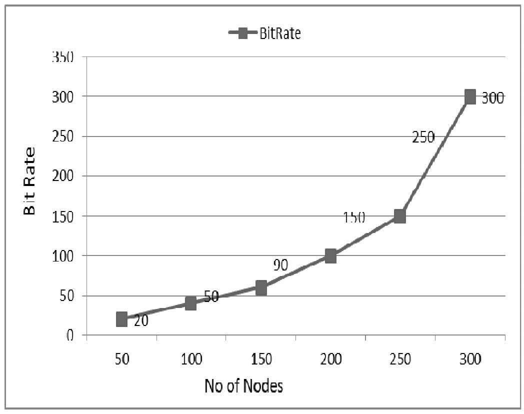

Figure 5: Delay time measurement of the particular position

The figure 6 shows that OFDMA frequency can be used to connect to the sink node and how the numbers of nodes are utilized with secure communication. The bit rate can be measured in every position for finding the appropriate frequency. Based on the frequency the data can be transferred to the particular position and efficient bandwidth is utilized in all nodes.

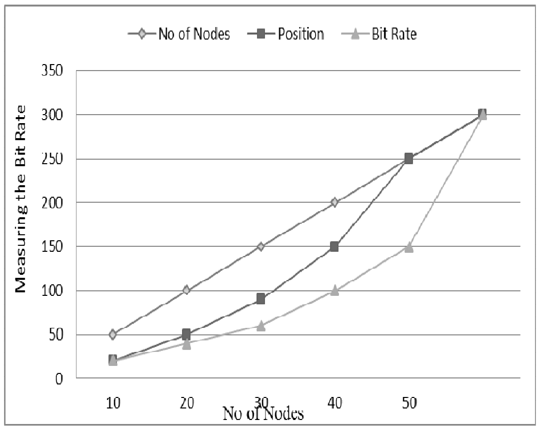

Figure 6: Measurement of the frequency position using OFDMA with sink node

Figure 7 shows the parameter position finding without -1 value in the localization. In the particular location, nodes are having the appropriate position to find the signal strength. If the values are -1, returns the negative position and also not finding the localization.

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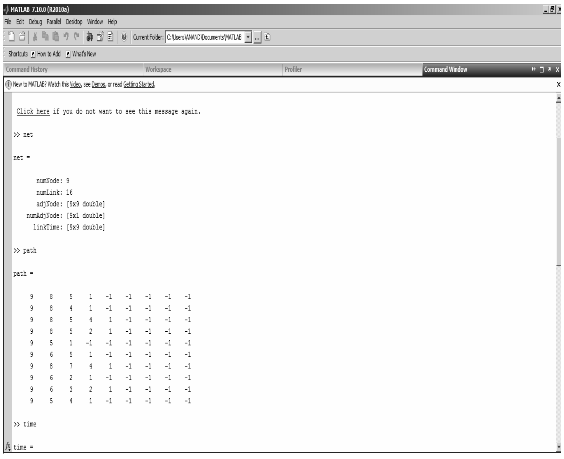

Figure 7: Implementation of node position finding in the localization in Matlab

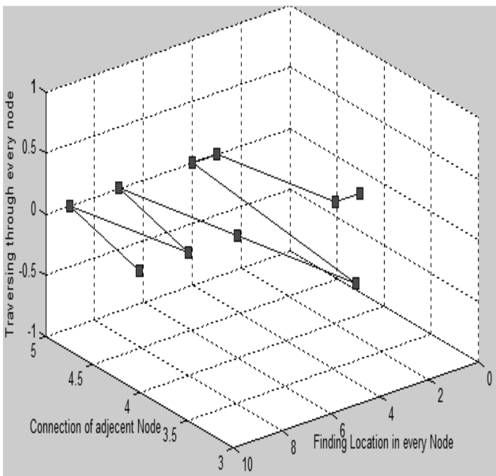

Figure 8: Traversing through every node for finding in the localization

The figure 8 shows how localization can be found in every location. When the position is identified, every node has connected to its neighboring node. The graph shows the square mark in every link to find its positions. The data are traversed through this node and finally reach to its destination.

7 CONCLUSIONS

The main proposed system of the study described that three way distribution processes of improved particle swarm optimization frequencies for mobile sink in localization of wireless sensor network. In this study the IPSO algorithm used for finding the location and to identify the localized environment. The mobile sink has been allocated the sink node for distribution of the data between one sink nodes to another sink node. During the distribution the OFDMA used to define the frequency with constant level. In the frequency channel all the data have distributed securely with the trust based evaluation method applied for protecting from unauthorized data. Finally, all the techniques are accumulated together in a channel without having any errors.

8. FUTURE ENHANCEMENT

The future enhancement of the work can be combined together of IPSO and ACO (Ant Colony Optimization) algorithm for a secure way of communication. The swarm intelligence also can be used for allocating route between nodes. In such a case the MIMO (Multiple Inputs and Multiple Outputs) can be used to find the signal position in different paths. MIMO is a radio antenna technology as it uses multiple antennas at the transmitter and receiver to enable a variety of signal paths to carry the data. It can also be used for choosing separate paths for each antenna to enable to be multiple signal paths.

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