N. Pushpalatha, Dr. B. Anuradha / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com
Vol. 2, Issue 4, July-August 2012, pp.1718-1721

A Low Cost Nodes Distribution on Hexagonal method for Wireless Sensor Networks

N. Pushpalatha* , Dr. B. Anuradha**
[1]Department of ECE, AITS, Tirupathi, India
[2]Department of ECE, S.V. University College of Engineering, Tirupathi, India

ABSTRACT

In some atmospheric environment, randomly deployed sensor nodes could not satisfy the requirements of wireless sensor networks. Therefore, it is necessary to use mobile sensor nodes in specially shaped area conditions. After moving nodes are deployed randomly, they could be relocated according to the real-time situation of network coverage area. This paper proposes A Low Cost Nodes Distribution on Hexagonal method for wireless sensor networks (WSNs) using MDS algorithm. It is to determine the Distribution of sensor nodes on the geographic area and computational cost of the system is presented. In this paper, to measure the accuracy of nodes distribution, a hexagonal method is used to deploy sensor nodes to the appropriate positions of wireless sensor network. Nowadays Wireless networking is used to meet a variety of needs. Smart environments represent the next evolutionary development step in buildings, utilities, industrial, scientific, medical, home, shipboard, military, transportation systems automation and mobile applications. Like any organism, the smart environment relies first and foremost the sensory data from the real world. It is used for 3D open and closed surfaces. The hexagonal method simulation results indicate that it has hundred percent coverage area with low computational cost for more than 100 nodes and range error is low.

Key Words - Wireless Sensor Networks, Nodes Distribution, Hexagonal method, Network Coverage Area

1. Introduction

With the development of sensor technique, network, wireless communications, Micro-Electro-Mechanical Systems and other modern technology, wireless sensor networks are becoming an active research area. Wireless sensor network is composed of massive collaborative sensor nodes, and each node has the abilities of sensing, computing and communicating. It has synthesized sensor techniques, embedded computations, distributed information processing and wireless communication technique, which can cooperate to complete real-time monitoring, sensing and gathering of object information, and then transmit it to the user after information processing. At present, wireless sensor network has a very broad application in military defense [6], industrial control [7], urban management [8], biomedicine [9], environmental monitoring [10], disaster and dangerous regional remote control, etc. Network coverage is the fundamental issue of wireless sensor network, and it has played a vital role in the coverage performance and life span of wireless sensor network. Coverage problem can be divided into two classes, static sensor network coverage and mobile sensor network coverage. This paper mainly discusses mobile sensor network coverage.

The work presented in the paper is A Low Cost Nodes Distribution on Hexagonal method for wireless sensor networks (WSNs). Some challenges of position estimation problem in real applications are dealt in this paper. The conditions that most existing sensor positioning methods fail to perform well are the anisotropic topology of the sensor networks and complex terrain where the sensor networks are deployed. Moreover, cumulative measurement error is a constant problem of some existing sensor positioning methods [1-2]. This proposed method able to distribute the sensor nodes on hexagonal method and also estimate the computational cost.

The focus of the paper is A Low Cost Nodes Distribution on Hexagonal method for wireless sensor networks (WSNs). The paper is organized as follows.

Section 2 presents the previous work of localization problem in wireless sensor networks. Proposed method has been discussed in section 3. In section 4 Simulation Results of the paper has been discussed. In section 5 Conclusion and Future work, where the future challenges and directions to improve localization in WSN technology are described.

2. Previous Work

The multidimensional scaling technique, which was a technique that had been successfully used to capture the inter correlation of high dimensional data at low dimension in social science, was used [4]. A Square method was used to estimate all sensors' relative locations by applying MDS to compute the relative positions of sensors with high error tolerance [3]. In order to collect some of pair wise distances among sensors, we select a number of source sensors, and they initialize the whole network to estimate some of the pair wise distances [2]. These estimated distances are then transmitted to a computer or sensor for square computation of some sensor system design or fly-over base-station. In this method, the number of nodes is more when compared to triangle positioning method algorithm and the coverage area was also more as shown in Fig. 1 and Fig.2.

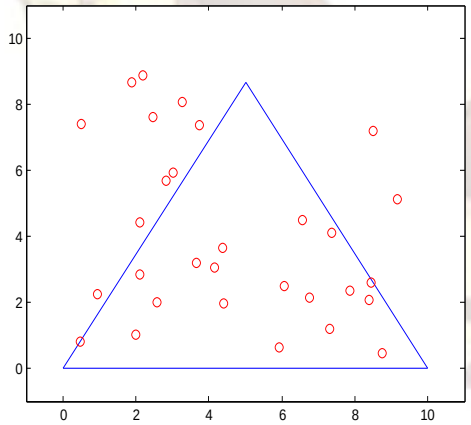

Fig.1 Randomly distributed sensors in a triangular Method

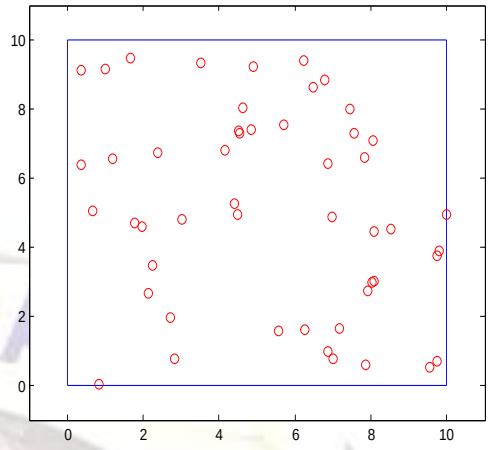

Fig.2. Randomly distributed sensors in a Square method.

3. Proposed Method

In this section, we present A Low Cost Nodes Distribution on Hexagonal method for wireless sensor networks (WSNs).The choice of integrating MDS is based on our extensive studies on existing localization algorithms. In this paper it is proposed 100 uniformly distributed nodes and there are no measurement errors. The Simulation results with 100 anchors randomly distributed across the networks are shown in Figure 3. A hexagonal method is used to deploy all the sensors within the coverage network area. In the square method some of the sensor nodes are not placed in the coverage area and there exists a ranging error. In the proposed method the sensors are deployed without any ranging error and coverage area is very high.

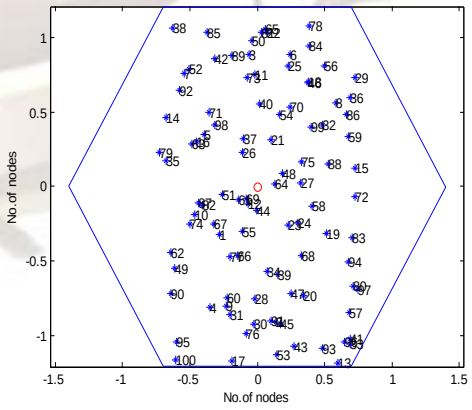

Fig.3 Randomly deployed sensors on a hexagonal method

4. Simulation Results

It is shown that the proposed algorithm works well for near uniform radio propagation. However, in the real world, radio propagation indoors and in cluttered circumstances is far from uniform. Local position estimation may also be very high. In the mat lab simulation the proposed algorithm is a random network of >100 nodes are created for a hexagonal area and a low cost hexagonal method is used to find out the computational cost as shown in table 1.In this method the computational cost is increases when we are increasing the number of nodes in the entire area of the hexagon and the coverage area of the network is 100% up to 300 nodes are randomly deployed in the entire area of the hexagon. The proposed method shows that when number of sides is increases in the entire area of the network the coverage area is increases and range error reduces.

Table.1 Analysis of Hexagonal Method

Hexagonal Method			
Number of nodes	Computa-tional cost	Coverage Area	Range error
10	0.2010	100%	0%
20	0.2095	100%	0%
30	0.2497	100%	0%
40	0.2792	100%	0%
50	0.2838	100%	0%
60	0.3181	100%	0%
70	0.4924	100%	0%
80	0.5409	100%	0%
90	0.6001	100%	0%
100	0.6010	100%	0%
110	0.6080	100%	0%
120	0.6211	100%	0%
130	0.6406	100%	0%
140	0.6504	100%	0%
150	0.6667	100%	0%
160	0.7126	100%	0%
170	0.7489	100%	0%
180	0.7559	100%	0%
190	0.7823	100%	0%
200	0.7937	100%	0%
250	0.8102	100%	0%
300	0.8516	100%	0%
400	1.0297	99%	1%
500	1.1135	98%	2%
1000	2.4032	96%	4%

5. Conclusions and Future Work

In this paper A Low Cost Nodes Distribution on Hexagonal method for wireless sensor networks (WSNs) is present. Simulation results also show that our proposal is low cost to adverse effect of anchor placement. The proposed algorithm can be implemented in a distributed fashion efficiently when the number of anchors is chosen appropriately. From simulations, we find that choosing anchors is more than 100 in the network. However, most networks in real-world applications are not isotropic. For anisotropic networks a circle shaped MDS algorithm can give better results than hexagonal method. The main advantage of the hexagonal method is used in Cellular and Mobile Networks as shown in Fig.4. In this algorithm the Computational cost is very low comparative to the previous method. In this method the coverage area is more and computational cost is low and it can reduce the power consumption. It is used in 3D open and closed surfaces. The future enhancement is increasing radio range for wireless sensor networks. The main limitation is when we are increasing the number of nodes above 300, then it can decrease the coverage area and range error is decreased. To overcome that better to increase number sides in the perimeter of the entire coverage area like octagon.

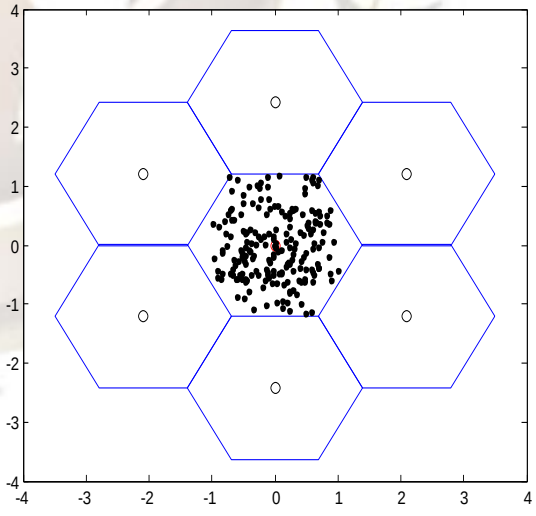

Fig.4 Hexagonal Cell site used in mobile networks

6. References

1 N.Pushpalatha and Dr.B.Anuradha, *"A Two-Dimensional IR Algorithm for Position Estimation in Wireless Sensor Networks",* International Journal of Computer Science and Technology, ISSN : 0976-8491(Online) | ISSN : 2229-4333 (Print) IJCST Vol. 3,Issue 2, Version 1, April - June 2012.Pp:35-39.

2 N.Pushpalatha and Dr.B.Anuradha, "*Shortest path position estimation between source and destination nodes in wireless sensor networks with low cost",* International Journal of Emerging Technology and Advanced Engineering (ISSN 2250-2459, Volume 2, Issue 4, April 2012). Pp:6-12

3 N. Pushpalatha and Dr.B.Anuradha, "*Distribution of Nodes on Square Method for Wireless Sensor Networks*", in International Journal of Computer Science and Telecommunications [Volume 3, Issue 1, January 2012].

4 N.Pushpalatha and Dr.B.Anuradha, " *Study of Various Methods of Wireless Ad-hoc Sensor Networks using Multidimensional Scaling for Position Estimation*" Global Journal Engineering and AppliedSciences-ISSN2249-2631(online): 2249-2623(Print) GJEAS Vol.1(3) , 2011.Pp:76-81

5 Eiko Yoneki and Jean Bacon, "*A survey of Wireless Sensor Network technologies: research trends and middleware's role*" University of Cambridge Computer Laboratory Cambridge CB3 0FD, United Kingdom

6 D. Estrin, R. Govindan, J. Heidemann, et al. Next century challenges: *scalable coordination in sensor networks [C], Mobile Communications*, 1999: 263-270

7 PG. J. Pottie, W. J. Kaiser. *Wireless integrated network sensors* [J], Communications of the ACM, 2000, 43(5): 51-58.

8 T. Arici, Y. Altunbasak. *Adaptive sensing for environment monitoring using wireless sensor networks* [C], Wireless Communications and NetworkingConference,2004,4:2347-2352.

9 R. Arumugan, V. Subramanian, A. Minai. SCRIBE: *self organized contention and routing in intelligent broadcast environments* [C], Military Communications Conference, 2003: 1567-1572.

10 Wu-chun Feng. *Securing wireless communication in heterogeneous environments* [C], MILCOM, 2002, 2: 1101-1106.

N.Pushpalatha completed her B.Tech at JNTU, Hyderabad in 2004 and M.Tech at A.I.T.S., Rajampet in 2007. Presently she is working as Assistant Professor of ECE, Annamacharya Institute of Technology and Sciences Tirupati since 2006. She has guided many B.Tech projects. Her Research area includes Data Communications and Ad-hoc Wireless Sensor Networks.

Dr.B.Anuradha is working as Associate Professor in the Department of ECE, at Sri Venkateswara University College of Engineering since 1992. She has guided many B.Tech and M.Tech projects. At present Five Scholars are working for PhD. She has published a good number of papers in journals and conferences.