MOBILE ANCHOR BASED LOCALIZATION SCHEME IN WIRELESS SENSOR NETWORK

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ABSTRACT

Wireless Sensor Network technology is the fast growing field so the challenges are also quit much, the main and important parameter in any network is the location of the nodes. The performance of any system is decided on the basis that how much it is clever to find the exact location with the minimum error in minimum time, also can it be able to find obstacle and identify them.in this paper we proposed the Mobıle Anchor Based Localızatıon Scheme In Wıreless Sensor Network. With two mobile anchor node to find the location of other sensor node in obstacloe based envornment. And finaly simulate the result in NS-2.

Keywords: Anchor , Beacon, Chords, Gps

I. INTRODUCTION

Accurate and low-cost sensor localization is a critical requirement for the deployment of wireless sensor networks in a wide variety of applications. Many applications require the sensor nodes to know their locations with a high degree of precision. Various localization methods based on mobile anchor nodes have been proposed for assisting the sensor nodes to determine their locations. However, none of these methods attempt to optimize the trajectory of the mobile anchor node. Accordingly, this project presents a path planning scheme, which ensures that the trajectory of the mobile anchor node minimizes the localization error and guarantees that all of the sensor nodes can determine their locations. The obstacle-resistant trajectory is also proposed to handle the obstacles in the sensing field. Later this path planning algorithm is adjusted so that it suits most of the effective localization algorithms. The performance of the proposed scheme is to be evaluated through a series of simulations with the ns-2 network simulator.

II. EXISTING SYSTEM

There are many schemes available for determining the location of sensor nodes. These can be classified into range based or range free, anchor based or anchor free, stationary or mobile sensor nodes, fine grained or coarse grained, and centralized or distributed as shown in figure 1, other than these schemes GPS based is also one of the technology which can be used for location identification. However, it consumes large amount of energy and is expensive because GPS receiver is required for every node. As compare to other technology GPS provides very high accuracy of localization. But because of limited amount of energy in sensor nodes and very high cost of GPS, it is not suitable for most of the WSN based applications. These methods are follws.

Fig.1. Localization Schemes

III.PRAPOSED SYSTEM

3.1. Localızatıon Implementatıon

The localization scheme was inspired by the perpendicular bisector of a chord conjecture. The conjecture describes that the perpendicular bisector of any chord passes through the center of the circle. As shown in Fig., the chord of a circle (AB) is a segment whose endpoints are on the circle. With two chords of the same circle, the intersection point of two perpendicular bisectors of the chords will be the center of the circle. The localization problem can be transformed based on the conjecture. The center of the circle is the location of the sensor node; the radius of the circle is the largest distance where the sensor node can communicate with the mobile anchors. The endpoint of the chord is the position where the mobile anchor point passes through the circle.

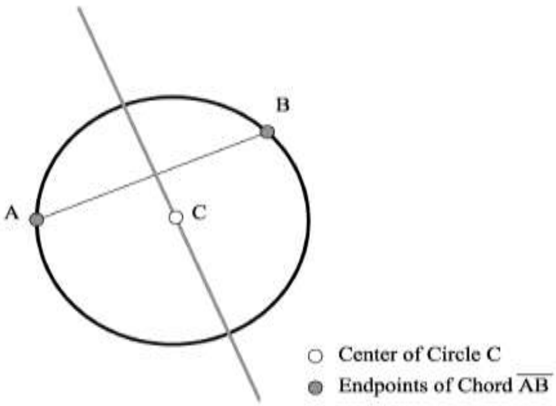

Fig 1.Perpendicular Bisector of A Chord Conjecture

3.2 Beacon Poınt Selectıon

In the mechanism, at least three end points on the circle should be collected for establishing two chords. Each mobile anchor point periodically broadcasts beacon messages when it moves in the sensor network. The beacon message contains the anchor node's id, location, and timestamp.

Every sensor node maintains a set of beacon points and a visitor list. The beacon point is considered as an approximate endpoint on the sensor node's communication circle. The visitor list stores both the mobile anchors whose messages have been received by the sensor node and their associated lifetime. The th beacon point in the sensor is represented as (id , location , timestamp) and the th entry in the visitor list can be recorded as (id , lifetime).

When a sensor node receives a beacon message from a mobile anchor point, the node will check whether the anchor point is in its visitor list. If not, a beacon point will be added and the anchor point with a predefined lifetime will be inserted in the visitor list. Otherwise, the beacon message will be ignored and the lifetime of the mobile anchor point will be extended. When the lifetime of the anchor point is expired, the corresponding entry in visitor list will be removed and the last beacon message of the anchor point will be recorded as a beacon point.

3.3 Locatıon Calculatıon

After three beacon points are obtained, two different chords can be generated. As shown in Fig. the set of selected beacon points is$\{B_I, B_J, B_K\}$and their locations are(x_i, y_i), (x_j, y_j), (x_k, y_k), and . Two chords randomly chosen B_iB_j, B_iB_k, and , are formed based on the beacon points. Consider that lines L_{ij} and L_{jk} are the corresponding perpendicular bisectors of the chords B_iB_j, B_iB_k and , respectively. Therefore, by simple algebraic calculation, the equations of two lines L_{ij} and L_{jk} can be presented as follows:

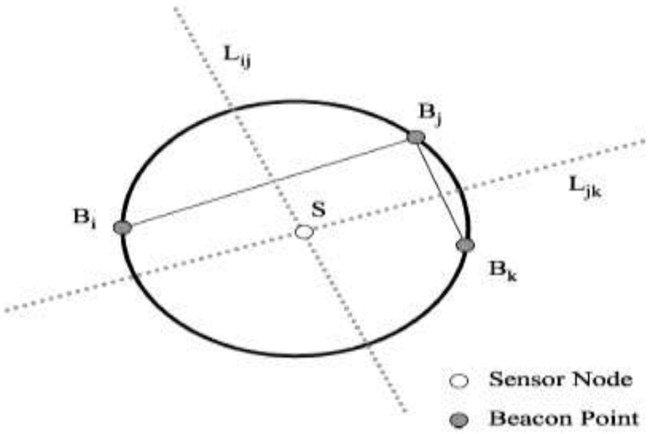

Fig 2.Anchor Path Planning Scheme

$$\begin{cases} L_{ij} : a_{ij}x + b_{ij}y = c_{ij} \\ L_{jk} : a_{jk}x + b_{jk}y = c_{jk} \end{cases}$$

If three beacon points are obtained on the communication circle of a sensor node, it follows that the mobile anchor node must pass through the circle on at least two occasions.

In the path planning scheme proposed in this study, the distance between two successive vertical segments of the anchor trajectory (i.e. the resolution of the anchor trajectory)is specified as $R-X$, where R is the communication radius of the mobile anchor node and X is set in the range $0 < X \le R/3$This is because if X is bigger than $R/3$,$R - X$ will be smaller than $2R/3$. Hence, the distance between four successive verticalsegments is less than the diameter of the communication circle(i.e. $2R$). As a result, the mobile anchor node will pass throughthe circle more than three times. In other words, increasing thevalue of X may incur redundant beacon points.

Conversely, decreasing the value of *X* may cause the chord length tofall below the minimum threshold value. Thus, in practice, acareful choice of *X* is required. To determine the positions of the sensor nodes close to the boundary of the sensing field, the dimensions of the field are virtually extended by a distance of *R* on each side, as shown in Fig. By extending the sensing field, and choosing an appropriate value of *X*, the proposed path planning scheme ensures that the mobile anchor node passes through the circle of each sensor node either two or three times.

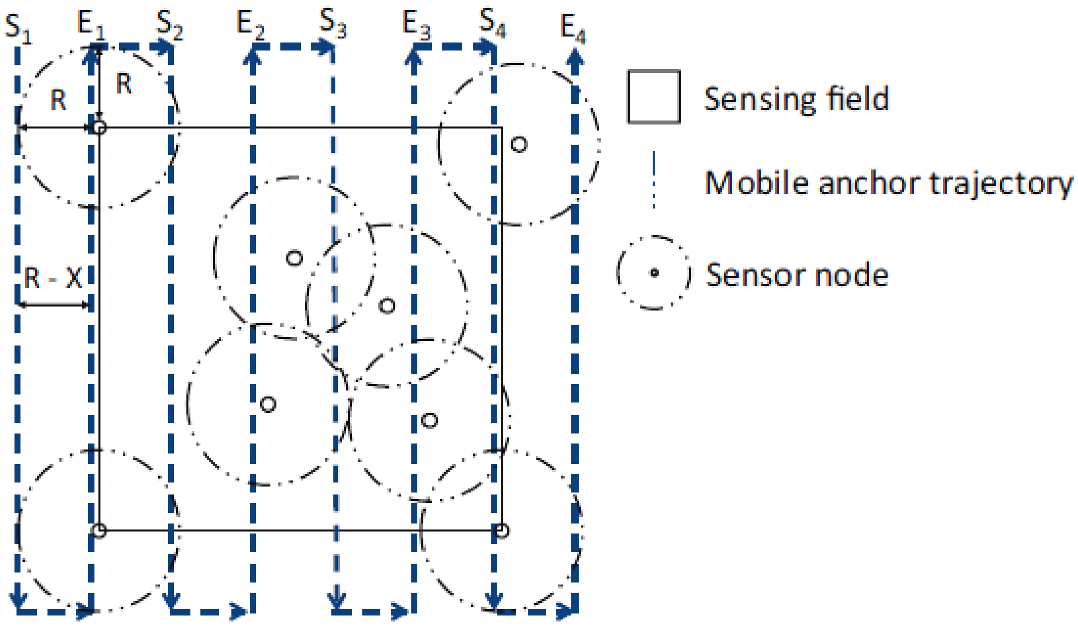

Fig 3 .Proposed Mobile Anchor Trajectory.

As shown in Fig 3, the total path length *D* is given as

$$D = (L+2R)\times\left(\left\lceil\frac{L+2R}{R-X}\right\rceil+1\right)+(R-X)\times\left\lceil\frac{L+2R}{R-X}\right\rceil$$

IV. PERORMANCE EVALUATION

We simulated the energy efficient localization technique on Network Simulator (version 2) widely known as NS2 [11], a scalable discrete-event driven simulation tool.

Building high performance WSN network systems requires an understanding of the behavior of sensor network and what makes them fast or slow. In addition to the performance analysis, we have also evaluated the proposed technique in measuring, evaluating, and understanding system performance. The final but most important step in our experiment is to analyze the output from the simulation. After the simulation we obtain the trace file which contains the packet dump from the simulation.

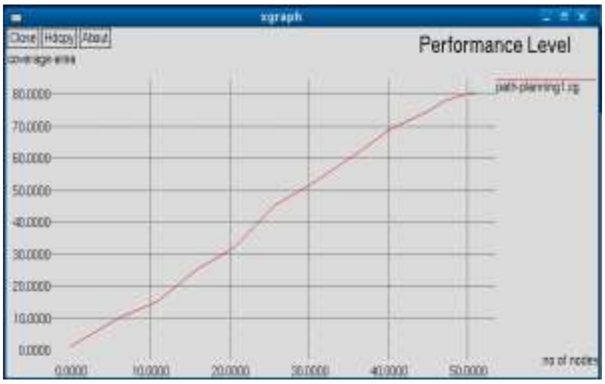

Figure 1 Coverage area Vs number of nodes

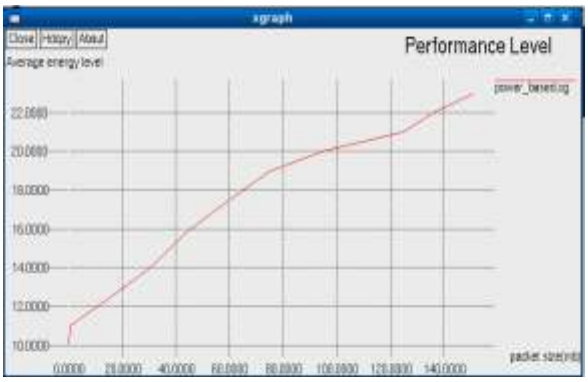

Figure 2. Coverage area Vs number of nodes

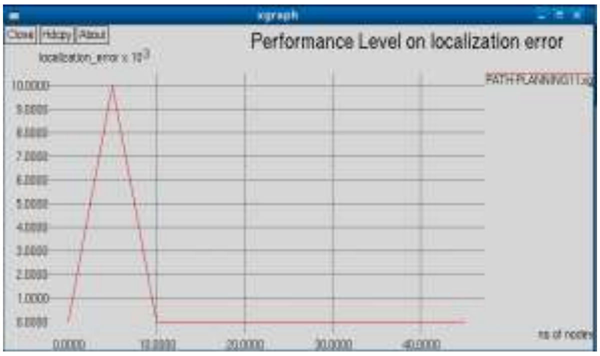

Figure 3. Coverage Area Vs Number Of Nodes

Figure 4. Coverage Area Vs Number Of Nodes

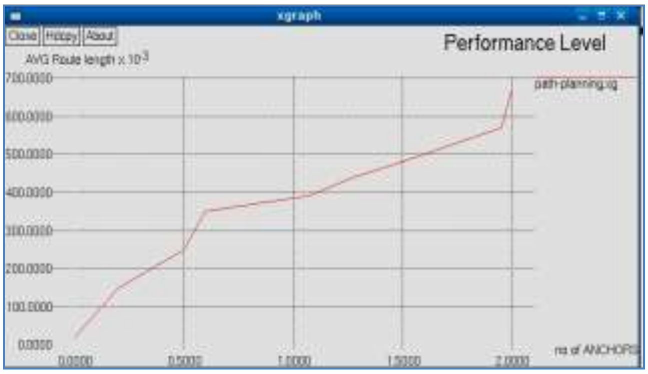

Figure 5. Coverage Area Vs Number Of Nodes

V. CONCLUSION

In this paper, we have proposed a path planning scheme for the mobile anchor node in the localization method. The modified movement trajectory and the virtual beacon point generation scheme are implemented to tolerate the obstacles in the sensing field. The performance of the proposed scheme is improved as compared to the original random movement strategy. Overall, the simulation results have shown that the proposed path planning strategy outperforms existing methods in terms of both a smaller localization error and a higher percentage of successfully localized sensor nodes. Furthermore, it has been shown that all sensor nodes can determine their locations in the presence of obstacles in the sensing field. The future work will investigate the path planning method for all kinds of mobile anchor-based localization schemes

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