An Algorithmic approach for Localization using Single Mobile Anchor Node using Information Baton Handover Policy

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***Abstract*—** The main goal of a sensor network is to collect and forward data to destination. It is very essential to know about the location of collected data. This type of information can be obtained using localization technique in wireless sensor networks (WSNs). Localization is a technique to determine the location of sensor nodes. Many research and work around is carried on Localization technique in WSN, because of its huge application in day today life. It is very important to design a low-cost, scalable, and efficient localization mechanisms for WSNs.

Keywords- *wireless sensor network, mobile anchor node, localization, information baton handover*

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I. INTRODUCTION

To determine the physical behavior of real world environment sensors nodes are deployed. Example fire monitoring in forest, measuring temperature, pressure, sound and etc. To find out the place where the changes in the environmental behavior is the crucial issue. So the concept of Localization is used. Localization is the way /technique to find out the location of node in wireless sensor network. Based on the conditions or based on the application of sensor network ,number of methods have been introduced in Localization technique.

We [1] classify the localization method into target/source localization and node self localization as shown in figure 1.And the target localization can be further classified into four categories: single-target localization in WSN, multiple-target localization in WSN, single-target localization in wireless binary sensor network (WBSN), and multiple-target localization in WBSN. And node self-localization can be classified into two categories: range-based localization and range- free localization. The former method uses the measured the distance/angle to estimate the location. And the latter method uses the connectivity or pattern matching method to estimate the location.

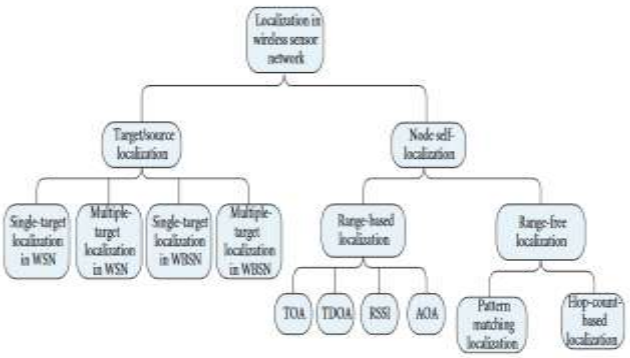

Figure 1 : Classification of Localization

II. RELATED WORK

Some existing static localization algorithms can also be applied in the WSN with mobile anchor nodes [2], [3].Meanwhile, some specialized localization algorithms have been proposed. Sichitiu and Ramadurai [4] proposed a localization algorithm, in which an anchor is able to move and broadcast its current beacon information from time to time, and sensor nodes can estimate their relative positions to the anchor through the received signal strength indicator (RSSI). In [5], a location-unaware node estimates its distance to the anchor with ultrasonic signal.

Z. Hu, D.B. Gu, Z.X. Song and H.Z. Li, "Localization in Wireless Sensor Networks Using a Mobile Anchor Node" proposed MACL. It is a mobile anchor centroid localization method, which uses a single mobile anchor node, moving in sensing field and broadcast its current location information periodically. No extra hardware or data

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communication is needed between the sensor nodes as this is the radio frequency based .

B. Xiao, H. Chen, S. Zhou, "A Walking Beacon-Assisted Localization in Wireless Sensor Networks", this method is based on the RSS property. RSS is the fundamental measurement to reflect the distance between two sensor nodes in the wireless communication environment. A beacon node assists a target node to estimate the location when it enters the communication range .

K. Yedavalli, and B. Krishnamachari, "Sequence-Based Localization in Wireless Sensor Networks", proposes a sequence based localization, which determine all feasible location sequences in the location space and list them in location sequence table. Determine the location sequence of the unknown node location by using RSS (Received Signal Strength Indicator) measurements of localization packets exchanged between itself and the reference nodes.

Search in the location sequence table for the "nearest" location sequence to the unknown node location sequence. The centroid mapped to by that sequence is the location estimate of the unknown node.

Accordingly, the total energy consumption will be reduces and prolong the network lifetime, the familiar approach is Received signal strength indicator and is useful in estimating the distance between the mobile node and neighbor node. Unknown nodes are randomly deployed and mobile anchor node moves. RSSI(Received Signal Strength Indicator) form the basis for determining requirement of a handover activity and reduce the unnecessary handover.

III. EXISTING SYSTEM

This section describes localization environment of the system. System consists of two type of sensor nodes they are static node and mobile anchor node. Static nodes are randomly distributed as they are unaware of their location. And mobile anchor is equipped with GPS receiver to fin the location of unknown [6] node and mobile anchor node is location aware node

Figure 2 describes, localization of the unknown nodes based on RSSI (Received Signal Strength Indicator).

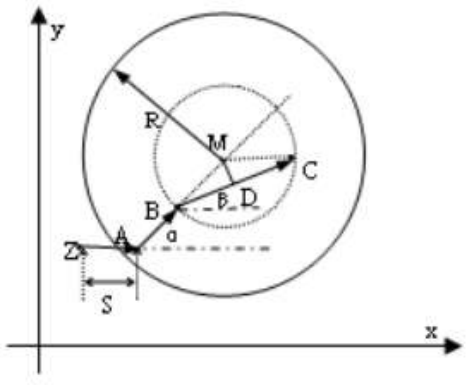

Figure 2 : Trajectory of the mobile anchor node

Referring to the above diagram , the dark circle inside the coordinates x and y represents communication range of target node M.

Steps to localize the unknown node are as follows:

1) When a anchor node is at point Z, anchor node cannot receive beacon information.
2) Once the node travels a distance s, and reaches point A which is within the communication of target node it broad cast its beacon information.
3) Node M records coordinates of point A the node . Now it receive the node M signal and detects the angle of arrival α.
4) Anchor node adjust its direction to target node and move to point B. Again step 2 and 3 repeats.
5) As we have set threshold of RSS(p_th) initially, RSS value at B should be larger than p_th of initial. Again repeats step 4 and 5 with angle of arrival as β to point C.
6) Node M (x,y) can estimate its coordinates by coordinates of points A(x_1,y_1),B (x_2,y_2),and C (x_3,y_3) as in (1) and (2).

$$y = \frac{y2-y1}{x2-x1}\,x + \frac{x2y1-x1y2}{x2-x1} \quad (1)$$

$$x = \frac{x2-x3}{y3-y2}\,x + \frac{(x3x3-x2x2+y3y3-y2y2)}{2(y3-y2)} \quad (2)$$

figure 3 shows localization error versus threshold of RSS, figure 4 shows localization error versus transmission interval and figure 5 shows localization error versus communication range.

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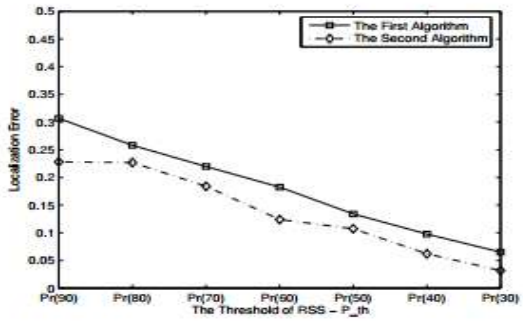

Figure 3: localization error versus threshold of RSS

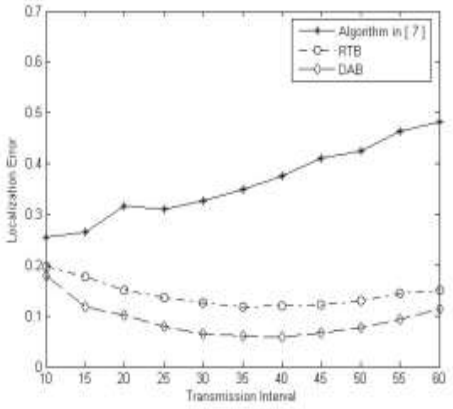

Figure 4: localization error versus transmission range

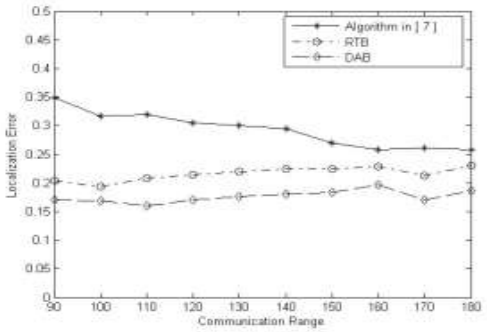

Figure 5:localization error versus communication range

IV. PROPOSED SYSTEM

In this Paper we have proposed algorithmic scheme based on RSSI(Received Signal Strength Indicator). Where build in antenna is present in the sensor node. First sensor node decides and selects a new mobile node for data less handover activity based on RSSI. For baton handover policy we are defining certain conditions.

- The mobile anchor node energy should not be less than 50%
- The anchor node should be with in the range of target node.
- During the hand over mechanism new node distance to the target node should be less then older node distance

Once the mobile anchor node decrease it energy to 50% in network it decides to hand over its information to another node. That another node should have maximum energy. And its distance to the target node should be less than present distance.

V. CONCLUSION

In this paper, we proposed an algorithmic approach for localization method based on baton handover policy using single mobile anchor node using RSSI. As Concept of Baton hand over policy , makes the network to be more reliable and efficient. Loss of data during data transmission will be reduced. Unnecessary loss due to hand over is also reduced.

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