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ENHANCED ENERGY AWARE IN WIRELESS SENSOR NETWORKS USING LOCALIZATION POSITIONING ALGORITHM: A SURVEY

Abhishek kumar Upadhyay, Prof. Dharmendra kumar singh, Department of EC, SVCST, Bhopal, India

Abstract

They mainly introduce the energy-based method. Then we investigate the node self-localization methods. Since the widespread adoption of the wireless sensor network, the localization methods are different in various applications. Wireless sensor networks have recently gained a lot of attention by scientific community. Small and inexpensive devices with low energy consumption and limited computing resources are increasingly being adopted in different application scenarios including environmental monitoring, target tracking and biomedical health monitoring. In many such applications, node localization is inherently one of the system parameters. Localization process is necessary to report the origin of events, routing and to answer questions on the network coverage, assist group querying of sensors. In general, localization schemes are classified into two broad categories: range-based and range-free. However, it is difficult to classify hybrid solutions as range-based or range-free. In this paper we make these classification easy, where range-based schemes and range-free schemes are divided into two types: fully schemes and hybrid schemes. Moreover, we compare the most relevant localization algorithms and discuss the future research directions for wireless sensor networks localization schemes. In localization the problem that the positioning correctness and a few anchor nodes. Purposed algorithmic program for improvement approach and find the optimum location. Find the optimum location by satisfying every the factors with minimize error and good accuracy.

KEYWORDS: localization, Error Correction, WSN, anchor node, range-based methods, range-free methods, hybrid-based methods, RSSI, mobile anchor nodes.

I. INTRODUCTION

Localization is one of the most important subjects because the location information is typically useful for coverage, deployment, routing, location service, target tracking, and rescue. Recent developments in MEMS IC technology and wireless communication have made possible the use of large networks of wireless sensors for a variety of applications including process monitoring, process control. A Wireless sensor network (WSN) is formed by hundreds of small, cheap devices called sensors which are constrained in terms of memory, energy and processing capacities [1]. These sensors are deployed to sense the physical characteristics of the world, such as temperature, light and pollution. WSNs are expected to be solution to a wide range of applications such as monitoring, natural disaster relief, patient tracking, military target and automated warehouses. In many of these applications, location awareness is useful or even necessary [2]. Indeed, without knowing the position of sensor node, collected data is valueless. The localization of sensors can be implemented by different manners. A simple solution is to equip each sensor node with a GPS receiver that can precisely provide the sensor nodes with their accurate position. However, adding the GPS to all nodes in the wireless sensor network is not practical because of high cost, high power consumption and environment constraint [3]. In addition, the GPS fails in indoors applications, under the ground, or dense forest. The sensor nodes are randomly deployed by the vehicle robots or aircrafts. While the Global Positioning System (GPS) is one of the most popular positioning technologies which are widely accessible, the weakness of high cost and energy consuming makes it different to install in every node. In order to reduce the energy consumption and cost, only a few of nodes which are called beacon nodes contain the GPS modules. The rest of nodes could obtain their locations through localization method. The process of estimating the unknown node position within the network is referred to as node self-localization. And WSN is composed of a large number of inexpensive nodes that are densely deployed in a region of interests to measure certain phenomenon. The primary objective is to determine the location of the target. As shown in Figure 1, we classify the localization method into target/source localization and node self-localization. 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. We will present the localization method in some special scenarios and finally introduce the evaluation criteria for localization in WSN [4].

Target/Source Localization: The source localization methods have a wide range of possible applications. The outdoor application includes vehicle or aircraft

localization. In an indoor environment, this method could track the human speakers. In underwater environment, it can be used to locate the large sea animals and ships. There are several ways to estimate the source location: energy-based, angle of arrival (AOA), time difference of arrival (TDOA). As an inexpensive approach, energy-based method is an attractive method because it requires low hardware configuration. In this survey, we focus on the energy-based source localization [5].

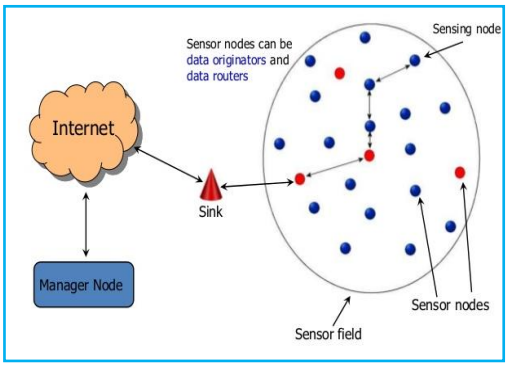

Fig1 WSN Communications Architecture

Range-free localization algorithms: In order to estimate the location of unknown node, this category is based on the use of the topology information and connectivity, i.e.," who is within the communication range of whom". According to the manner that location of unknown node is obtained. The range-free schemes can be further divided into two types: fully-range-free and hybrid-range-free scheme.

Range-based localization algorithm: this category of algorithms is based on using range measurement techniques for location estimation. According to the manner of using the range measurement techniques, this category can be divided into two types: fully-range-based and hybrid-range-based localization algorithm. Both of them are even anchor based or anchor free [6].

II.RELATED WORK

F. Santos et al. [7] .present a survey on localization methods for mobile wireless sensor networks (MWSNs). First, the authors provide a brief taxonomy of MWSNs, including the three different architectures of MWSNs, the differences between MWSNs and WSNs, and the advantages of adding mobility. The MWSN localization discussed in is consists of three phases: 1) coordination, 2) measurement, and 3) position estimation. In the coordination phase, sensor nodes coordinate to initiate localization, including clock synchronization and the notification that the localization process is about to begin. In the second phase, the measurement techniques, e.g., the angle-of-arrival (AOA) and the time-difference-of-arrival (TDOA) methods are presented. The measurements obtained in the second phase can be used to determine the approximate position of the mobile target node based on localization algorithms, e.g., the Dead Reckoning, the maximum likelihood estimation (MLE) and the Sequential Bayesian estimation (SBE). To the best of our knowledge, the reference is the first survey focusing on MWSNs localization.

D. Moore et al. [8] the authors proposed a Robust Distributed network Localization with noisy range measurements (RODL) for locating nodes in a sensor network in which the node measures distances to neighboring using the time difference of arrival (TDOA). In particular, the authors consider how the measurement noise can cause incorrect realization of node displacement. In this approach, each node becomes the center of a cluster and computes the relative location of its neighbors which can be absolutely localized. Once is done, an optional optimization can be deployed to refine the localization of clusters. Cluster stitching technique is used to obtain a coordinate assignment for all the nodes, within a general coordinates system.

X. Li et al [9] recently, a large number of localization techniques and algorithms have been proposed for WSNs, and simultaneously many studies have been done to survey and analyze existing Localization techniques and algorithms. For example first provide an overview of measurement techniques that can be used for WSN localization, e.g., distance related measurements, angle-of-arrival (AOA) measurements and RSS profiling techniques. Then the one-hop and the multi-hop localization algorithms based on the measurement techniques are presented in detail, respectively, where the connectivity-based or "range free" localization algorithms and the distance-based multi-hop localization algorithms are particularly discussed due to their prevalence in multi-hop WSN localization techniques. In addition, based on the analysis, the open research problems in the distance-based sensor network localization and the possible approaches to these problems are also discussed.

H. P. Mistry et al. [10].a survey on mobility-assisted localization techniques is presented for WSNs. First, Key issues and inherent challenges faced by mobility-assisted localization techniques are analyzed. Then, mobility assisted localization techniques are discussed based on two typical categories: range-based and range-free based localization approaches. Furthermore, the well known mobile anchor trajectories presented in existing localization algorithms are also reviewed, including SCAN, HILBERT, CIRCLES and DREAMS. Mobility-assisted localization is a kind of efficient approach that significantly reduces implementation cost by using

limited number of mobile anchors instead of a large number of static anchor nodes. However, only the four mobile anchor trajectories are discussed in [36]. Nowadays, much mobility-assisted localization has been proposed for WSNs, and quite a number of path planning schemes have been proposed for mobile anchor nodes. Therefore, in this paper, we further study Mobile Anchor Node Assisted Localization (MANAL) based on the movement of mobile anchor nodes.

A. N. Bishop et al. [11], Proposed in Exploiting geometry for improved hybrid AOA/TDOA-based localization (EATL). This scheme is based on the combination techniques of bearing (angle of arrival AOA) and time difference of arrival TDOA techniques. First, each beacon node measures the target bearing (positive counter-clockwise from the x-axis) which is equal to the sum of the true bearing and an error. Moreover, each anchor node measures the time of signal arrival, which is equal to the sum of true time of signal arrival and an error. Then the time-difference between the arrival times at anchor nodes gives the distance–difference measurements. After that, the authors formulate a constraint function that is used in a constrained optimization process; this process estimates the maximum likelihood measurement errors such that the final solution satisfies the proposed constraint which captures the underlying geometry. Thus the maximum likelihood measurement errors when subtracted from the measurements give values of bearing and distance-difference that permits a consistent location estimate the proposed algorithm is inherently more robust to initialization procedures than the traditional maximum likelihood estimation techniques.

G. Han et al. [13].range-based localization techniques are discussed in detail. They are classified into four categories as follow: 1) centralized versus distributed algorithm, 2) range free versus range based localization techniques, 3) anchor based versus anchor free localization techniques, and 4) mobile versus stationary node localization. Some authors have proposed algorithms in which mobile anchor nodes are used in order to improve localization accuracy of stationary sensor nodes. In addition, there are only mobile anchor nodes in WSNs, but also mobile unknown nodes or targets. Therefore, some mobile node localization algorithms are proposed to locate or track mobile sensor nodes. However, in the paper, the details of mobile node localization algorithms are not discussed.

Desai et al. [14], proposed in Fusion of RSSI and TDOA measurements from wireless sensor network for robust and accurate indoor Localization (FRTL) that combines RSSI and TDOA measurements in location system. This algorithm uses TDOA as a primary distance estimation scheme for localization. It collects and trains RSSI data with the associated known distances, in parallel. Trained distances based on appropriate RSSI value can then replace any missing TDOA measurements. In presence of acoustic noise when TDOA communication is unavailable, the algorithm can also use trained distances in place of all missing TDOA measurements.

Zhongming et al. [15], proposed in an Iterated Hybrid Localization Algorithm (IHLA) based on the centroid scheme and DV-Hop scheme. When each unknown node computes its initial coordinates by using the centroid scheme, it estimate again the distances among each unknown node to the beacon nodes based on the DV-Hop scheme. After that, Taylor Series Expansion (TSE) algorithm is used to estimate coordinates of each unknown node. The proposed algorithm has better localization accuracy compared with centroid scheme and DVhop scheme. However, this hybrid algorithm is more complex and needs more computing time,

III.EXPECT OUTCOME

The field of WSN in localization method Search optimization and high accuracy for the location of nodes is initially estimated using Mobile Anchor Positioning method in wireless sensor networks and identifies various challenges. Positioning method discover the optimum node location and best possible result**.**

IV. CONCLUSION

Localization in wireless sensor network is a hot area of research that has been addressed through many proposed method. Based on the dependency of the range measurements theses proposal method are classified into two major categories: range-based schemes and range-free schemes. However, it is difficult to classify hybrid schemes which combine different methods based on connectivity information and/or range measurement techniques as range-based or range-free schemes. In this paper we make the classification of any localization schemes easy, where range based schemes and range-free schemes are divided into two types: fully schemes and hybrid schemes. Furthermore, this classification is proposed also to help in comparing localization schemes in terms of accuracy. In particular, between the schemes of the same category either for range- based or for range-frees categories. But it still suffers from the time of execution needed for the calculation. Proposed error optimization algorithms for accelerating this time is perspective making this scheme an effective solution for the localization in wireless sensor networks. The development in mat lab tool of new combination

between the range measurement techniques and connectivity methods for different application highly motivated the study in this direction.

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