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Grid Based Sensor Deployment Technique for Localization in WSN

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Abstract: *Localization is broadly exploited in wireless sensor networks (WSNs) to recognize the existing locality of the sensor nodes. A WSN include to multiple nodes which create the installation GPS on all sensor node costly and furthermore GPS will not confer exact localization outcome in an indoor atmosphere. Manually configuring location reference on all sensor nodes is not likely in the case dense network. This gives grow to an issue where the sensor nodes must identify its existing locality without exploiting any special h/w like GPS and without the aid of manual configuration. Localization technique creates the spread of WSNs economical. Most the Localization technique is carried out with the aid of beacon node or anchor node that called as its existing location. Based on the location data confer thru the beacon node or anchor, other nodes localize themselves. In this paper we study about sensor network and localization technique we proposed a distance based approach to find best location of sensor nodes. Our work implement on NS-2.35.*

Keywords: *WSN;Localization;*

I. Introduction

WSN is a group of disseminated electronic devices used in wireless communiqué for detecting, computing and communicating info among the nodes. WSN is a technology revolution modifies society and incorporated into every separate. WSN are utilized in manyusagessuch as military, disaster management, hospitals and monitoring of agriculture e.tc.

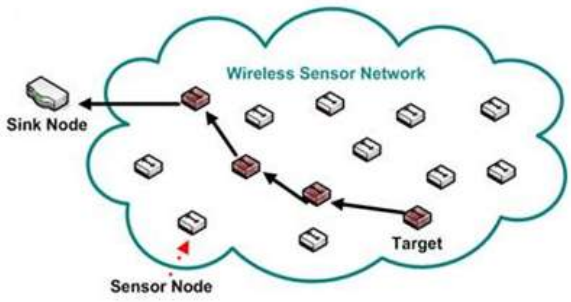

Fig. 1. WSN Architecture

In WSN, positioned of nodes in the ad-hoc manner and don't know the exact position of each node. Node positioning is rising and crucial investigateregion in WSN. In actual time usageas fire accidents conditions aid the fireman rescue teams to detect their positions, route thru a construction during in emergency situations and to communicate the location info to an outside controlling unit [1].

The Node Localization problem is viewed as detect the positional info i.e. spatial coordinates of each the nodes over a region of significance in a network. Localization becomes very serious when there is an ambiguityregarding the position of the nodes. Location info of a node lays the foundation for each other applications e.g. reporting the origin of events, coverage, node life-time control, routing, and target tracking. Node localization was first to complete thru adding Global Positioning System (GPS) to the nodes but it's considerably broken which adding GPS to each the nodes in a WSN atmosphere reaches to the following faults:-

- Increase to the Cost factor.
- GPS can't work in indoor atmosphere.
- GPS consumes more power thereby lessening the battery power of particular the initial set of sensor nodes whose positions are known [2].

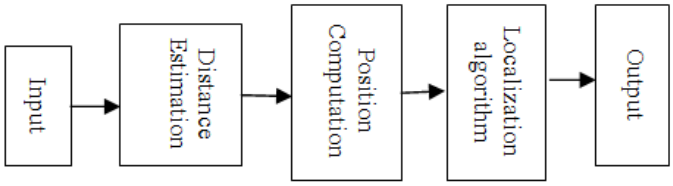

Fig.2 Localization Process

Localization technique is indispensable for WSNs, and it is used for various sensor network applications. When any sensor devices are located in the harsh environments, the GPS can be useless and localization is required for obtaining the location info of each device. Essentially, localization system of WSNs is formed of the reference nodes, that the unknown nodes and understand their very own locations, that don't recognize their very own locations. Depend on the information of the reference nodes; sensor nodes can achieve their locations by using the ranging techniques [3].

II. Categorization

Localization algorithms in WSN can be separated into two parts.

A. anchor-based and anchor free

A range of algorithms, known as anchor-based algorithms depend upon the presence nodes that know their particular position previous to the localization algorithm start. Those nodes are known as anchors. The presence of anchors enables to reduce the computational complexity of computation, and agree to achieve the coordinates that are in accordance with some global coordinate system. At the same time, anchor protection and deployment in some situations aren't possible. Thus, a differentcollection of algorithms, known as*anchor-free* algorithms, agree to detect the node position when no anchor are present Anchor-based algorithms can be additional subdivided into two parts: *multi-hop and single-hop* algorithms [4].

B. Range-based and Range free

Range based algorithms depend on measuring physical attributes of the wirelessly signals transmitted between antennas such as the time of arrival (ToA) and the angle of arrival (AoA) of the signal and the received signal strength indicator (RSSI). These algorithms, however, necessitate include extra hardware to sensors; that's power-consuming and costly. Range-free algorithms, that can be centralized or distributed. Each sensor relays inforegarding itself to a base station (BS) in centralized range-free localization algorithms. The BS uses this information to make a map of the network to estimate the sensor position. These centralized algorithms suffer from communication overhead between the BS and sensors. Eachsensorlocalize itself locally as describe next in distributed range free localization algorithms [5].

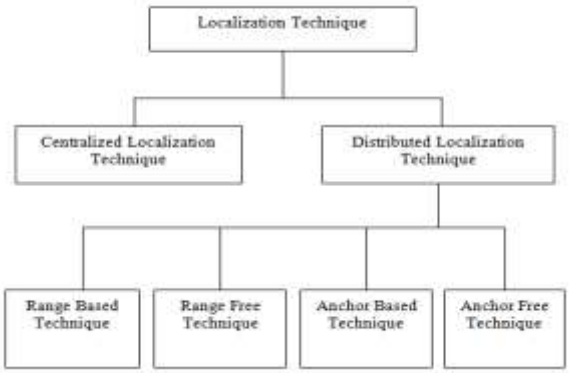

Fig.. 3 Localization Techniques

Table 1classification of proposals for localization in WSN [6]

Proposals	**Range based/ Range free**	**Anchor based/ Anchor free**
Ren c. Luo Fellow, et. al	Range based	Anchor Based
D. Niculesu and B. Nath	Range Based	Anchor Based
Mianjin et. al	Range free	Anchor free
KoenLangendoen, et. al	Both	Anchor Based
E.S. Navarro, et.al	Range free	Anchor Based
Yi Shang, et. al	Range Free	Anchor Based
Yi Shang, et. al	Range free	Anchor free
Anushiya A kannar, et.al	Range free	Anchor Based

III. Literature Survey

Gauravet.al (2016) in this paper, they present a distributed range free localization algorithm: Varying Anchor Range Half Normal(VARHN) for WSN, in which connectivity, varying anchor ranges and approach of half normal are used for providing a low estimated error than other range free algorithms. In VARHN algorithm, anchor nodes send beacon signals in the entire network at dissimilar range levels, thatcreateseveral rings and transmission ranges circles of anchors. The principle of half normal is used for estimating the position of unknown nodes. VARHN is also energy efficient because it doesn't need info exchange amid nodes. Simulation outcomeillustratethat the algorithm has more accuracy than Centroid, Weighted Centroid Localization (WCL) and Convex Position Estimation (CPE) localization algorithms [7]**.**

SimZaidiet.al (2016) in this paper, they illustrate that localization accuracy may really benefit from joint utilization, at without cost, of the info already givethru the forwarding nodes (i.e., relays) amid all anchor (i.e., position-aware) and sensor nodes sets. As such, they develop a newest range-free localization algorithm, determine its average location estimation error (LEE) in closed-form, and relate it to LEE execution with the best representative algorithms. The algorithm outcome them in accuracy. In contrast to the latter, they further confirmthatits able to achieve a LEE average and variance of regarding0 when the no of sensors is largersufficient, thereby achieving an unprecedented accuracy performance among range free techniques [8].

SumanBhowmik (2016) In this paper proposed, There are severalusage for that location data plays a significate role. Detect location info thru a sensor node is known as the localization problem. The major challenge is to determine the location of unknown nodes depend on the known location of other nodes. A range-free localization design depends on fuzzy-logic strategy has been recommended. The localization scheme utilizes the RSS from the anchor nodes according to their proximity to the sensor nodes and fuzzy logic is utilizedtomake the relationship amid distance and RSS to evaluate accurate localization. They have compared defineappraoch to other existing algorithms through extensive simulations. The simulation outcomes illustrate the effectiveness of the defineapproach [9].

SlavisaTomic (2016) In this paper, addresses destination localization difficulty in both non-cooperative and cooperative 3-D WSN, for each cases of an unidentified/unknown and identified/known sensor, transmit power, PT. They employ a hybrid system which fuses angle and distance measurements, extracted from the AoA and RSS info, individually. Depend on the range, angle and measurement model, they derive a newest non-convex estimator depend on the least squares (LS) pattern. The derived non-convex estimator strongly estimated the maximum likelihood (ML) one for least sound. They then illustrate that the improved estimator can be changed into a generalized trust region sub-area (GTRS) framework, thru following the squared range (SR) strategy, for non-cooperative WSN. For cooperative WSN, Theyillustratethat the estimator can be transformed into a convex issuethru applying appropriate semi-definite programming (SDP) relaxation techniques. Moreover, theyillustratethat the generalization of the define estimators for known PT is straightforward to the case where PT isn'tknown.Our simulation outcomeillustratethat the novel estimators have excellent performance, and are robust to not knowing PT. The newestimators for non-cooperative localization significantly outperform the existing ones, and these estimators for cooperative localization illustration exceptional performance in all considered settings [10].

Neelam Barak (2016) In this paper, An efficient and indigenousapproach for global optimization methodology depend on particle intelligent swarm to be exploited for locating the nodes in a WSN has been define in this work. The objective function utilized is the estimation error of neighboring anchor nodes in the environment. PSO is a globally utilized optimization method that works on swarm intelligence approach. These algorithms make sure highest rates of convergence and prevent the issueof trapping in local minima. Thiswork uses a modified PSOmethod which is computationally efficient and subsequent simulation results have proven the better convergence results derived from the algorithm over traditional methods of PSOmethod [11].

YounesAhmadi (2016) In this paper, a range free localization algorithm for sensor positioning is define. It'sdepend on sensor distributed network replica, coverage radius, hop count amidall sensor and anchor and better in the smallest mean square error (MMSE) thatcalculate coefficients for distance estimation amid anchors and sensors. In define method, the best coefficient for all hop count is calculated with offline processing and Monte Carlo method. Then these coefficients are stored in each sensor database and they are used for localization in the practical environment. Unlike certain existent positioning approach, in this algorithm, it's not necessary to calculate distance estimation coefficient thrusensors. In the defineapproach, its suppose that each sensors utilize the omni-directional antenna for their normaldata transmission. Highest precision in geographical coordinate determining, lesser traffic load and especially better performance in the homogenous and non-homogenous environment are the most significantcharacteristic of this algorithm.Simulationoutcomedemonstrate that the algorithm has aexcellent position determination and decrease traffic load for WSNs, as evaluate to certain existent positioning schemes. Indeed the proposed method improves localization precision and reduces traffic load simultaneously [12].

IV. Propose Work

In our proposed work first we introduce sensor area as grid and find in one grid how many nodes are present than we Deploy one mobile node in every grid. After the deployment mobile node behaves as grid member .Each mobile node connected to each other and knows their location. With the aid of mobile coordinate all nodes get their coordinate.

NETWORK MODEL:

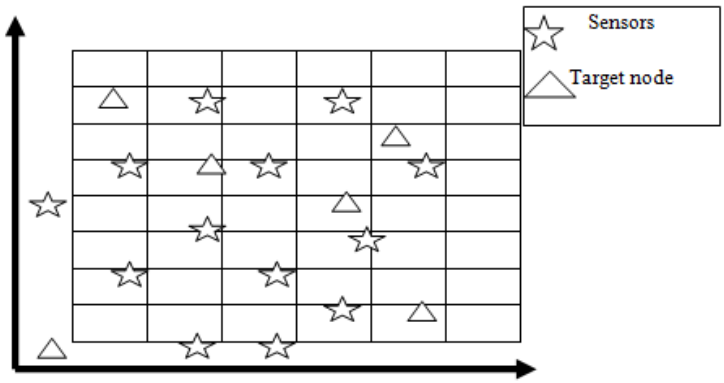

Fig.. 4 The diagram of network

Sensor nodes randomly extend in the network.Each node is location-aware and static and; destinations are also in the static state. For the ease of study, the monitor region is defined as the square of area of n×n, it's separated into N (N= n×n) grids. M (M<<N) sensor nodes with position data are randomly deploy within few grids.

Considering the effectiveness of network coverage (the Monitored region is covered thru a least number of sensors), we suppose that there's at most of one node for every grid. *K* (*K*<*M*<<*N*) target are scattered in dissimilar grids, and there is no more than one target in every grid. Moreover, the real target's position is supposed as the similar grid center. The layout of the network is illustrated as Fig. 1.

Proposed Algorithm

1:get topology ():
2: send LREQ ();
3: Recv LREP ();
4: Node calculates estimate position;
In it ();
t=nearest_node ();
REQ=send (t)
Step 5: calculate actual position
Step 6:

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Step 7: calculate transmission range and hop to reach data to destination
Step 8: on the basis of step 6 and step 7 get actual position of node.
Step: exist

V. Performance Evaluation

We simulated the localization technique of energy efficient on Network Simulator (version 2) widely recognized as NS2, 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.

VI. Simulation & Result

The simulation is carried out in NS2. The number of nodes is 50, XY dimension is 2000X2000.

Table 2 Simulation parameters

Topology Size	2000 m X 2000 m
Number of node	50
Number of unknown node	2

Beacon node	3
MAC layer	IEEE 802.11
Protocol	AODV
X	2000
Y	2000
Simulation Time	50 sec
Traffic Source	Constant bit rate(CBR)
Packet Size	512 bytes
Transmit Power	360 mW
Range	500m
Node Placement	Random waypoint

Packet delivery ratio (PDR):

The ratio of packets delivered from source to destination. The Fig illustrates a PDR graph amid base approach and proposed approach. The proposed approach is better than the base approach to the PDR.

$$PDR = \frac{totalnoofpacketsreceived}{totalnoofpacketssend} \quad (1)$$

Fig..5 pdr graph

Routing Overhead:

The routing overhead is defined as flooding data and data of data and in the network transmits thru application, which exploit a bit of available transfer rate of communiqué protocols. The Fig.4 represents a routing overhead graph amid proposed approach and base approach. Since the overhead should be least but as the routing improvements in the proposed work, the overhead also improves.

$$Routingoverhead = \frac{numberoffloodingdata}{time} \quad (2)$$

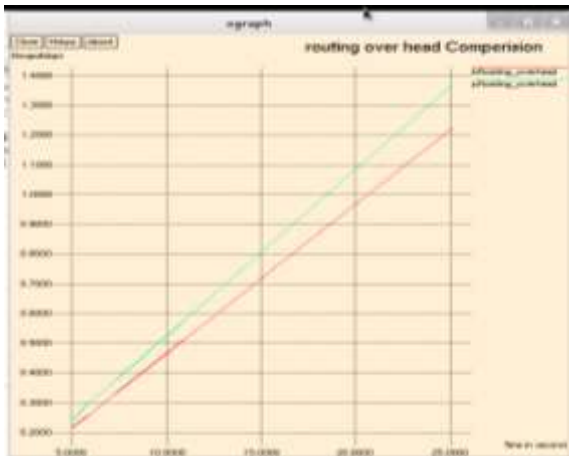

Fig.. 6 Routing overhead graph

Throughput:
Throughput of the network is calculated by the total number of packets sent over a particular period of time. In this graph, it is shown that the throughput increase as compared to existing works.

TransmissionTime=FileSize/Bandwidth(sec) (3)

Throughput = File Size / Transmission Time (bps) (4)

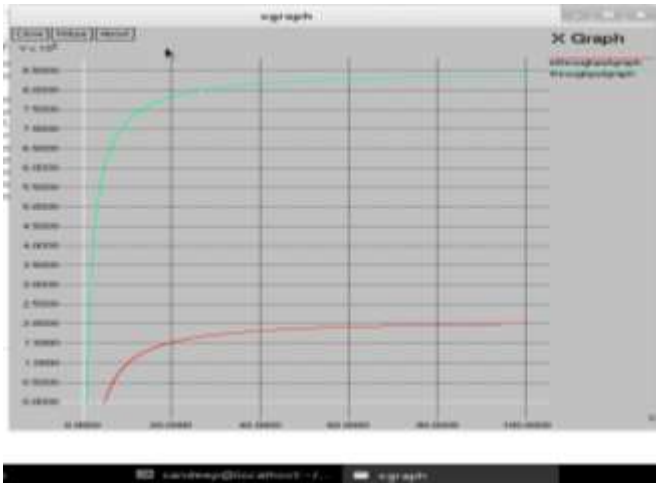

Fig.. 7 Throughtput graph

Table 3. Comparison Table

PARAMETERS	RANGE	power	Accuracy
RANGE-BASED	long range calculation using each node	HIGH POWER	HIGH
RANGE-FREE	long range using db hope and distance	MODERATE	HIGH
WITH ANCHOR - NODE	range and angle based techniques and TOA	LOW	HIGH USING GPS AND ANCHOR-NODE
WITHOUT ANCHOR -NODE	range detect using GPS	LOW	AVERAGE USING ONLY GPS
GRID BASED	high rangr predicting neighbour grids	LOW	HIGH,EXACT AND EFFECTIVE

VII. Conclusion

Wireless ad-hoc sensor networks have as of late developed as a premier research subject. They have extraordinary long term capacity to modify our lives, economic potential, and pose various new system-building issues. Sensor networks also possessing a certain innovative optimization and conceptualproblem. For instance, namely position, consumption, and tracing, are essential issues, various applications relying on them requiring information. Localization is used for tracking the actual position of nodes.

The results of proposed approach are better in terms of PDR and routing overhead and throughput.

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