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# GRAPHICAL THEORY ANALYSIS ON SENSOR NETWORK WITH INTEGRATED FORMULATION

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**Abstract:**

Sensors are a key component of any smart control system. The Network Wireless Sensors is one of the fastest developing ICT and promises a wide range of applications in next-generation networks, the Internet of Thing and applications that are critical and safe in mission. Today, wireless sensor networks ( WSNs) are a area of active study that involves daunting subjects such as energy usage, algorithms for routing, position discovery, robustness, reliability and so on. Despite the problems opened in WSNs, a range of applications are already available. In all instances, the WSN must remain as involved and usable as possible for the functionality of the program. The intention to present this paper is to stimulate interests in utilizing and developing the previous studies into emerging applications utilized the graphical data.

## 1.0 Introduction

The Wireless Sensor Network ( WSN), which extends from the national security, engineering , environmental control and traffic management, has been infiltrated in our lives. The network is created by the self-organization of sensors in different sensing areas. The sensors in the WSN will work in collaboration to senses, gathers and stores relevant data in the monitoring area, setting the groundwork for real time knowledge retrieval, processing and delivery. The reliability of the transmission of data, a core determinant of monitoring activities outcomes, is of considerable significance to research. It assumes that the network is sufficiently dense, nodes know their own site and locations and that multi-hop transmission processes are reliable. Various new forwarding strategies to improve the geographical routing performance are proposed. These routing techniques can be broken down into two groups, distance and receiving. A node is only familiar with the distance of its neighbours, while the packet reception rates of its neighbours are also available on reception. Distance transmission consists of the original greedy transmission and distant blacklists. When the node is originally greedy, packets are sent to the nearest neighbor on the basis of a minimum reception rate. Once two nodes are neighbors, a minimum transmission threshold must be met. Original greedy transit selects the highest distance neighbors, regardless of reception rate.

### Wireless Sensor Networks

A small selection of sensor units, spread geographically in an internal or an outside environment (usually defined), is included in the wireless sensor networks (W SNN). A WSN gathers environmental data and the location of node devices can, a priori, be known or unknown. Network nodes can connect with all devices real or logical: this connection determines an application topology. For example, a WSN can occur with all forms of topology (mesh, star, etc.) being the same. However, all implementations may not be. That may not.

**Advantages and Limitations of Wireless Sensor Networks**

In cases of difficult direct contact with human beings, wireless networks are useful in systems where tracking, monitoring, environmental security, routing, the detection of incidents, a multiple-agent system and other systems where sensors play an important role.

Other characteristics arise from all network behaviour, including robustness, reliability, communication between devices, time transmissions and operational safety. Sensor nodes have certain inherent limitations, like limiting energy and storage ability. Sensor nodes should operate autonomously in a centralized or distributed way for a long time and have minimum failures in all environments.

**Applications:**

WSN systems can be categorized in two categories: indoor / outdoor surveillance, health monitoring, power tracking, monitoring product position, automation of plants and operations, and seismic and structural tracking. Applications for tracking include objects, plants, people and vehicles. Although there are several different applications, we list below some examples of applications used and evaluated in the real world

**2.0 Literature review:**

**Pottie GJ. [1]** The paper presents a survey on the reliability of existing Wireless Sensor Network ( WSN) data transport protocols. Authors study multiple reliability systems based on replication methods using different packet or event synchronization combinations for recovering missing data with hop-by - hop or end-to - end mechanisms.

**Ayadi A. [2]** The paper provides a study of current wireless sensor network reliability models. The reliability tests of most WSNs are focused on the principle of graph and probability. Connectivity trustedness explores the probability that any nodes or connection faults will always connect the network for a specified duration The delays, packets and other network parameters are evaluated by the efficiency of results.

**Sharma KK, Patel RB [3]** The reliability of WSNs is affected by several factors including component failure, environmental influences, changes to tasks and network updates. It is hard to explain or calculate these factors and network conduct using mathematical modelling.

**Park SJ, Sivakumar R [4**] studies packet delivery performance under various transmission and physical-layer coding capabilities. In the MAC layer, the reliability of packet distribution is calculated by various MAC layer mechanisms such as carrier-sensing and link-layer retransmission.

**Yan M, Lam KY, Han [5]** The goal is to avoid malicious lightning nodes that send the sensor the wrong location. In order to determine its location, sensors depend on light knowledge. The following protection criteria must be met in order to avoid a risk to the localization process. Sensors are only needed to accept authenticated node information. Sensors should only use knowledge not distorted

**3.0 Distributed Techniques for Wireless Sensor Networks**

Distributed techniques are applied when some properties are maintained in the application, namely energy efficiency, number of connections, memory and efficiency, etc or when data processing is centrally inefficient. The methods spread have other unique characteristics:

***Independence***. This is present where a person is the only one who wants to store the data and to change or erase the data. The saved information does not depend on other devices for information. The key decisions are based on the data of the device. Most times this feature provides information support from a supporter's own server or host.

***Integrity with respect to Other Services***. Present in this type of technology does not mean that centralized models are integral.(iii) Scalability. According to the application, scaffolding allows the network to add more nodes without any change in network performance, so that the rest of the network will be unaffected(iv). Networks are based on the knowledge of local information, namely neighbours.

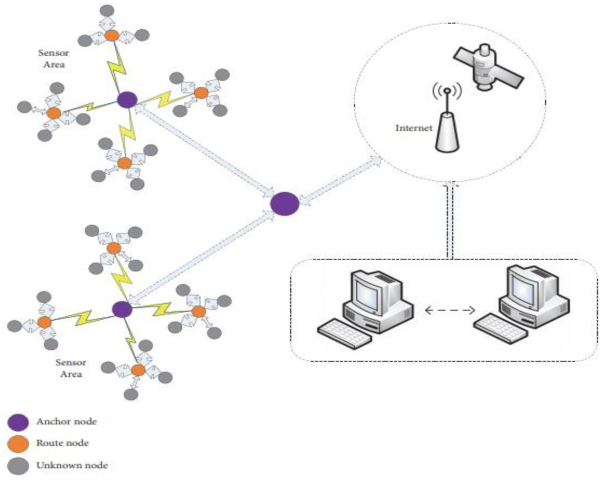



**Figure: System architecture of wireless sensor network.**

**K = {1, 2, . . . 3}.** Te distance between node i and node j and $d_{ij}$ Distance matrix Δ (i, j) and connectivity relationship matrix M

$$\Delta(i,j) = \begin{cases} d_{ij} & j \neq i \\ 0 & esle \end{cases}$$

$$\mathbf{M}(i,j) = \begin{cases} 1 & j \neq i \\ 0 & esle \end{cases}$$

The motion model of a node can be expressed as

$$X_{i(t)} = X_{i(t-1)} + \frac{1}{2} v_{i(t-1)} \times \Delta t \begin{bmatrix} \cos\theta_{i(t-1)} \\ \sin\theta_{i(t-1)} \end{bmatrix}$$

$$v_{i(t)} = \frac{1}{3} \omega \times v_{i(t-1)} + a \times rand$$

where ω is inertial weight. a is the acceleration factor. is a random number between 0 and 1.

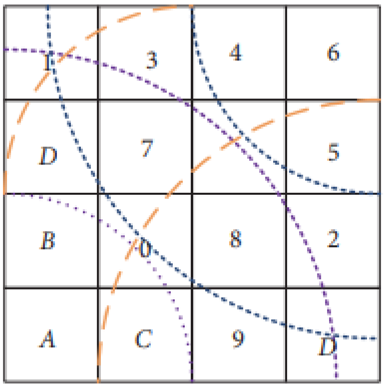



Figure : Mesh generation.

In the local coordinate of cluster Cs, node I ∈ Cs, the relative coordinate is $x^I_5 = [x_I^5, x_I^5\ x_I^5]^T$. Te relative coordinates of node i can be calculated as

$$\mathbf{x}_i^0 = -\frac{1}{3}\left(A_2^T B^T B A_2\right)^{-1} A_2^T B^T$$

**4.0 Graphical theory Analysis on sensor network:**

In a conventional network setting with 150 mm = 150 mm, 400 wireless sensor nodes are placed alone. The radiation distance of each broadcast can reach the entire network in the sensor area. Te-node communication model defaults to square-random model, the beacon node is the same communication radius and the unknown node Figure 4 indicates that the error of the localization decreases as the beacon node density increases. For the same density, the proposed method is better than a number of traditional localization methods for sensor nodes such as DV-HOP, GA and PSO

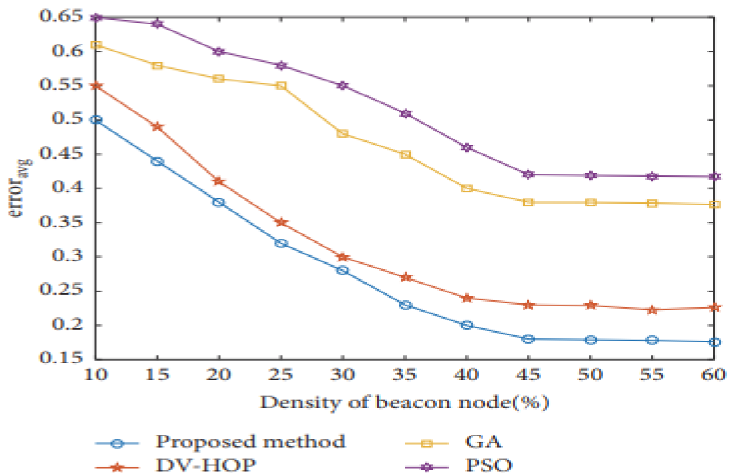



**Figure: Relation between beacon node density and location error**

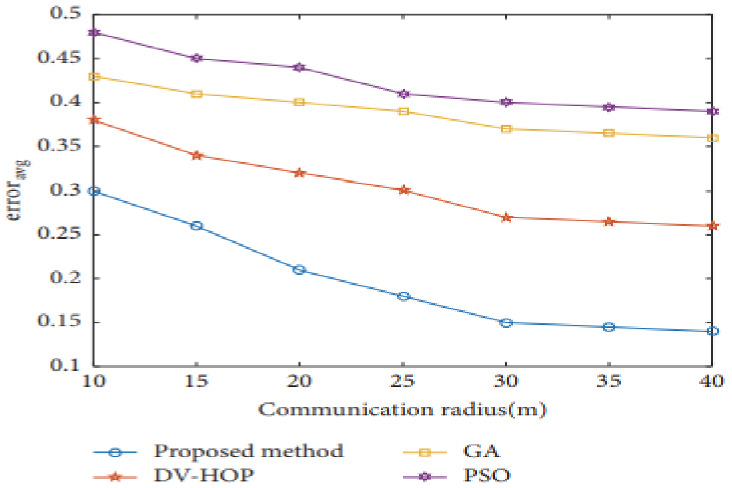



**Figure: Relation between node communication radius and location error.**

The density of the beacon node is approximately 10%, the exact localization of the system suggested by the classic algorithms is not apparent. Because there is a relatively small proportion of beacon nodes, the beacon nodes near unknown nodes also are relatively small. The number of lightning nodes is growing. The minimum hop number between unknown nodes and beacon nodes is also the, thereby reducing the distance between them to closer to actual value and essentially reducing the localization errors. Once the share of beacon nodes is raised to about 45%, the position error is relatively constant, but the direction precision of the proposed approach is even less evident

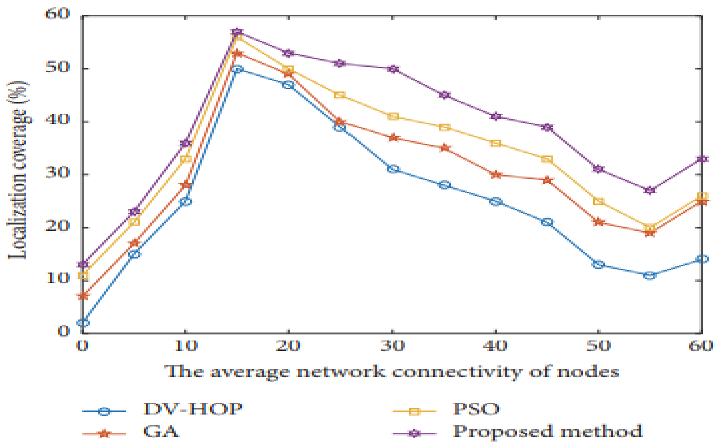
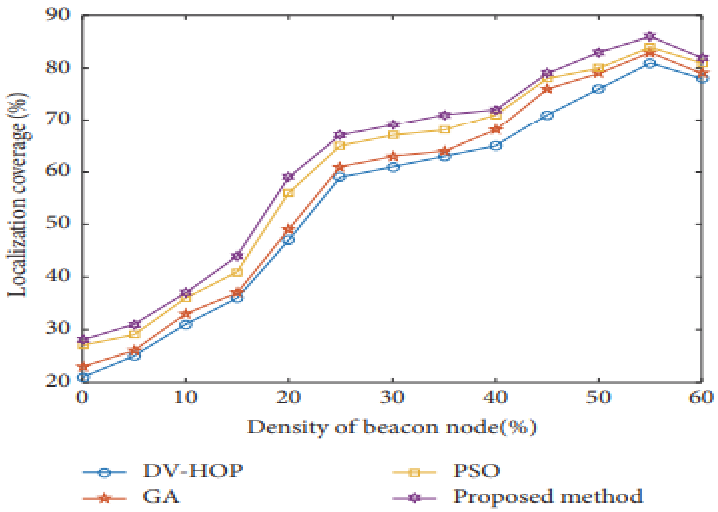



**Figure: Coverage changes with network connectivity**

The method proposed is better than the localizing methods DV-HOP, GA and PSO node sensors for the same communications node radius. Nonetheless, if the node span of connection rises to a certain degree (like 30 m), algorithms don't improve or decrease the localization accuracy of the node much. The lower the network connection density and the density of the light (Anchor Density, AD), the better the system performance at WSN, due to the cost and power consumption of the sensor nodes.




Key distribution protocol is one of the important components to safeguard WSN transmission Reducing source consumption and extending the WSN lifecycle are the main goal of the WSN based on network secure communication assurance.

**CONCLUSIONS:**

Data aggregation in sensor networks is the data processing process from multiple sensor nodes and summaries until the data is sent to a sink node or base station. Before the data is transmitted. For WSNs, data compression is important as this decreases latency rates, increasing energy efficiency and enhancing the life of the network. Sensor nodes can save much more energy particularly if they are located relative near each other and away from the base station. In order to organize and maintain sensor nodes, sensor distribution, management and control services have been developed. They increase the overall power, task distribution and resource use performing of the network. Provision of resources such as power and bandwidth are properly allocated to maximize use. Coverage and location are included in provisioning. The WSN coverage must guarantee that the monitored area has a high degree of reliability in its entirety. Coverage is important as it affects the number of sensors to deploy, their placement, connectivity and power. Localization is the process through which a node attempts to determine its own location. Control and management services play a major role in WSNs because they support middleware services such as security and synchronization so we believe that WSNs will become more mature and popular with advancing sensor technology and more informatively.

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