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Comparison between Existing and Proposed Method for Coverage Hole Detection and Recovery in WSN

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Abstract: A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices using sensors to cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants, at different locations. Several problems occur in the WSN. They decreases efficiency of WSN. The coverage problem is one of the fundamental issue in WSN.

In the paper, we propose an effective approach for coverage holes detection. The network is dividing into square shape zones .Every zone is the combination of several sensor nodes. Also patching nodes based algorithm is applied for the removal of holes. Simulation demonstrates that our algorithm can detect and recover coverage hole and guarantee full coverage with simplified manner.

Keywords: Wireless sensor network, square zones, coverage holes , detection of holes, patching nodes

I. INTRODUCTION

Wireless sensor network communicate with the radio frequency waves. The sensors have to perform two different tasks in the network. The first task is that they have to sense the data from the corresponding neighbors and send it to the other neighbor. The second one is communicate with the neighboring nodes. The communication between the different sensor nodes is done with the help of routing. Today Wireless sensor network is used in every field of applications like battle field, traffic control, in colleges, entry gates, etc.

There is already an extensive literature about the coverage hole problems in WSNs.

A. Existed Method

Proposed a decentralized, coordinate-free, node-based coverage hole detection algorithm. It was based on boundary critical points, and can be run on a single node with verifying boundary critical points from neighbors. The hole patching algorithm was implemented with the concept of perpendicular bisector and our detection algorithm. The patching sensor nodes were deployed on hole boundary bisectors. A majority of the researchers using acomplicated network model, or only providing partial coverage for patching.

B. Proposed Method

It uses the distributed coverage hole detection and recovery scheme, and guarantee full coverage with an effective manner.

The main contribution of our work can be summarized as follows.

(1) We introduce a concept of zones for member calculation.

(2) We bring forward a node-based coverage hole detection scheme without knowing exact locations of nodes.

(3) Our proposed patching scheme is based on the concept of communication range which provide full coverage, not proportion.

The remainder of the paper is organized as follows.

Performance analysis and simulation results are presented inSection 2. The conclusion and future work are made in Section3.Acknowledments and References are in Section 4.

II. PERFROMANCE EVALUATION

A. Simulation Setup

Our algorithms are simulated using MatLab 7.10 for different number of nodes that are deployed randomly over 100m ×100m. According to our scheme we can deploy any number of

nodes . For each sensor node, the sensing range is 10m, and communication range is twice of the sensing range 20m. The network is heterogeneous, and coverage degree k=1.We use square simulating different coverage holes. In our proposed scheme we use square zones simulating different holes, while in existing scheme sensing circle was used.The result of the simulation in existing scheme is the no of uncovered area or holes are more as compare to our proposed scheme.The result of simulation is that the entire region is covered and connected.

B. Simulation Parameter

The following are the simulation parameters considered for the implementation of the developed scheme:

- An area of 100 * 100 is selected.
- Area is divided into 5*5 zones.
- Width of each zone is half the communication range i.e. 10m.
- No of deployed nodes is n.
- No of new node to cover each hole is 2.(We choose the maxnode=2 for patching in order to cover each hole ,also get full coverage, while in existing some ratio ofnew nodes was used that not necessarily cover each hole;it may leave many fragments of holes.)

C. Simulation Result

1). Comparing with Existing scheme

Existing patching scheme is based on the concept of perpendicular bisector line.Everyhole boundary edge has a corresponding perpendicular bisector and patching nodes are deployed on hole-boundary bisectors. In order to compare with existing approach, we randomly deployed n sensor nodes in an area 100m*100m form a coverage hole. Then run two schemes independently to patch the coverage hole.

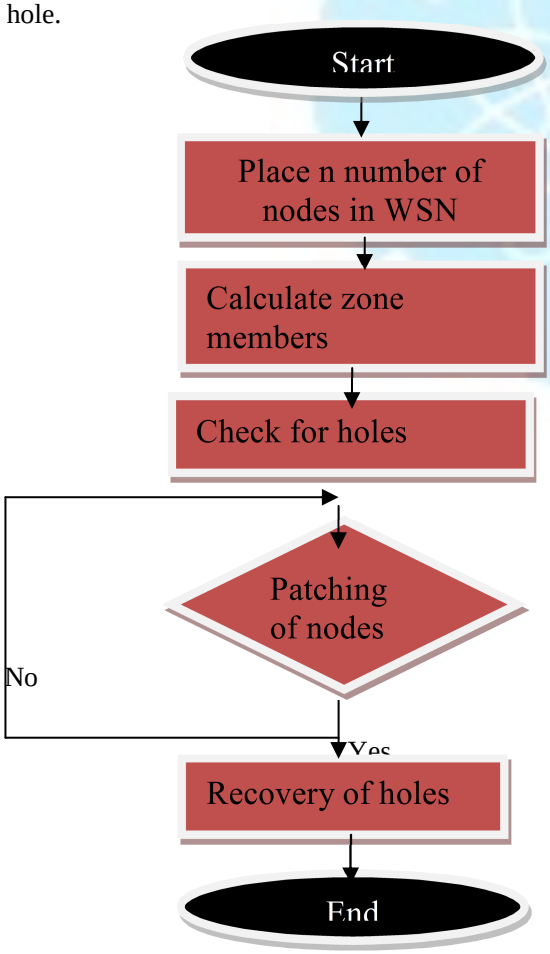

Figure 2.1 : Flow chart for proposed work implementation

DETECTION OF HOLES

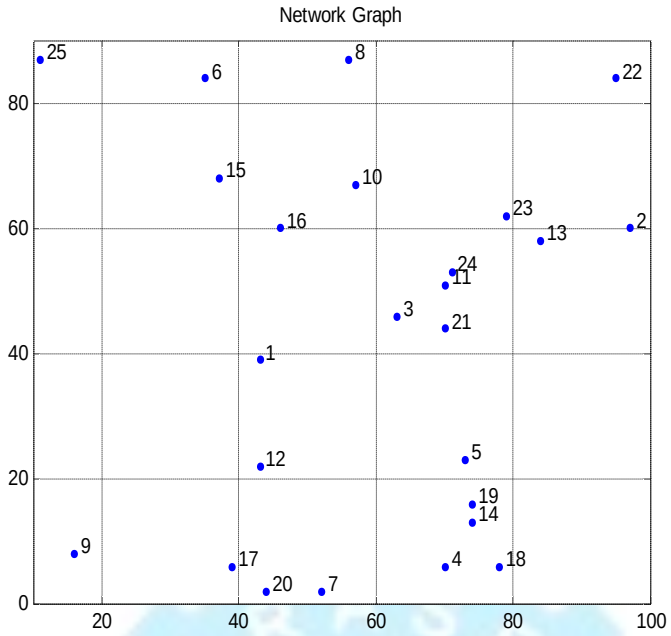

Figure2.2: Detection of coverage holes(nodes=25)

RECOVERY OF HOLES
EXISTING METHOD

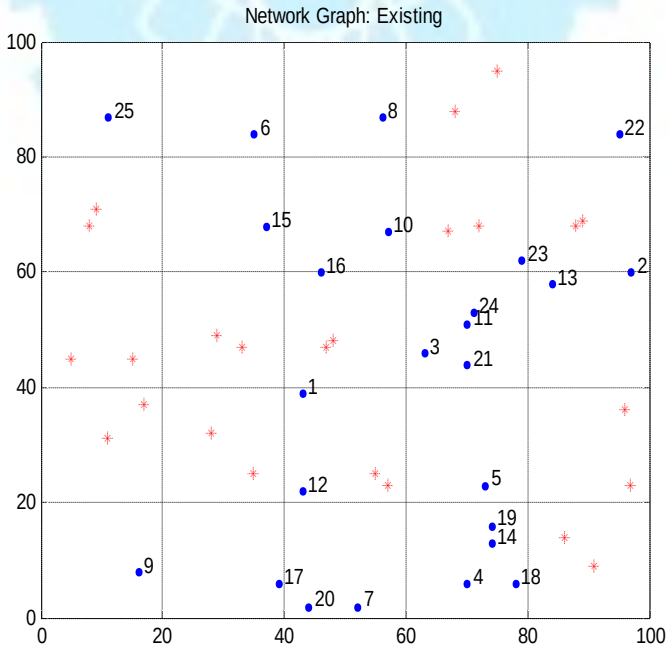

Figure 2.3: Recovery of holes using existing algorithm(nodes=25)

PROPOSED METHOD

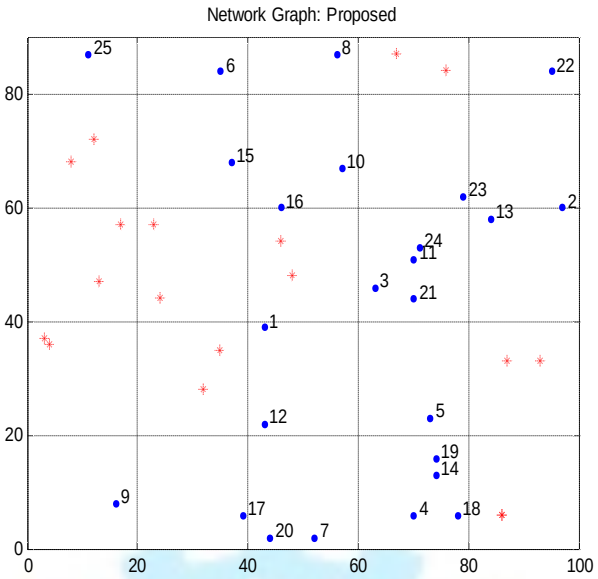

Figure 2.4: Recovery of holes using proposed algorithm(nodes=25)

COMPARISON BETWEEN EXISTING AND PROPOSED METHOD

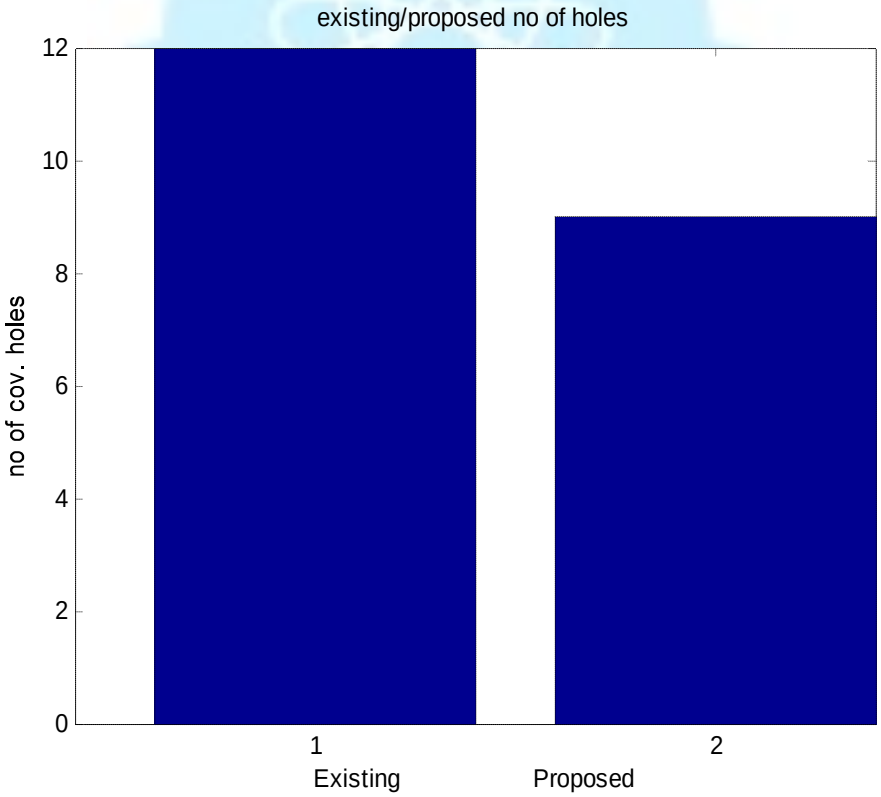

fig : 2.5 comparison between existing and proposed method(nodes=25)

Table 2.1: Comparison between existing and proposed method

NODES	EXISTING	PROPOSED
25	12	9
50	5	4
90	1	0

GRAPHICAL REPRESENTATION

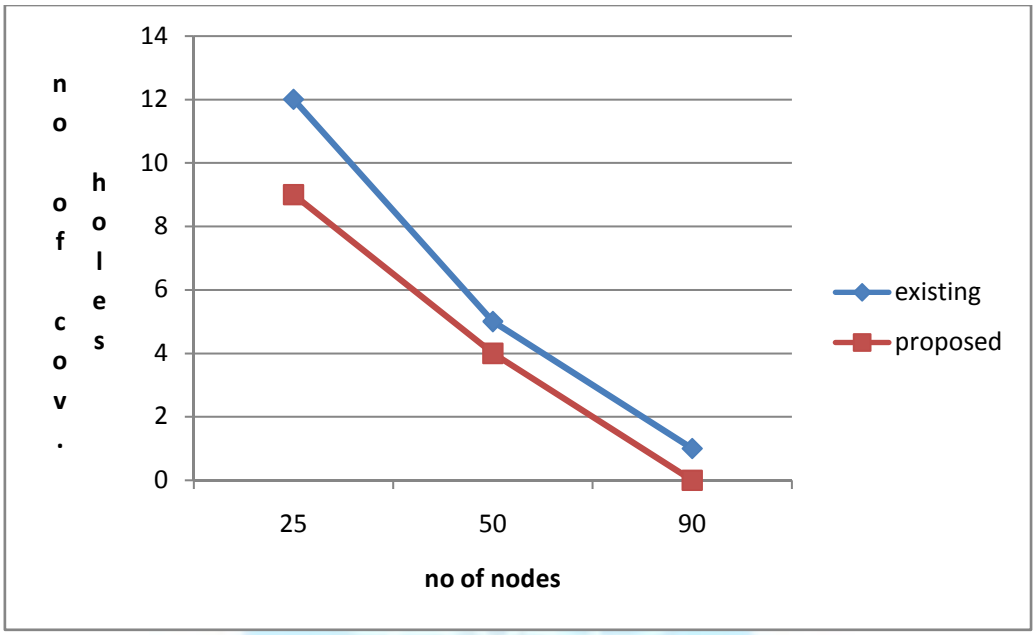

Figure 2.6: Graphical comparison between existing and proposed method

From the above comparison between existing/proposed algorithm, it is clear that proposed method is better than existing method because number of coverage hole decreases as we increases the number of deployed nodes. When number of deployed nodes are 90,then in existing method holes are 1 while in proposed WSN is completely recovered.

III. CONCLUSION AND FUTURE WORK

The paper proposes a solution for distributed coverage hole detection and patching in coordinate-free wireless sensor networks, which based on dividing the area into several zones. Simulation results show successful comparison in exisiting and proposed scheme for coverage.
By removing holes we get a network with a higher degree of coverage
Further research and simulation will use our proposed algorithms in reality.

IV. ACKNOWLEDGMENT

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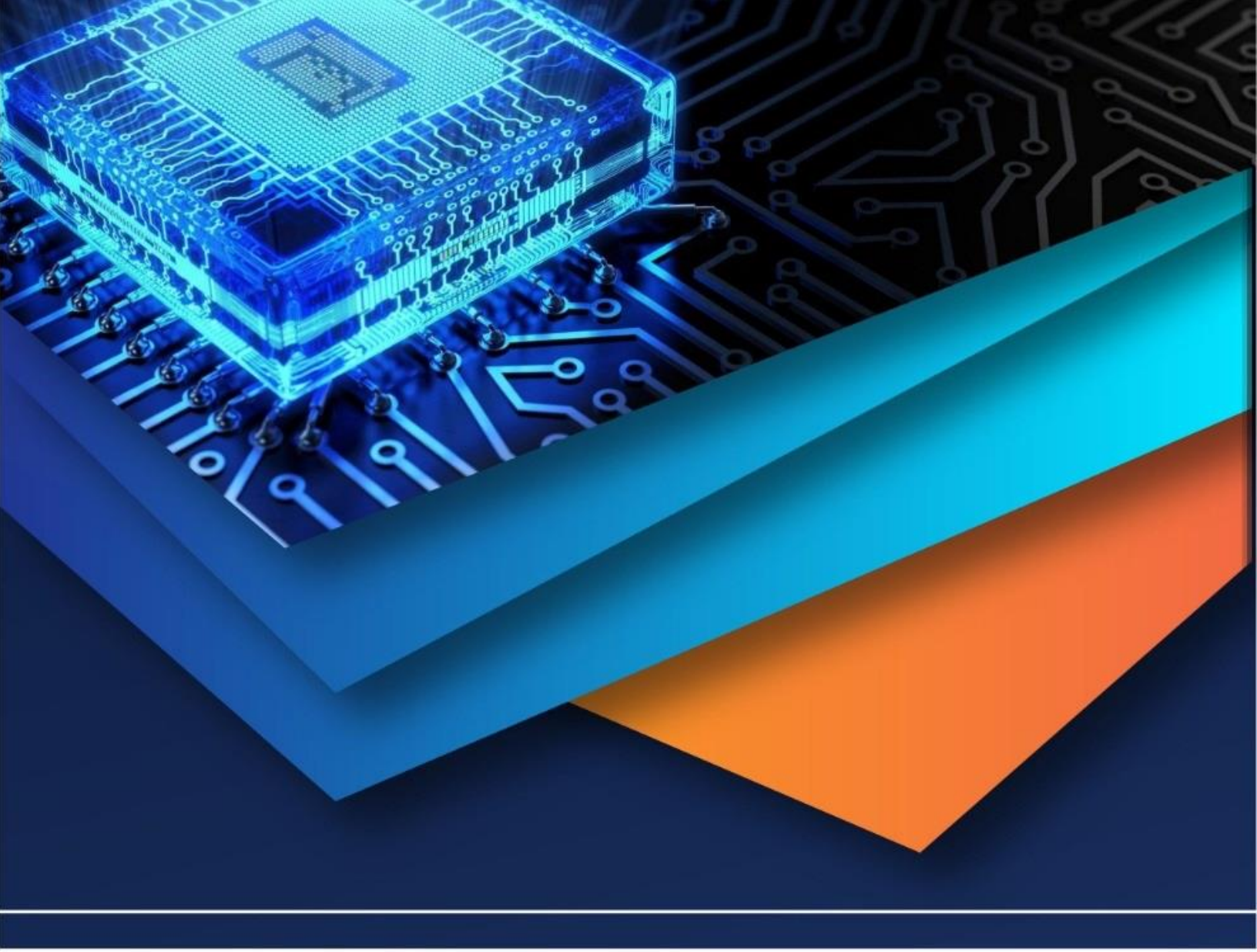

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