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Hole detection and cluster based algorithm in wireless sensor network

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ABSTRACT

In industrial environments the uncoverage problem is the one of the major issues in wireless sensor network. The existing method they with four different energy efficient connected coverage algorithms: Communication Weighted Greedy Cover (CWGC), Optimized Connected Coverage Heuristic (OCCH), Overlapped Target and Connected Coverage (OCCH) and Adjustable Range Set Cover(ARSC).These algorithms only deals with sensor monitoring and the life time of network is poor. In the proposed method is to analysis the characteristic of two different algorithms like Tree-based coverage hole detection algorithm and Cluster Based Energy Efficient Power Saving Scheme (CBEEPSS) algorithm. These algorithms are used to detect the hole and dead nodes. The aim of the project is to provide IWSNs designers with useful insights to choose an appropriate coverage strategy and achieve expected performance indicators in different industrial applications.

Keywords:

Tree based coverage whole detection, cluster based energy efficient power saving scheme.

1. INTRODUCTION

Industrial Wireless Sensor Networks (IWSNs), that with it include of many sensor nodes, have evolved as a robust tool for an Industrial Automation System (IAS). Traditional IAS network is totally different from wired communications, sensors of an IWSN can be installed on industrial equipment and monitor critical parameters to ensure normal operations.[1]

Due to the absence of cables, the use of inexpensive and tiny sensor nodes contributes to the flexibility and energy efficiency of IAS. However, to realize the envisioned industrial applications and, hence, take the advantages of the potential gains of WSN, effective communication protocols, which can address the unique challenges posed by such systems, are required.

The Process of monitoring and controlling is a combination of architectures, mechanisms, and algorithms used in the industrial factory to achieve the goal.

WSN is a technology it is presently used in a wide range of applications to offer remarkable advantages over wired system. However, It lags in the implementation of various control based applications. The demanding constraints for process monitoring and control applications many challenges to the implementation of WSNs to the industrial field. In this paper we have proposed to various issues relating to implementing the WSN technology to process monitoring and control The major advantage of using IWSNs in industrial areas such as providing greater flexibility, rapid deployment, flexibility, and inherent intelligent-processing capability. In this regard, WSN plays an important role in creating a highly reliable and self healing industrial system that rapidly responds to real-time events with appropriate actions.

These approaches could be used to monitor essential equipment with dedicated target sensor nodes. This paper evaluates prominent approaches to connected target coverage in terms of reliability of covering essential nodes in noisy environments.

EXISTING SYSTEM

1. ENERGY-EFFICIENT CONNECTED TARGET COVERAGE ALGORITHMS

The energy efficient connected coverage algorithms is included by four different algorithms like CWGC, OCCH, OTCC and AR-SC These four algorithms can be used to embodied coverage strategy and expected performance occurs in industrial applications.

The main objective of these algorithm used to objective: to maximize network lifetime while maintaining sensing coverage and network connectivity.

The four algorithms used for the industrial sensing purpose differ only by the design ideas they adopted to save energy and prolong network lifetime. These four protocols represent

the four typical the most representative for the purpose of comparison. The four typical design scan be respectively summarized as follows: 1) scheduling sensor node activity to allow redundant nodes to enter the sleep mode (CWGC), 2) protecting nodes which monitor critical targets from forwarding data (OCCH), 3) eliminating the redundancy caused by overlapped targets (OTCC), and 4)reducing power consumption (AR-SC).

1.1Communication Weighted Greedy Cover (CWGC)

The proposed model of communication weighted greedy cover to solve the CTC problems.[1] The CTC problem is an Maximum Cover Tree (MCT) problems. Fig.1 CWGC consists of three steps: 1) select source nodes that can cover all the targets, 2) calculate the communication overhead of each edge in the graph to generate the shortest routing path to the sink, and 3) update the communication overhead to avoid selecting nodes with low residual energy.

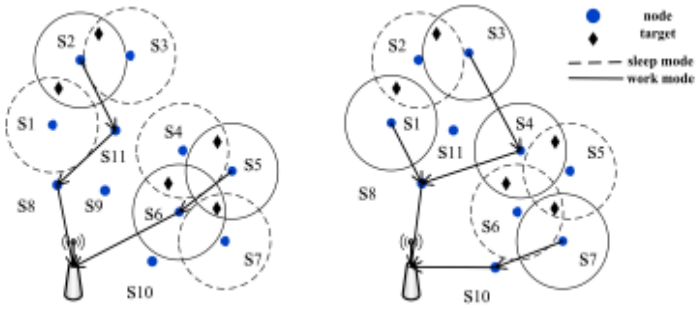

Figure. 1. The maximum cover tree problem.

The CWGC algorithm is also called as fast heuristic algorithm. [6]The number of cover trees to formed large, because to achieve satisfied results. As generating a new cover tree, it will reach protocol cost, for an example exchanging node status without neighbors and broadcasting the operational duration of the cover tree, the protocol cost of the approximation algorithm will be high. Therefore, we develop a faster low-cost heuristic algorithm for the MCT problem.

1.2Optimized Connected Coverage Heuristic (OCCH)

Optimized Connected Coverage Heuristic (OCCH) algorithm proposed to monitor the critical nodes. Fig.2 The sensor node is monitor the critical target is called as critical node. [4]This Proposed an efficient algorithm OCCH to protect the critical nodes from forwarding data.

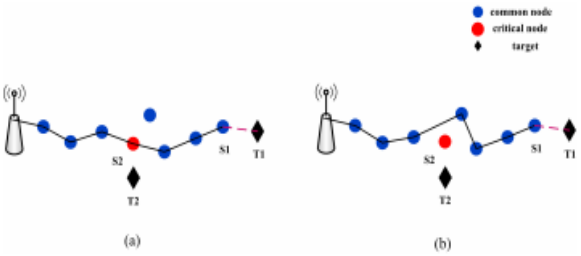

Figure.2. Avoid traversing a node that covers a critical target

OCCH aims to list common nodes replace of critical nodes to relay data by increasing the communication weights of the critical nodes. This mechanism only works well when there exist neighbor nodes about critical nodes.

1.3Overlapped Target and Connected Coverage (OTCC)

The Overlapped Target and Connected Coverage algorithm is used to remove the redundancy of overlapped targets. In Fig.3 Transmitting energy according to the number of targets covered by the sensor and removes the redundancy of overlapped targets. In this algorithm is used for scheduling algorithm.

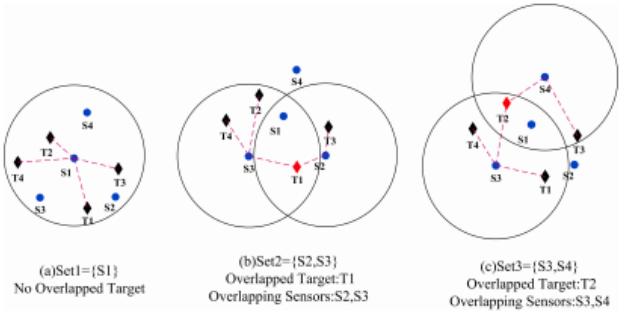

Figure.3.Overlapped target and overlapping sensors in joint set

The proposed method is used for heuristic algorithms. This algorithms is also reduce the complexity of optimal algorithm. We developed a sensor-scheduling algorithm by implemented the maximum number of joint sets for a given coverage relationship. Then determining the active time of each joint set, the lifetime of the network can be maximized while ensuring that all the targets are completely covered. The overlapped target connected coverage algorithm used to prevent the redundant coverage and data transmission. OTCC algorithm is proposed to eliminating the redundancy and increase the network lifetime.

1.4Adjustable Range Set Covers (AR-SC)

The Adjustable Range Set Covers (AR-SC) algorithm is proposed to sense the radius of target coverage problems. The sensing radius of the each node can be used for different power levels. Fig .4. The aim of this methods is sense the different node radius and also increase the network lifetime.

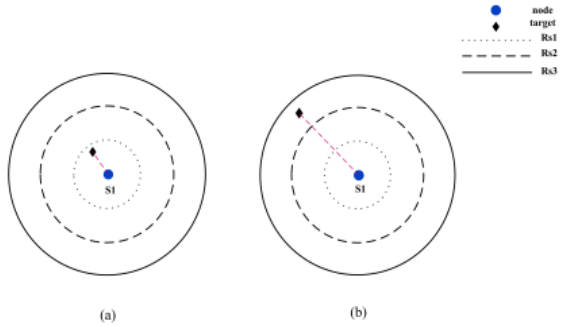

Figure.4. one node, one target and three power levels.

The advantage of this algorithm is an high scalability improvement of network lifetime and maximum node utilization. It is not used for the industrial environment because the average energy consumption is high and convergence speed will be low. It is used for nature gas pipeline or Leakage monitoring oil pipelines.

2.PROPOSED SYSTEM

2.1CBEEPSS Algorithm:

Large number of sensor nodes are needed in order to generate the nodes to compare the performance of the various networks at different environments. This simulation is to simulate the key parameter which has diversified the estimation of the position of the sensor nodes and the sensing area, antenna directions (Omni directional), network parameters such as number of random locators and the number of static sensor nodes, and locator deployment strategy.

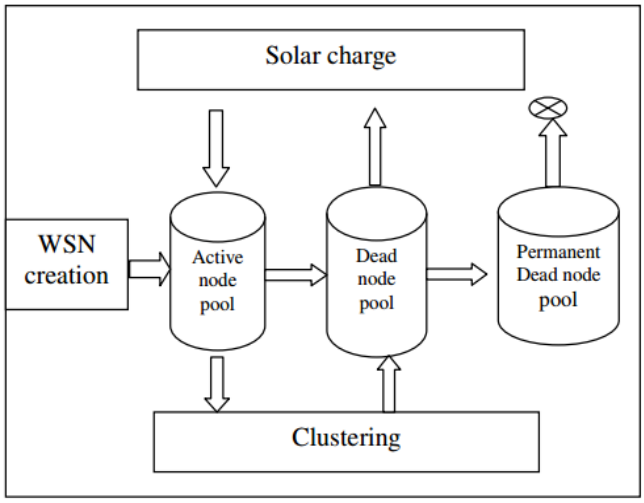

Fig 5. System architecture of CBEEPSS

The cluster based energy efficient power saving scheme shown on figure 5. It is used to create cluster head and also reduce the energy consumption. In the proposed method all the informations are transmitted in nodes to cluster head. In process is helpful to detect dead nodes and also increase the network lifetime.

Tree based hole detection algorithm:

Tree based hole detection algorithm is used to detect the coverage holes in the wireless sensor. These algorithms are analysized in three steps. First step to detect the coverage hole in the network. Second step to merging the coverage areas. Third step find the size of coverage hole in the wireless sensor network.

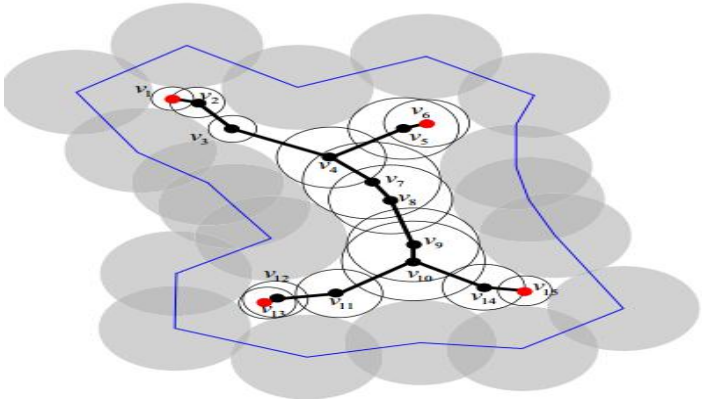

Figure 6.Tree based hole detection algorithm

The tree based hole detection algorithm shown on figure 6. These algorithms are combined with existing algorithms. The proposed algorithms are improve the network lifetime compared to the previous work.

3.SIMULATION RESULTS

3.1Network Lifetime

In these the four algorithms the number of nodes increase, also increase the network lifetime in different degrees. It is observed that CWGC always performs better than the other Three algorithms.[1]

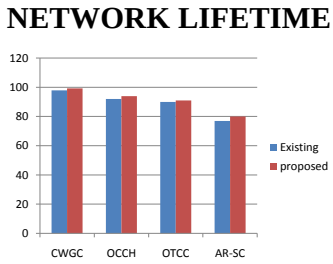

Figure.7.comparisons of network lifetime

The increasing number of nodes, more cover sets can be generated so the network lifetime can be increased. the network lifetime of OCCH is almost equal to the CWGC. The scope of OCCH is used to protect critical nodes. OCCH aims to schedule common nodes replaced of critical nodes to relay data by increasing communication weights of critical nodes.

3.2 Coverage time

The relationship between the number of nodes and coverage time is described in Fig.8 The CWGC and OCCH can be observed that the gap is small due to their similar framework. OTCC wants to find a particular routing path for each target in the coverage area. [1]So that it spends more time to search

routes.

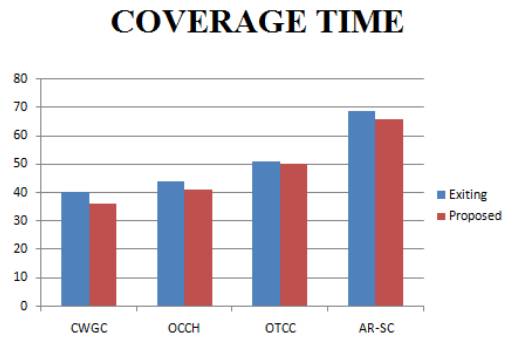

Figure.8.comparisons of coverage time

AR-SC performs the worst compared to another three algorithms because AR-SC needs to each node calculation under different power levels and choosing of the node with the highest contribution until all the targets are covered.2] The high coverage requires under their maximum power levels.

3.3 Average Energy Consumption

The relationship between the number of nodes and energy consumption is described in Fig.9 sensor nodes are slowly deployed in the network, the average energy consumption is large because the nodes need to more energy to awakened for sensing or transmission.

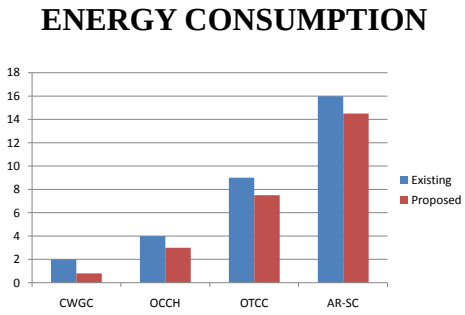

Figure.9.comparisons of average energy consumption

In multi-hop transmission network is hard to realize. These networks consists of only a few nodes and The average energy consumption decreases when the more number of sensor nodes in the network. AR-SC outperforms in other three algorithms because it is used for more number of sensor nodes.

3.4 Ratio of Dead Node

The relationship between the number of nodes and energy consumption is described in Fig .10 The network lifetime is over, the number of dead nodes helps to reflect the overuse of certain nodes, which is a direct reason of ending network lifetime.

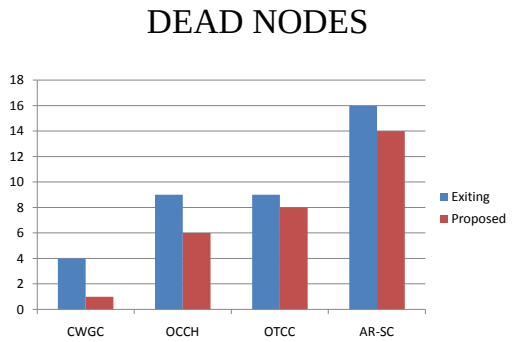

Figure.10. Ratio of Dead nodes

AR-SC algorithms satisfied the most of the sensor nodes in involved high performance of network lifetime.[8] The ability of sensing range makes to prolong the network lifetime. The cost of consuming energy is very high.

2. CONCLUSION

In this paper, we are proposed to analyze the characteristics of four different energy efficient connected coverage algorithms. The comparisons of these four algorithms are produced by different conditions. In these conditions expand the network life time, coverage time, average energy consumption and Dead nodes ratio. The detailed information is useful to design appropriate coverage strategy in IWSN's designers.

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