

SECURE ENERGY OPTIMIZED ROUTING ALGORITHM IN WSN-A SURVEY

Vaibhav B Kate

Computer Engineering Department

KJ College of Engineering and Management Research

Pune, India

vaibhav.kate4545@gmail.com

Abstract: A wireless sensor network which plays a crucial role in wireless communication. The intensification of wireless sensor network increases day by day, which is used in every field like military, government, etc. the battery is one of the main sources of the energy for the sensor nodes. The difficulty arises in Wireless Sensor Network (WSN) when the distance among the nodes increases and obviously as distance increases numerous hops will necessitate for data forwarding from source to destination or at a particular location. The compactness will help for maximizing to forward information among nodes, which having long distance. In this paper, we present up to date secure energy optimized routing techniques for Wireless Sensor Networks is surveyed collectively with the details of the functioning or performance consequences of each approach. We summarize the challenges of secure energy routing protocols for WSNs of present methods intended for data transmission. These approaches will certainly minimize the energy utilization and will helpful to increase the efficiency of the wireless sensor network. This paper will help the person who reads with the foundation for research in Secure Energy optimized routing techniques for wireless sensor networks.

Keywords: secure energy optimized routing, wireless sensor network, sensor node, and network efficiency.

1. INTRODUCTION

Wireless sensor network is widely increasing, in which the most important objective is to assemble data from the neighboring surroundings of wireless network sensors. The most important differences between wireless sensor networks and other networks are restricted energy resources and quite less processing potential. For that reason, dealing with power and minimizing energy utilization are the key factors in these networks. Wireless sensor network is a network of tiny nodes which are responsible for receiving and transforming data calculating and communicating wirelessly. Limited energy

resources and quite low processing ability, the methods of saving energy to defeat the limitations must be considered so that the efficiency and energy utilization are enhanced [1]. The most important worth of a sensor network it includes power exploitation constrain for sensor nodes using battery life. The idyllic sensor network will be those which have smallest amount energy utilization in whole process in transmission [1][2].

A wireless sensor network (WSN) are scattered sensors utilize to monitoring environmental circumstances and responsible to send data from source to destination node [3]. The wireless sensor network was initially used in the military applications. Further its use in the industrialized progression monitoring. Wireless sensor networks facilitate monitoring and controlling of physical environments from remote locations with better accuracy. They have applications in different types of areas such as environmental monitoring, defense field and congregation sensing information in unfriendly locations. Sensor nodes are energy intense and it have computational constraints because of number of hops and long distance communication. Wireless Sensor network has the communications that helping to the user for execution, monitor, and respond. Each and Every node has its individual embedded processors, radio transceivers, sensors. The resources required for sensor are restricted in terms of data storage space, backup energy resources, processing capability and communication bandwidth [1][2]. The nodes in the Wireless sensor node are motionless. So that's why they intellect the location and then communicate with different sensors nodes. In wireless network straight communication to the sink node is not promising, so that multi hop communication is used. In the multi hop communication the connection gets determined first from source node to destination node. The nodes transmit the signal from beginning to end via path until the data completely reaches to the sink node. The major question arises at the nodes which are close to the sink node. Energy utilization in Wireless Sensor Network is based on assembling or aggregation, communication, and data dispensation. Among these Energy utilization ways, the amount of energy expenditure for communication is the maximum so that it is essential to decrease communication overhead by using an energy-efficient routing technique [3][2].

The node which is very closer of sink node is used extra times as compared to other nodes, because each path has to pass all the way through the node which is in the very close loop of the sink node. Outcome of this, the energy expenditure of these nodes is more as compared with other nodes. Energy resources of these nodes will consume untimely. The solution to solve this problem is traffic managing [1]. We considered necessary energy efficient techniques used for the reason of speedy initialization of routing which will pick up the most of the neighboring nodes as the destination node. Also considering Fast up gradation in routing table for node or link breakdown and concentrating on to diminish the overcrowding or congestion in the network [2].

2. LITERATURE SURVEY

2.1: A new ant colony routing approach with a trade-off between system and user optimum [3]:

Z. Cong, B. De Schutter, and R. Babuska Introducing the Ant Colony optimization technique. Networks having thousands of links and nodes, which are having different size, energy and processing power to handle the traffic flow in network. Ant Colony optimization algorithm is formulated to attain the objective of finding the best possible allocation of traffic flows among the nodes in the network. In this paper explained a energetic traffic network replication model which contains numerous origins and destinations as well as a vibrant travel cost function which is based on the present and future environment of the traffic network. The core innovation is that focusing on the transaction between the systems finest and the users finest to optimize the routing. Ant Colony Optimization algorithm introverted focuses on the user's best, in this paper also introducing an innovative ant-based optimization way that allows guiding the routing decisions towards the systems best by introducing the stench pheromone, which can be helpful to build links less attractive in the case that there, are already too many ants using that link. The Ant Colony optimization algorithm, collectively with a energetic traffic flow model, to optimize the routing decisions and to avoid or relieve traffic blocking.

2.2: A Routing Algorithm Based on Ant Colony, Local Search and Fuzzy Inference to Improve Energy Consumption in Wireless Sensor Networks [4]:

In this paper, Mina Jafari and Hassan Khotanlou introducing ant optimization algorithm with local search and fuzzy presumption method, to locate best routes and raise energy efficiency. In WSN power organization and minimizing energy utilization having enormous significance in sensor networks. This paper explains a technique for Wireless sensor network routing which can be more efficient concerning the parameters which includes route length, end-to-end delay and node energy. The technique based on ant colony routing algorithm and local enquiry to find best possible routes. It also based on a fuzzy presumption system was used to establish the route superiority which showed superior performance which will compared with equation of route superiority.

The performance of algorithm is depends on routing all the way through ant colony algorithm and local search in that a local search to set up route and to achieve the sink earlier than a universal search by ant algorithm. If it is originate means there is a direction to sink node, the global search is overlooked. The routing procedure in algorithm is initiated if the route is essential to be obtainable. For that reason, forwarding the manage packets in network is abridged and there will be less excess in network. If data sent to sink node in the network of a multiple nodes, for the accelerating routing table is searched for a route to sink node. If route is present send data to sink, the most excellent one is elected from the criteria and the data are sent with no interruption.

2.3: Dynamic Anycast Routing and Wavelength Assignment in WDM Networks Using Ant Colony Optimization (ACO) [5]:

Kavitha Bhaskaran, Joan Triay, and Vinod M. Vokkarane propose and study an Ant Colony Optimization based algorithm to resolve the lively anycast mechanism for routing and wavelength assignment difficulty in wavelength routed visual networks. Anycast routing wavelength assignment based on ant colony optimization appreciably minimizes jamming possibility as compared with the dynamic, shortest-path first and load-balancing algorithms.

Here analyzing the use of arbitrary wavelength assignment with the Ant Colony Optimization based routing algorithm. Anycast refers to the broadcast of data from a source node to any one associate in the applicant destination position. In uni-casting, every destination deal with distinctively identifies a single receiver, while on other hand in anycasting, each destination deal with identifies a set of receivers but only one among them is selected for a specified request to receive information from a particular sender. If anycast requests are routed cautiously, it can be help to carry supplementary energetic traffic weight in the network. Additionally, anycast is a capable communication prototype for future optical Grid networks. The main contribution is the use of ant colony optimization to solve the dynamic anycast difficulty proficiently. Ant Colony Optimization is a probabilistic optimization technique that uses pheromone trails laid by ants by the side of diverse routes to discover the best possible paths on the dynamic network.

2.4: An ant colony optimization routing algorithm for two order picker with congestion consideration [6]:

Fangyu Chen, Hongwei Wang and Chao Qi, Yong Xie studying a routing scheme to manage the picker blocking that challenge to the conventional statement concerning the narrow aisle order picking structure. Introducing a novel routing algorithm based on Ant Colony Optimization for two order pickers with jamming deliberation. This can be applying in a real-time environment with no dependence on exacting warehouse process strategy. Among two comprehensive devoted heuristics with congestion contemplation as suggestion group. For now, the impacts of warehouse layout, order size, and pick walk-time proportion are analyzed. This technique can be flexibly functional to dissimilar warehouse process strategies, and which can be simply comprehensive to the condition of three order pickers or

more. The most important assistance of this paper is a new ACO-based algorithm is intended to association the gap between the lapses of overcrowding problem in routing tactic and the generally occurrence of congestion in perform. Secondly, benefiting from the urbanized technology in both hardware and software areas, this algorithm makes the warehouse process assessment more real-timely.

2.5: Ant Colony based Routing for Mobile Ad-Hoc Networks towards Improved Quality of Services [7]:

Bibhash Roy, Suman Banik, Parthi Dey, Sugata Sanyal, Nabendu Chaki Studying routing tactic that can be optimized for supporting to multimedia communications on mobile networks which is depending on Ant Colony structure. The main difficulty in mobile ad hoc network is to sustain the quality of service in the occurrence of vibrant topology. The obstacles exist in ad hoc networks is to discover a path for communication between end points which are fulfilling user's need and need to be preserve uniformity. The algorithm consists of both hasty and practical mechanism. Mobile Ad Hoc Network is a active multi-hop wireless network recognized by a set of mobile nodes on a common wireless channel. The main issues in mobile ad-hoc network is routing due to the mobility of the nodes. When information comes to mobile network, the difficulties occur due to various individuality like dynamic topology, time untrustworthy, requirements of quality services, partial resources and energy.

The major confront in this category of networks is to locate a path between communication end points. Ant colony optimization algorithms have revealed to be a high-quality method for developing routing algorithms for mobile networks. In this paper, a new quality of service algorithm for mobile network is introducing. This algorithm combine the thought of Ant Colony Optimization with Optimized Link State Routing) protocol to classify multiple steady paths between end point nodes.

2.6: An Energy-efficient Clustering Solution for Wireless Sensor Networks [8]:

Dali Wei, Yichao Jin, Serdar Vural, Klaus Moessner, and Rahim Tafazolli studying a distributed clustering algorithm, Energy proficient Clustering, determine appropriate bunch whose sizes depending on the node distance to the data sink, at the time of achieving estimated equalization of node lifetime and concentrated energy utilization. Also studying the easy energy efficient multi-hop data compilation protocol to calculate the efficiency of Energy efficient Clustering and analyze the uninterrupted energy utilization of the protocol. Energy efficient Clustering is appropriate for any data compilation protocol that keeps attention on energy preservation. Energy efficient Clustering extend network lifetime and also achieve energy equalization efficiently other well acknowledged clustering algorithms. Introducing a scalability, isolated, energy cognizant clustering algorithm, Energy-efficient Clustering. Energy-efficient Clustering determine proper cluster sizes taking into consideration for hop distances to the data sink. Additionally studying an energy-efficient multi-hop wireless sensor network data compilation protocol and compute its energy expenditure. This protocol targets at low signaling transparency and helping in low level of energy utilization. Energy-efficient Clustering is self-determining from the fundamental data compilation protocol and is flexible to any data deliverance protocol for data compilation to a sink node.

2.7: Cluster based wireless sensor network routing using artificial bee colony algorithm [9]:

Dervis Karaboga, Selcuk Okdem and Celal Ozturk is studying an energy efficient clustering method, which is depending on artificial bee colony algorithm. This is obtainable to extend the network life span. The presentation of these approaches compares with protocols based on LEACH and element swarm optimization, the artificial bee colony algorithm effectively is functional with wireless sensor network routing protocols. It explains a central clustering technique for the choice of cluster heads. The assortment method is operational on the support station and except this process. It is functioning in a scattered behavior. Base station hardware is frequently extra complicated compared with other network

elements like cluster heads, sensor nodes. Consequently, it takes the overhead of the routing procedure from sensor nodes whose most important responsibilities are sensing the surroundings and coverage. In this paper clustering method uses an artificial bee colony algorithm which and the clustering performance algorithm. Artificial bee colony algorithm demanding to accomplish a best possible data consortium process. In this routing technique, offer an appropriate routing format for wireless sensor nodes in the view of the performance of routing method as selecting best possible cluster-head nodes to reduce energy use.

2.8: An Energy-efficient Routing Protocol using Message Success Rate in Wireless Sensor Networks [10]:

Min Yoon, Yong-Ki Kim and Jae-woo Chang implemented a new energy-efficient routing protocol with message success rate for solving the node attentiveness difficulty. A new cluster head assortment algorithm depending on node connectivity and develop cluster preservation algorithms. Furthermore, to give assurance of data communication, consistency by using message success rate is one of the most admired procedures for data communication trustworthiness, for selecting a most efficient routing path. The technique is useful to minimize communication overhead, by using the information of adjacent nodes at the time of cluster creation and cluster head assortment phase. To overcome difficulties such as communication reliability and energy efficiency, introducing a new energy efficient routing protocol depending on clusters. Which used to explain the node attentiveness difficulty, they also propose a new cluster head selection algorithm which is based on node connectivity and create cluster splitting and amalgamation algorithms to build the best possible clusters of original clusters and for the guarantee data communication reliability use message success rate, as a final point, to decrease data communication overhead, considering the information of adjacent nodes in cluster building and cluster head selection.

2.9: VNE-AC: Virtual Network Embedding Algorithm based on Ant Colony Metaheuristic [11]:

Ilhem Fajjari, Nadjib Aitsaadi, Guy Pujolle and Hubert Zimmermann studying a virtual network embedding difficulty. The main purpose is to plan virtual networks in the substrate network with the smallest amount of physical resources depends on the bandwidth, power dispensation and memory. In this trying to diminish the refuse rate of requests and make the most of returns for the substrate network contributor. In view of the fact that the difficulty is NP-hard and to contract with it bring forward a novel scalable embedding approach named Virtual Network Embedding algorithm depending on the Ant Colony metaheuristic. In this scheme, virtual nodes are sorted according to the obtainable and requested resources. After that the virtual node which having higher resource request is assign to the substrate node which having the largest accessible resource metric significance recursively. The main key aspect is to reduce the assigned resources in the substrate network for every virtual network demand to reduce the reject rate and make best use of the provider's profits.

3. FACT AND FINDINGS OF DIFFERENT PAPERS

The table 1 show the different facts and finding of the papers so far reffered

Title of Paper	Publication/year	Authors	Facts	Findings
A new ant colony routing approach with a trade-off between system and user optimum[3]	International IEEE Conference (2011)	Z. Cong, B. De Schutter R. Babuska	Consider the Dynamic Traffic Routing difficulty for a traffic network which define as a directed graph and is dealing with the mathematical aspects of the consequential optimization difficulty of network flow theory.	Ant Colony Optimization algorithm is implemented to accomplish the objective of finding the best possible allocation of traffic flow in the sensor Network.
A Routing Algorithm Based on Ant Colony, Local Search and Fuzzy Inference to Improve Energy Consumption in Wireless Sensor Networks[5]	International Journal of Electrical and Computer Engineering (IJECE) (2013)	Kavitha Bhaskaran Joan Triay, Vinod M Vokkarane	The proposed scheme consider ant colony based routing algorithm, local analysis to find best possible routes and fuzzy presumption method used to decide the route quality	Provide a method to find best possible routes and increase energy efficiency. Use of various algorithms method with ant algorithm helping to solve optimization problems and Optimum energy consumption.
Dynamic Anycast Routing and Wavelength Assignment in WDM Networks Using Ant Colony Optimization (ACO)[4]	IEEE International Conference (2011)	Fatma Othman, Nizar Bouabdallah, Raouf Boutaba	Proposed an Ant colony optimization (ACO) based algorithm to identify the vibrant anycast routing and wavelength assignment (RWA) problem in wavelength routed optical networks.	The ant colony optimization based routing and wavelength assignment algorithm considerably outperforms the conventional shortest path first algorithm for unicast and anycast requests, and performs appreciably better than the dynamic load based routing algorithm.

An ant colony optimization routing algorithm for two order pickers with congestion consideration[6]	Computers & Industrial Engineering Elsevier Publication (2013)	Fangyu Chen, Hongwei Wang, Chao Qi, Yong Xie	A new routing algorithm based on Ant Colony Optimization (ACO) for two order pickers (A-TOP) with congestion deliberation.	A-TOP gives the shortest standard picking time in most of the instance. At the similar time, the new algorithm perform Fine in dealing with the congestion.
Ant Colony based Routing for Mobile Ad-Hoc Networks towards Improved Quality of Services[7]	Journal of Emerging Trends in Computing and Information Sciences (2012)	Bibhash Roy, Suman Banik, Parthi Dey, Sugata Sanyal, Nabendu Chaki	The proposed algorithm combines the thought of Ant Colony Optimization (ACO) with Optimized Link State Routing (OLSR) protocol to recognize numerous established paths between source and destination nodes.	The projected routing scheme can be optimized to Maintain multimedia communications in mobile ad hoc networks based on Ant Colony framework.
An Energy-efficient Clustering Solution for Wireless Sensor Networks[8]	IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS (2011)	Dali Wei, Yichao Jin, Serdar Vural, Klaus Moessner, and Rahim Tafazolli	Introducing a distributed clustering algorithm, Energy-efficient Clustering (EC), that determine appropriate cluster sizes depending on the hop distance at the time of achieving estimated equalization of node lifetimes and minimizes energy utilization.	Proposed scheme used to progress energy-conservation in Multi-hop data deliverance also calculate the efficiency of EC's findings on CH allocation in the network, extends network lifetime and provides equalization .

Cluster based wireless sensor network routing using artificial bee colony algorithm[9]	Springer Science (2012)	Dervis Karaboga Selcuk Okdem Celal Ozturk	A novel energy efficient Clustering method, based on artificial bee colony algorithm, is accessible to extend the network life-time.	The proposed protocol prolongs the network lifetime as well as employs a service quality method by taking into consideration delays between the signals. effectively maximize the network lifetime and reduce transmit delays
An Energy-efficient Routing Protocol using Message Success Rate in Wireless Sensor Networks[10]	Journal of Convergence (2013)	Min Yoon, Yong-Ki Kim Jae-woo	Proposed a new energy-efficient routing protocol using message success rate. For solving the node absorption problem	Proposed scheme construct Clusters in a more uniform way and provide improved energy effectiveness. In adding, provides 4 to 5 times more reliable rate than LEACH and multihop-LEACH prolong the lifetime of resources constraint
VNE-AC: Virtual Network Embedding Algorithm based on Ant Colony Metaheuristic[11]	IEEE International Conference on (2011)	Ilhem Fajjari, Nadjib Aitsaadi, Guy Pujolle ubert Zimmermann	Proposed a new efficient and scalable strategy named VNE-AC. based on a Max-Min Ant System metaheuristic .virtual network embedding problem. to map virtual networks in the substrate network with least physical resources	Proposed method minimize the allocated resources In the substrate network for each virtual network request in order to minimize the reject rate and maximize the provider's revenue.

Table 1: Facts and Findings

4. CONCLUSION AND FUTURE SCOPE

Wireless Sensor Network is broadened in a variety of fields wherever human being involvement is impracticable like environment monitoring, earthquake situations and forest blaze detection and many more. The ant colony optimization based routing and wavelength assignment algorithm considerably outperforms the conventional shortest path first algorithm for unicast and anycast requests, it also

maintains multimedia communications in mobile ad hoc networks. Fundamental issues concerned in Wireless Sensor Networks are humanizing the lifetime of network and Optimum energy consumption. Screening different methodologies which are used in wireless sensor network for methods to find best possible routes and increase energy efficiency. Wireless sensor network having dissimilar nodes with special kind of energy which used to improve the lifetime of the network. Study can be utilized for research in method to find best possible routes and increase energy efficiency for WSN. Study can be elaborated for security of energy efficient routing protocol.

ACKNOWLEDGEMENT

We thank the mysterious referees for their valuable suggestions to improvise the content and quality of this paper. The author is grateful to our principal for providing necessary facilities towards carrying out this work. We acknowledge the diligent efforts of our Head of the Department to guide us towards implementation of this review paper.

REFERENCES

- [1] Adamu Murtala Zungeru, Kah Phooi Seng, Li-Minn Ang, and Wai Chong Chia "Energy Efficiency Performance Improvements for Ant-Based Routing Algorithm in Wireless Sensor Networks", Hindawi Publishing Corporation, Journal of Sensors, Volume 2013, Article ID 759654.
- [2] Marco Dorigo and Thomas Stützle "Ant Colony Optimization: Overview and Recent Advances" Institute de Recherches Interdisciplinaires et de Développements en Intelligence Artificielle, TR/IRIDIA/2009-013.
- [3] Z. Cong, B. De Schutter, and R. Babuska, "A new ant colony routing approach with a trade-off between system and user optimum", Proceedings of the 14th International IEEE Conference on Intelligent Transportation Systems (ITSC 2011), Washington, DC, pp. 1369–1374, Oct. 2011.
- [4] Mina Jafari, Hassan Khotanlou "A Routing Algorithm Based on Ant Colony, Local Search and Fuzzy Inference to Improve Energy Consumption in Wireless Sensor Networks", International Journal of Electrical and Computer Engineering (IJECE), Vol. 3, No. 5, October 2013, pp. 640–650, ISSN: 2088-8708.
- [5] Kavitha Bhaskara, Joan Triay, Vinod M. Vokkarane "Dynamic Anycast Routing and Wavelength Assignment in WDM Networks Using Ant Colony Optimization (ACO)", Communications (ICC), 2011 IEEE International Conference on, 1550-3607 June 2011.
- [6] Fangyu Chen, Hongwei Wang, Chao Qi, Yong Xie "An ant colony optimization routing algorithm for two order pickers with congestion consideration", Computers & Industrial Engineering 66 (2013) 77–85, July 2013.
- [7] Bibhash Roy, Suman Banik, Parthi Dey, Sugata Sanyal, Nabendu Chaki, "Ant Colony based Routing for Mobile Ad-Hoc Networks towards Improved Quality of Services", Journal of Emerging Trends in Computing and Information Sciences, VOL. 3, NO. 1, ISSN 2079-8407, January 2012.
- [8] Dali Wei, Yichao Jin, Serdar Vural, , Klaus Moessner, Rahim Tafazolli, "An Energy-efficient Clustering Solution for Wireless Sensor Networks", IEEE Transactions On Wireless Communications, September, 2011.
- [9] Dervis Karaboga, Selcuk Okdem, Celal Ozturk, "Cluster based wireless sensor network routing using artificial bee colony algorithm", Autonomous and Intelligent Systems (AIS), 2010 International Conference, June 2010 .
- [10] Min Yoon, Yong-Ki Kim and Jae-woo Chang "An Energy-efficient Routing Protocol using Message Success Rate in Wireless Sensor Networks", Journal of Convergence, Volume 4, Number 1, March 2013.
- [11] Ilhem Fajjari, Nadjib Aitsaadi, Guy Pujolle and Hubert Zimmermann "VNE-AC: Virtual Network Embedding Algorithm based on Ant Colony Metaheuristic", Communications (ICC), 2011 IEEE International Conference, June 2011.