

# A Bioinspired Cost Aware Secure Routing Protocol For Wireless Sensor Network

Dipawali Nerkar  
Department of Computer  
Science and Engineering  
Nagpur Institute of Technology,  
Nagpur

Jagdish Pimple  
Department of Computer  
Science And Engineering  
Nagpur Institute of Technology,  
Nagpur

## ABSTRACT

In multi-hop wireless sensor networks (WSNs), Optimization and security are two different design issues with non-refill energy resources. In this paper, we first introduce secure and efficient Cost-Aware Secure Routing (CASER) protocol to point two different issues by two specifications: energy balance control and possibility based random walking. Then we find that the energy loss is randomly for the given network topology, which very much reduces the lifetime of the sensor networks. To overcome this problem, we introduce an efficient random energy deployment approach to increase the lifetime and message sending part in the similar energy source and security requirement. We also provide a computable security analysis on the proposed routing protocol. In this introduced CASER protocol which provides best deal between routing efficiency and energy balance, and significantly increases the lifetime of the sensor networks in all sides. For the random energy distribution, our analysis shows that we can increase the lifetime and the total number of messages that can be delivered by more than four times under the same assumption. In introduced CASER protocol, we show that it can produce a high message delivery ratio when secure routing from trace back attacks.

## General Terms

Algorithms, Design, Performance, Theory

## Keywords

WSNs, CASER, Routing, security, energy efficiency.

## 1. INTRODUCTION

The modern technological improvements make wireless sensor network (WSNs) technically and economically reasonable to be extensively used in both military and civilian applications. Characteristic of such networks is that each network contains large number of free and neglected sensor nodes. In that type of nodes often contain very few and non-restorable energy resources, therefore in that situation, energy is very important design issue for these networks. Less energy reduction for message delivery and have the good message delivery ratio provided by a well designed routing protocol which increases the sensor network lifetime and also manage total sensor network energy reduction. Now a day, WSNs make advance technically and economically. In design WSNs, Routing is another very challenging task. Another issue in WSNs is wireless communication which is done by a broadcast medium. It is very important for security. Other possible issue is jamming and traces back attack. To solve all that issue, we propose a bioinspired based secured and efficient cost aware secure routing protocol (CASER) for WSNs. CASER allow message to be transmitted using two strategies : random walking and deterministic routing for same framework. These strategies are implemented by using

specific security requirement. Two major advantages of CASER protocol are: (I) it help to balanced energy consumption of the entire sensor network which increases the lifetime of WSNs. (II) Based on routing requirement that containing fast/slow message delivery and secure message delivery to protect routing from trace back attack and malicious traffic jamming attack in WSNs, CASER protocol support many routing strategies Most important approach of this paper can be defined as follows:

- 1) A secure and capable Cost-Aware Secure Routing (CASER) protocol for WSNs, helpful to maintains the message delivery requirements.
- 2) A quantitative method keeps the energy reduction then the sensor network life and the whole number of messages that can be send are recover below the same energy usage.
- 3) To observed security of the routing algorithm.
- 4) Offered a best non-consistent energy placement policy for the given sensor networks based on the energy depletion ratio.

## 2. LITERATURE SURVEY

In WSNs due to the limited resources, routing is a challenging task. Geographic routing is widely used and it is very promising approaches for WSNs. To route data packets hop-by-hop from the source to the destination geographic routing protocols collect the geographic location information .The source node select the immediate neighboring node to send the message based on the direction or the distance .The distance between the neighboring nodes can be calculated by signal strengths or using GPS equipments . The relative location information of neighbor nodes can be swap between neighboring nodes. In a geographic adaptive fidelity (GAF) routing scheme was proposed for sensor networks equipped by low power GPS receivers. In GAF, the area of network is distributed into fixed size virtual grids. In every grid, only one node is choose as the active node, at that time, the others will sleep for a period to save energy. The sensor sends the messages support on greedy geographic routing strategy. Instead of using flooding, a query based geographic and energy aware routing (GEAR) was proposed for the sink node disseminates requests with geographic attributes to the target region. Based on estimated cost and learning cost. Each node forwards messages to its neighboring nodes. The estimated cost assume for both the distance to the destination and the remaining energy of the sensor nodes. At that time, the learning cost helps for updating information to deal with the local minimum problem.[11]

Di Tang et al [1] were proposing CASER Protocol introduce for Wireless Sensor networks. In this method, they proposed

to increase the energy as well as lifetime of sensor nodes in the WSNs.

Ameer A. Abbasi [2] offered a method for a failure of nodes may cause the network to partition into blocks. It is very effective recovery scheme to separately reposition a subset of the lead nodes to return connectivity. Recovery schemes either require high node moving overhead. To solve these problem and presents a Least-Disruptive topology Repair (LeDiR) algorithm. LeDiR relies on view of a node concerning the network to request a revival plan that relocates the least number of nodes and conform that no path between any pair of nodes is absolutely

G. Wang [3] Sensor placement is a main problem in designing sensor networks. This check a distributed sensor Protocols for mobile sensors. Later than determining coverage holes the protocols calculate the location of sensors where they should shift. The protocols support high coverage within a limited placement time and limited movement. Voronoi diagrams used to find out the coverage holes and design three movement-assisted sensor deployment protocols, VEC (VECTorbased), VOR and Minimal based on the principles of moving sensors from tightly positioned areas to lightly positioned areas.

S. Yang [4] proposed the ability of sensor networks which depends on the coverage of the monitoring area. The good sensors placement is very important for balancing the workload of sensors. The placement of shift helped sensor deals with moving sensor deals from an unbalanced state to a balanced state. The various optimizations difficulty can be faced to reduce dissimilar parameters, plus total moving distance, total number of moves, communication cost, and meeting rate. The SMART is developed to use scan and dimension exchange to achieve a balanced state and to address a only one of its kind problem called communication holes in sensor networks. Broadly studied area in WSNs is lifetime. In a routing scheme was proposed to instead of always selecting the lowest energy path to find the secondary - best path that can expand the lifetime of the WSNs. In the introduced method, by a reactive protocol such as AODV or directed diffusion, multiple routing paths are set ahead. After that routing method will select a path based on a probabilistic method according to the remaining energy.

In Chang and Tassiulas [5] supposed that the source power level can be changed according to the distance between the source and the destination. Routing was created as a linear programming problem of neighboring node selection to maximize the network lifetime.

Then Zhang and Shen [5] examined the unbalanced energy consumption for regularly arranged data gathering sensor networks. In this proposed, the network is partition into many corona zones and each node can perform data aggregation. A localized zone-based routing scheme was suggested to stability energy consumption among nodes within each corona.

In this paper, we introduced a secure and efficient Cost-Aware Secure Routing (CASER) protocol that can tackle energy balance and routing security simultaneously in WSNs. In CASER protocol, each sensor node needs to remain the energy levels of its immediate neighboring grids in addition to their relative locations. From this information, every sensor node can produce varying filters based on the supposed design trade-off between securities and efficiency. In that, results

shows CASER can offer brilliant energy balance and routing security and also show that the proposed secure routing can increase the message sending ratio due to decreased lifeless ends and loops in message forward.

### **3. PROBLEM DEFINATION**

Think about such a problem, node failure is major critical and challenging in nature. To find out this issue also consist of factoring in reporting and current application tasks in the recovery process and increasing for evaluating the different failure improvement scheme. Sensing and data procedure are important WSNs have many more nodes and are more tightly arrange Hardware must be cheap. nodes are more horizontal to failures WSNs operate under very strict energy limitations Node failures are very impossible except a part of the deployment area includes factoring in coverage and ongoing .

Purpose tasks in the recovery method and developing for assess the various failure recovery schemes. Possibility for several nodes to not succeed at the same time is very small and would not be a concern the smallest block inward toward the unsuccessful node; it may harmfully affect the node coverage.

The aims of this project are as follows:

- To enhance the network life.
- To avoid map out and jamming bothers.
- To achieve the secure routing path.
- To suggest a structure for error finding in WSN.
- To propose a faulty node detection mechanism.
- To propose a clustering approaches to devise an efficient fault detection algorithm.
- To study and validate the performance of the advised error detection algorithm through replication.
- To compare the proposed approach with the existing approach.

### **4. PROPOSED WORK**

Small energy efficiency in network which decreased generally lifetime of network .It is very huge and difficult task. We have to generate combinational method to improve and advance in the existing technique. To propose the genetic algorithm which provide the number of solution for packet delivery and giving the assurance of data security. Our propose protocol uses two methods is follows:

#### **4.1 Genetic algorithm**

Researcher have focused on propose a cost of aware secure routing protocol for WSN using hard threshold for energy balance control and possibility base random routing. This approach is excellent for a fixed topology base WSN but might not give optimal solution if the network deployment (node placement) is random or uneven. This poses a very big problem of low energy efficient in the network and reduces the overall lifetime problem of the network. To overcome this problem, we proposed a genetic algorithm based a bioinspired CASER for WSNs.

#### **4.2 AES Algorithm**

For securing the path, we will used the AES (Advanced Encryption Standard) for sending and receiving data. In this encryption and decryption used same step in reverse order.

### 4.3 Modules Used In the Project

In this project, we are used following module:

- 1) Generation of WSN Module.
- 2) Development of genetic algorithm Module.
- 3) Development of genetic algorithm Module.
- 4) Development of AES algorithm Module:
- 5) Integration of genetic algorithm with AES Module.

#### 4.3.1 Generation of WSN Module:

They have one data collecting point, namely sink. Sensor nodes have not only to send information to sink, but to swap data between themselves. That is why there are many method of organization of communication between sensor nodes within WSN. These schemes are called network topologies. Network topologies in WSNs are: *star*, *tree* and *mesh*. Dissimilar WSN standards support different types of network topologies.

#### 4.3.2 Development of genetic algorithm Module

A Genetic Algorithm executes fitness tests on new structures to select the top population. Fitness decides the quality of the individual on the basis of the classifying criteria, the improved the fitness value, the enhanced the chance of survival. GAs solves design problems similar to that of natural solutions for biological design problems.

Genetic Algorithm:

1. Generate the N random solution called as population for routing data from source to destination.
2. For each iteration repeat the following steps:
  - a) Find the fitness of the each solution where the fitness is proportional to delay, energy, distance and link quality between hops.
  - b) Find the mean fitness of each solution.
  - c) Discard all solution whose value is more than mean fitness and replace with other solution (this is called as mutation).
  - d) For all solution where fitness is less than mean, carry of them forward to next iteration (this is called crossover)
  - e) Repeat a to d for all iteration.
3. At the end of kth iteration select the solution with the minimum fitness.
4. Route the data through that path.

#### 4.3.3 Development of AES algorithm Module:

AES is used for encryption as well as decryption. That always performed same steps for to complete both encryption and decryption in reverse order.

AES Algorithm:

1. Derive the set of round keys from the cipher key.
2. Initialize the state array with the block data (plaintext).
3. Adjoin the first round key to the starting state array.
4. Complete nine rounds of state manipulation.
5. Complete the tenth and final round of state direction

6. Copy the final state array out as the encrypted data (cipher text).

#### 4.3.4 Integration of genetic algorithm with AES Module:

In this module, we combine the genetic algorithm with AES Module for cost aware secure routing. Genetic algorithm find out secure path for sending data with increasing lifetime of network and AES algorithm sending and receiving data securely and reduces jamming and trace back attack

### 5. CONCLUSION AND FUTURE WORK

In this paper, we introduced a bioinspired cost aware secure routing protocol for wireless sensor network for stability of the energy consumption and raises network natural life. CASER has give to support routing method in message forwarding to enhance the lifetime at the same time as extending routing security. CASER shows that brilliant routing presentation in terms of energy balance and routing path sharing for routing path security. We also introduced an uneven energy position method to extend the sensor network lifetime. Our analysis and reproduction results show that enhance the lifetime and the many messages that can be forward under the uneven energy placement by other than four moments in times.

In this proposal includes the use of improved CASER protocols to overcome their weakness in the basic CASER protocol and a purpose based protocol lacking particular restriction about its application right for military, medical, and commercial applications will be focus of our future work

### 6. REFERENCES

- [1] Di Tang Tongtong Li Jian Ren and Jie Wu “Cost -Aware SEcure Routing (CASER) Protocol Design for Wireless Sensor Networks” IEEE Transactions on Parallel and Distributed Systems. 2015
- [2] A. Abbasi, M. Youngish, and K. Akkaya, “Movement-assisted connectivity restoration in wireless sensor and actor networks,” IEEE Trans. Parallel Distrib. Syst., vol. 20, no. 9, pp. 1366-1379, Sep. 2009.
- [3] G.Wang, G. Cao, and T. La Porta, “Movement-assisted sensor deployment,” IEEE Trans. Mobile Comput., vol. 5, no. 6, pp. 640–652 Jun. 2006.
- [4] S. Yang, M. Li, and J.Wu, “Scan-based movement-assisted sensor deployment methods in wireless sensor networks,” IEEE Trans. Parallel Distrib.Syst., vol.18, no.8, pp.1108–1121, Aug.2007
- [5] Z. Shen, Y. Chang, H. Jiang, Y. Wang, and Z. Yan,“A generic framework for optimal mobile sensor redeployment,” IEEE Trans. Veh. Technol.,vol. 59, no. 8, pp. 4043–4057, Oct. 2010.
- [6] C.V.Swathi1, Mrs.Nagarathna2, “Energy Efficient Routing Protocol with Secure Hash Algorithm for Multi Hop WSN,” International Journal of Research In Science & Engineering Volume: 1 Special Issue: 2
- [7] B.Sireesha1, G.TagoreSai Prasad2, “an alternative secured and efficient routing strategy for wireless sensor networks” (IJETER), vol. 3 no.6, (2015)
- [8] Mrs. S. Gowsiga , Dr. P. Senthil Kumar “ a review study of various routing protocols based on routing information update mechanism of mobile ad hoc networks” (IJERA)

- International Conference on Humming Bird ( 01st March 2014)
- [9] Salonee Mishra and Binod Kumar Pattanayak “power aware routing in mobile ad hoc networks:a survey” vol. 8, no. 3, march 2013.
- [10] Junmo Yang, Kazuya Sakai, Bonam Kim, Hiromi Okada, and Min-Te Sun “Cost-Aware Route Selection inWireless Mesh Networks”
- [11] Anandhi.R, Dr.R.Manicka chezian “A Review on Geographic Routing in Wireless Sensor Network” Vol. 2, Issue 7, July 2014.
- [12] Roshni M. Bhave, Prof. Vijay Bagdi “Recovery of Nodes Failure in Wireless Sensor Network Using CASER Protocol and DARA:Review” Volume: 3 Issue: 2
- [13] Sajid Hussain, Abdul Wasey Matin, Obidul Islam Genetic Algorithm for Hierarchical Wireless Sensor Networks” journal of networks, vol. 2, no. 5, september 2007
- [14] P.D. Khambre,S.S.Sambhare, P.S. Chavan1 “Secure Data in Wireless Sensor Network via AES(Advanced Encryption Standard)” Vol. 3 (2) , 2012,3588-3592