# IMPROVED ROUTING ALGORITHM FOR COMMUNICATION ON INTRUDER SAFE PATH

**Deepak kumar***

**Ravindra Kumar****

**Shashi Bhushan Tyagi*****

***M.Tech Student, Deptt. of CSE, Tula's Institute, Dehradun. (waytodeepak3@gmail.com)**

**** Assistant Professor, Deptt. of CSE, Roorkee Engg. & Mgt. Technology Institute, Shamli.**

***** Assistant Professor, Department of CSE, Tula's Institute, Dehradun (Uttarakhand).**

## ABSTRACT

*To generate the optimum communication path in terms of energy and distance we perform Routing. But in an adhoc network, there is a limitation in terms of centralized congestion as well as the attack over some intruder nodes. In such case to perform the effective communication there is the requirement of some such routing approach that can provide the routing with elimination of intruder nodes over the network. In this work, ACO based routing approach is defined to generate the intruder safe path over the network. The presented approach is implemented in matlab environment and obtained results show the effective results in terms of optimized distance and energy.*

***Keywords:*** Routing, ACO, Effective Communication, Intruder Safe

## I. INTRODUCTION

*Wireless Sensor Networks* (WSNs) are self-configured and are without infrastructures. WSN collects data from the environment and sends it to a destination site where the data can be observed, memorized and analyzed. Wireless sensor devices responds to a "control site" on specific requests, or can be equipped with actuators to realize commands.

There are two types of WSNs: structured and unstructured. An unstructured WSN is one that contains a dense collection of sensor nodes. In a structured WSN, all or some of the sensor nodes are deployed in a pre-planned manner [4, 5]. Sensor networks represent a significant improvement over traditional sensors, which are deployed in the following two ways:

Sensors can be positioned far from the actual phenomenon. Several sensors that perform only sensing can be deployed [6].

A sensor network is composed of a large number of sensor nodes, which are densely deployed either inside the phenomenon or very close to it.

Unique feature of sensor networks is the cooperative effort of sensor nodes. Sensor nodes are fitted with an on-board processor. Instead of sending the raw data to the nodes responsible for the fusion, sensor nodes use their processing abilities to locally carry out simple computations and transmit only the required and partially processed data.

Some of the application areas are health, military, and security. For example, the physiological data about a patient can be monitored remotely by a doctor. Sensor networks can also be used to detect foreign chemical agents in the air and the water. They can help to identify the type, concentration, and location of pollutants. In essence, sensor networks will provide the end user with intelligence and a better understanding of the environment. Some other commercial applications include managing inventory, monitoring product quality and monitoring disastrous areas.

### A) Challenges in WSN

All security approaches require a certain amount of resources for the implementation, including data memory, code space, and energy to power the sensor. While building a wireless sensor network, one faces several challenges that need to be addressed at the design stage itself. WBSNs bear unique features and challenges in terms of sensor selection, sensing technology, networking and security design issues. Body sensors should be easy, comfortable to wear, and non-obstructive; the reliability of sensor nodes is critical in emergency situations and thus is required to be very high; the communication range is extremely short, rendering most attacks impossible or very difficult. One challenge threatening the successful deployment of sensor networks is privacy. Sensor network privacy issue that cannot be adequately addressed by network security is source-location privacy.

**B) Unreliable Communication**

*Unreliable Transfer:* Normally the packet-based routing of the sensor network is connectionless and thus inherently unreliable. Packets may get damaged due to channel errors or dropped at highly congested nodes. The result is lost or missing packets.

*Conflicts:* Even if the channel is reliable, the communication may still be unreliable. This is due to the broadcast nature of the wireless sensor network. If packets meet in the middle of transfer, conflicts will occur and the transfer itself will fail [1].

*Latency:* The multi-hop routing, network congestion and node processing can lead to greater latency in the network, thus making it difficult to achieve synchronization among sensor nodes

**C) Security**

Often, the utility of a sensor network will rely on its ability to accurately and automatically locate each sensor in the network. A sensor network designed to locate faults will need accurate location information in order to pinpoint the location of a fault. Unfortunately, an attacker can easily manipulate non-secured location information by reporting false signal strengths, replaying signals, etc.

A technique called verifiable multilateration (VM) [59] in which, a device's position is accurately computed from a series of known reference points. In authenticated ranging and distance bounding are used to ensure accurate location of a node. Because of distance bounding, an attacking node can only increase its claimed distance from a reference point. However, to ensure location consistency, an attacking node would also have to prove that its distance from another reference point is shorter. Since it cannot do this, a node manipulating the localization protocol can be found. For large sensor networks, the SPINE (Secure Positioning for sensor Networks) algorithm is used. It is a three phase algorithm based upon verifiable multilateration.

## II. EXISTING WORK

Energy efficiency is the most important issue in all facets of wireless sensor networks (WSNs) operations because of the limited and non-replenish able energy supply. And WSNs are deployed in environments where sensors can be exposed to conditions that might interfere with the sensor readings. Moreover, a variety of sensors may be attached to WSNs to monitor the environment. Data aggregation, eliminating the data redundancy and improving the accuracy of information gathering, is essential for WSNs. Hence, BPNDA was proposed, a data aggregation scheme based on back-propagation network (BPN). In the BPNDA, a three-layer BP neural network was used. The input layer neurons are located in cluster members (CMs), while the hidden layer neurons and the output layer neurons are located in cluster head (CH). Only the extracted data that represented the features of the raw data will be transmitted to the sink, so the efficiency of data gathering is improved and the total energy consumption is reduced [2]

This paper an intelligent analysis is used to process the structure of a wireless sensor network (WSn) and produce some information which can be used to improve the performance of WSns' management application. Wireless sensor networks need to be managed in different ways; e.g. power consumption of each sensor, efficient data routing without redundancy, sensing and data sending interval control, etc. The random distribution of wireless sensors, numerous variables which affect WSn's operation and the uncertainty of different algorithms (such as sensors' self-localization) give a fuzzy nature to Wsns. Considering this fuzzy nature and numerous details, a neural network is an ideal tool to be used to cover these details which are so hard to be explicitly discovered and modeled. In this paper they introduce our neural network based approach which results in a more efficient routing path discovery and sensor power management. They define a set of attributes based on sensors' location and neighborhood and use them as inputs of our neural network and the output of the neural network will be used as a factor in the route path discovery and power management. They designed a simulator based on our approach and observed the effect of our method on wireless sensor network lifetime and sensor power consumption which will be presented in this paper [3].

This paper describes the concept of sensor networks which has been made viable by the convergence of microelectro- mechanical systems technology, wireless communications and digital electronics. First, the sensing tasks and the potential sensor networks applications are explored, and a review of factors influencing the design of sensor networks is provided. Then, the communication architecture for sensor networks is outlined, and the algorithms and protocols developed for each layer in the literature are explored. Open research issues for the realization of sensor networks are also discussed. [4]

## III. PROPOSED WORK

In this present work we have improve the routing approach by improving the existing path selection algorithm with the inclusion of Ant Optimization approach. According to this proposed approach the bad node analysis is performed and based on this analysis. The first step is to setup the network with specific parameters. This parameter includes:

i) Number of Packets: This property represents the number of successful packet delivery for a specific communication.
ii) Number of Packet loss: Due to the congestion or any block node there are the chances of the data loss over the network. This parameter will analyze the packet loss over the transmission. It is the decision parameter that will perform the analysis the next node is a valid node or not.
iii) Packet Delivery Ratio: This parameter is basically defines the ratio of packets transmitted and the packet successfully arrived to the destination. The packet delivery ratio we have analyzed on 4 intermediate nodes to identify the problem area over the network.
iv) Time Delay: It defines the delay in the communication. The delay will occur because of congestion over the network.
v) Energy: As each node in the communication is a sensor node, because of this each node is defined with specific energy we have defined 5 Jule to each node. With each communication over the network some energy is lost. If the energy is less then minimum required energy or 0 the node will be dead itself.
vi) Turnaround Time: It is the actual time taken to perform the communication over the network.

1. Define N Number of Sensor Nodes in the WSN with specific parameters in terms of energy, transmission rate etc.
2. Each Node Ni start Moving in Direction of Specific Direction Di
3. Find M Neighbor Nodes of Nodes Ni and Maintains the respective Information

```
        For (j=1 to M)

        {

        MaintainFormation (Ni,Nj)

        }

4       if DataLoss(Ni)>Threshold and TimeDelay > Threshold1
        /* If Bad Node or Congested Node Occur on Node i*/

        {

        For i=1 to Mi

        {

            CollectInformation(Ni, Neighbor(Ni));

        }

        Implement Forward ANT to find the alternate path in each Direction of Neighbor (N(i)).

5       Set the Pheramon on Each Hop and Identify the Possible Path
6       Implement Backward ANT to inform Neighbor Nodes about Backup Path
7       Trace the Pharamons and Communicate of New Path
8       Perform the Normal Communication

        }
```

The description of the Ant concept is presented here

1. At regular interval any nodes (Source) is selected to send data to some destination node d.

2. Each forward ant selects the next hop node using the routing table information. the next node selected depends on some random scheme. If all nodes already visited a uniform selection will be performed

3. If the selected node is some attack or damage node or it is not currently available. the forward ant wait to turn in the low priority node from the queue.

4. It will identify any of the next non visited nodes and pay some delay on it.

5. If some cycle detected the ant is forced to turn on the visited node.

6. When the ant reaches the destination node a backward ant is generated to transfer all its memory.

7. Backward ant uses same path generated by forward ant.

By default route is chosen on the basis of Path selection formula and i.e. we will choose the lowest energy path. It means every time the selected path is using lowest energy. In case there is problem in the selection of the path then we apply the Ant Colony Algorithm the purpose of which is to continue sending data using the previous path (as from Path selection Algorithm.

Hence we achieved efficiency in terms of energy by applying path selection whereas Ant Colony Optimization Algorithm gives the required reliability.

**IV. RESULTS**

The presented work is implemented in Matlab environment under different scenarios. The scenario used in the system is defined as under

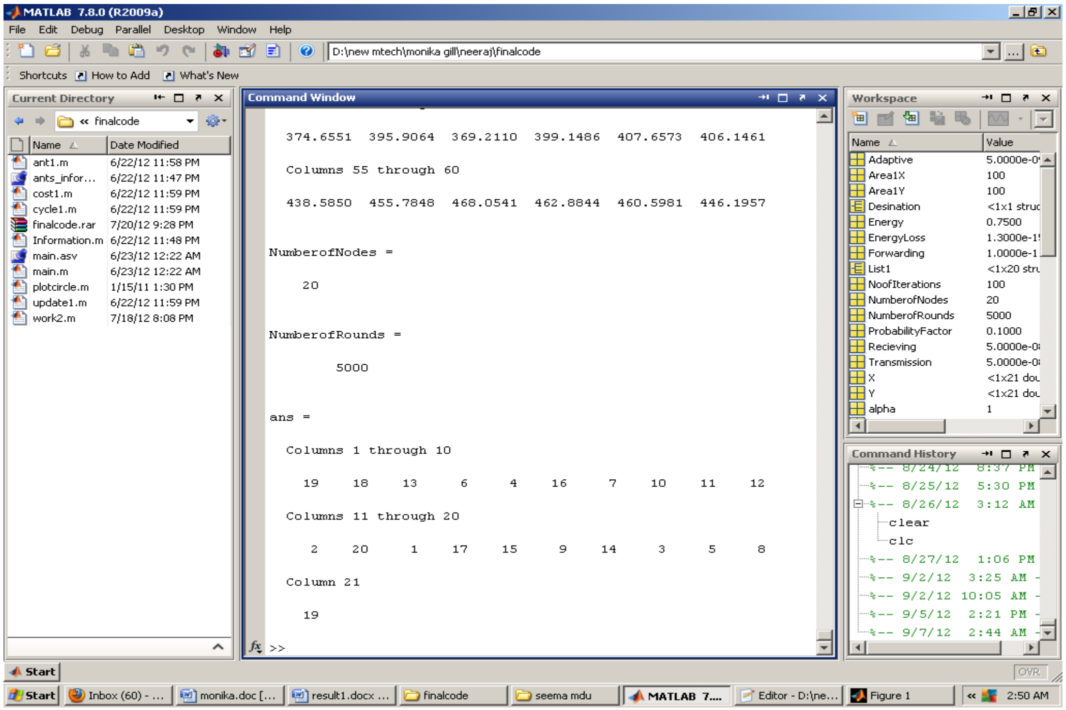


*Figure 1: Optimized Path*

Figure 1 is showing the optimized path after implementation of proposed ACO based approach. As we can see the output is showing the node sequence in which the nodes are being visited. In the subplot one the optimization process is shown and in sub plot 2 the optimized path obtained from the approach is shown.

## V. CONCLUSION

Since in WSNs energy efficiency is a crucial factor for the performance of wireless sensor networks, an efficient as well as reliable algorithm can extend the lifetime of the sensor network because the energy dissipation is minimized. In this work, an energy-saving strategy that exploits the combination of Path Selection and Ant Optimization techniques in Wireless Sensor Networks has been developed. The proposed strategy has demonstrated its performance superiority in terms of energy efficiency for different network sizes. By simulation, we have found out that the energy in our protocol is dissipated less than the other energy-aware routing protocols. By default the route is chosen on the basis of Path Selection formula i.e. we will choose right path means the lowest energy path. It means every time the selected path is using lowest energy. In case there is problem in the selection of the path (in case of any fault node) then we apply the Ant Colony Algorithm the purpose of which is to continue sending data using the previous path (as from Path Selection Algorithm.). This ensures the reliability of the network communication i.e. data exchange will not stop even in case of failure of any node. Hence we achieved efficiency in terms of energy by applying path selection whereas Ant Colony Optimization Algorithm gives the required reliability.

***REFERENCES***

[1] Xin Tan," A Hybrid Approach of Path Planning for Mobile Robots based on the Combination of ACO and APF Algorithms", 978-1-4244-3894-5/09©2009 IEEE.

[2] Yee Zi Cong," Mobile Robot Path Planning using Ant Colony Optimization", 2009 IEEE/ASME International Conference on Advanced Intelligent Mechatronics.

[3] Michael Rinehart," Shortest Path Optimization under Limited Information", Joint 48th IEEE Conference on Decision and Control and 28th Chinese Control Conference 978-1-4244-3872-3/09©2009 IEEE

[4] João Pedro," Distributed Routing Path Optimization for OBS Networks based on Ant Colony Optimization", IEEE "GLOBECOM" 2009 978-1-4244-4148-8/09©2009.

[5] Maumita Bandyopadhyay," Zone Based Ant Colony Routing in Mobile Ad-hoc Network", 978-1-4244-5489-1/10© 2010 IEEE

[6] Ahmed A. A. Zakzouk," An Ant Colony Optimization Approach for Solving Shortest Path Problem with Fuzzy Constraints".

[7] Afshin Ghanizadeh," A Fuzzy-Particle Swarm Optimization Based Algorithm for Solving Shortest Path Problem", 978-1-4244-6349-7/10@ 2010 IEEE.

[8] Xin Tan," A Hybrid Approach of Path Planning for Mobile Robots based on the Combination of ACO and APF Algorithms", 978-1-4244-3894-5/09©2009 IEEE.

[9] Yee Zi Cong," Mobile Robot Path Planning using Ant Colony Optimization", 2009 IEEE/ASME International Conference on Advanced Intelligent Mechatronics.

[10] Michael Rinehart," Shortest Path Optimization under Limited Information", Joint 48th IEEE Conference on Decision and Control and 28th Chinese Control Conference 978-1-4244-3872-3/09©2009 IEEE

[11] João Pedro," Distributed Routing Path Optimization for OBS Networks based on Ant Colony Optimization", IEEE "GLOBECOM" 2009 978-1-4244-4148-8/09©2009

[12] Ahmed A. A. Zakzouk," An Ant Colony Optimization Approach for Solving Shortest Path Problem with Fuzzy Constraints".