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Research Paper

Implementation and performance evaluation of AODV-PSO with AODV-ACO

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Abstract

AODV gives a course to correspondence while the bunch head is chosen utilizing PSO, in light of the separation from the group part hub to sink hub and the lingering vitality in that hub. Reproduction comes about demonstrate that the inspiration of this work enhances the lifetime of the system remarkably. The Performance of Wireless Sensor Network is upgraded by the proposed Algorithm in light of AODV with PSO convention as far as expanded Packet conveyance proportion, diminishing the normal deferral, expanded normal throughput and diminishing aggregate vitality utilization amid execution.

Keywords: *AODV-PSO, AODV-ACO, WSN, Performance Evaluation.*

1. Introduction

WSN comprise of an expansive number of little, low-estimated and asset compelled sensor and also a couple of base stations or sinks. In most WSN settings sensors gather information from the earth and forward it to the sink. A sink is an intense element that may goes about as an entryway to another system, an information handling or an entrance point for human interface. WSN organization can be impromptu. The WSN may be frequently conveying on an extensive scale in a geographic area in unfriendly conditions. While numerous sensors interface straightforwardly to controllers and handling stations, an expanding number of sensors impart the gathered information to a unified preparing station. This is noteworthy since many system applications require hundreds or thousands of sensor hubs, regularly conveyed in remote and out of reach regions. A remote sensor has a detecting part, as well as correspondence, on-board handling, and capacity abilities. With these upgrades, a sensor hub is in charge of information accumulation, and furthermore for data examination, connection, and game plan of its own sensor information and in addition information through other sensor hubs. At the point when numerous sensors helpfully watch expansive physical conditions, they frame a WSN. Sensor hubs impart with each different as well as with a base station (BS) utilizing their remote radios, enabling them to distribute their sensor information to remote handling, investigation, perception, and capacity frameworks [3].

However Smart Dust at DARPA (Defense Advanced Research Projects Agency of USA) characterized WSN as: "A remote sensor organize is an organization of huge quantities of little, minimal effort, self-fueled gadgets that can detect, connect, register and speak with different gadgets keeping in mind the end goal to assemble nearby data to settle on worldwide choices about the physical condition". The advancement of WSN improvement start with the United States of America (USA) amid the time of the Second World War with the then Soviet Union which is presently Russia. The USA situated acoustic sensor organize at an arranged spot at the base of the ocean bottom with the expectation of following Soviet Union submarines. Around then the acoustic sensor organize application were known as Sound Surveillance System (SOSUS), and that was wired system rather than the present remote sensor arrange. Propelled sensor arrange was started by DARPA by USA with the presentation of Distributed Sensor Networks (DSN) venture in 1980. The acoustic sensor arrange contains handling plans, transmission, calculations, steering and dispersed programming frameworks. Modernization has additionally prompted brisk headway of sensor organizes as of late with the working of little and prudent smaller scale electro-mechanical frameworks (MEMS). In any case, the task created by DARPA contributed dynamic unconstrained system situations and WSNs in exhibit times [4].

2. Review Literature

Loveneet Kaur and Dinesh Kumar [2014] proposed limiting vitality utilization and augmenting the lifetime of the system are enter necessities in the plan of sensor organizing conventions. Different directing conventions with various sorts of destinations have just been proposed for WSN. Different advancement systems are available, which are utilized to enhance the execution of the system. Examined about different directing difficulties in WSN, different streamlining methods like GA, PSO, ACO and ABC. Advantages and the execution zones of different procedures .

S.Y. Amdani [2014] examined a convention, which is heterogeneous in vitality. Completely examined the fundamental conveyed bunching directing convention LEACH (Low Energy Adaptive Clustering Hierarchy), and SPIN focused on vitality utilization .

Tifenn Rault et al. [2013] assessed a few territories going from physical layer streamlining to arrange layer arrangements. Talked about a best down investigation of the course of action between lifetime augmentation and application imperatives, amid planning the WSNs. Perceived the real classifications of uses and their specific prerequisites. Dissected another classification of vitality protection plans found in the current writing, an efficient exchange in the matter of how the plans conflict with the specific requirements. Finally they explored the strategies connected in WSNs to accomplish exchange off between various necessities, for example multi-target streamlining .

Tarachand Amgoth and Prasanta K. Jana [2016] presented vitality mindful directing calculation for bunch based WSNs. The calculation depends on a savvy technique of group head (CH) decision, remaining vitality of the CHs and the separation between bunches, for bunch development. To help information steering, a coordinated virtual spine of CHs is developed which is established at the sink? The proposed calculation is additionally shown to adjust vitality utilization of the CHs amid information steering process. Confirmed that the calculation accomplishes consistent message and direct time complexity. Examined the proposed calculation and final products demonstrate that the calculation improve the situation than other existing calculations as far as vitality utilization, arrange lifetime and different parameters .

Md Azharuddin et al. [2014] gave appropriated grouping and steering calculations together alluded as DFCR. The calculation is exhibited to be vitality efficient and blame tolerant. The DFCR utilizes a disseminated run time recuperation of the sensor hubs because of unforeseen breakdown of the group heads (CHs). It deals with the sensor hubs which have no CH inside their contact go. Performed broad trials on the proposed calculation utilizing different system conditions. The new outcomes are contrasted with the current calculations with show the quality of the calculation as far as different execution criteria.

M. Emre Keskin et al. [2011] proposed a numerical model which coordinates WSN outline choice on sensor places, information courses, action plans, course of the portable sink(s) and after that present two heuristic strategies for the arrangement of the model. Shown the productivity and exactness of the heuristics on a few different haphazardly made issue cases on the premise of broad numerical experimentations.

Hussein Mohammed Salman [2016] examines conventions into numerous classifications relying upon set of measurements like the level of protection and security, functionalities, framework, or the application which utilized for it. Inspected the dependability and accessibility of each class of steering conventions, and the vitality use of every convention..

Abdulaleem Ali Almazroi and Ma Ngadi [2015] presented an exhaustive survey and order on the current steering sensor conventions, which are especially proposed for WSNs. The fundamental inspiration driving the advancement of each directing convention class and clear up the operation of various conventions in detail identified with vitality issues, with featuring their points of interest and weaknesses. Besides, the current multipath steering approach is broadly utilized as a part of WSNs with a specific end goal to show signs of improvement arrange execution, for example, dependability, stack adjusting, transfer speed conglomeration, adaptation to internal failure and QoS Improvement. In this manner, underlined the idea of the multipath steering methodology and its basic difficulties, furthermore the essential inspirations for using this strategy in WSNs. What's more, we think about and assess the best in class multipath steering conventions that in view of vitality mindful technique, QoS multipath directing and adaptation to non-critical failure.

Dr. R. Kalai Magal and Mrs. M. Revathy [2014] examined late directing conventions for sensor arranges and give a characterization to the different methodologies sought after. The three fundamental classifications investigated in this paper are progressive, information driven and area based. Each steering convention is depicted and examined under the reasonable class.

Pratyay Kuila and Prasanta K. Jana [2014] grouped Linear/Nonlinear Programming (LP/NLP) details of these issues sought after by two proposed calculations for the same in view of molecule swarm improvement (PSO). The directing calculation is extended with a compelling molecule encoding framework and multi-reason fitness work. The grouping calculation is introduced by considering vitality preservation of the hubs through load adjusting. The proposed calculations tried widely and the outcomes are assessed with the current calculations to show their predominance as far as system life, dead sensor hubs, vitality utilization and conveyance of aggregate information bundles to the base station.

3. Proposed Work and Result

This paper performs following errands to execute PSO,ACO on AODV convention with PSO, ACO.

a) Study of PSO, ACO and AODV convention.
b) Implementation of PSO, ACO on AODV convention.
c) Compare the outcomes in NS2 utilizing PSO, ACO with AODV.

In this paper we have proposed a convention in light of PSO , ACO with AODV convention to upgrade the lifetime of a system. Initially AODV convention finds the course for correspondence of hubs. The chose course should be enhanced. Since various courses expend diverse vitality as the hubs increments in the course of system, the more vitality is required. In this way PSO , ACO conventions is utilized for advancement of course. The upgraded course devours less vitality.

In this paper, we assess the execution of AODV-PSO with: AODV-ACO.

a) For AODV- ACO

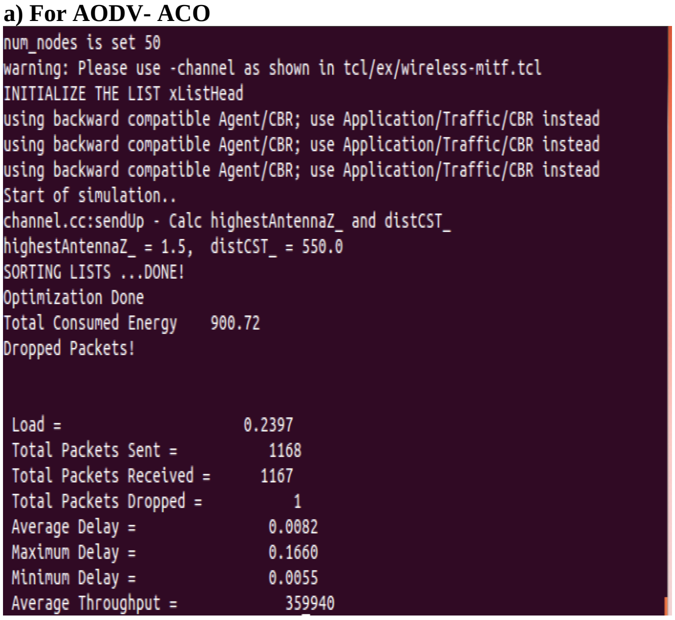

Figure 1 Simulation of AODV-ACO

Figure 1 shows the performance evaluation of AODV with Ant Colony Optimization for simulation time 20s. Total consumed energy is calculated.

Table 1 Energy consumption of AODV-ACO

	AODV-ACO
Total Consumed Energy	900.72

Table 1 depicts that at simulation time 20s the Total consumed energy in AODV-ACO is 900.72

Table 2 Performance metrics of AODV-ACO

Performance Metrics	AODV-ACO
Total Packets Sent	1168
Total Packets Received	1167
Total Packets Dropped	1
Packet Delivery Ratio	0.9991
Average Delay	0.0082
Maximum Delay	0.1660
Minimum Delay	0.0055
Average Throughput	359940

The table 2 is about the evaluation of the modified AODV-ACO. The evaluation is performed on the basis of Total packets dropped, Packet Delivery Ratio, Average delay, Minimum delay, Maximum delay and Average throughput.

b) FOR AODV and AODV-PSO

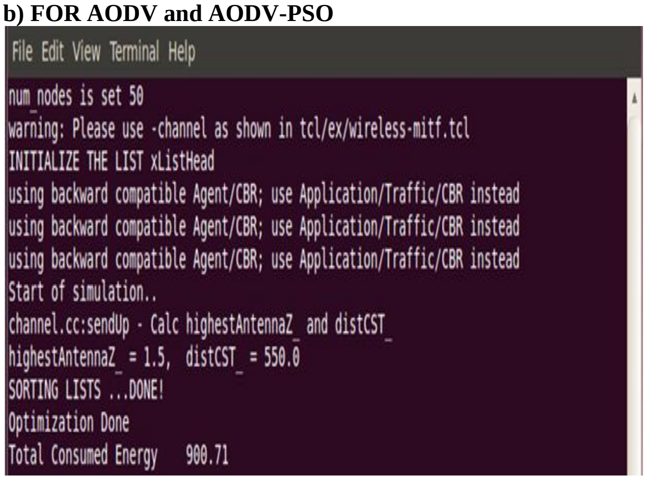

Figure 2 Consumed energy of AODV-PSO

Table3 Energy consumption of AODV

	AODV
Total Consumed Energy	903.746

Table 4 Energy consumption of AODV-PSO

	AODV-PSO
Total Consumed Energy	900.71

In the table 3 and 4 there is a comparison between the consumed energy of the simple AODV and the modified AODV-PSO. Table 3depicts that at simulation time 20s the Total consumed energy in AODV is 903.746 and in AODV-PSO is 900.71

Table 5 Performance metrics of AODV-PSO

Performance Metrics	AODV-PSO
Total Packets Sent	1168
Total Packets Received	1167
Total Packets Dropped	1
Packet Delivery Ratio	0.9991
Average Delay	0.0082
Maximum Delay	0.1660
Minimum Delay	0.0055
Average Throughput	359940

Table 6 Energy Consumption of AODV-PSO, AODV-ACO

Optimization	Consumed Energy
PSO	900.71
ACO	900.72

4. Conclusion

Performance of AODV-PSO , AODV-ACO has been compared with the AODV routing algorithm which is also simulated in the same environment. For comparison various parameters like end-to-end delay average, throughput and energy consumption have been taken into account. Routing algorithm is designed to be both power-aware and energy-efficient, so as to lengthen the network lifetime. Simulation results demonstrate that clustering method balances the energy utilization well among all sensor nodes and attains an observable enhancement in the network lifetime. Simulation outcomes demonstrated that the modified protocol considerably outperforms AODV in terms of packet loss proportion. The proposed algorithms tested extensively and the results are evaluated with the existing algorithms to demonstrate their superiority in terms of network life, dead sensor nodes, energy consumption and delivery of total data packets to the base station.

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