Abstract—Congestion in Wireless sensing element Network (WSN) is a difficulty of concern for many researchers in recent years. The key challenge is to develop an algorithm which can understand the optimized route on the thought of parameters like residual energy, vary of retransmissions and also the distance between supply and destination. The Firefly rule is enforced during this paper that depends on the attractiveness issue of the firefly insect to manage congestion in WSN at transport layer. The results in addition show that the projected approach is best as compared to Congestion Detection and dodging (CODA) and Particle Swarm improvement (PSO) on network life and turnout of the network.

Index Terms—Congestion Control, WSN, Firefly Algorithm, CODA, PSO, Topology.

I. INTRODUCTION

A Wireless device Network is made by spatially distributing low high-powered device nodes. thanks to the recent developments in low high-powered little device technologies, the device nodes are utilized in big selection of applications in environmental observation [1]. Throughout event detection, congestion will occur whereas transferring the info from source to sink. Congestion management in WSNs suggests that to boost the performance once demand for the finite transmission capability exceeds the provision. Wireless sensing nodes have sure constraints thanks to that the wireless implementation of sensing protocol isn't simple. one among the most constraints among them is that the energy of every node [2]. Energy is a very important parameter because it decides the network period of every node [3]. Once a sensing element node transmits data onto the bottom station, the energy loss incurred could also be quite intensive depending on the position of the device nodes relative to the bottom station. Energy constraints conjointly make style of the WSN protocols terribly complicated. Therefore, minimizing congestion and also the energy consumptions the key demands among the device network protocols and algorithms.

The device networks are self-healing, therefore a node is inserted or removed while not having to restart the network. It is potential to own a high rate over massive special scales. This high rate allows changes to be seen clearly. it's potential to own several users viewing the info at the same time, and conjointly manipulating it [4]. High rate conjointly ends up in a congestion state of affairs. Wireless device networks have many potential application areas like oceanographic data assortment, home networking, disaster management, pollution looking, offshore exploration, craft management and health management systems [4], preciseness agriculture, control, remote surroundings observation, target tracking, power observation, inventory location observation, marine surroundings observation, plant and method automation, crime investigation and military applications [5]-[7]. Wireless device Network could also be a brand new area of wireless device network in underwater environments that has challenges to be overcome like long propagation delay, severely restricted system of measurement, and time varied multi-path propagation [8]. The main aim of the paper is to propose associate approach to regulate congestion in wireless device networks at transport layer. Section a pair of of the paper discusses regarding the transient literature study; Section three formulates the matter. Section four projected methodology to unravel the matter is shown. Section five explains the simulation surroundings, after that results and conclusion unmentioned in Sections half-dozen and seven severally.

A. Objective

The main objective of the project is event detection, congestion will occur whereas transferring the info from supply to sink. Congestion management in WSNs suggests that to enhance the performance once demand for the finite transmission capability exceeds the availability. one in every of the most constraints among them is that the energy of every node. Energy is a vital parameter because it decides the network time period of every node. Once a sensor node transmits data onto the bottom station, the energy loss incurred is also quite intensive looking on the position of the sensor nodes relative to the bottom station. Energy constraints additionally build style of the WSN protocols terribly complicated. Therefore, minimizing congestion and also the...
energy consumption is that the key demands among the detector network protocols and algorithms.

**B. Literature Review**

Faster et al. [9] planned a comprehensive study of the living and evolving discipline of Swarm Intelligence, and their application in recursive programs. On the opposite hand, it encourages new researchers and recursive program developers to use this simple and withal very economical algorithmic rule for drawback determination. It generally guarantees that the obtained results will meet the expectations. Sarma et al. [1] planned energy economical cluster formation of device nodes mistreatment jumper firefly. Firefly Algorithms are planned to attenuate the intra-cluster distance so as to optimize the energy consumption of the network. The performance of the network is then compared with the LEACH protocol. Xu, Ming et al. [2] planned energy-efficient algorithms to chop back energy consumption of Wireless device Networks to some extent by neglecting the correlation existed between the native data of nodes. A multi-population Firefly rule is planned during this work to correlate the data in Wireless device Network. Schenato et al. [3] planned a replacement of consensus-based protocol, remarked as Average Time Synch, for synchronizing the clocks of a wireless device network. This algorithm could be a combination of 2 algorithms whose main task is to average native information. The projected algorithmic rule has the advantage of being whole distributed, asynchronous, robust to packet drop and device node failure, and it’s adaptation to time-varying clock drifts and changes the communication topology. Sai Prakash et al. [10] planned a firefly impressed clock formation in wireless device networks. During this cluster based energy aware technique the responsibility of cluster head is distributed among nodes to distribute the energy drain issue. The planned approach has shown improvement within the network life and minimizes the partitioning downside.

Kumar, E. Sandeep et al. [8] planned Wireless sensor networks embrace very little nodes with sensing, computation, and wireless communications capabilities. during this work Firefly rule is employed in cluster of the device nodes within the network. Sun, Yi et al. [11] planned a cluster theme for the network that employs Firefly rule. The cluster of the network thought of is taken into account] on the premise of parameters considered along which has energy and distance and a reach-back technique is utilized for cluster of the device network.

**II. EXISTING SYSTEM**

A Wireless detector Network is made by spatially distributing low hopped-up detector nodes. owing to the recent developments in low hopped-up little detector technologies, the detector nodes area unit utilized in wide selection of applications in Environmental observance. Throughout event detection, congestion will occur whereas transferring the info from supply to sink. Congestion management in WSNs means that to enhance the performance once demand for the finite transmission capability exceeds the availability. Wireless sensing nodes have certain constraints owing to that the wireless implementation of sensing protocol isn't simple. One of the most constraints among them is that the energy of every node. Energy is a very important parameter because it decides the network life of every node. Once a detector node transmits data onto the bottom station, the energy loss incurred is also quite intensive counting on the location of the detector nodes relative to the bottom station. Energy constraints additionally build style of the WSN protocols terribly complicated. Therefore, minimizing congestion and also the energy consumption is that the key demands among the detector network protocols and algorithms.

**III. PROPOSED SYSTEM**

Reactive routing technique is employed within the planned work. In reactive routing the route is computed on demand basis. once a node desires to transmit information then it'll typically generate RREQ message that may be a route request message and is flooded within the network. it'll end in a delay in initiating the communication from supply to destination. In reactive routing the route is taken into account during which the RREQ message reaches earlier through either single hop or multiple hops. A Firefly algorithmic program primarily based approach is planned to regulate congestion in WSN at transport layer. Firefly insect produces flashes of short period through a method known as luminescence. it's wont to attract potential prey or partner or for the difficulty of warning against predator. Therefore intensity of flash becomes a vital parameter for the opposite firefly insects.

In firefly primarily based approach the residual energy worth plays a serious role as this worth is shared among alternative nodes within the network. variety of retransmissions of each node and therefore the distance worth between any 2 nodes within the cluster is calculated. supported these values and therefore the values of residual energy, a brand new route is found within the network from supply to sink. The nodes that have low energy worth attracted towards the high energy node Associate in Nursing an attractiveness issue is calculated. The congestion on any node is decided by constant methodology as delineate earlier. supported the remaining queue size worth Associate in Nursing optimum route is computed by swing the on top of values within the objective perform.

**IV. MODULES**

**A. Node Creation**

Constructing Project style in NS2 ought to takes place. every node ought to send how-do-you-do packets to its neighbor node that are in its communication vary to update their topology.

**B. Topology Discovery Message**

In this module the supply node send the packets to the destination. every and each nodes broadcast their packets to their neighbour node.

**C. FIREFLY rule (META HEURISTIC SEARCH)**

This module tries to bring the message nearer to the
destination in every step mistreatment solely native info. Thus, every node forwards the message to the neighbor that's most fitted from an area purpose of read. the foremost appropriate neighbor will be the one WHO minimizes the space to the destination in every step.

* for every neighbor of supply node calculate the space distance between the Destination node.

* Transmit the info to the node that is nighest to the Destination node among all the Neighbor Node

* Then the node that receives information from the supply node can transmit the info to its neighbor node that is nighest to the destination node.

* This procedure can repeat till the info reaches the destination.

D. CONGESTION CONTROL PROCESS USING FIREFLY

![Process Flow Diagram](image)

E. ARCHITECTURE

![Architecture](image)

V. SIMULATION ENVIRONMENT

For making the simulation surroundings, we've taken a one thousand × one thousand in size grid in Network Simulator-ns- 2.35 and fifty nodes area unit placed within the space (grid), because the network is wireless, thus we've to assign few wireless network parameters to the node. every node within the network is organized to wireless channel and Omni-directional antenna sort. raincoat layer is employed within the simulation with commonplace following IEEE 802.11 and the radio model has been adopted.

VI. RESULTS AND DISCUSSIONS

Fig 6.1.1 shows that the queue length (number of packets) of every node with relevance the simulation time. The Queue length is reciprocally proportional to the amount of hops and by increasing the amount of hops congestion in the network is decreasing. Because the variety of hops in between supply and destination will increase, the queue length of every node decreases and packets will travel through other designated nodes shows the graph between fitness issue and simulation time for various hop numbers. Fitness issue is the decreasing performs. This suggests that that the optimum route is chosen supported the lesser price of fitness function. The fitness perform contains varied parameters like outturn, packets lost, energy etc. that decreases with the rise within the simulation time. Because the variety of hops within the network will increase the worth of fitness perform decreases.

A. Comparative Analysis

Displays the graph between simulation time and outturn of the network. The graph compares Congestion Detection and shunning (CODA), Particle Swarm improvement (PSO) and planned Firefly formula based approach. just in case of Firefly formula the outturn of the network is nearly constant and larger than the outturn calculated victimization the ending and PSO formula. There’s a decrease in worth for ending at around30 seconds of simulation that shows that at the height of traffic at the center the performance of the formula goes down and packet loss rate within the network will increase. displays the graph between the simulation time and therefore the network time period of the nodes within the network. it's clear from the graph that the network time period of nodes just in case of Firefly formula is larger than ending and PSO. this can be attributable to the actual fact that Firefly formula consumes low energy as compared to different algorithms with the rise in simulation time. the subsequent graphs square measure designed by considering the hop count to be forty.
VII. CONCLUSION & FUTURE SCOPE

As more analysis topics, most metaheuristic algorithms need smart modifications therefore on solve combinatorial improvement properly. Although with nice interest and plenty of in depth studies, a lot of studies area unit extremely required within the space of combinatorial improvement exploitation metaheuristic algorithms. Additionally, most current metaheuristic analysis has targeted on tiny scale issues, it'll be extraordinarily helpful if more analysis will concentrate on large-scale real-world applications. Results from the simulations indicate that agglomeration exploitation Jumper Firefly formula offers a higher network period of time when put next to Firefly and LEACH. Future scope includes the implementation of hybrid improvement technique for agglomeration in wireless sensing element networks.

REFERENCES