DESIGNING SIMULATION FRAMEWORK FOR MULTI-HOP ROUTING IN WIRELESS SENSOR NETWORKS

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The Research Monograph Series in *Computing, Electrical & Communication Networks*

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Published by
Bohr Publishers, Chennai, India
Old Door No. 4, New Door No. 3, Rishilaya Building, 2nd Street, Golden Avenue,
Devi Karumariamman Nagar, Velachery, Chennai – 600 042, India

ISBN: 978-93-92892-11-0 (Print)
978-93-92892-21-9 (Online)

Typeset and Cover designed by
Chennai Publishing Services Pvt. Ltd., Chennai, India
Printed by Ridha Prints Pvt. Ltd., Madurai, India

ABSTRACT

WSN is an advanced key area of research which helps in identifying many unmanned applications in forest based hazardous areas such military applications and it has wide range of focus in medical applications too. In real world scenario, the expectation levels of sensor nodes have become a high impact in terms of size, cost, efficiency and reliability. In such a case all the sensor nodes are deployed and current resource utilization leads the sensor nodes to sacrifice its performance level this may happened often in sensor medium. In sensor nodes the structural elements are fully based on cost, resource, battery backup, packet transmission etc. The sensor device generally has three main systems namely

1) An advent subsystem which sense the environment
2) Computational logic which converts the sensed raw into computational data.
3) Message exchange protocol.

The major part of research focus on "message exchange protocol" in context of finding optimal/best path within the communication of sensor nodes to the base station.

The most key problems in wireless sensor networks are finding optimal routing algorithms for sending packets from source node (sensor nodes) to destination node (base station/sensor nodes). Basic universal property of WSN focuses on low power consumption during packet transmission and receiving. Several algorithms exists in literature, since some are of in vital role other may not. Here we adopt by merging swarm based algorithm with genetic approach. Initially the nodes are ordered, based on their energy criterion, and then focusing towards node path; this can be done using Proactive route algorithm for finding optimal path between S-D (Source–Destination) nodes. Fast processing and pre traversal can be done using selective flooding approach and results are genetic in nature.

The wireless sensor node should function for a long interval by utilizing the available energy resources and should full fill reliability by means of data transmission, even if any one of the nodes fails. A new hybrid approach in routing protocol by combining PSO routing

protocol with clustering algorithm is implemented and checked. Here the approach focuses fully on ACO and BCO on PSO routing protocol and K-Means clustering algorithm for illustrating the clusters of node or grouping the nodes. The proposed approach is tested for its proficiency, performance, energy consumption level and reliability.

In heterogeneous sensor nodes are basically standalone in nature. For that network, creating the communication path is quite a big deal, Here we deeply investigate a routing model for heterogeneous nodes in Wireless sensor networks using Voronoi cell. We estimate the actual traffic among the sensor node, which is defined clearly as the traffic packets, controlled at each server. Network load is monitored using the traffic inbound rules and the estimation is defined in the circular pattern in the form of Voronoi cell. Each functional patterns of the traffic are classified as source and destination in asymptotic rule. Each sensor nodes traffic are redirected to the centralized server acting in the real world, where the sensor data are patched periodically and the data packets travelling from the node to node are updated. Each traffic patterns and sensor nodes are classified and the nodes communication regions are known to the base station by drawing the pattern in Voronoi. The experimental results show the actual working model and our routing model yields 78% accuracy.

A new framework model with less computational utilities, aiming to reduce the software complexity in terms of routing without sacrificing the performance of the network was proposed and implemented. The sensor nodes are connected with base station, in our model the neighbouring node information is considered and maintained, which helps in packet forwarding in frequent intervals when the nodes are in wireless mode. Here, in our model the node holds the neighbour information and relay the next hop information in straight line, hence it is rechecked to next – hop relay. If the next hop is closest to the neighbour node or relay is hold on the neighbour node, then the hop will be considered as the node entity and routing packets are greedy in nature and forwarded to the next hop. CTS and RTS messages are sent to the neighbour node to discover the node and its identity. Our experimental results are denoted in terms of simulation and the simulation topology shows that our framework outperforms the existing protocol in wireless sensor network with 92% accuracy.

Hence to deploy an optimal data packet routing in wireless sensor network was an impact of researchers. here we proposed a new scheme called circular routing called CBR, here the routing scheme is one of the vast advent where the data packets inter arrival was calculated periodically for every hops. For every instance the boundary or contour

of the network is evaluated which in turn gives an optimality in terms of finding the shortest contour within the circular boundary of network. Experimental results demonstrate the actual working procedure of the routing scheme in WSN. The proposed method was much better in terms of optimal resource utilization and routing based on the hop to hop in multi hop networks.

The hypothesis states that the entire routing algorithm implemented here is to find the optimal path between sensor nodes (S-D) in terms of optimality in routing perspective. To gain the increased level of success rate in routing data packets, we have implemented various algorithms for WSN. Five various routing protocol has been proposed and out of all Voronoi cell – circular pattern based routing outperforms with higher accuracy rate in both the heterogeneous and homogenous WSN. The experimental results show the working routing model yields 78% accuracy in both heterogeneous and homogenous WSN.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS AND ABBREVIATIONS

SYMBOLS

$\eta 1$	-	Self-confidence factor
$\eta 2$	-	Swarm-confidence factor
P_{id}	-	Personal best position
$P_{id}n$	-	Global best position
r_1, r_2	-	Independent random
V_{id}	-	Velocity of the particle
X_{id}	-	Position of the particle
n	-	Total number of particle
~ V	-	Function Threshold
HC	-	Hybridization Coefficient

ABBREVIATIONS

ACK	-	Acknowledgement
ACO	-	Ant Colony Optimization Algorithm
APTEEN	-	Adaptive Threshold Sensitive Energy Efficient
ARP	-	Address Resolution Protocol
BCO	-	Bee Colony Optimization
B-MAC	-	MAC Protocol For Wireless Sensor Networks
CBR	-	Contour Based Routing
CCA	-	Clear Channel Assessment
CDMA	-	Code Division Multiple Access
CPU	-	Central Processing Unit
CTS	-	Clear To Send
GA	-	Genetic Algorithm
GAF	-	Geographic Adaptive Fidelity
GEAR	-	Geographic and Energy Aware Routing
GIS	-	Global Information System
GPS	-	Global Positioning system
GPSR	-	General Packet Radio Service
GSO	-	Genetical Swarm Optimization
IDSQ	-	Information-Driven Sensor Querying

LEACH	-	Low-Energy Adaptive Clustering Hierarchy
LML	-	Local Markov Loops
MAC	-	Medium Access Control
MANET	-	Mobile Ad-Hoc Network
MECN	-	Minimum Energy Communication Network
MLDA	-	Maximum Lifetime Data Aggregation
MLDR	-	Maximum Lifetime Data Routing
MMSN	-	Multi-Frequency. Media Access Control For Wireless Sensor Networks
MR	-	Multi-Resolution Searching
PEGSIS	-	Power-Efficient Gathering in Sensor Information Systems
PMAC	-	PseudoMAC
PSO	-	Particle Swarm optimization
QoS	-	Quality of Service
RAM	-	Random Access Memory
ROM	-	Read Only Memory
RTS	-	Request To Send
SAR	-	Sequential Assignment Routing
SI	-	Swarm Intelligence
SMECN	-	Small Minimum Energy Communication Network
SNGF	-	Stateless Geographic Non-Deterministic forwarding
SNP	-	Sensor Network Protocol
SNR	-	Signal Noise Ratio
SPIN	-	Sensor Protocols for Information via Negotiation
SYN	-	Synchronization
TDMA	-	Time Division Multiple Access
TEEN	-	Threshold Sensitive Energy Efficient
WSN	-	Wireless Sensor Networks