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AN URBAN ROAD TRAFFIC WITH THE DEDICATED FUZZY CONTROL SYSTEM IN VANET

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ABSTRACT

A intelligent system is embedded on all upcoming devices on working environment to allow the system to think, ease of access and share information .In wireless adhoc networks intelligent transportation system is used improve vehicle communication and safety movement between vehicles with multihop transmission. Feasible outcome of needed data's to take decision in VANET mainly used in urban road topology it contain more mobility of vehicle is present. Incorporating intelligent transport system to provide multiple routing path to know the shortest distance between VANET. Cluster head dope out with position of vehicle more number of vehicles is added to the cluster head. Using fuzzy logic we can eliminate collision and increase packet delivery ratio. In this paper FUZZY LOGIC with time based allocation to avoid retransmission of packet and collision rate. It's more feasible to communicate with inter-vehicle by cluster formation with the scheduled time which reduce the network overhead .Performance of fuzzy with time slots are proven with the simulated results

Keywords: VANET, fuzzy, multicriteria decision making, multihop communication.

INTRODUCTION

VANET networks have been bring the peoples to communicate with range of frequency .Global communication of networks are used in the VANETS for wide range of reachability and sharing of events in the networks. Mobile sensing with in car to interact with another car, infrastructure and road side unit various routing protocol are used to make one-one, one-many communication. Now a day's people wanted to live in sophisticated life with reliable needs and fast transmission of messages. GPS/Galileo will provide the car deployed direction and safety measure that are taken in the any event taken in the traffic. Mobility of vehicle will increase the services in globally and economically. Multiple decisions are taken with the road based movement between vehicles. Before fuzzy system in vehicle they face more limitation in message transformation. It leads to more collision in between vehicle and more request are given to cluster head at one time it leads to drop the energy and increase the delay ratio. Apply the fuzzy logic in car vehicle to improve this parameter. If we increase the safety in real world environment though it's quite difficult to perform the global system. Before implementing in to the real world we can perform simulation of our fuzzy logic. Rules are built in the fuzzy logic which will act as the vehicle mobility and direction.

Urban environment contain more vehicles are taken in traffic with precise avoidance of safety and communication ratio will increase.

Mobility of node in the environment vehicles are placed to interact with others based on the criteria of request and acceptance. Based on mobile input we can allocate range access to another system with prior allocation. The changes can be placed with the condition and vehicle movement. System is imposed with various mobility models in vehicles with multiple decisions in the system. Fuzzy control is capable of making multiple decisions in the routing vehicles to reach the feasible path from the source to destination with shortest duration. Fuzzy IF-THEN rules are used to predict the rule based access to mobility models. Each model is divided based on needs of service road based, environment based, and movement pattern of the vehicles deployed in the VANETs.

Inference engine used to provide think of vehicle to take decision with the different mobility models with fuzzifier of real world model.obstuction of model are used with various fuzzification to provide feasible path in mobility. Emergency events are placed in road it provide fast recovery of event. Besides this estimation of routing method to give stable path, recover the traffic and reduce the network overload. Shortest path to allocate the vehicle to improve the performance in VANET environment.

To facilitate the network with services with based on the time allocation with stable communication taken between the vehicles. Using intelligent transportation system we can reduce collision and it automatically increases the QOS parameter.

RELATED WORKS

VANET infrastructure are proposed with various researchers provide routing protocol approaches based in path of vehicle. In [1] to ensure the Quality of vehicles to provide service with various routing protocol are used to compare with to provide effective routing mechanism. Inter vehicle communication is mainly based on the system. To broadcast storm and feasible transmission .with non-segmented part of message and forward the message to the transmitted region efficient broadcast the reliable information. With stated in [2] this approach are used in the vehicles. The paper proposed in [3] is black-burst is to allocate intersection broadcast with allocated timeslots with utilization of direction and position collision is avoided with fixed length of resolution. Clear to send packet used for packet contention given the

distance. Directional based broadcast in urban are stated in [5]with Efficient distance based broadcast in urban road sides time interval are used for system with coverage of network. Realistic environment is given for mobility of nodes in [6]with fuzzy logic provide with sensor node that are deployed in the vehicles for signaling. Movement pattern in the environment that are fed with the selection of fuzzy set.

Proposed paper in [7] given adjustment of service with adaptive time slots to provide the communication to vehicles region of transmission is selected with the cluster formation and packet transmission range for dedicated path to destination.

Adaptive TDMA slot are used mainly to reduce collision between vehicles the channel of lanes are provided with certainty of transformation with high throughput and improved packet delivery ratios. is given in[8]large vehicles are placed in urban area with short range of communication is taken by allocated time channel is given with the control of access with cluster head elected based on the energy given to node mobility range and position.

PROBLEMS

In VANETs without using the fuzzy logic is difficult to make system to think and to take multiple decisions for vehicle. Collision range will be more if not having the fuzzy rules. Our proposed paper is used to increase the energy, reduce delay, and improve the packet delivery ratios.

SYSTEM DESCRIPTION

Intelligent Transportation Systems (ITS)

Environment that is design with the intelligent system in vehicles it gives:-

- Huge safety control in vehicles
- Increases the mobility of the vehicle
- Vehicle to infrastructure communication it provides the range of 5.9GHZ of path with distance of vehicle to route.
- Reduce the use of driver need and solve the problem in the road topology
- Computational Transportation systems are used in the static infrastructure in vehicle integrated with transportation system.
- RADAR pulses are reflect and sense the device in vehicle with front and back

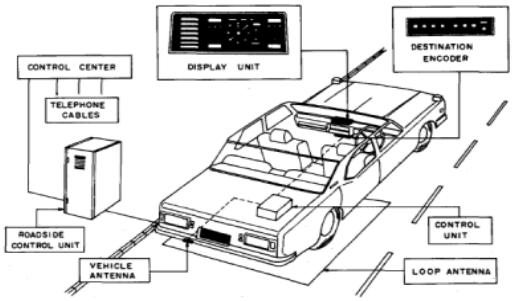

Figure-1. Intelligent transportation system.

In Figure-1 provides the various equipment that are embedded with the display, controller, and destination range in the vehicles.

a) Positioning of Vehicle Equipped with Intelligent Transportation System

Vehicle based ITS are deployed with many information for fast access and to communicate with other vehicles with Global Position system(GPS) feasible information are provide to the driver and event notification of the urban roads.

Figure-2. Vehicles based intelligent transportation system.

b) Road Side Unit with Intelligent Transportation System

Vehicles that are moving in urban areas contain the road side unit information it will pass the traffic information to other vehicle with direction, incident response to vehicle with the real time mobility condition. Road side unit that contain information of vehicle and edges, vertex of the road side units

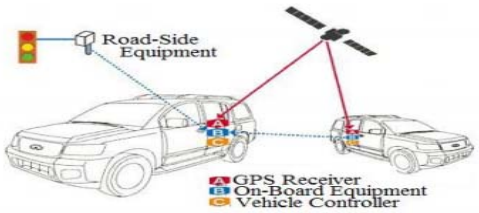

Figure-3. Road side intelligent transportation system.

The technology that are integrated in Road Side Unit (RSU).Dynamic traffic information and control of traffic operation are managed.

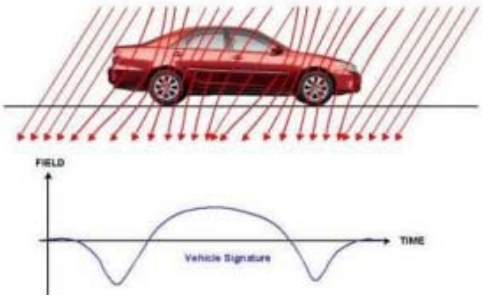

Figure-4. Mobility of vehicles in road side unit.

Vehicles that are endured in the road side unit with position in road speed of vehicle that are travelling in the road topology reachability of other vehicle are listed to other vehicles. Any accident occurs in the road with the help of Road Side Unit (RSU) we can intimate for recovery. Time based access of vehicles is provided with the entry of vehicles to the road and destination path is provided with routing protocol to reach the destination .More likely it provide the shortest and reliable way to find robust direction with speed limit. It reduces the driver work and increase sophistication over driving.

VANETs with Fuzzy Controlling Mechanism

Fuzzy in VANETs provide the solution of unpredicted or unexpected problem in the road topology. In highways are taken with any accident which provide the intimation to other vehicle based on the distance for quick resume and multicast to other vehicles about the event. If there is any need of message transformation in nodes with long distance is given with dedicated time access for each vehicle in the road in order to avoid collision in the vehicles.

Schedule the fuzzy logic with correlated data fuse in system to provide periodic range of access with other vehicle to improve the packet delivery ratio.

FUZZY RULES
IF INPUT 1(VEHICLE 1 ENTRY IN THE URBAN AREA)

(ID, SPEED, TYPE OF MSG, NEAR AND FRONT& BACK POSTION OF VEHICLE)
//
AND/OR INPUT 2(VEHICLE 2 ENTRY)
//
(ID, SPEED, TYPE OF MSG, NEAR AND FRONT POSITION OF VEHICLE)
//
.....
.....
.....
.....
AND/OR INPUT 50(VEHICLE 50 ENTRY)
//
(ID,SPEED,TYPE OF MSG,NEAR AND FRONT & BACK POSITION OF VEHICLE)
//
THEN OUTPUT =(EXIT POSITION OF VEHICLE WITH REACHED DESTINATION

Inference engine are used to make proper decision to collect the global knowledge of the road and keep all the vehicle information with the updated Road side unit(RSU) to take multiple decision taken whenever there is aggregation of data in the vehicles it check the time to access the vehicle with the priorities of time represented in(high, low and medium range).Inference of engine is taken to 50 number of vehicles with possible outcome of transformation provide the output with YES/NO for dynamic mobility of reasoning by the vehicles. Cluster head is elected with more vehicles and transfer to another cluster head for robust interaction for the application reduces the network overload and collision of more vehicles.

NETWORK MODEL

VANETs in Urban environment with fuzzy logic are stated with the topology generation provided for simulation .Performance metrics are taken with simulated results are dope out in this model.

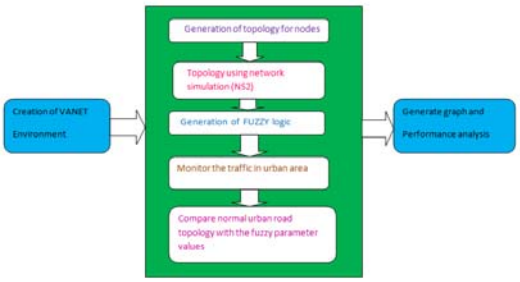

Figure-5. System architecture.

Nodes are created with the Urban road topology is build fuzzy inference rules to take multiple decision in the system and monitor the traffic and performance of fuzzy metrics in VANETs .

IMPLEMENTATION

This proposed paper present fuzzy based control mechanism to provide reserved time for vehicle to take communicates .Cluster head are formed with high energy and reduce the collision rate.

- Mobility model
- Normal routing in urban areas
- Fuzzy logic with adaptive schedules algorithm
- Performance metrics

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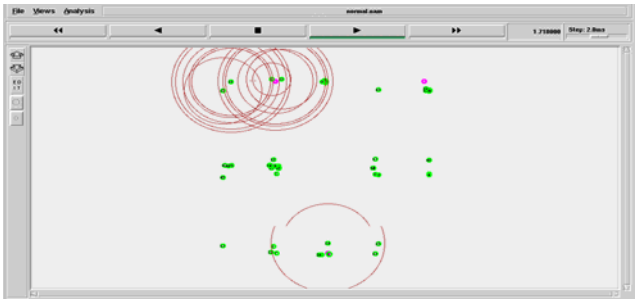
Mobility Model

VANET environment are generated with more number of vehicles deployed with urban topology to form vehicles mobility using VANET MOBI SIM .Mobility trace file are fed in to the generated simulated nodes.



Screen Shot-1. Mobility of nodes.

Normal Routing Protocol in Urban Areas

Routing protocol that are used in the urban area placed with normal time based schedule allocation of the vehicle that are enter in to the system to improve the energy in vehicle and it can't reduce the delay when more communication request pass to the cluster head.

Calculation:-

- $Delay = rt(dest) - tt(source)$
- $Collision\ rate = \frac{Number\ of\ packet\ received}{Number\ of\ packet\ send}$
- $Consume\ energy = initial\ energy - final\ energy$
- $Energy = (ie - fe) + ie$
- $Throughput = \Sigma\ t(nodes) + N$

rt(dest) = receive time at destination
tt(source) = transmit time at source
ie = initial energy
fe = final energy
t(nodes) = throughput of nodes
N = Number of nodes

Table-1. Normal urban routing methodology (AODV) with packet transmission values.

Time slots for packet transmission	Collision rate (bps)	Energy spent (joules)	Delay rate(micro sec)	Throughput(kbps)
2	116.21	16.30	116.38	37.60
4	44.96	16.70	517.95	122.01
6	39.90	17.31	1253.72	151.91
8	38.67	17.84	1968.21	165.81
10	35.10	18.38	2300.81	174.07

In Table-1 show the AODV protocol used in all urban topology with time for packet transmission and with increase of energy slightly but leads to more drop in throughput.

Fuzzy Logic with Adaptive Schedule Algorithm

Fuzzy logic are used in the urban area to provide the multiple decision in environment to reduce the delay and increase the time throughput ratio

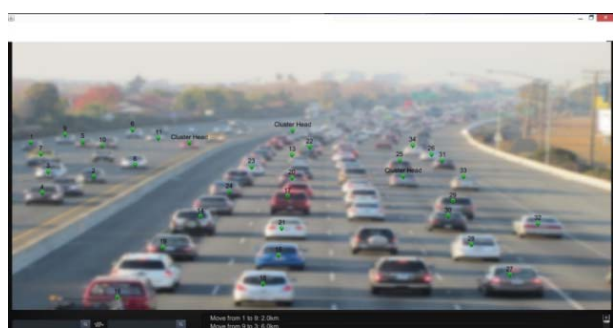
PSEUDO CODE:-FUZZY LOGIC FOR URBAN ROAD WITH THE ADAPTIVE SLOT ASSIGNMENT

```
Initialize
V = {v1 , v2 ,…, vn} // Vehicle IDs;
L = {(x1 ,y1 ), (x2 ,y2 ),…, (xn ,yn)} // Location S = {s1, s2,…, sn} // Speed;
D = {d1 d2,...,dn} // Distance; CL = (p, q) // Center location
DD = (α, β) // Driving direction as a unit vector; specD // Specified distance
begin
for i = 1 to n do if (Di >= specD)
if (DD = a && S >q)
μ(i) = f (a,S,D)
μ(i) = f (β,S,D)
μ(i) = 1; //lower approximation end if
end if
end for
end
```

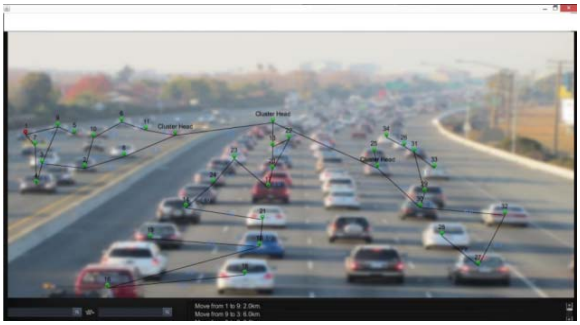
Table-2. Adaptive slot assignment with the fuzzy logic packet transmission values

Time slots for packet transmission	Collision rate (bps)	Energy spent (joules)	Delay rate(micro sec)	Throughput(kbps)
2	289.28	12.62	8.96	7.13
4	14.57	13.06	36.35	121.8
6	9.97	13.57	68.38	171.4
8	8.49	14.07	115.51	189.9
10	7.93	14.57	176.91	202.9

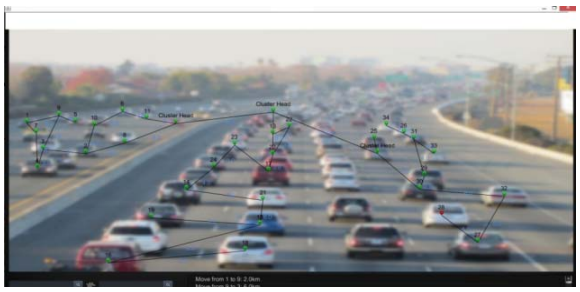
Reduction of collision in the urban road topology with integration of fuzzy based vehicle.



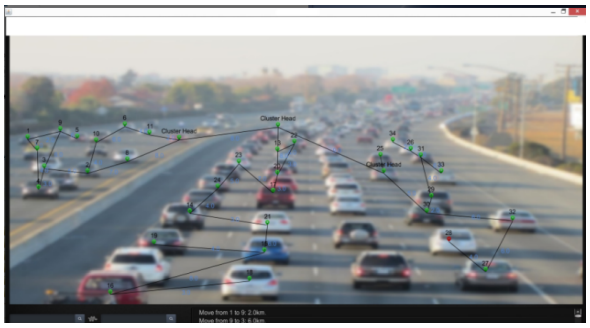
Screen Shot-2. Deployment of node in urban area.



Screen Shot-3. Selecting source node.



Screen Shot-4. Selecting destination node.

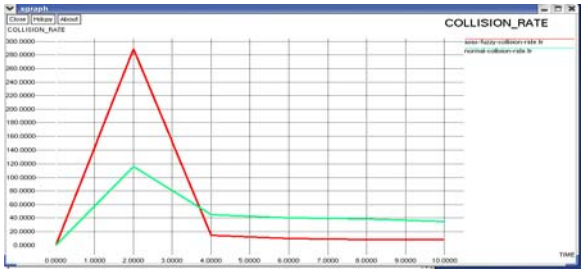


Screen Shot-5. Routing from source to destination.

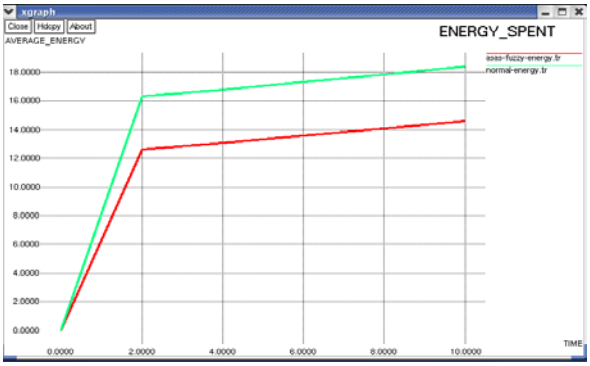
Fuzzy deploy mentation in huge traffic area with node selection and distance of direction to reach the destination path which is feasible.

PERFORMANCE METRICS

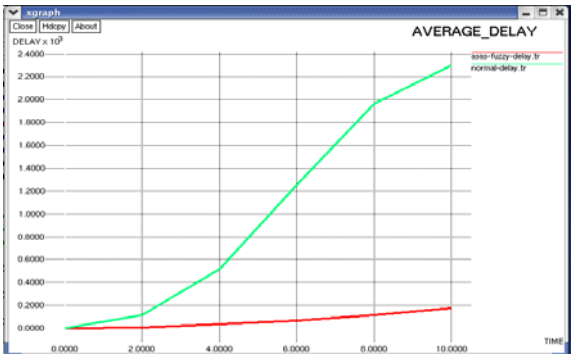
Using the fuzzy logic in urban area we can evaluate the Quality of metrics with the graph with the calculated values in Table-1 and Table-2.



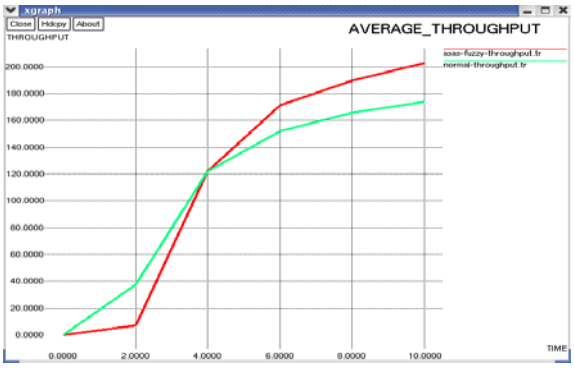
Screen Shot-6. Collision rate with fuzzy logic.



Screen Shot-7. Energy spent with fuzzy logic.



Screen Shot-8. Delay rate with fuzzy logic.



Screen Shot-8. Through put with fuzzy logic.

Parameter values that are computed in various urban environments to increase the energy rate in the vehicles and it reduce the minimum cluster head formation to reach the destination node.

CONCLUSION AND FUTURE WORK

This proposed paper consists of various multipath decision metrics are used with network simulator (NS2) and java environment for GUI interface in urban road topology environment. It will route to destination with minimum of energy spent and improve with the throughput ratio with maximum time it engage the channel in vehicles. In it can improve with the security mechanism in urban areas.

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